



Digitized Automation for a Changing World

# Delta SD3 Series

## Smart Screwdriving System

### User Manual

# Preface

---

Thank you for purchasing this product. This manual provides information about the Delta SD3 Series Smart Screwdriving System.

This manual includes:

- Installation and inspection of smart screwdriving controller and transducerized smart screwdriver
- Smart screwdriving controller structure and wiring diagram
- Description of functions overview
- Description of parameters
- Description of sequence
- Description of sources
- Description of results
- Description of controller
- Description of tool
- Description of reports
- Troubleshooting
- Function codes of Modbus communications
- Function codes of TCP/IP communications

Product features:

- Multiple tightening strategies: you can customize different tightening strategies for different tightening scenarios to achieve quality requirements.
- New generation motors: the compact design meets the need for reducing the size and weight of the equipment structures.

How to use this manual:

Use this manual as a reference when installing, setting up, using, and maintaining the smart screwdriving system.

Delta technical services:

Consult your Delta equipment distributor or Delta Customer Service Center if you encounter any problems.

## Safety precautions

Pay special attention to the following safety precautions at all times during inspection, installation, wiring, operation, maintenance, and examination of the smart screwdriving system.

The symbols of “DANGER,” “WARNING”, and “STOP” indicate:



**Danger. May cause severe or fatal injuries to personnel if the instructions are not followed.**



**Warning. May cause moderate injury to personnel, or lead to severe damage or even malfunction of the product if the instructions are not followed.**



**Absolutely prohibited activities. May cause serious damage or even malfunction of the product if the instructions are not followed.**

### Installation



- Do not expose the product to an environment containing water vapor, corrosive gas, inflammable gas, or other foreign matter to reduce the risk of electric shock or fire.
- The system must be properly plugged in to a grounded outlet.
- Before plugging or unplugging the tool cable, make sure you have turned off the controller power.

### Operation



- Only personnel receiving professional training on industrial assembly can operate this product.
- This product is designed for intermittent use. The general work cycle is run for 1 second then stop for 4 seconds. This product includes a protection mechanism to ensure that the acceptable work cycle (depending on the torque value and operation time) is not exceeded.



- During the operation, do not touch any rotating tool parts, or it may cause personnel injury.
- Do not hit the tool. Impact force will damage the tool.

### Maintenance and inspection



- Do not use cleaning fluids containing solvents to clean the tool parts or cables.
- Only authorized personnel can repair or restart the system.

# Table of Contents

---

## Before Operation

### 1

#### Product Overview

1.1 Components of the system .....	1-2
1.2 Model overview .....	1-3
1.2.1 Nameplate information .....	1-3
1.2.2 Model explanation .....	1-5
1.2.3 Product specifications .....	1-7
1.3 Delta smart screwdriving controller and transducerized smart screwdriver.....	1-8
1.4 Part names of the smart screwdriving controller.....	1-10
1.5 Part names of the transducerized smart screwdriver.....	1-12

### 2

#### Installation

2.1 Ambient storage conditions .....	2-2
2.2 Ambient installation conditions.....	2-2
2.3 Mounting direction and space of the controller.....	2-3
2.4 The use and installation of the screwdriver .....	2-4
2.4.1 Installing the bit .....	2-6
2.4.2 Installing the connection cable .....	2-6
2.5 Dimensions .....	2-7
2.6 Safety precautions .....	2-9
2.7 Maintenance.....	2-10

### 3

#### Wiring

3.1 System connection.....	3-2
3.1.1 Connection diagrams .....	3-2
3.2 Wiring for I/O connectors .....	3-3
3.2.1 Pin assignments for I/O connectors.....	3-3
3.2.2 Signal explanation for I/O connectors .....	3-5
3.2.3 Wiring diagrams.....	3-6
3.3 Wiring for RS-485 connector (for extension) .....	3-8

# Operation and Setting

## 4 Functions Overview

4.1 Functions on the main screen.....	4-2
---------------------------------------	-----

## 5 Parameters (Tightening parameters)

5.1 Parameters page overview .....	5-2
5.2 Create a tightening parameter .....	5-3
5.3 Tightening strategies and the Settings tabs .....	5-4
5.3.1 General Settings .....	5-5
5.3.2 Tightening Settings.....	5-7
5.3.2.1 Standard strategy.....	5-7
5.3.2.2 Enhanced strategy.....	5-12
5.3.2.3 Pre-position strategy.....	5-13
5.3.2.4 Self-defined strategy.....	5-15
5.3.3 Loosening settings .....	5-20
5.4 Save a tightening parameter .....	5-21
5.5 Copy / paste a tightening parameter .....	5-21
5.6 Delete a tightening parameter.....	5-23
5.7 Export / import a tightening parameter.....	5-24

## 6 Sequence (Tightening sequence)

6.1 Sequence page overview .....	6-2
6.2 Create a tightening sequence.....	6-4
6.3 Save a tightening sequence .....	6-8
6.4 Copy / paste a tightening sequence .....	6-9
6.5 Delete a tightening sequence .....	6-11
6.6 Export / import a tightening sequence .....	6-12

## 7 Sources (Tightening source)

7.1 Operating mode .....	7-2
7.2 Switching Method .....	7-4
7.2.1 Manual (Manual setting) .....	7-5
7.2.2 Screw Bit Selector.....	7-7
7.2.3 Barcode Scanner .....	7-8
7.3 Copy / paste a tightening source .....	7-9
7.4 Delete a tightening source .....	7-11
7.5 Export / import a tightening source .....	7-12

# **8 Results**

8.1 Operation results (Result).....	8-2
8.2 Operating curve (Curve).....	8-8
8.3 HDMI output.....	8-9
8.4 VNC remote connection .....	8-9

# **9 Controller**

9.1 System Settings .....	9-2
9.2 DI/DO.....	9-11
9.3 Peripheral Device .....	9-12
9.4 Communication (Modbus).....	9-14
9.5 Service Station.....	9-15

# **10 Tool**

10.1 Tool Info.....	10-2
10.2 Tool Settings .....	10-3
10.3 LED Light Settings .....	10-4
10.4 Tool Calibration.....	10-5

# **11 Reports**

11.1 Production Report .....	11-2
11.2 Error Report.....	11-3
11.3 Warning Report.....	11-4
11.4 Button Report.....	11-5

## **Troubleshooting**

# **12 Troubleshooting**

12.1 Alarm list.....	12-2
12.1.1 Device alarms.....	12-2
12.1.2 Tightening errors .....	12-3
12.1.3 Operation warnings.....	12-7
12.2 Causes and corrective actions .....	12-8
12.2.1 Description of device alarms .....	12-8
12.2.2 Description of tightening errors .....	12-13
12.2.3 Description of operation warnings .....	12-44

## Appendix

# A

## Modbus Communication - Function Codes

A.1	System structure .....	A-5
A.2	Operational status of the smart screwdriving system .....	A-10
A.3	Handshake data of the smart screwdriving system.....	A-14
A.3.1	Parameters operations.....	A-17
	#100 Write the parameter.....	A-17
	#110 Write to delete the parameter.....	A-21
	#150 Read the parameter .....	A-22
A.3.2	Sequence operations.....	A-23
	#200 Write the sequence .....	A-23
	#201 Write the navigator coordinates.....	A-25
	#202 Write the navigator image codes .....	A-27
	#203 Write the coordinates of positioning arm.....	A-29
	#210 Write to delete the sequence .....	A-31
	#250 Read the sequence .....	A-32
	#251 Read the navigator coordinates.....	A-33
	#252 Read the navigator image codes .....	A-34
	#253 Read the coordinates of positioning arm .....	A-35
A.3.3	Sources operations .....	A-36
	#300 Write the operating mode and switching method of source .....	A-36
	#301 Write the contents of a single source .....	A-37
	#302 Write to switch parameter under manual setting.....	A-40
	#303 Write to switch sequence under manual setting .....	A-41
	#310 Write to delete the source .....	A-42
	#350 Read the operating mode and switching method of source.....	A-43
	#351 Read the contents of a single source.....	A-45
A.3.4	Results operations .....	A-47
	#400 Write the switching method of source .....	A-47
	#401 Write the barcode string .....	A-48
	#402 Write to clear all errors .....	A-49
	#403 Write to reset the operation progress.....	A-50
	#404 Write to force execute the previous step.....	A-51
	#405 Write to force execute the next step .....	A-52
	#406 Write to restrict tightening operation .....	A-53
	#407 Write to restrict loosening operation .....	A-54
	#408 Write the scanner advanced settings .....	A-55
	#409 Write to clear the single screw tightening NOK count .....	A-57

#410 Write to clear the single screw loosening NOK count .....	A-58
#411 Write to reset the operation time .....	A-59
#412 Write to reset the operation status .....	A-60
#450 Read the switching method of source .....	A-61
#451 Read the barcode string .....	A-62
#452 Read the scanner advanced settings.....	A-63
#453 Read the tightening status indicator .....	A-64
<b>A.3.5 Controller operations .....</b>	<b>A-65</b>
#500 Write the request for permissions login .....	A-65
#501 Write the request for password change.....	A-66
#502 Write the request for permissions logout .....	A-68
#503 Write the page permissions .....	A-69
#504 Write the Ethernet settings .....	A-70
#505 Write the request for factory reset.....	A-72
#506 Write the buzzer sound pattern .....	A-73
#507 Write the DI/DO functions .....	A-74
#508 Write the DI/DO conversion table.....	A-76
#509 Write the default torque unit .....	A-78
#510 Write the default tool start condition .....	A-79
#511 Write NO / NC contact setting for a single DI/DO.....	A-80
#512 Write to export all system data .....	A-81
#513 Write to import all system data .....	A-82
#514 Write the default two-stage mode under self-defined torque control.....	A-83
#515 Write the display of upper limit for each stage of curves.....	A-84
#516 Write the display of operation warning window .....	A-85
#517 Write file format of the exported result for each screw .....	A-86
#518 Write the sampling rate for curves.....	A-87
#519 Write the function of always monitoring the current.....	A-88
#520 Write the compensation for tool temperature rise .....	A-89
#521 Write the peripheral device settings.....	A-90
#522 Write the TCP data content of the result for each screw.....	A-92
#523 Write the monitor function when parameters do not match the tool.....	A-93
#524 Write the default angle unit.....	A-94
#525 Write the volume of buzzer and operation screen buttons .....	A-95
#526 Write the display orientation of external screen.....	A-96
#527 Write the home screen .....	A-97
#528 Write the RS-485 settings .....	A-98
#529 Write the function of converting curve data to positive values.....	A-100
#550 Read the Ethernet settings.....	A-101
#551 Read the page permissions.....	A-102

#552 Read the firmware version .....	A-103
#553 Read the DI/DO functions .....	A-104
#554 Read the DI/DO conversion table .....	A-105
#555 Read the default torque unit .....	A-107
#556 Read the default tool start condition .....	A-108
#557 Read NO / NC contact setting for a single DI/DO .....	A-109
#558 Read the default two-stage mode under self-defined torque control .....	A-110
#559 Read the display of upper limit for each stage of curves .....	A-111
#560 Read the display of operation warning window .....	A-112
#561 Read file format of the exported result for each screw .....	A-113
#562 Read the sampling rate for curves .....	A-114
#563 Read the function of always monitoring the current.....	A-115
#564 Read the compensation for tool temperature rise .....	A-116
#565 Read the peripheral device settings .....	A-117
#566 Read the TCP data content of the result for each screw .....	A-118
#567 Read the monitor function when parameters do not match the tool .....	A-119
#568 Read the default angle unit .....	A-120
#569 Read the volume of buzzer and operation screen buttons .....	A-121
#570 Read the display orientation of external screen.....	A-122
#571 Read the home screen.....	A-123
#572 Read the RS-485 settings .....	A-124
#573 Read the function of converting curve data to positive values .....	A-125
<b>A.3.6 Tool operations.....</b>	<b>A-126</b>
#600 Write to activate the tool .....	A-126
#601 Write to enable service reminder .....	A-127
#602 Write the lever start level .....	A-128
#603 Write the push start level .....	A-129
#604 Write the work light brightness .....	A-130
#606 Write the LED light settings .....	A-131
#607 Write to calibrate the tool .....	A-133
#650 Read the tool information.....	A-134
#651 Read the lever start level .....	A-135
#652 Read the push start level .....	A-136
#653 Read the work light brightness .....	A-137
#655 Read the LED light settings.....	A-138
#656 Read the tool calibration setting .....	A-140
#657 Read the tool firmware version.....	A-141
#658 Read the status of service reminder.....	A-142
#659 Read the status of tool activation.....	A-143
<b>A.3.7 Reports operations.....</b>	<b>A-144</b>

#700 Clear the production report entries .....	A-144
#701 Clear the error and warning report entries .....	A-145
#702 Clear the production report files .....	A-146
#750 Find and read the production report entries.....	A-147
#751 Find and read curves .....	A-152
#752 Find and read the error report entries .....	A-169
#753 Find and read the warning report entries .....	A-170
#754 Find and read the button report entries .....	A-172

## B

## TCP/IP Communication - Function Codes

B.1 System structure .....	B-5
B.2 Operational status of the smart screwdriving system .....	B-6
#10 Write to enable the subscription .....	B-6
#11 Write to disable the subscription.....	B-6
#20 Write the operational status value.....	B-7
#30 Write the function of automatically sending the TCP data content of the result for each screw.....	B-8
#50 Read the operational status value .....	B-9
#60 Write the setting of automatically sending the TCP data content of the result for each screw.....	B-14
#80 Read the setting of automatically sending the TCP data content of the result for each screw.....	B-18
B.3 Handshake data of the smart screwdriving system.....	B-19
B.3.1 Parameters operations.....	B-22
#100 Write the parameter.....	B-22
#110 Write to delete the parameter.....	B-27
#150 Read the parameter .....	B-28
B.3.2 Sequence operations.....	B-29
#200 Write the sequence .....	B-29
#201 Write the navigator coordinates.....	B-31
#202 Write the navigator image codes .....	B-33
#203 Write the coordinates of positioning arm.....	B-34
#210 Write to delete the sequence .....	B-37
#250 Read the sequence .....	B-38
#251 Read the navigator coordinates.....	B-39
#252 Read the navigator image codes .....	B-40
#253 Read the coordinates of positioning arm .....	B-41
B.3.3 Sources operations .....	B-42
#300 Write the operating mode and switching method of source .....	B-42
#301 Write the contents of a single source .....	B-44

#302 Write to switch parameter under manual setting.....	B-47
#303 Write to switch sequence under manual setting .....	B-49
#310 Write to delete the source .....	B-50
#350 Read the operating mode and switching method of source.....	B-52
#351 Read the contents of a single source.....	B-53
<b>B.3.4 Results operations .....</b>	<b>B-54</b>
#400 Write the switching method of source .....	B-54
#401 Write the barcode string .....	B-55
#402 Write to clear all errors .....	B-56
#403 Write to reset the operation progress.....	B-57
#404 Write to force execute the previous step.....	B-58
#405 Write to force execute the next step .....	B-59
#406 Write to restrict tightening operation .....	B-60
#407 Write to restrict loosening operation .....	B-61
#408 Write the scanner advanced settings .....	B-62
#409 Write to clear the single screw tightening NOK count .....	B-63
#410 Write to clear the single screw loosening NOK count .....	B-64
#411 Write to reset the operation time .....	B-65
#412 Write to reset the operation status .....	B-66
#450 Read the switching method of source .....	B-67
#451 Read the barcode string .....	B-68
#452 Read the scanner advanced settings.....	B-69
#453 Read the tightening status indicator .....	B-70
<b>B.3.5 Controller operations .....</b>	<b>B-71</b>
#500 Write the request for permissions login .....	B-71
#501 Write the request for password change .....	B-72
#502 Write the request for permissions logout .....	B-74
#503 Write the page permissions .....	B-75
#504 Write the Ethernet settings .....	B-76
#505 Write the request for factory reset.....	B-77
#506 Write the buzzer sound pattern .....	B-78
#507 Write the DI/DO functions .....	B-79
#508 Write the DI/DO conversion table.....	B-81
#509 Write the default torque unit .....	B-83
#510 Write the default tool start condition .....	B-84
#511 Write NO / NC contact setting for a single DI/DO.....	B-85
#512 Write to export all system data .....	B-86
#513 Write to import all system data .....	B-87
#514 Write the default two-stage mode under self-defined torque control.....	B-88
#515 Write the display of upper limit for each stage of curves.....	B-89

#516 Write the display of operation warning window .....	B-90
#517 Write file format of the exported result for each screw .....	B-91
#518 Write the sampling rate for curves.....	B-92
#519 Write the function of always monitoring the current.....	B-93
#520 Write the compensation for tool temperature rise .....	B-94
#521 Write the peripheral device settings.....	B-95
#522 Write the TCP data content of the result for each screw.....	B-96
#523 Write the monitor function when parameters do not match the tool.....	B-98
#524 Write the default angle unit.....	B-99
#525 Write the volume of buzzer and operation screen buttons .....	B-100
#526 Write the display orientation of external screen.....	B-101
#527 Write the home screen .....	B-102
#528 Write the RS-485 settings .....	B-103
#529 Write the function of converting curve data to positive values.....	B-105
#550 Read the Ethernet settings.....	B-106
#551 Read the page permissions.....	B-107
#552 Read the firmware version .....	B-108
#553 Read the DI/DO functions .....	B-109
#554 Read the DI/DO conversion table .....	B-110
#555 Read the default torque unit .....	B-112
#556 Read the default tool start condition .....	B-113
#557 Read NO / NC contact setting for a single DI/DO .....	B-114
#558 Read the default two-stage mode under self-defined torque control .....	B-115
#559 Read the display of upper limit for each stage of curves .....	B-116
#560 Read the display of operation warning window .....	B-117
#561 Read file format of the exported result for each screw .....	B-118
#562 Read the sampling rate for curves .....	B-119
#563 Read the function of always monitoring the current.....	B-120
#564 Read the compensation for tool temperature rise .....	B-121
#565 Read the peripheral device settings .....	B-122
#566 Read the TCP data content of the result for each screw .....	B-123
#567 Read the monitor function when parameters do not match the tool .....	B-124
#568 Read the default angle unit .....	B-125
#569 Read the volume of buzzer and operation screen buttons .....	B-126
#570 Read the display orientation of external screen.....	B-127
#571 Read the home screen.....	B-128
#572 Read the RS-485 settings .....	B-129
#573 Read the function of converting curve data to positive values .....	B-130
<b>B.3.6 Tool operations.....</b>	<b>B-131</b>
#600 Write to activate the tool .....	B-131

#601 Write to enable service reminder .....	B-132
#602 Write the lever start level .....	B-133
#603 Write the push start level .....	B-134
#604 Write the work light brightness .....	B-135
#606 Write the LED light settings .....	B-136
#607 Write to calibrate the tool .....	B-137
#650 Read the tool information.....	B-138
#651 Read the lever start level .....	B-139
#652 Read the push start level .....	B-140
#653 Read the work light brightness .....	B-141
#655 Read the LED light settings.....	B-142
#656 Read the tool calibration setting .....	B-143
#657 Read the tool firmware version.....	B-144
#658 Read the status of service reminder .....	B-145
#659 Read the status of tool activation.....	B-146
<b>B.3.7 Reports operations.....</b>	<b>B-147</b>
#700 Clear the production report entries .....	B-147
#701 Clear the error and warning report entries .....	B-148
#702 Clear the production report files .....	B-149
#750 Find and read the production report entries.....	B-150
#751 Find and read curves .....	B-155
#752 Find and read the error report entries .....	B-174
#753 Find and read the warning report entries .....	B-175
#754 Find and read the button report entries .....	B-177

# 1

## Product Overview

Before using the Delta smart screwdriving system, pay attention to the descriptions of the components of the system, nameplate, and model type. You can find a suitable smart screwdriving system in the table in Section 1.3.

1.1	Components of the system .....	1-2
1.2	Model overview .....	1-3
1.2.1	Nameplate information.....	1-3
1.2.2	Model explanation .....	1-5
1.2.3	Product specifications.....	1-7
1.3	Delta smart screwdriving controller and transducerized smart screwdriver.....	1-8
1.4	Part names of the smart screwdriving controller.....	1-10
1.5	Part names of the transducerized smart screwdriver.....	1-12

## 1.1 Components of the system

A complete Delta smart screwdriving system includes:

- (1) A smart screwdriving controller
- (2) A transducerized smart screwdriver (two screwdrivers for dual-tool controllers)
- (3) A connection cable (two for dual-tool controllers) with M16 8-pin circular connectors on both ends. It is used for connecting the transducerized smart screwdriver to the smart screwdriving controller.
- (4) Power supply for the smart screwdriving controller:

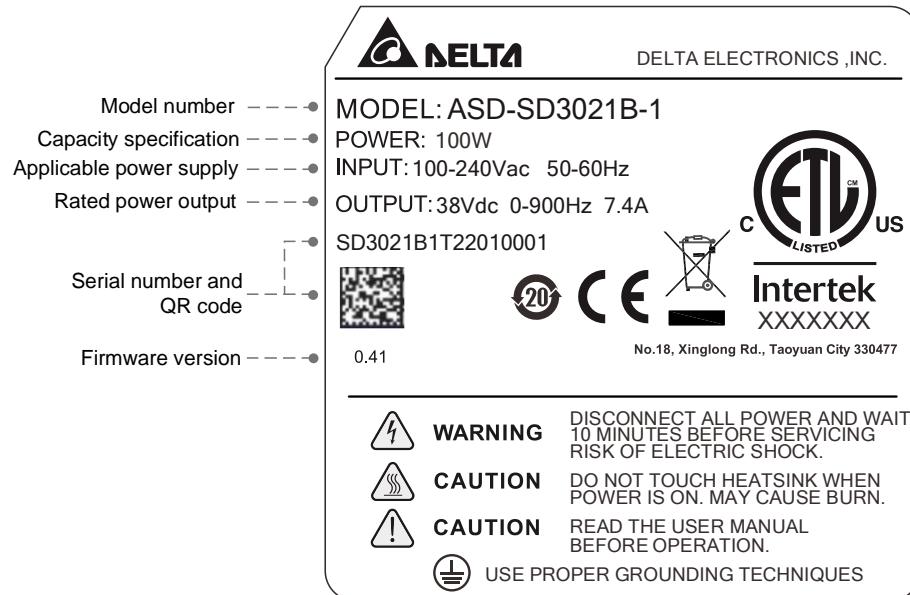
Model	Control circuit
ASD-SD3021B-1	100 to 240 V <sub>AC</sub>
ASD-SD3041B-2	100 to 240 V <sub>AC</sub>

## 1.2 Model overview

### 1.2.1 Nameplate information

**Delta smart screwdriving system – smart screwdriving controller**

#### ■ Nameplate information



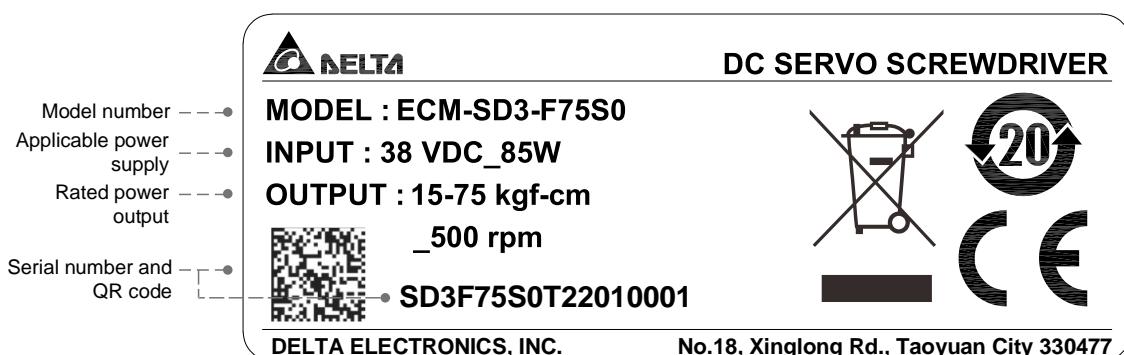
#### ■ Serial number

SD3021B1	T	22	01	0001
(1)	(2)	(3)	(4)	(5)

- (1) Model number
- (2) Manufacturing plant (T: Taoyuan; W: Wujiang)
- (3) Year of production (22: year 2022)
- (4) Week of production (from 1 to 52)
- (5) Production sequence in a week (starting from 0001)

**Delta smart screwdriving system – transducerized smart screwdriver****■ Nameplate information**

1

**■ Serial number**

<u>SD3F75S0</u>	<u>T</u>	<u>22</u>	<u>01</u>	<u>0001</u>	(1) Model number
(1)	(2)	(3)	(4)	(5)	(2) Manufacturing plant (T: Taoyuan; W: Wujiang)
					(3) Year of production (22: year 2022)
					(4) Week of production (from 1 to 52)
					(5) Production sequence in a week (starting from 0001)

### 1.2.2 Model explanation

#### Delta smart screwdriving system – smart screwdriving controller

1

ASD – SD3 – 02 1B – 1  
(1) (2) (3) (4) (5)

- (1) Product name

ASD: AC Servo Drive

- (2) Series

SD3: Screw Driver 3 series

- (3) Rated power output

Code	Specification
02	100 W
04	200 W

- (4) Power supply

1B: 100 to 240 V<sub>AC</sub>, 50 / 60 Hz, single-phase

- (5) Supported number of tools

1: single-tool

2: dual-tool

**Delta smart screwdriving system – transducerized smart screwdriver**

ECM – SD3 – F 12 S 0  
(1) (2) (3) (4) (5) (6)

1

(1) Product name

ECM: electronically commutated motor

(2) Series

SD3: Screw Driver 3 series

(3) Start condition

F: push start / lever start

(4) Torque output

Code	Specifications
12	2.4 to 12 kgf-cm
30	6 to 30 kgf-cm
50	10 to 50 kgf-cm
75	15 to 75 kgf-cm

(5) Special code

S: standard type

(6) Bit specifications

0: 6.35 mm (1/4") hex bit

1: 5 mm hex bit

### 1.2.3 Product specifications

#### Transducerized smart screwdriver

Model	ECM-SD3-F12S0 ECM-SD3-F12S1	ECM-SD3-F30S0 ECM-SD3-F30S1	ECM-SD3-F50S0 ECM-SD3-F50S1	ECM-SD3-F75S0 ECM-SD3-F75S1
Torque output (kgf-cm)	2.4 to 12	6 to 30	10 to 50	15 to 75
Maximum speed (rpm)	2000	1100	700	500
Torque precision	3%			
Weight	560 g			
Bit specifications	6.35 mm (1/4") hex bit for the model number that ends with 0 5 mm hex bit for the model number that ends with 1			
Ambient temperature	0°C to 40°C (32°F to 104°F)			
Storage temperature	0°C to 60°C (32°F to 140°F)			
Humidity	0% to 90% RH (non-condensing)			
IP rating	IP40			

#### Smart screwdriving controller

Model	ASD-SD3021B-1	ASD-SD3041B-2
Display	Panel type	10.1" TFT LCD (IPS full viewing angle)
	Resolution	800 x 1280, 24-bit RGB
	Backlight	LED backlight (when room temperature < 25°C (77°F), half-life > 50,000 hours)
	Brightness	500 cd/m² (Typ.)
Serial communication port	1 set of RS-232 port, 2 sets of RS-485 ports	
Touchscreen	4-wire resistive touchscreen Operation expectance > 1,000,000	
Network interface	1 port, 10/100 Mbps auto-detection (with built-in isolated circuit)	
HDMI	1 port, HDMI 1.4a transmitter	
USB	1 USB Host, Ver 2.0	
Power supply	50 / 60 Hz, 100 to 240 V <sub>AC</sub>	
Supported number of tools (screwdrivers)	1	2
DC power output	1 set of 24 V <sub>DC</sub> ; max. output: 1A per tool	
Digital input / output	8 DOs (150 mA max. output current) + 8 DIIs (30 V <sub>DC</sub> max) per tool	
Output voltage	38 V <sub>DC</sub>	
Continuous output current	3.7 Arms per tool	
Max. instantaneous output current	15 Arms per tool	
Ambient temperature	0°C to 40°C (32°F to 104°F)	
Storage temperature	0°C to 60°C (32°F to 140°F)	
Humidity	0% to 90% RH (non-condensing)	
IP rating	IP20	

## 1.3 Delta smart screwdriving controller and transducerized smart screwdriver

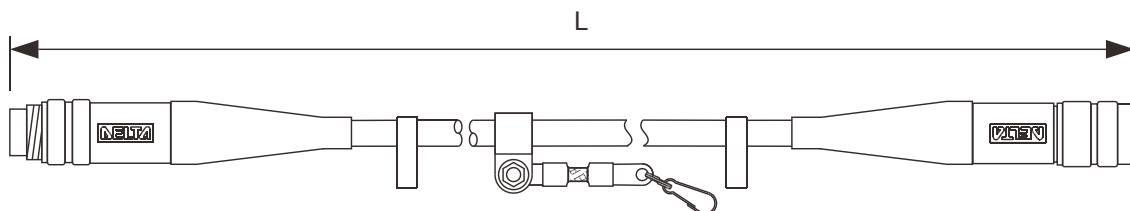
1

Transducerized smart screwdriver			Smart screwdriving controller		
Model	Torque output (kgf-cm)	Max. speed (rpm)	Model	Supported number of tools	Power supply
ECM-SD3-F12S0 ECM-SD3-F12S1	2.4 to 12	2000	ASD-SD3021B-1	1	100 to 240 V <sub>AC</sub>
ECM-SD3-F30S0 ECM-SD3-F30S1	6 to 30	1100			
ECM-SD3-F50S0 ECM-SD3-F50S1	10 to 50	700			
ECM-SD3-F75S0 ECM-SD3-F75S1	15 to 75	500			
ECM-SD3-F12S0 ECM-SD3-F12S1	2.4 to 12	2000			
ECM-SD3-F30S0 ECM-SD3-F30S1	6 to 30	1100			
ECM-SD3-F50S0 ECM-SD3-F50S1	10 to 50	700			
ECM-SD3-F75S0 ECM-SD3-F75S1	15 to 75	500			

### ■ Optional accessories

Connection cable between screwdriver and controller

(both ends are M16 8-pin circular connectors)

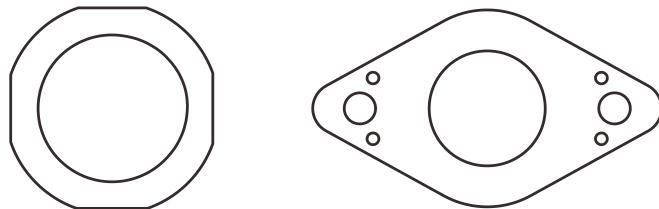


Model number	L	
	m	feet
ACS3-CASDFH03	3	9.84
ACS3-CASDFH05	5	16.4
ACS3-CASDFH07	7	22.97
ACS3-CASDFH10	10	32.81

**Flange module** (including a flange and a fixing nut)

For fixing the transducerized smart screwdriver to a screw tightening machine or a robotic arm.

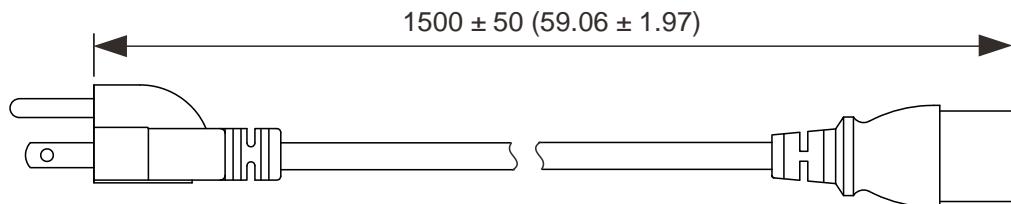
Delta model number: ECM-SD3-ACSSR



Note: refer to Sections 2.4 and 2.5 for the installation method and dimensions.

**AC power cable** (125V / 10 A; 1.5 m; Type B plug, US standard)

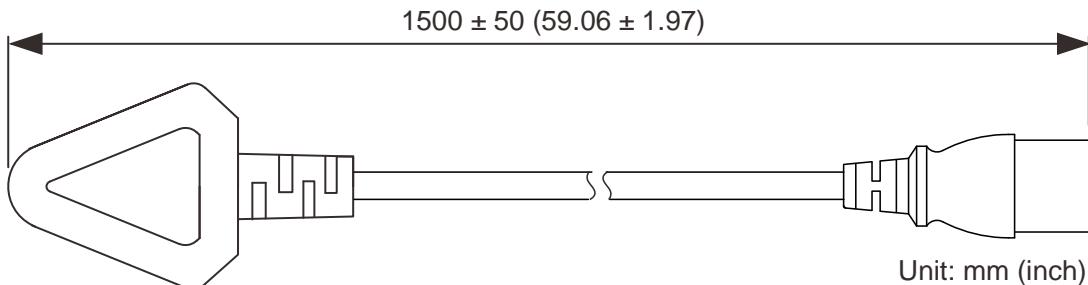
Delta model number: ACS3-CAPW311A



Unit: mm (inch)

**AC power cable** (250V / 10 A; 1.5 m; Type I plug, CN standard)

Delta model number: ACS3-CAPW311C

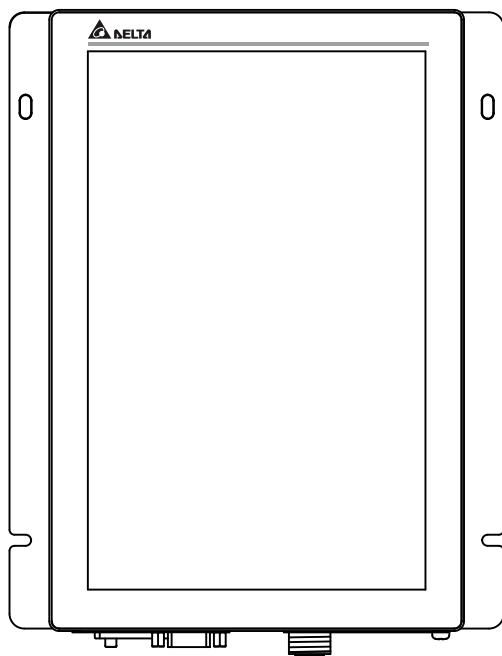


Unit: mm (inch)

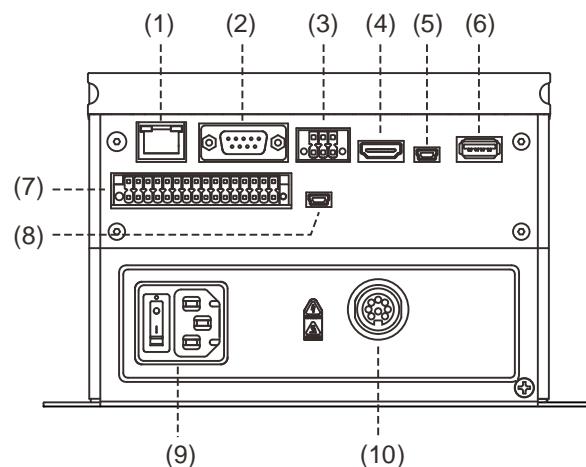
## 1.4 Part names of the smart screwdriving controller

Single-tool controller (model number: ASD-SD3021B-1)

1



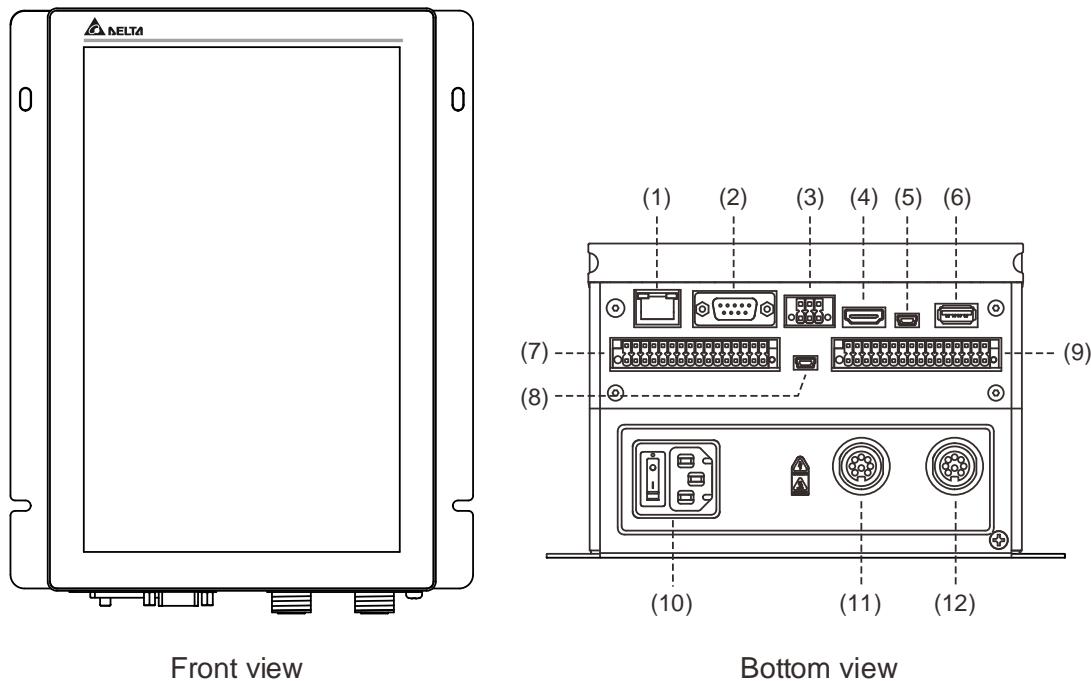
Front view



Bottom view

No.	Description	No.	Description
(1)	Standard RJ45 connector – connects to the host system (PC / PLC / HMI)	(6)	Host connector <ul style="list-style-type: none"> <li>■ Accesses the tightening data (parameters and results).</li> <li>■ Connects to the Barcode Scanner.</li> </ul>
(2)	Standard RS-232 connector	(7)	Digital I/O port
(3)	Two RS-485 connectors – connect to extra RS-485 devices	(8)	SLAVE-B connector – for the controller firmware update
(4)	HDMI output – synchronously projects the Result screen to an external monitor	(9)	AC connector and switch
(5)	SLAVE-A connector – for the HMI software and firmware update	(10)	Connector for Tool 1

Dual-tool controller (model number: ASD-SD3041B-2)



Front view

Bottom view

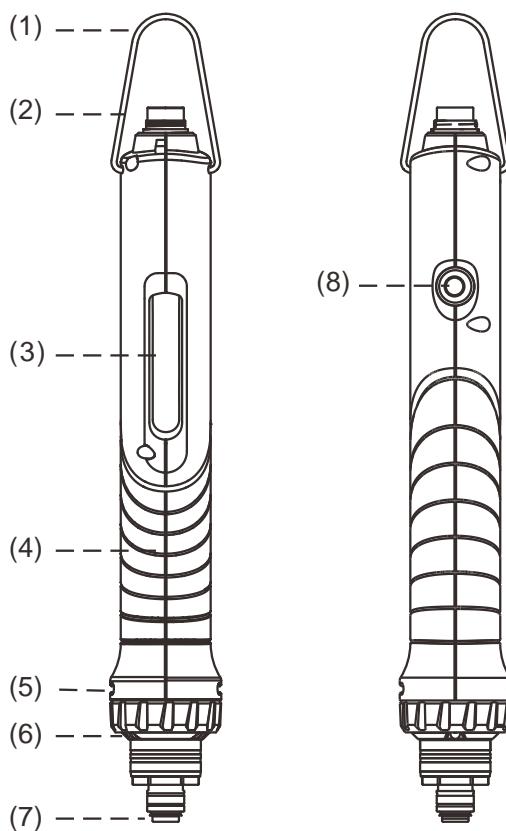
No.	Description	No.	Description
(1)	Standard RJ45 connector – connects to the host system (PC / PLC / HMI)	(7)	Digital I/O port 1
(2)	Standard RS-232 connector	(8)	SLAVE-B connector – for the controller firmware update
(3)	Two RS-485 connectors – connect to extra RS-485 devices	(9)	Digital I/O port 2
(4)	HDMI output – synchronously projects the Result screen to an external monitor	(10)	AC connector and switch
(5)	SLAVE-A connector – for the HMI software and firmware update	(11)	Connector for Tool 1
(6)	Host connector <ul style="list-style-type: none"> <li>■ Accesses the tightening data (parameters and results).</li> <li>■ Connects to the Barcode Scanner.</li> </ul>	(12)	Connector for Tool 2

Pay special attention to the following when wiring:

1. The controller must be properly grounded to prevent the large power supply noise from causing precision error of the smart transducerized screwdriver.
2. When the power is off, do not touch the main power cable since the large capacitor inside the controller still contains a dangerously large amount of electric charge.
3. Keep the connection cable at least 30 cm (11.8 inches) away from other signal wires.
4. Do not use any external capacitor, otherwise it may damage the controller.

## 1.5 Part names of the transducerized smart screwdriver

1



No.	Item	Description
(1)	Hanging ring	Used for hanging the screwdriver up for easy access.
(2)	Connector	Connects the transducerized smart screwdriver and smart screwdriving controller using the connection cable.
(3)	Lever start	Press this lever to start the screwdriver.
(4)	Non-slip handle	Prevents the screwdriver from slipping out during handheld use.
(5)	Status LED indicator	<ul style="list-style-type: none"> <li>■ Displays the current status of the screwdriver. The displayed status can be adjusted through LED Light Settings.</li> <li>■ Default status of light indicators: Yellow: Ready Red: Tightening NOK Green: Tightening OK</li> </ul>
(6)	Work light LED indicator	Provides solid white light under power supply. The brightness can be adjusted through Tool Settings.
(7)	Shaft of the screwdriver	Used for installing a 6.35 mm (1/4") or 5 mm hex bit.
(8)	CW / CCW switch	Used for switching the rotation direction for the screwdriver between clockwise (CW) and counterclockwise (CCW) to tighten or loosen the screws.

# 2

## Installation

Follow the safety precautions, ambient storage conditions, and ambient installation conditions in this chapter during installation.

2.1	Ambient storage conditions.....	2-2
2.2	Ambient installation conditions.....	2-2
2.3	Mounting direction and space of the controller .....	2-3
2.4	The use and installation of the screwdriver.....	2-4
2.4.1	Installing the bit.....	2-6
2.4.2	Installing the connection cable.....	2-6
2.5	Dimensions .....	2-7
2.6	Safety precautions .....	2-9
2.7	Maintenance.....	2-10

## Precautions:

The smart screwdriving controller must be properly grounded to prevent the large power supply noise from causing precision error to the transducerized smart screwdriver.

# 2

## 2.1 Ambient storage conditions

Before installation, this product must be kept in the shipping carton. In order to retain the warranty coverage and for future maintenance, follow these instructions for storage.

While the product is temporarily not in use:

- The storage temperature should be 0°C (32°F) to 60°C (140°F).
- The storage relative humidity should be 0% to 90% (non-condensing).
- Avoid storing the product in an environment containing corrosive gas.

## 2.2 Ambient installation conditions



**Delta smart screwdriving system:** the ambient temperature should be between 0°C (32°F) and 40°C (104°F). The environment should be free of devices that generate excessive heat; no water, water vapor, dust, and oily dust; no corrosive and inflammable gases or liquids; no airborne dust or metal particles; and the environment should be solid without vibration and free of electromagnetic interference.

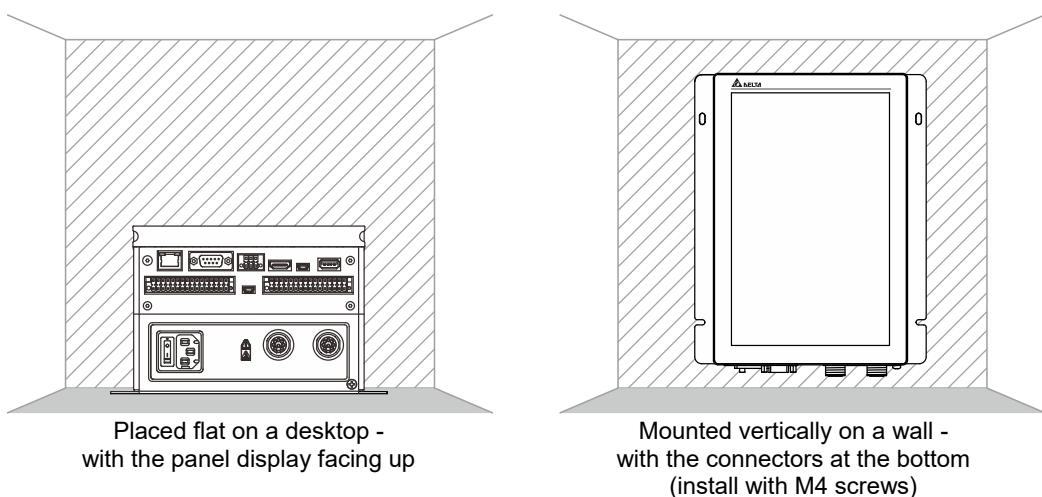
If the ambient temperature is over 30°C (86°F), place the product in a well-ventilated environment. During long-term operation, the ambient temperature should be under 25°C (77°F) to ensure the product performance.

## 2.3 Mounting direction and space of the controller

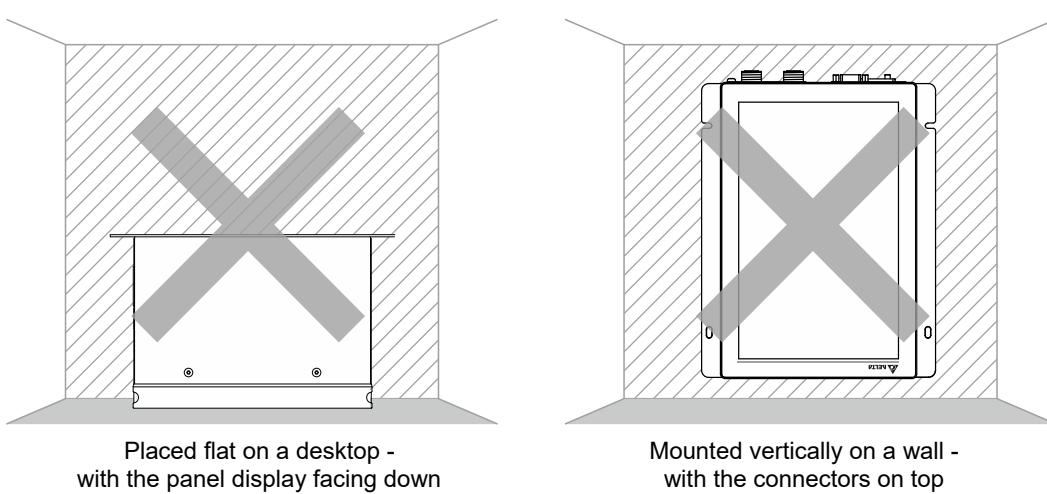
Precautions:

- Mount the smart screwdriving controller in the correct direction according to the following illustrations, with the controller placed flat on a desktop or mounted vertically on a wall. Incorrect mounting direction may cause malfunction.
- For better ventilation and cooling, allow sufficient clearance space (at least 5 cm or 2 inches) between the controller and the adjacent objects or walls, otherwise the overheating may cause malfunction.

**Correct**



**Incorrect**



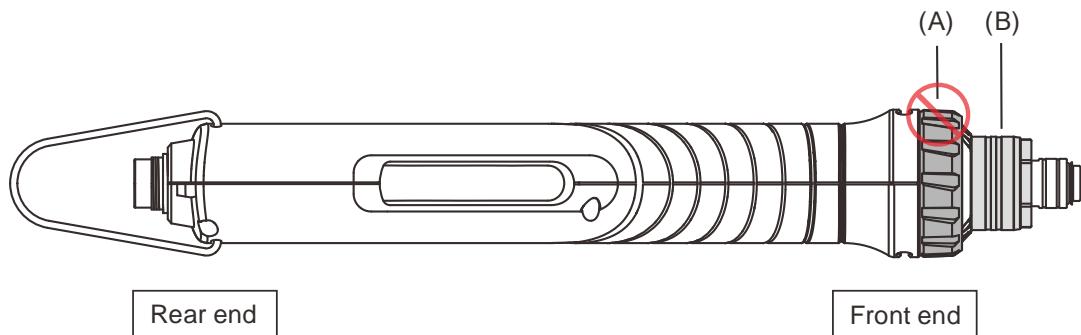
## 2.4 The use and installation of the screwdriver

The transducerized smart screwdriver can be used as a fixed or handheld device.

2

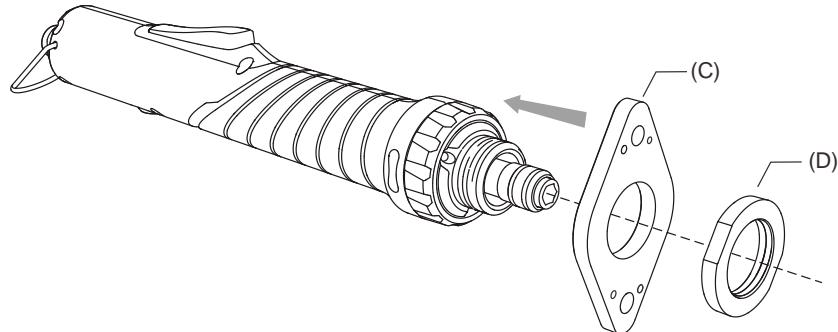
Installation precautions:

- The front end and rear end of the screwdriver are marked in the following figure.
- Do not remove the part (A) as shown in the following figure.
- When installing the accessories to the screwdriver, remove the protective cover from the part (B).

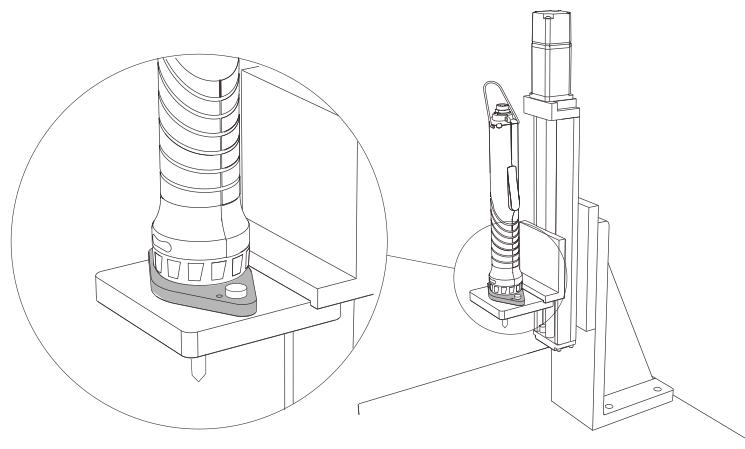


### Installing for fixed use

Remove the protective cover from the part (B). Attach the flange (C) of the flange module to the part (B), and then tighten the fixing nut (D) with the torque of 55 to 60 kgf-cm.



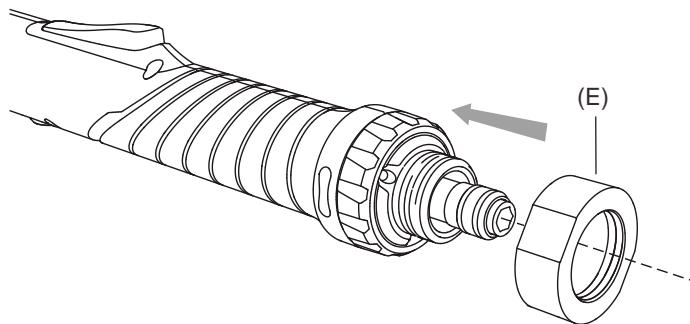
This installation method is for fixing the screwdriver to a screw tightening machine or a robotic arm.



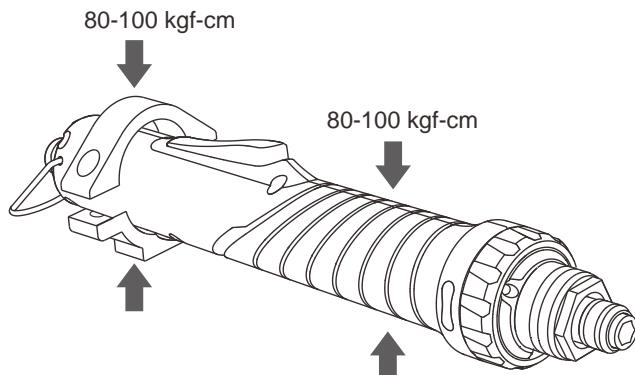
**Installing for handheld use (with a torque arm)****■ Clamping the front end of the screwdriver**

Do not mount the screwdriver on the clamp of the torque arm directly by the part (B).

Refer to Section 2.5 for the front-end dimensions of the screwdriver and select an adapting nut (E) according to the clamp size of the torque arm. Next, remove the protective cover from the part (B) of the screwdriver, and then attach the adapting nut (E) to the part (B).

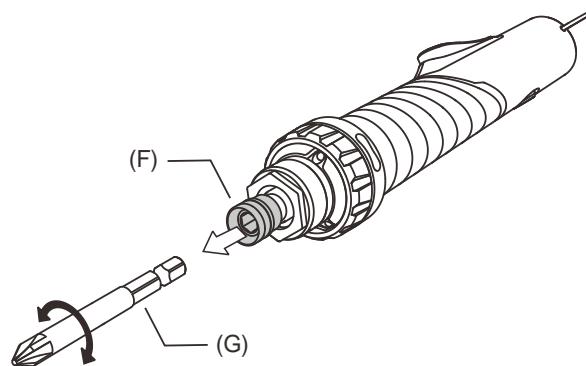
**■ Clamping the middle or rear end of the screwdriver**

Mount the screwdriver on the clamp of the torque arm by the rear end or the non-slip handle with the suggested clamping torque of 80 to 100 kgf-cm. Avoid the part of the CW / CCW switch or the lever start of the screwdriver.



### 2.4.1 Installing the bit

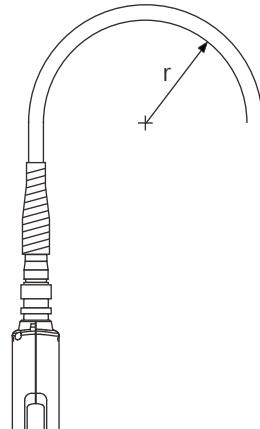
1. Pull out the collar (F).
2. Insert the bit (G). If unable to insert the bit, rotate it to an angle where it can be inserted.



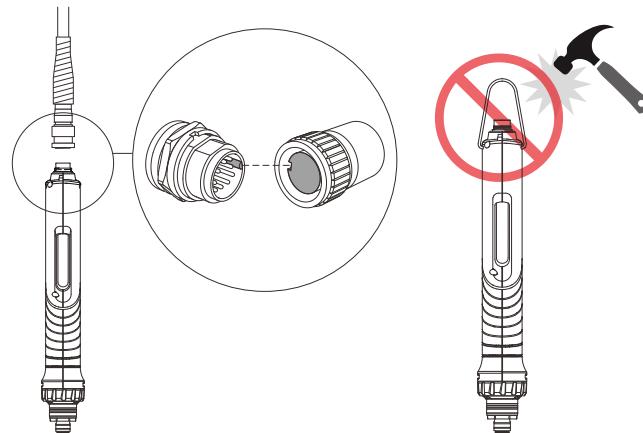
### 2.4.2 Installing the connection cable

The connection cable is used for connecting the transducerized smart screwdriver and the smart screwdriving controller.

- Note that the bend radius ( $r$ ) should be no less than 60 mm (2.36 inches) when the cable is bent.

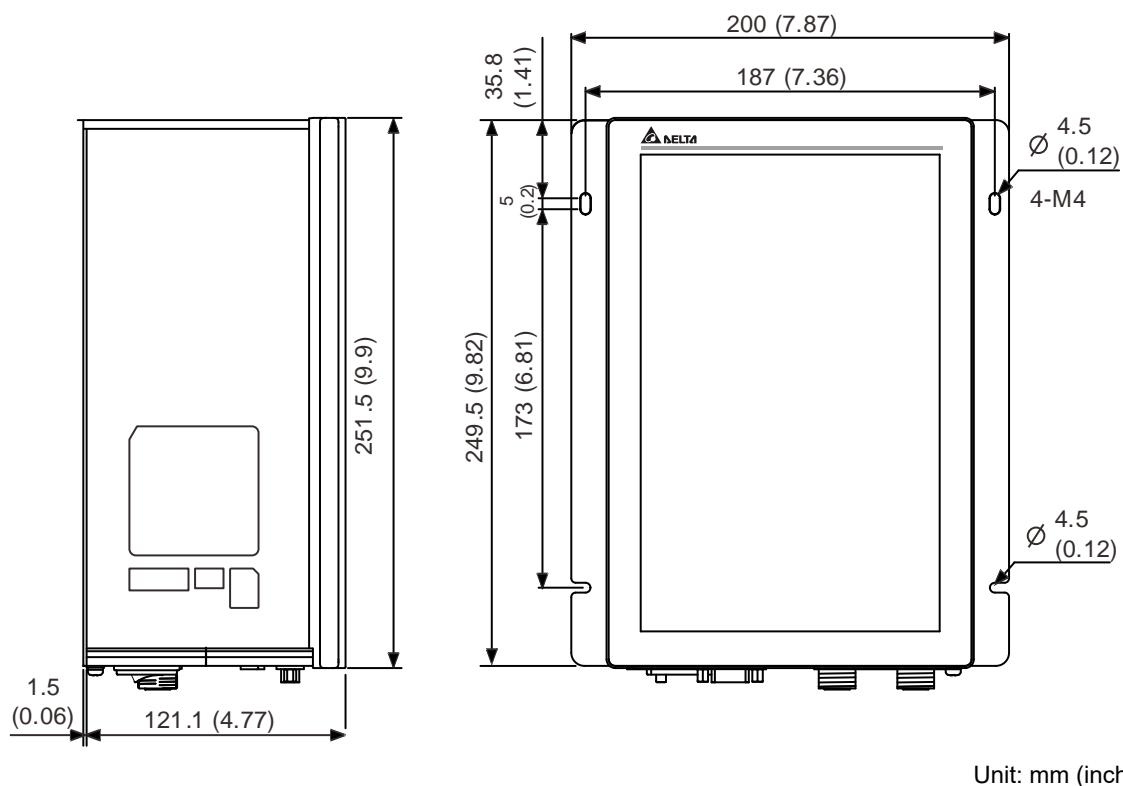


- When attaching the connection cable to the screwdriver, align the poka-yoke notch on the cable connector with the poka-yoke bump on the screwdriver connector (as shown in the following figure on the left), and then tighten the nut on the cable connector clockwise. While attaching, avoid impacting the pins of screwdriver connector (as shown in the following figure on the right), otherwise, it may cause malfunction of the screwdriver.

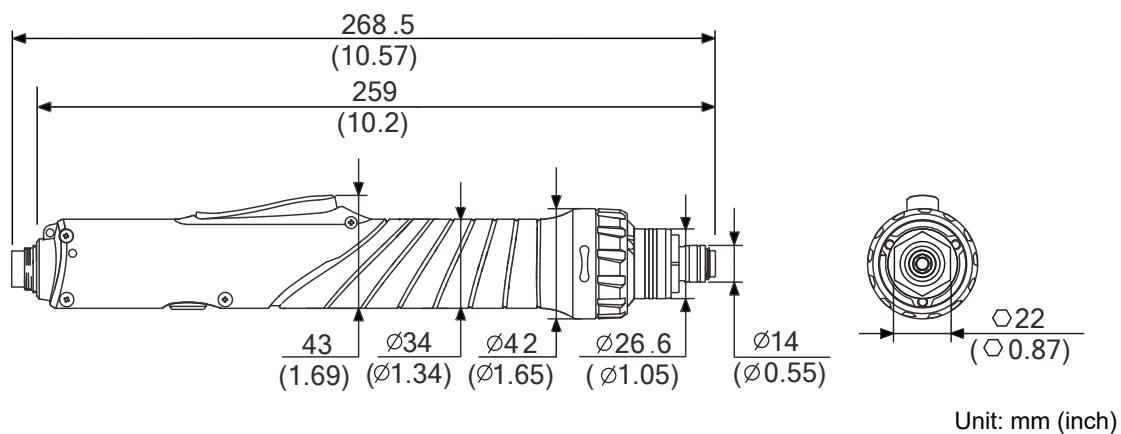


## 2.5 Dimensions

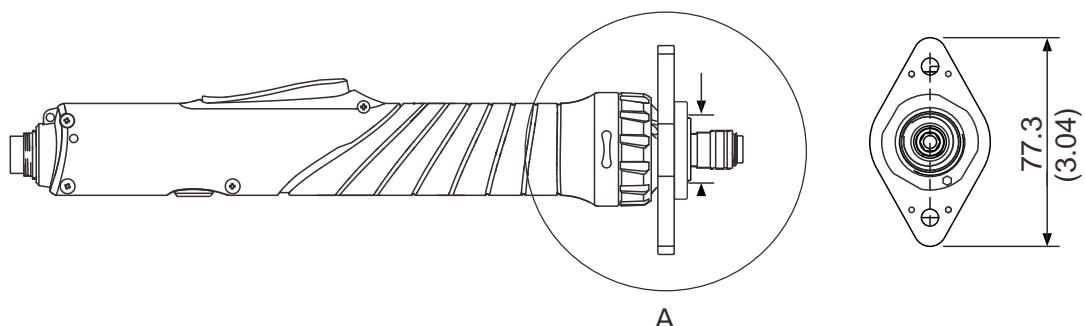
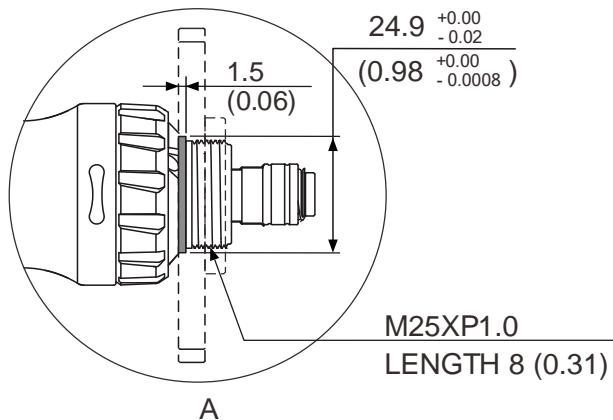
### Smart screwdriving controller



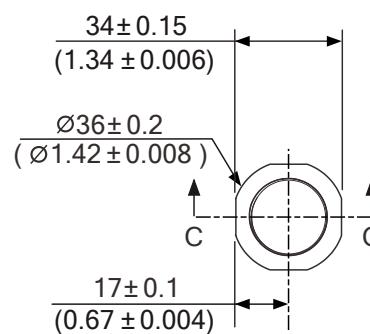
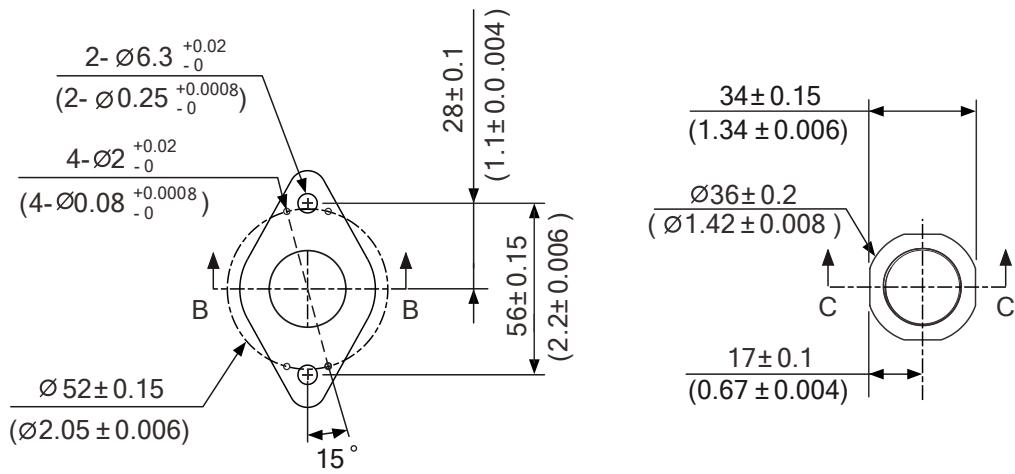
### Transducerized smart screwdriver



2

**Transducerized smart screwdriver + flange module**

Unit: mm (inch)

**Flange module (optional purchase, including a flange and a fixing nut)**

Unit: mm (inch)

## 2.6 Safety precautions

The Delta smart screwdriving system is designed for industrial applications. It is necessary that you fully understand the system specifications and the content of the operation manual. For your safety and correct use, read the manual, specifications, and precautions for the system carefully before installing.

The safety precautions are as follows:

### Handling, mounting, and storage

- When handling the transducerized smart screwdriver, hold the body of the screwdriver instead of only holding the cable or the shaft.
- Do not impact the shaft of the screwdriver. Impact force will damage the shaft and the motor at the rear end of the shaft.
- The shaft of the screwdriver is not waterproof or oil-proof. Do not use, install, or store the screwdriver in an environment with high humidity or contains water, oily liquids, corrosive or inflammable gases.
- The material of the screwdriver shaft is not rustproof. Although rustproof oil has been applied to the shaft during the manufacturing process, you must check the shaft condition and apply rustproof oil every three months if storing the motor for more than six months.
- Ensure that the environmental conditions for storing the product conform to the specifications written in this manual.

### Operation

- The operation of the transducerized smart screwdriver is controlled by the smart screwdriving controller. Do not directly connect a commercial power supply (100 / 220V, 50 / 60 Hz) to the circuit of the screwdriver, otherwise the screwdriver will not operate normally and may be permanently damaged.
- Follow the specifications when using the product. The ambient temperature must not exceed the specified range.
- The material of the screwdriver shaft is not rustproof. To ensure a longer service life, apply rustproof oil during operation.
- If any odor, noise, smoke, heat, or abnormal vibration occurs during operation, stop the screwdriver and turn off the power immediately.
- Before replacing the screwdriver or the connection cable, be sure to first turn off the power to the controller. Otherwise, it may damage the screwdriver or the connection cable.
- Keep the ambient environment clean and tidy to ensure smooth operation of the screwdriver and controller.
- The connection cable must be properly attached and fixed to avoid cable damage from entangling or tripping hazard from loose cables.
- Wear safety goggles when using electric assembly tools.

**Others**

- Do not use the transducerized smart screwdriver, connection cable, or smart screwdriving controller for purposes other than those specified in this manual. Illegal or improper use may cause personal injury or damage the product and its parts; this will also void the warranty.
- Do not disassemble or attempt to repair the controller, the screwdriver or their parts without authorization, otherwise it may cause personal injury and will void the warranty.
- Use the screwdriver with a torque arm as possible to reduce the reaction force. Do not use the screwdriver as a handheld device when the required torque is over 30 kgf-cm.

## 2.7 Maintenance

The recommended maintenance cycle and maintenance measures for the Delta smart screwdriving system under normal use are as follows:

Maintenance cycle	Maintenance measures
Every 250,000 counts of tightening + loosening	It is advisable to send the system back for precision calibration and maintenance.
One year of use or every 1,000,000 counts of tightening + loosening	Send the system back for precision calibration and maintenance.

# 3

## Wiring

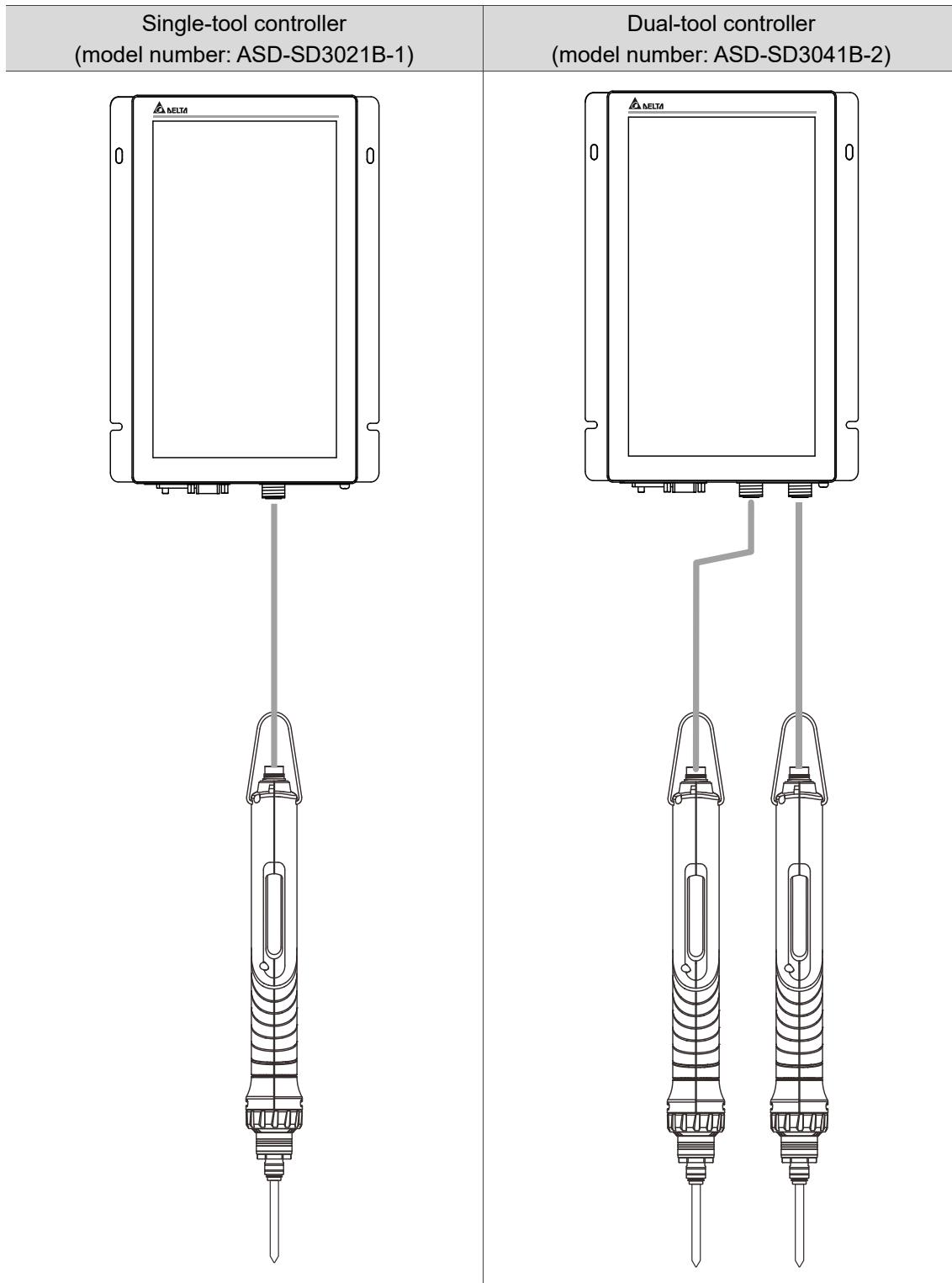
This chapter illustrates the power supply circuit, connectors, and wiring of the Delta smart screwdriving system.

3.1	System connection .....	3-2
3.1.1	Connection diagrams .....	3-2
3.2	Wiring for I/O connectors.....	3-3
3.2.1	Pin assignments for I/O connectors .....	3-3
3.2.2	Signal explanation for I/O connectors.....	3-5
3.2.3	Wiring diagrams .....	3-6
3.3	Wiring for RS-485 connector (for extension) .....	3-8

## 3.1 System connection

### 3.1.1 Connection diagrams

3



#### Installation precautions:

1. Make sure the power supply and connection cable(s) (with M16 8-pin connectors) are correct.
2. When an alarm occurs or when in an emergency stop, turn off the switch next to the AC connector on the smart screwdriving controller to power off the controller and the transducerized smart screwdriver.

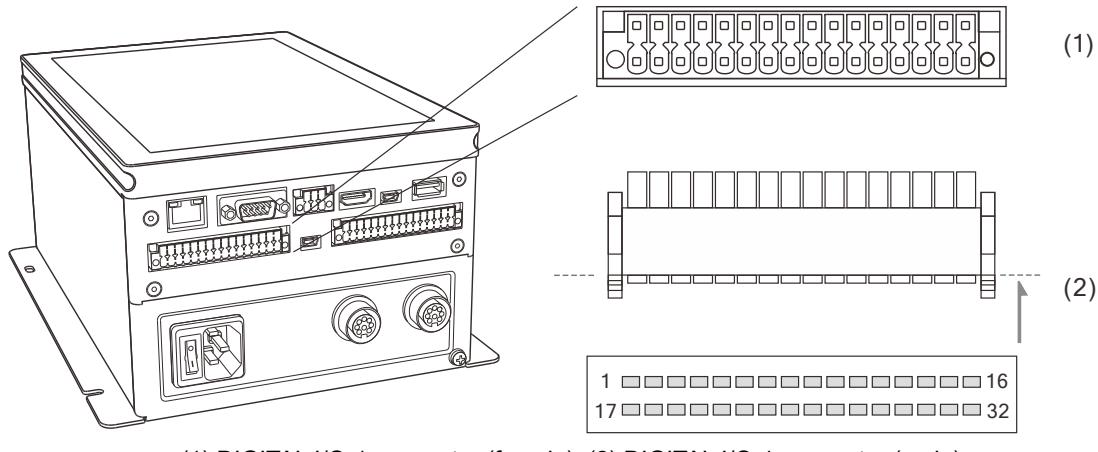
## 3.2 Wiring for I/O connectors

### 3.2.1 Pin assignments for I/O connectors

Define 8 digital inputs (DI) and 8 digital outputs (DO) for the I/O connector to achieve higher flexibility in the communication between the host system and smart screwdriving controller.

Refer to Section 3.2.3 for the wiring diagrams. The pin assignments for the two digital I/O ports of the dual-tool controller are shown as follows:

Note: for the single-tool controller, refer to the pin assignment of DIGITAL I/O-1 connector.



(1) DIGITAL I/O-1 connector (female); (2) DIGITAL I/O-1 connector (male)

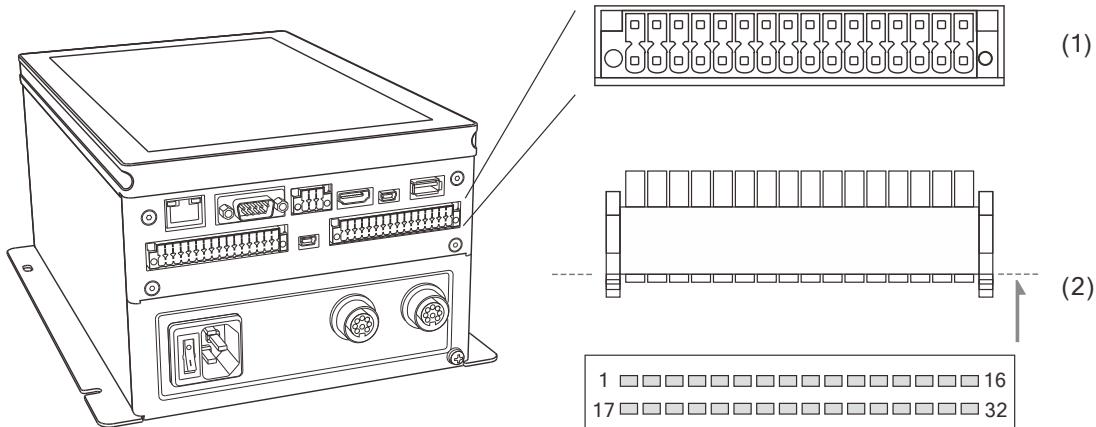
Pin assignment:

Pin	Signal	Description	Pin	Signal	Description
1	DO_24V_A	Power output (+) (24V ± 10%)	17	NC <sup>*1</sup>	-
2	DO_A1+	Digital output (+)	18	DO_A8+	Digital output (+)
3	DO_A1-	Digital output (-)	19	DO_A8-	Digital output (-)
4	DO_A2+	Digital output (+)	20	DI_A1	Digital input
5	DO_A2-	Digital output (-)	21	DI_A2	Digital input
6	DO_A3+	Digital output (+)	22	DI_A3	Digital input
7	DO_A3-	Digital output (-)	23	DI_A4	Digital input
8	DO_A4+	Digital output (+)	24	DI_A5	Digital input
9	DO_A4-	Digital output (-)	25	DI_A6	Digital input
10	DO_A5+	Digital output (+)	26	COM_A+	Common reference pin for DI_A1 to DI_A6
11	DO_A5-	Digital output (-)	27	DI_A7+	Digital input (+)
12	DO_A6+	Digital output (+)	28	DI_A7-	Digital input (-)
13	DO_A6-	Digital output (-)	29	DI_A8+	Digital input (+)
14	DO_A7+	Digital output (+)	30	DI_A8-	Digital input (-)
15	DO_A7-	Digital output (-)	31	NC <sup>*1</sup>	-
16	NC <sup>*1</sup>	-	32	PGND	Power output (-) (ground for 24V ± 10%)

Note:

1. NC indicates the terminal is for internal use only. Do not connect to NC, or it may damage the controller.
2. You can wire the bit selector to Pin 20 - 25 and 27 - 30, and then refer to Sections 9.2 and 9.3 for the setting.

3



(1) DIGITAL I/O-2 connector (female); (2) DIGITAL I/O-2 connector (male)

## Pin assignment:

Pin	Signal	Description	Pin	Signal	Description
1	DO_24V_B	Power output (+) (24V ± 10%)	17	NC <sup>*1</sup>	-
2	DO_B1+	Digital output (+)	18	DO_B8+	Digital output (+)
3	DO_B1-	Digital output (-)	19	DO_B8-	Digital output (-)
4	DO_B2+	Digital output (+)	20	DI_B1	Digital input
5	DO_B2-	Digital output (-)	21	DI_B2	Digital input
6	DO_B3+	Digital output (+)	22	DI_B3	Digital input
7	DO_B3-	Digital output (-)	23	DI_B4	Digital input
8	DO_B4+	Digital output (+)	24	DI_B5	Digital input
9	DO_B4-	Digital output (-)	25	DI_B6	Digital input
10	DO_B5+	Digital output (+)	26	COM_B+	Common reference pin for DI_B1 to DI_B6
11	DO_B5-	Digital output (-)	27	DI_B7+	Digital input (+)
12	DO_B6+	Digital output (+)	28	DI_B7-	Digital input (-)
13	DO_B6-	Digital output (-)	29	DI_B8+	Digital input (+)
14	DO_B7+	Digital output (+)	30	DI_B8-	Digital input (-)
15	DO_B7-	Digital output (-)	31	PGND	Power output (-) (ground for 24V ± 10%)
16	NC <sup>*1</sup>	-	32	PGND	

## Note:

1. NC indicates the terminal is for internal use only. Do not connect to NC, or it may damage the controller.
2. You can wire the bit selector to Pin 20 - 25 and 27 - 30, and then refer to Sections 9.2 and 9.3 for the setting.

### 3.2.2 Signal explanation for I/O connectors

The signals listed in the previous section are further described in the following table.

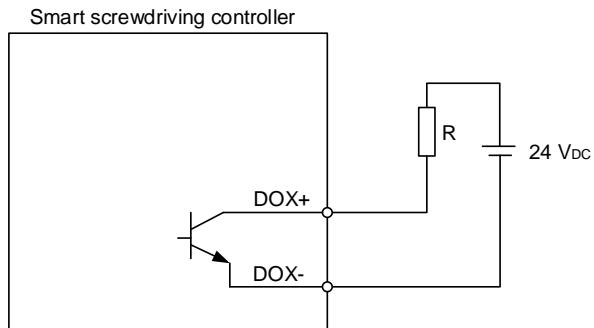
	Signal	Pin	Description	Wiring method (refer to Section 3.2.3)
DI	DI_A1 to A6	DIGITAL I/O-1 20 to 25	For voltage input; requires an external power supply (24V ± 10%). Supports both NPN and PNP wiring (must be used with COM_A+).	C3 / C4
	DI_B1 to B6	DIGITAL I/O-2 20 to 25	For voltage input; requires an external power supply (24V ± 10%). Supports both NPN and PNP wiring (must be used with COM_B+).	
	DI_A7+ DI_A7-	DIGITAL I/O-1 27, 28	DI_A7+ / A8+ / B7+ / B8+ are for voltage input; requires an external power supply (24V ± 10%).	C5 / C6
	DI_A8+ DI_A8-	DIGITAL I/O-1 29, 30	DI_A7- / A8- / B7- / B8- are reference pins for voltage input.	
	DI_B7+ DI_B7-	DIGITAL I/O-2 27, 28	NPN: connect DI_A7- / A8- / B7- / B8- to the positive (+) terminal of the external power supply (24V ± 10%).	
	DI_B8+ DI_B8-	DIGITAL I/O-2 29, 30	PNP: connect DI_A7- / A8- / B7- / B8- to the negative (-) terminal of the external power supply (24V ± 10%).	
DO	DO_A1+ to A8+ DO_A1- to A8- DO_B1+ to B8+ DO_B1- to B8-	DIGITAL I/O-1 2 to 15, 18, 19 DIGITAL I/O-2 2 to 15, 18, 19	Perform wiring based on the load type. Require an external power supply (24V ± 10%).	C1 / C2
Power	COM_A+ COM_B+	DIGITAL I/O-1 26 DIGITAL I/O-2 26	The common reference pins for voltage input for DI_A1 to A6 / DI_B1 to B6. NPN: connect COM_A+ / B+ to the positive (+) terminal of the external power supply (24V ± 10%). PNP: connect COM_A+ / B+ to the negative (-) terminal of the external power supply (24V ± 10%).	-
	DO_24V_A DO_24V_B	DIGITAL I/O-1 1 DIGITAL I/O-2 1	Power output (+) (24V ± 10%)	-
	PGND	DIGITAL I/O-1 32 DIGITAL I/O-2 31 or 32	Power output (-) (ground for 24V ± 10%)	-
Other	NC	DIGITAL I/O-1 16, 17, 31 DIGITAL I/O-2 16, 17	These terminals are for internal use only. Do not connect to NC, or it may damage the controller.	-

### 3.2.3 Wiring diagrams

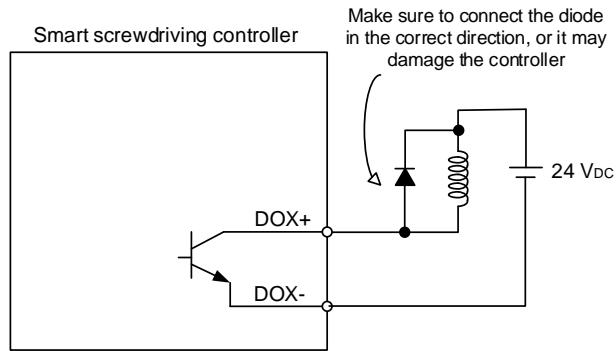
#### DO wiring:

C1: external power supply, general load

3



C2: external power supply, inductive load



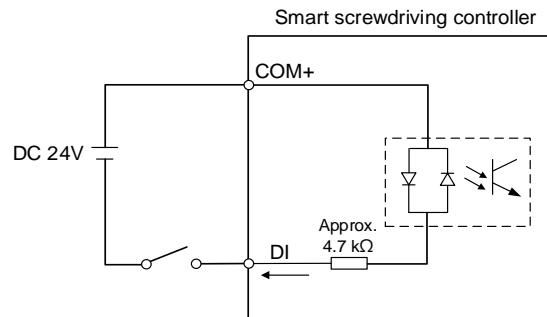
**DI wiring: input signals by relay or open collector transistor.**

Conditions of DI signal On / Off:

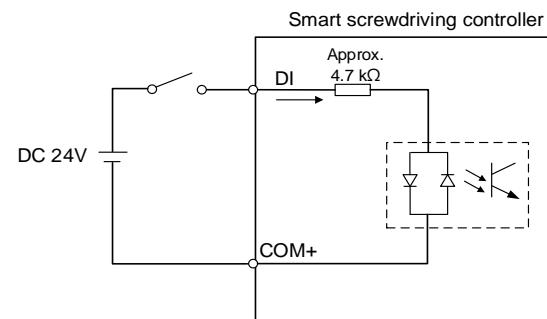
On: 15V - 24V; input current of 8 mA.

Off: 5V or lower; input current must not be higher than 0.5 mA.

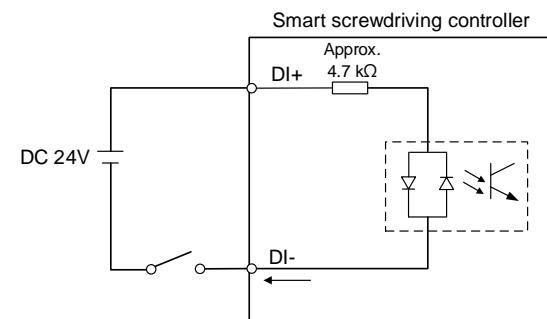
C3: NPN transistor, SINK mode (DI\_A1 to A6, DI\_B1 to B6)



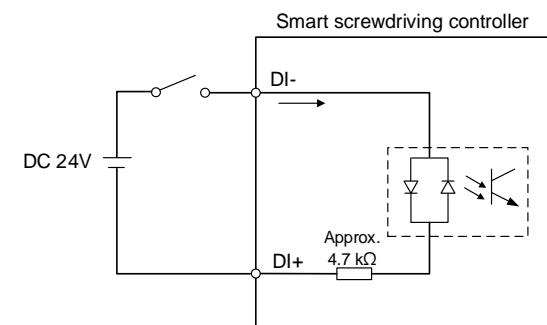
C4: PNP transistor, SOURCE mode (DI\_A1 to A6, DI\_B1 to B6)



C5: NPN transistor, SINK mode, not using COM+ for input (DI\_A7, A8, B7, B8)



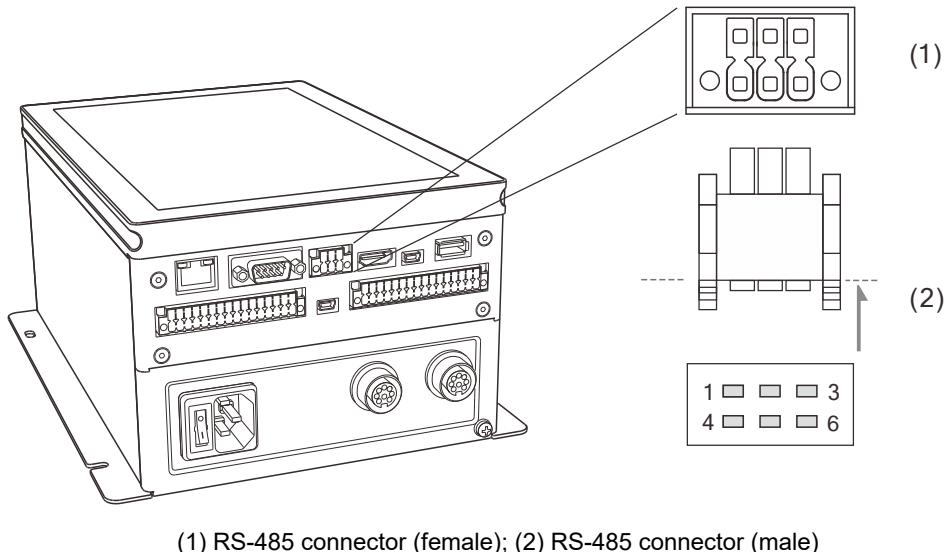
C6: PNP transistor, SOURCE mode, not using COM+ for input (DI\_A7, A8, B7, B8)



### 3.3 Wiring for RS-485 connector (for extension)

Connect the equipment (such as a PLC) with an RS-485 communication interface to the smart screwdriving controller through the RS-485 connector.

There are 2 signal pairs for RS-485: D1- & D1+ and D2- & D2+.



(1) RS-485 connector (female); (2) RS-485 connector (male)

Pin assignment:

Pin	Signal	Description	Pin	Signal	Description
1	D1-	First pair of differential signals Tx- / Rx-	4	D1+	First pair of differential signals Tx+ / Rx+
2	GND	Ground for +12V	5	NC*	-
3	D2-	Second pair of differential signals Tx- / Rx-	6	D2+	Second pair of differential signals Tx+ / Rx+

Note: NC indicates the terminal is for internal use only. Do not connect to NC, or it may damage the controller.

# Functions Overview

# 4

---

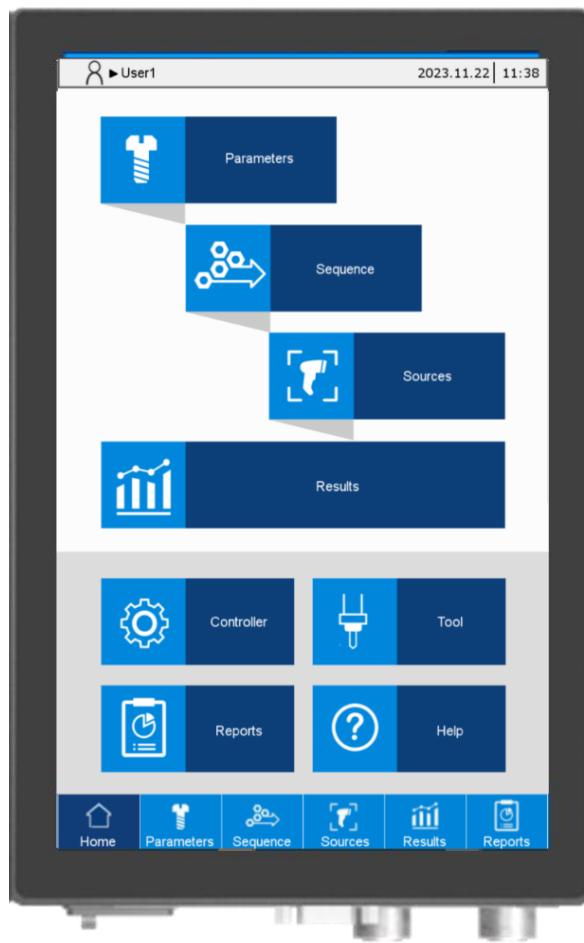
This chapter introduces the functions on the main screen of the smart screwdriving controller.

4.1 Functions on the main screen.....4-2

## 4.1 Functions on the main screen

There are eight functions on the main screen of the smart screwdriving controller:  
Parameters, Sequence, Sources, Results, Controller, Tool, Reports, and Help.

4



Each function is described as follows:



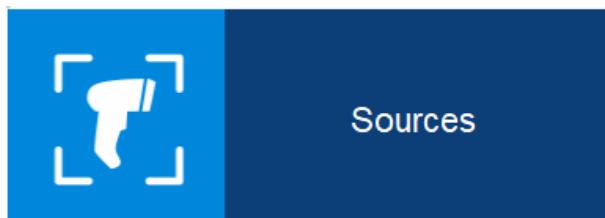
Parameters

Parameters: configure the appropriate parameters and various screw tightening strategies for different tightening scenarios.



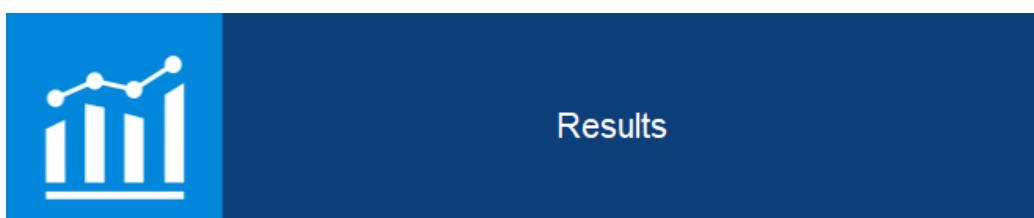
Sequence

Sequence: create the screw tightening sequences for different tightening requirements.



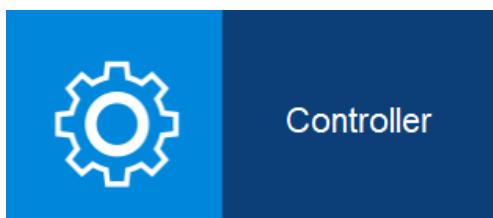
Sources

Sources: specify the operating mode and switching method of the smart screwdriving system.



Results

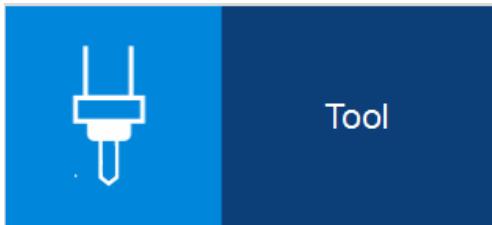
Results: obtain information of the current tightening operation and the operating curves.



Controller

Controller: access and configure the smart screwdriving controller information and settings, including the system settings, DI/DO, peripheral device, communication (Modbus), and service station.

4



Tool

Tool: access and configure the transducerized smart screwdriver information and settings, including the tool info, tool settings, LED light settings, and tool calibration.



Reports

Reports: access the reports of all operational statuses, including production reports, error reports, warning reports, and button reports.



Help

Help: obtain the documents for operational support.

# Parameters (Tightening parameters)

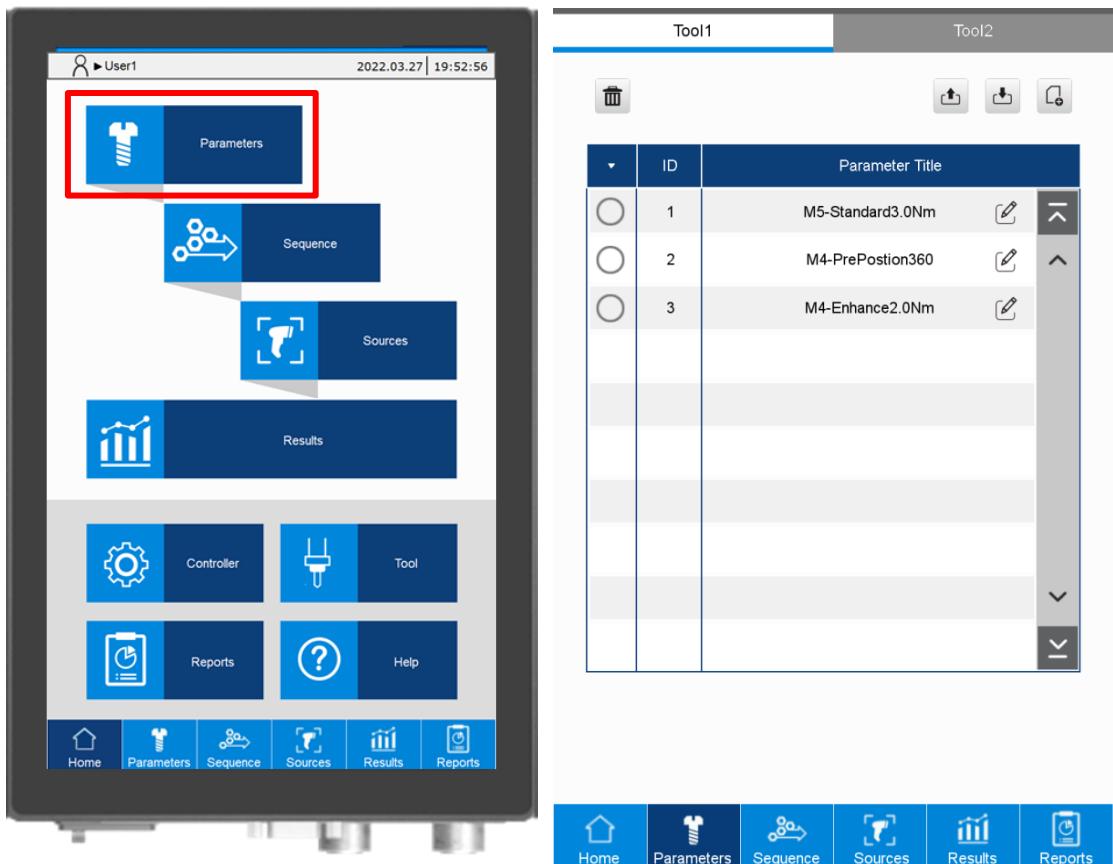
# 5

This chapter introduces the **Parameters** page of the smart screwdriving controller. You can configure the appropriate parameters for different tightening scenarios to achieve the quality requirements of products. You can also use the screw tightening strategies to customize various tightening processes.

5.1	Parameters page overview .....	5-2
5.2	Create a tightening parameter .....	5-3
5.3	Tightening strategies and the Settings tabs .....	5-4
5.3.1	General Settings .....	5-5
5.3.2	Tightening Settings .....	5-7
5.3.2.1	Standard strategy .....	5-7
5.3.2.2	Enhanced strategy .....	5-12
5.3.2.3	Pre-position strategy .....	5-13
5.3.2.4	Self-defined strategy .....	5-15
5.3.3	Loosening settings .....	5-20
5.4	Save a tightening parameter .....	5-21
5.5	Copy / paste a tightening parameter .....	5-21
5.6	Delete a tightening parameter .....	5-23
5.7	Export / import a tightening parameter .....	5-24

## 5.1 Parameters page overview

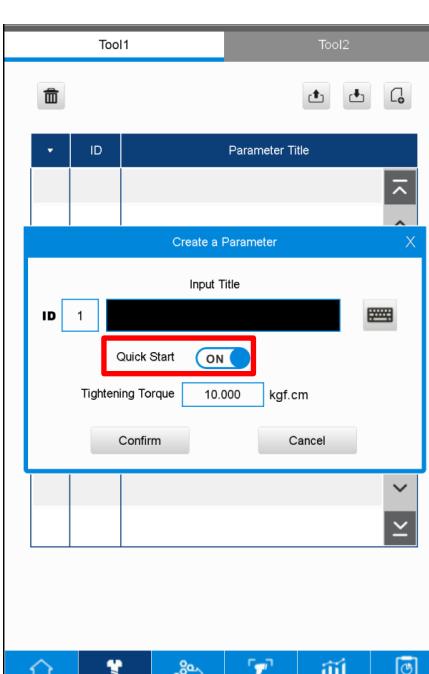
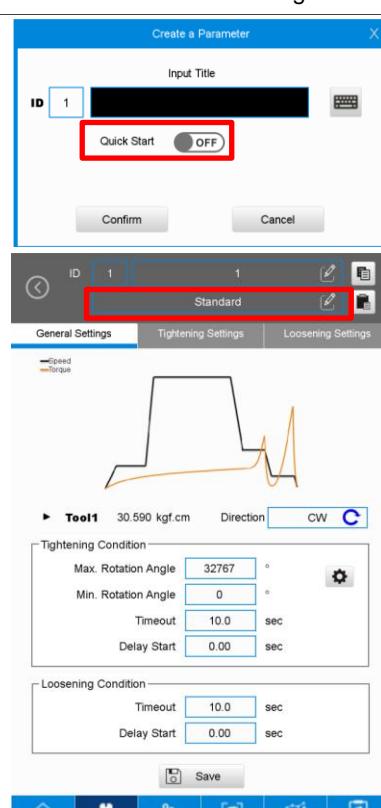
Create different tightening parameters for transducerized smart screwdrivers of different specifications. Up to 500 sets of parameters can be created for a single tool. Each row in the following parameter list represents one set of tightening parameter.



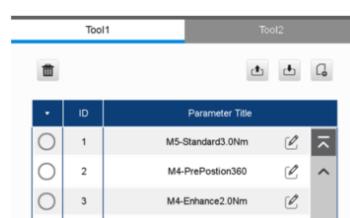
## 5.2 Create a tightening parameter

Steps to create a tightening parameter are as follows:

1. Click , and then the system searches for an available ID and sets it as the new parameter ID. If desiring to specify an ID, directly set it in the **ID** field of the Create a Parameter window.
2. Input the parameter title.
3. Choose whether to use the Quick Start function for the parameter setting.

Quick Start function On	Quick Start function Off
<ul style="list-style-type: none"> <li>■ The Quick Start function is On by default.</li> <li>(a) Input the final Tightening Torque and click <b>Confirm</b> to create the parameter.</li> <li>Default values are applied to the remaining settings.</li> </ul> 	<ul style="list-style-type: none"> <li>■ Switch off the Quick Start function and click <b>Confirm</b> to enter the parameter editing screen.</li> <li>(a) Set the tightening strategy as Standard, Enhanced, Pre-position, or Self-defined.</li> <li>(b) Set the contents of the <b>General Settings</b>, <b>Tightening Settings</b>, and <b>Loosening Settings</b> tabs in sequence.</li> <li>(c) Click <b>Save</b> to save the settings.</li> </ul> 

4. The parameter list displays the ID and Parameter Title of the parameters which are successfully created.



## 5.3 Tightening strategies and the Settings tabs

The system provides four tightening strategies for users to customize the tightening processes based on different needs.

1. Standard: there are four stages, including Start, Rundown, Pre-tightening, and Tightening.  
The settings in each stage can be adjusted individually.
2. Enhanced: further tightening with the Tightening stage from the Standard strategy.
3. Pre-position: drive in the screw to reach the specified angle, torque, or torque rate with the Start and Rundown stages from the Standard strategy.

Stage Strategy \ Stage	Start	Rundown	Pre-tightening	Tightening
Standard	Start angle	Rundown angle Rundown torque Torque rate	Pre-tightening torque Torque rate	Target angle Target torque Clamp torque Clamp angle
Enhanced	-	-	-	Target angle Target torque
Pre-position	Start angle	Rundown angle Rundown torque Torque rate	-	-

4. Self-defined: arrange the tightening process as needed with a maximum of six stages. Use self-defined strategies for special scenarios.

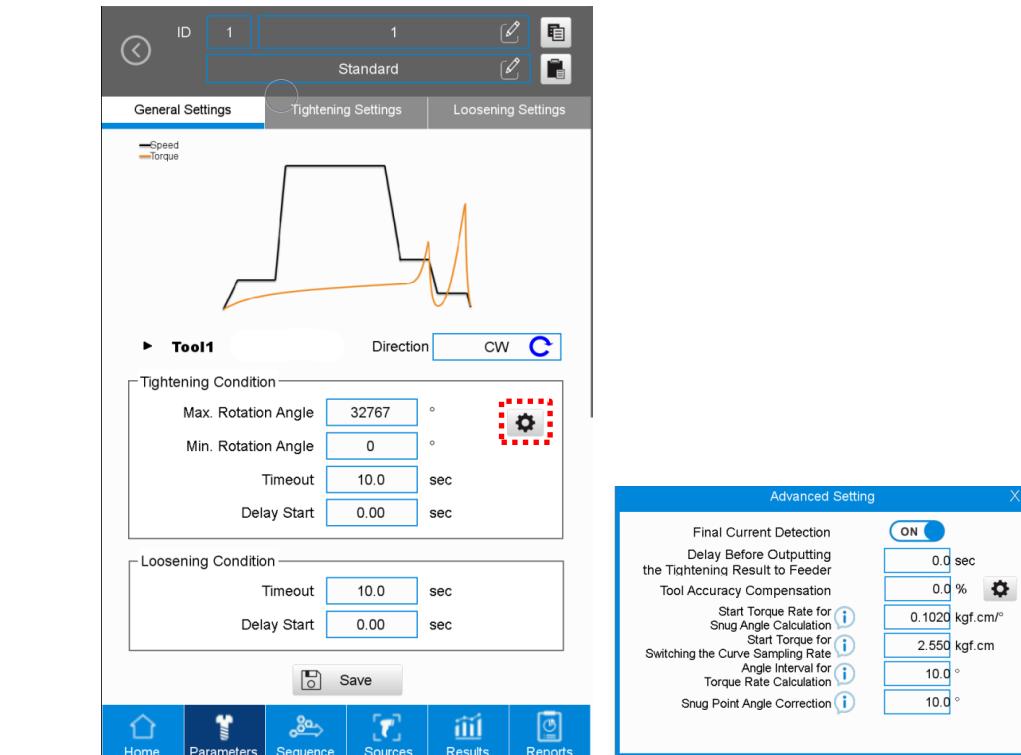
Stage Strategy \ Stage	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Self-defined	Angle Control Torque Control Torque Rate Control Clamp Torque Control Clamp Angle Control					

Each strategy contains three setting tabs: **General Settings**, **Tightening Settings**, and **Loosening Settings**. The following illustrates the setting screens of the three tabs under different tightening strategies.

### 5.3.1 General Settings

The screen of the **General Settings** tab is the same (except the curve graphs) for all tightening strategies. In this tab, you can set the general tightening and loosening conditions.

This section takes the General Settings screen of Standard strategy as an example.



Item		Function description
Tool 1 / Tool 2		Tool ID for the current parameter.
Direction		Specify the rotation direction of the tool.
Tightening Condition	Max. Rotation Angle	Set the maximum and minimum rotation angle of the tightening (1 turn = 360°). For checking whether the screw length is suitable.
	Min. Rotation Angle	For checking whether there is an under-driven screw.
	Timeout	Limit the total time of the tightening process.
	Delay Start	Set the delay time before the tightening starts.
Loosening Condition	Timeout	Limit the total time of the loosening process.
	Delay Start	Set the delay time before the loosening starts.
Advanced Setting	Final Current Detection	This function is On by default. It can determine if the screwdriver is degraded by using the controller current sensor and the tool torque sensor to measure the current values at the final tightening stage and then comparing them.
	Delay Before Outputting the Tightening Result to Feeder	If you have set a DO function as "Tightening Result Sent to Feeder", after the tightening task is complete, the system does not send the DO signal to the feeder for feeding the next screw until this delay time has elapsed.

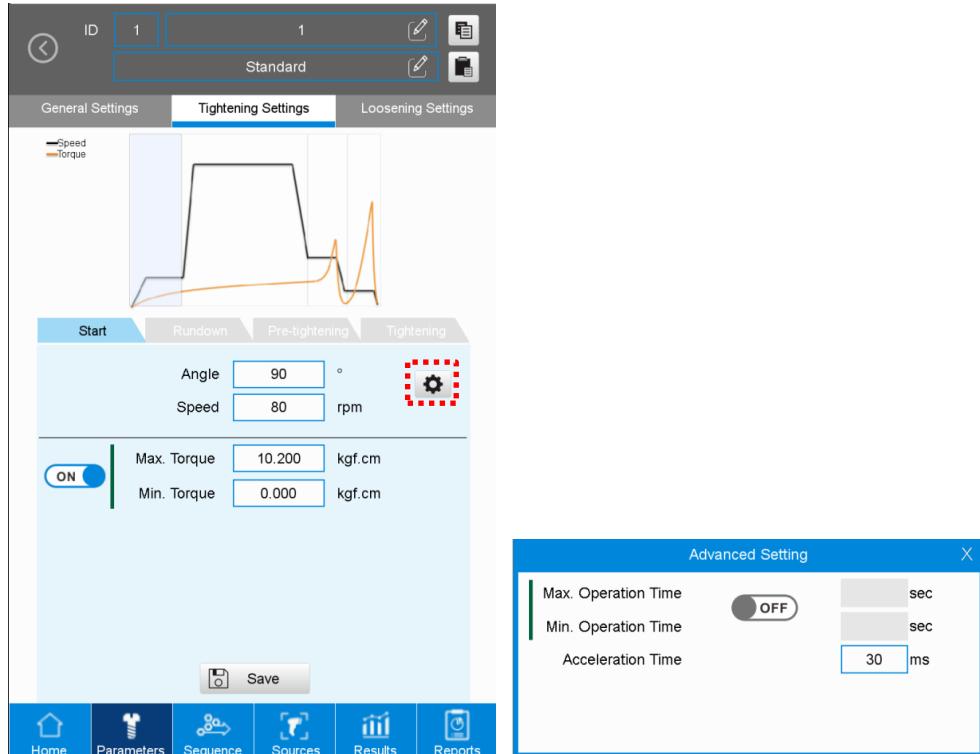
	Item	Function description
Advanced Setting	Tool Accuracy Compensation	Calibrate the tool torque with a third-party calibration device. This function is the same as the Tool Calibration in Section 10.4, except that it only calibrates the parameter being set at present.
	Start Torque Rate for Snug Angle Calculation	When the set torque rate is reached, the system starts recording the rotation angle of the tool from this time point until the end of the final tightening.
	Start Torque for Switching the Curve Sampling Rate	The curve sampling rate changes by referring to this torque value. When the tightening torque reaches this value, the sampling rate changes from 10 ms to 2 ms.
	Angle Interval for Torque Rate Calculation	Torque rate is a curve described by the calculation of dividing the unit torque by the unit angle. Adjusting this interval can filter out the power surge during operation, but when the setting is too high, the curve is more likely to become distorted.
	Snug Point Angle Correction	Correct the angle by which the system determines the snug point is reached. For example, if the angle determined by the system is 100° and you set the Snug Point Angle Correction to 10°, then the angle is corrected to 90° (= 100° - 10°).

## 5.3.2 Tightening Settings

### 5.3.2.1 Standard strategy

When you set the tightening strategy as Standard, the **Tightening Settings** tab contains four stages: Start, Rundown, Pre-tightening, and Tightening.

- Start: drive in the screw at low speed to make sure it aligns with the screw hole.

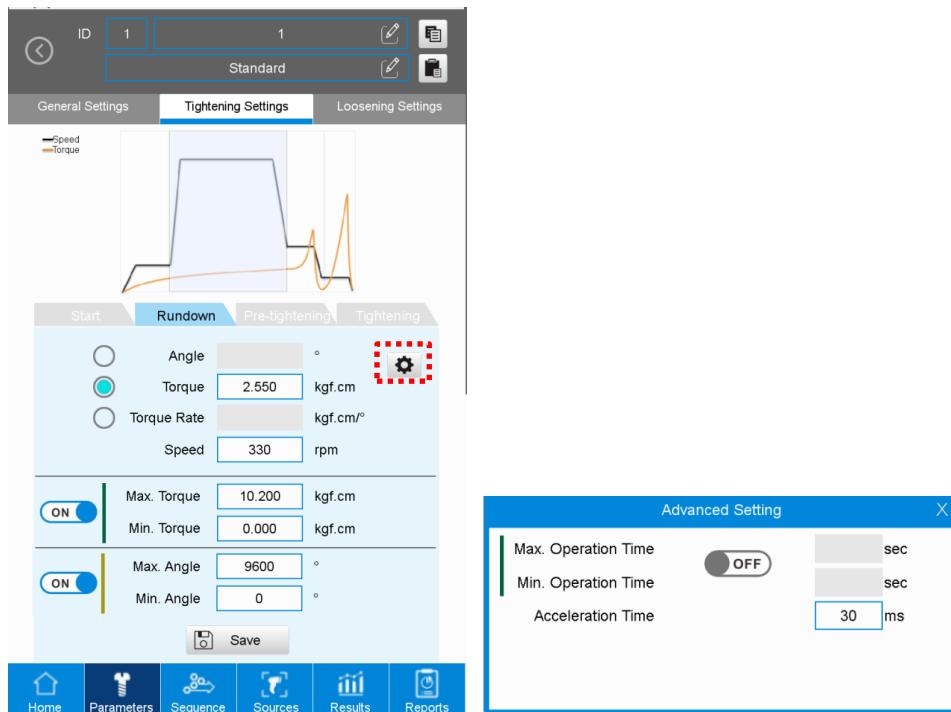


Item	Function description	
Angle	After the set angle is reached, the system switches to the Rundown stage. The recommended angle is 90° to 360°. (0: skip the Start stage and switch to the Rundown stage).	
Speed	The speed should not be set too high; the recommended speed is 80 rpm.	
Max. Torque*	Set the upper and lower limits for the torque of this stage. You can turn this function on or off.	For checking whether the screw is already tightened.
Min. Torque*		For identifying whether the tool is successfully started.
Advanced Setting	Max. Operation Time	Set the upper and lower limits for the operation time of this stage. You can turn this function on or off.
	Min. Operation Time	
	Acceleration Time	Adjust the acceleration time for this stage.

Note: the torque values set for this stage cannot exceed the torque values set in the Tightening stage.

B. Rundown: drive in the screw at high speed.

5

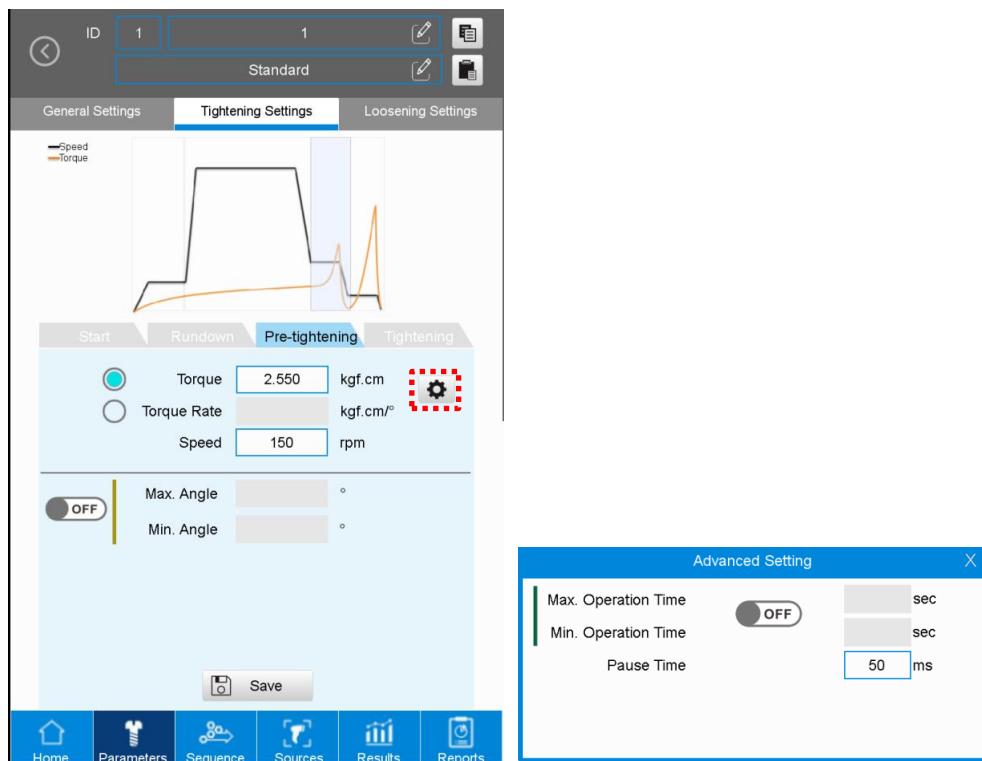


Determine if the Rundown stage is complete by the set Angle, Torque, or Torque Rate.

Item	Function description		
Angle	After the set angle is reached, the system switches to the Pre-tightening stage. For example, if the number of threads on the screw is 10, the rundown angle must be smaller than 3600°; the recommended angle would be around 3300°.		
Torque*	After the set torque is reached, the system switches to the Pre-tightening stage. The recommended torque is 25% of the target torque.		
Torque Rate	After the set torque rate is reached, the system switches to the Pre-tightening stage. Torque rate is a curve described by the calculation of dividing the unit torque by the unit angle, often used to observe the drastic torque changes during the tightening process. You can refer to the torque rate curve to find when snug point is reached and then set the torque rate as the threshold.		
Speed	It is recommended that you set the speed lower than the maximum speed of the tool specification; the default value is 70% of the tool max. speed.		
Max. Torque*	Set the upper and lower limits of the torque for this stage. You can turn this function on or off.	When there are foreign objects or burrs in the screw holes, the friction increases and leads to excessive torque. Limit the maximum torque by setting the Max. Torque.	
Min. Torque*			
Max. Angle	Set the upper and lower limits of the angle for this stage. You can turn this function on or off.		
Min. Angle			
Advanced Setting	Max. Operation Time	Set the upper and lower limits of the operation time for this stage. You can turn this function on or off.	
	Min. Operation Time		
	Acceleration Time	Adjust the acceleration time for this stage.	

Note: the torque values set in this stage cannot exceed the torque values set in the Tightening stage, otherwise an alarm occurs when you save the settings.

- C. Pre-tightening: have the screw head sit flush with the object surface, and reach the specified torque requirement.



Determine if the Pre-tightening stage is complete by the set Torque or Torque Rate.

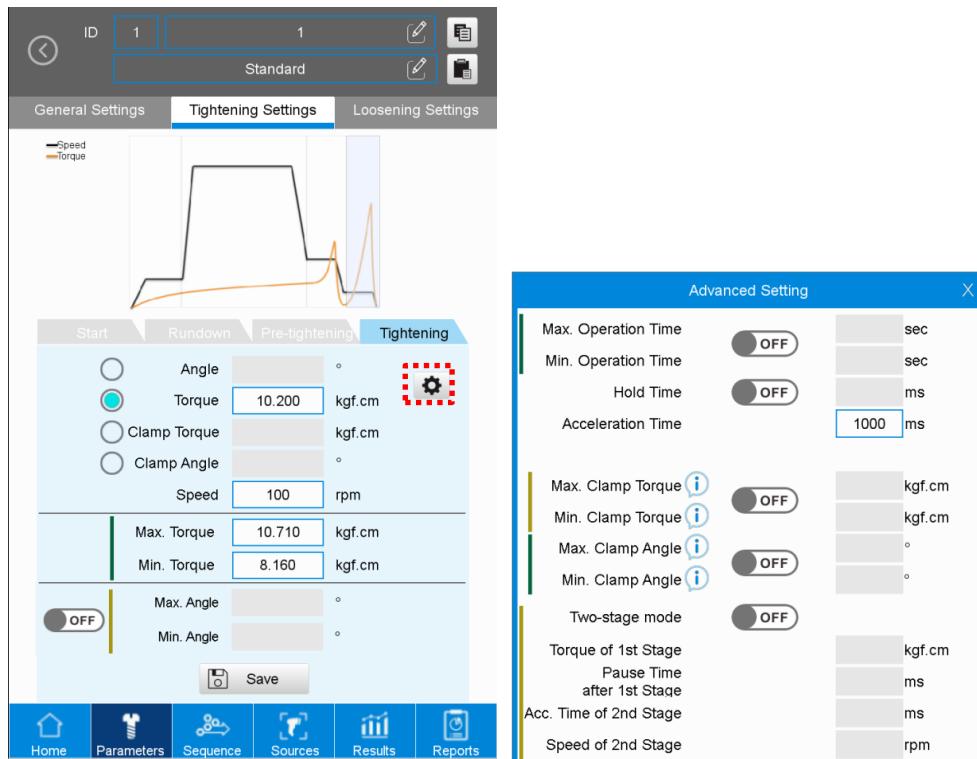
Item	Function description
Torque* <sup>1</sup>	After the set torque is reached, the system switches to the Tightening stage. The recommended torque is 80% of the target torque.
Torque Rate	After the set torque rate is reached, the system switches to the Tightening stage. Torque rate is a curve described by the calculation of dividing the unit torque by the unit angle, often used to observe the drastic torque changes during the tightening process. You can refer to the torque rate curve to find when snug point is reached and then set the torque rate as the threshold.
Speed* <sup>2</sup>	In this stage, the screw head is tightened closer to the object surface, so the speed should not be too high; the recommended setting is < 200 rpm.
Max. Angle	Set the upper and lower limits of the angle for this stage. You can turn this function on or off.
Min. Angle	
Advanced Setting	Max. Operation Time
	Min. Operation Time
	Pause Time

Note:

- The torque value set in this stage cannot exceed the torque value set in the Tightening stage, otherwise an alarm occurs when you save the settings.
- The speed set for this stage cannot exceed the speed set in the Tightening stage.

D. Tightening: tighten the screw at a low speed to achieve the final tightening results.

5



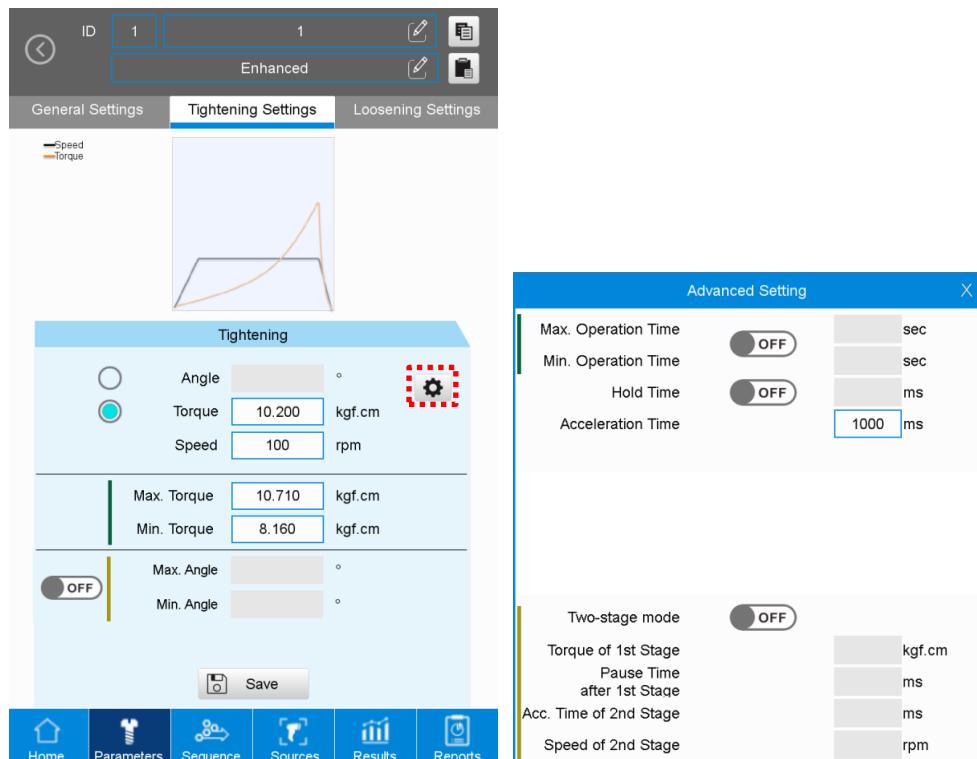
Determine if the Tightening stage is complete by the set Angle, Torque, Clamp Torque, or Clamp Angle.

Item	Function description	
Angle	After the set angle is reached, the Tightening operation ends.	
Torque	After the set torque is reached, the Tightening operation ends.	
Clamp Torque	Set a relative torque, and after the torque value is reached, the Tightening operation ends. <ul style="list-style-type: none"> <li>■ When the Rundown stage is in Torque Rate control: Relative torque = (Final torque) - (Torque when snug point is reached)</li> <li>■ When the Rundown stage is not in Torque Rate control: Relative torque = (Final torque) - (Pre-tightening torque)</li> </ul>	
Clamp Angle	Set a relative angle, and after the angle value is reached, the Tightening operation ends. <ul style="list-style-type: none"> <li>■ When the Rundown stage is in Torque Rate control: Relative angle = (Final tightening angle) - (Angle when snug point is reached)</li> <li>■ When the Rundown stage is not in Torque Rate control: Relative angle = (Final tightening angle) - (Angle when Pre-tightening is complete)</li> </ul>	
Speed	Do not set the speed too high in case the screw tightening precision is affected. The default setting is 100 rpm.	
Max. Torque	Set the upper and lower limits of the torque for this stage.	For checking whether the tightening results meet the product specification.
Min. Torque		
Max. Angle	Set the upper and lower limits of the angle for this stage. You can turn this function on or off.	The Max. angle is for monitoring the final torque to determine whether the tightening results meet the product specification. The final tightening angle is different according to the hardness of the object material. The softer the material, the larger the angle.
Min. Angle		

Item	Function description	
Advanced Setting	Max. Operation Time	Set the upper and lower limits of the operation time for this stage. You can turn this function on or off.
	Min. Operation Time	The Min. Operation Time is for checking whether the actual operation time is too short and determining whether there is an under-driven screw.
	Hold Time	Set the duration of keeping the Servo ON state after the tightening process is complete to enhance the tightening effect. The default value is 0 ms. You can turn this function on or off.
	Acceleration Time	Adjust the acceleration time for this stage.
	Max. Clamp Torque	Set the upper and lower limits of the torque for the duration from the time when snug point is reached to the Tightening stage. You can turn this function on or off.
	Min. Clamp Torque	
	Max. Clamp Angle	Set the upper and lower limits of the angle for the duration from the time when snug point is reached to the Tightening stage. You can turn this function on or off.
	Min. Clamp Angle	
	Further divide this stage into two stages. You can turn this function on or off.	
	Torque of 1st Stage	Torque of the 1 <sup>st</sup> stage. The default is 0.8 times of the target torque.
Two-stage mode	Pause Time after 1st Stage	The pause before entering the 2 <sup>nd</sup> stage from the 1 <sup>st</sup> stage. The default is 0 ms.
	Acc. Time of 2nd Stage	The acceleration time of the 2 <sup>nd</sup> stage. The default is 1000 ms.
	Speed of 2nd Stage	The rotation speed of the 2 <sup>nd</sup> stage. The default is 100 rpm.

### 5.3.2.2 Enhanced strategy

When you set the tightening strategy as Enhanced, the **Tightening Settings** tab only contains the Tightening stage.



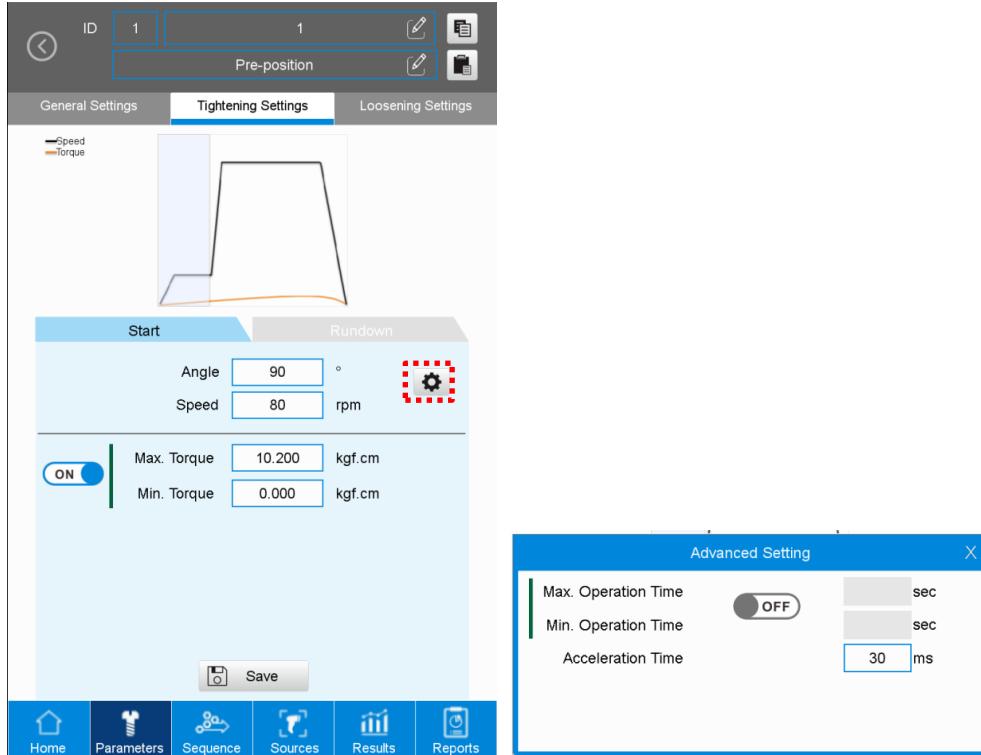
Determine whether the Tightening is complete by the set Angle or Torque.

Item	Function description	
Angle	After the set angle is reached, the Tightening operation ends.	
Torque	After the set torque is reached, the Tightening operation ends.	
Speed	This strategy is for further tightening the screw, so the speed should not be too high. The default speed is 100 rpm.	
Max. Torque	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	
Min. Torque		
Max. Angle		
Min. Angle		
Advanced Setting	Max. Operation Time Min. Operation Time Hold Time Acceleration Time	Torque of 1st Stage Pause Time after 1st Stage Acc. Time of 2nd Stage Speed of 2nd Stage
	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	

### 5.3.2.3 Pre-position strategy

When you set the tightening strategy as Pre-position, the **Tightening Settings** tab contains two stages: Start and Rundown.

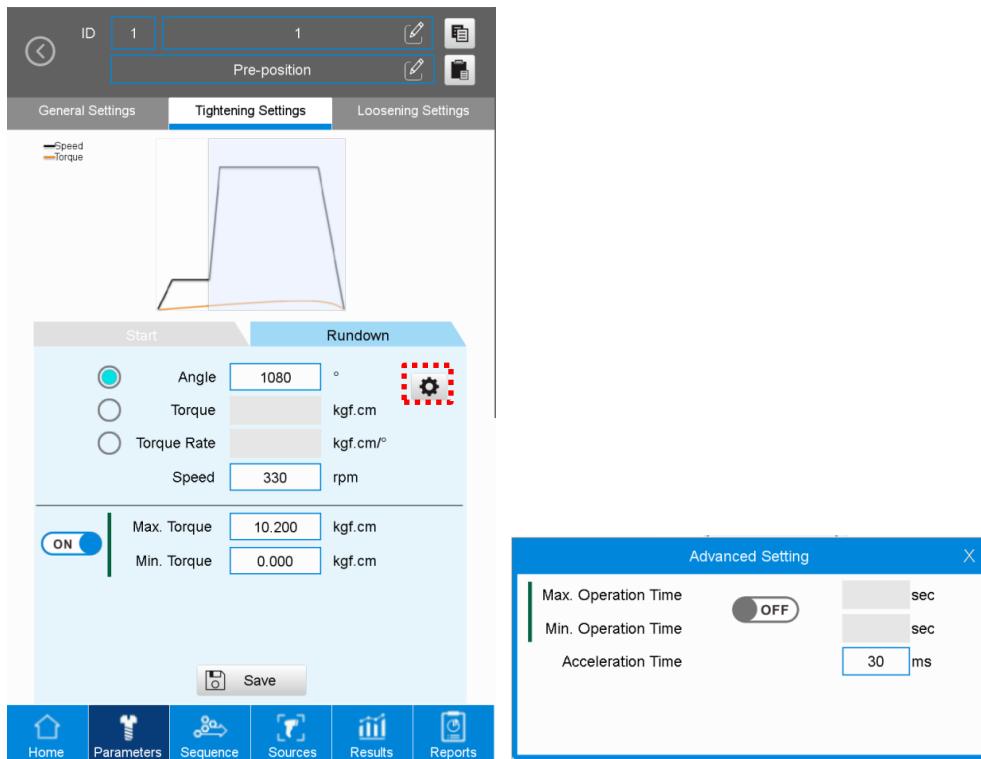
#### A. Start



Item	Function description
Angle	After the set angle is reached, the system switches to the Rundown stage. The recommended setting is 90° to 360°. (0: skip the Start stage and switch to the Rundown stage)
Speed	The speed should not be set too high; the recommended setting is < 80 rpm.
Max. Torque	
Min. Torque	
Advanced Setting	Refer to Section 5.3.2.1 for the Start stage under Standard strategy.
Max. Operation Time	
Min. Operation Time	
Acceleration Time	

## B. Rundown

5



Determine whether the Rundown stage is complete by the set Angle, Torque, or Torque Rate.

Item	Function description
Angle	After the set angle is reached, the Rundown operation ends.
Torque	After the set torque is reached, the Rundown operation ends.
Torque Rate	After the set torque rate is reached, the Rundown operation ends.
Speed	It is recommended that you set the speed lower than the maximum speed of the tool specification. The recommended setting is 70% of the tool max. speed.
Max. Torque	
Min. Torque	
Advanced Setting	Max. Operation Time
	Min. Operation Time
	Acceleration Time

Refer to Section 5.3.2.1 for the Rundown stage under Standard strategy.

### 5.3.2.4 Self-defined strategy

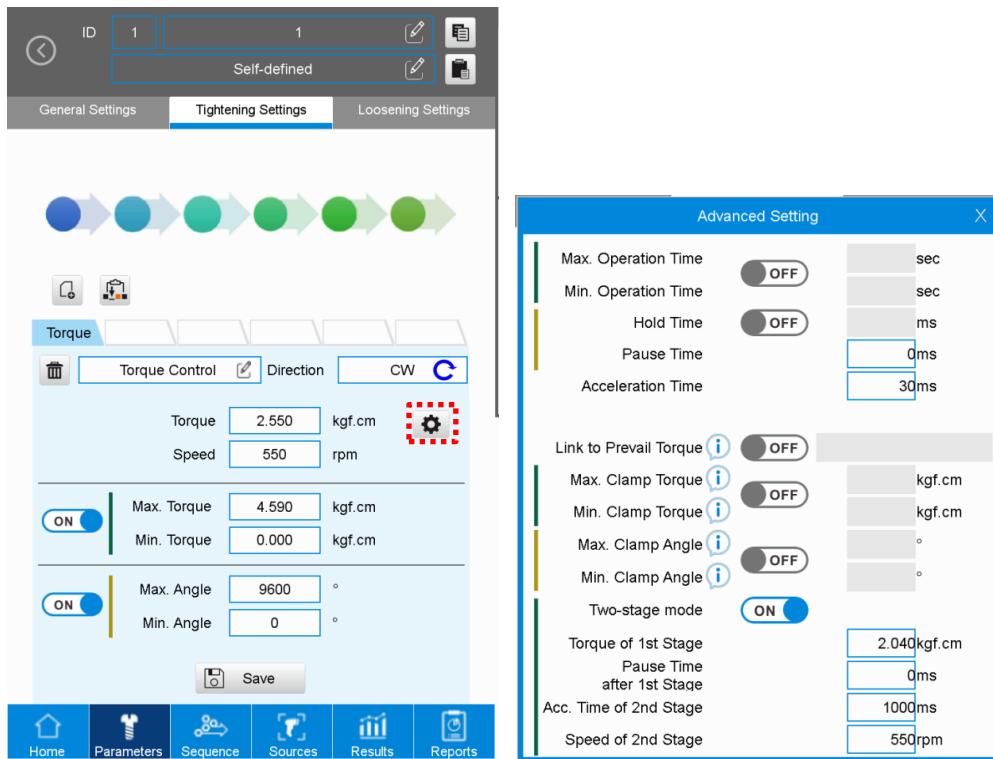
When you set the tightening strategy as Self-defined, up to six stages can be set in the **Tightening Settings** tab. You can specify the tool rotation direction and control method for each stage. The control methods are detailed as follows.

- A. Angle Control: when tightening, the tool stops after the specified angle is reached.

Item	Function description
Angle	After the set angle is reached, the operation for this stage ends.
Speed	Set the operation speed of this stage.
Max. Torque	Set the upper and lower limits for the torque of this stage. You can turn this function on or off.
Min. Torque	
Max. Angle	Set the upper and lower limits for the angle of this stage. You can turn this function on or off.
Min. Angle	
Advanced Setting	Max. Operation Time Set the upper and lower limits for the operation time of this stage. You can turn this function on or off.  Min. Operation Time Set the pause time after the set angle is reached. After the operation for this stage ends, the system does not enter the next stage until the pause time has elapsed. (0: disable the function)  Pause Time Acceleration Time Adjust the acceleration time of this stage.  Angle Range for Prevail Torque Calculation Set the angle range for which you want to calculate the average torque. For example, if the total rotation angle in this stage is 1000°, and the Angle Range for Prevail Torque Calculation is set as 70%, then the average torque of the last 700° in this stage is automatically calculated during the tightening process.

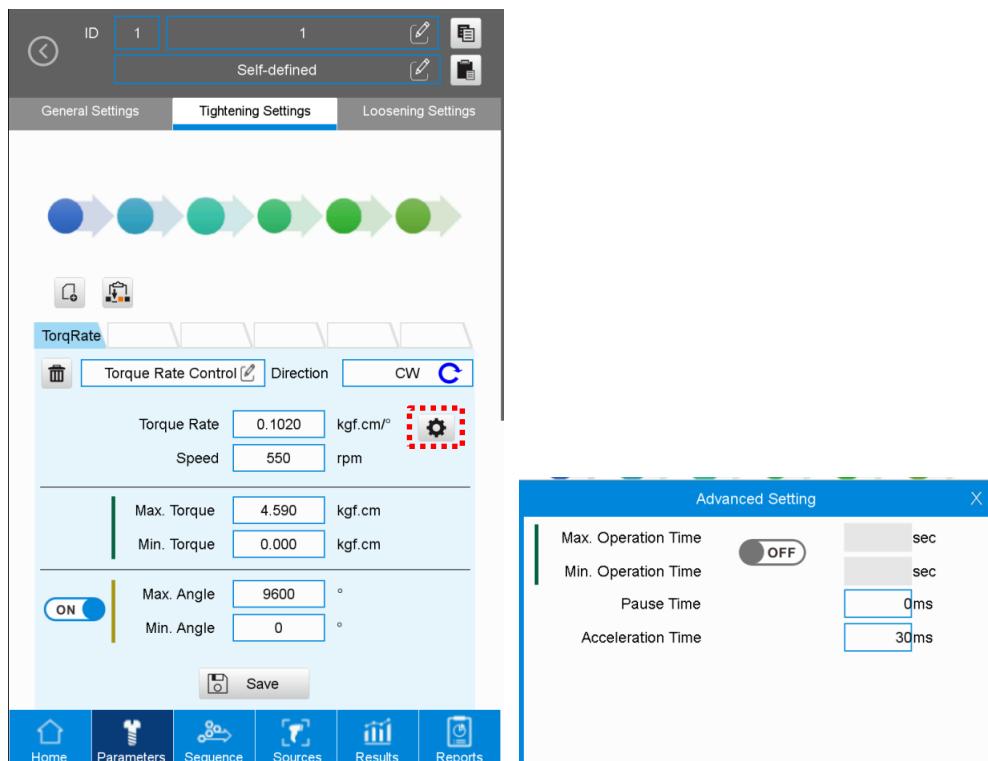
B. Torque Control: when tightening, the tool stops after the specified torque is reached.

5



Item	Function description																														
Torque	After the set torque is reached, the operation for this stage ends.																														
Speed	Set the operation speed of this stage.																														
Max. Torque	Refer to Section 5.3.2.4 for the Angle Control under Self-defined strategy.																														
Min. Torque																															
Max. Angle																															
Min. Angle																															
Advanced Setting	<table border="1"> <tr> <td>Max. Operation Time</td> <td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td> </tr> <tr> <td>Min. Operation Time</td> <td></td> </tr> <tr> <td>Hold Time</td> <td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td> </tr> <tr> <td>Pause Time</td> <td>After the set torque is reached, the tool stops for a period of time to release stress.</td> </tr> <tr> <td>Acceleration Time</td> <td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td> </tr> <tr> <td>Link to Prevail Torque</td> <td>Link to the prevail torque saved in different tightening parameters to compensate the final torque in this stage. You can turn this function on or off.</td> </tr> <tr> <td>Max. Clamp Torque</td> <td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td> </tr> <tr> <td>Min. Clamp Torque</td> <td></td> </tr> <tr> <td>Max. Clamp Angle</td> <td></td> </tr> <tr> <td>Min. Clamp Angle</td> <td></td> </tr> <tr> <td>Two-stage mode</td> <td> <table border="1"> <tr> <td>Torque of 1st Stage</td> <td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td> </tr> <tr> <td>Pause Time after 1st Stage</td> <td></td> </tr> <tr> <td>Acc. Time of 2nd Stage</td> <td></td> </tr> <tr> <td>Speed of 2nd Stage</td> <td></td> </tr> </table> </td> </tr> </table>	Max. Operation Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Min. Operation Time		Hold Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Pause Time	After the set torque is reached, the tool stops for a period of time to release stress.	Acceleration Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Link to Prevail Torque	Link to the prevail torque saved in different tightening parameters to compensate the final torque in this stage. You can turn this function on or off.	Max. Clamp Torque	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Min. Clamp Torque		Max. Clamp Angle		Min. Clamp Angle		Two-stage mode	<table border="1"> <tr> <td>Torque of 1st Stage</td> <td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td> </tr> <tr> <td>Pause Time after 1st Stage</td> <td></td> </tr> <tr> <td>Acc. Time of 2nd Stage</td> <td></td> </tr> <tr> <td>Speed of 2nd Stage</td> <td></td> </tr> </table>	Torque of 1st Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Pause Time after 1st Stage		Acc. Time of 2nd Stage		Speed of 2nd Stage	
Max. Operation Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																														
Min. Operation Time																															
Hold Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																														
Pause Time	After the set torque is reached, the tool stops for a period of time to release stress.																														
Acceleration Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																														
Link to Prevail Torque	Link to the prevail torque saved in different tightening parameters to compensate the final torque in this stage. You can turn this function on or off.																														
Max. Clamp Torque	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																														
Min. Clamp Torque																															
Max. Clamp Angle																															
Min. Clamp Angle																															
Two-stage mode	<table border="1"> <tr> <td>Torque of 1st Stage</td> <td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td> </tr> <tr> <td>Pause Time after 1st Stage</td> <td></td> </tr> <tr> <td>Acc. Time of 2nd Stage</td> <td></td> </tr> <tr> <td>Speed of 2nd Stage</td> <td></td> </tr> </table>	Torque of 1st Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Pause Time after 1st Stage		Acc. Time of 2nd Stage		Speed of 2nd Stage																							
Torque of 1st Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																														
Pause Time after 1st Stage																															
Acc. Time of 2nd Stage																															
Speed of 2nd Stage																															

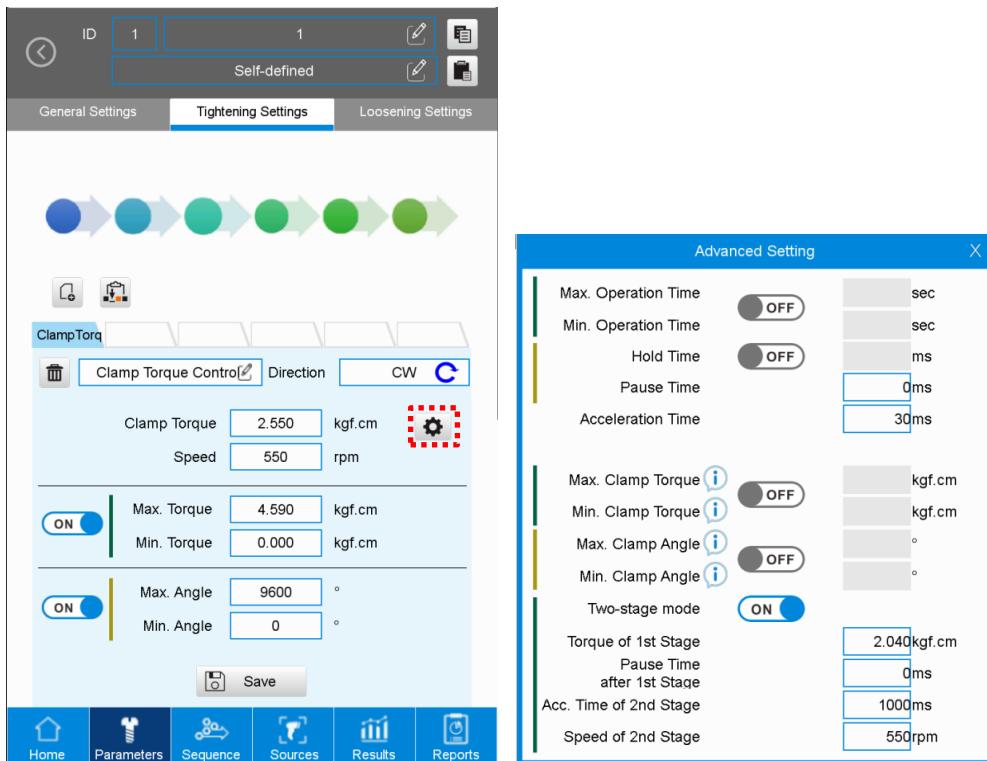
- C. Torque Rate Control: when tightening, the tool stops after the specified torque rate is reached.



Item	Function description
Torque Rate	After the set torque rate is reached, the operation for this stage ends.
Speed	Set the operation speed of this stage.
Max. Torque	
Min. Torque	
Max. Angle	Refer to Section 5.3.2.4 for the Angle Control under Self-defined strategy.
Min. Angle	
Max. Operation Time	
Min. Operation Time	
Pause Time	After the set torque rate is reached, the tool stops for a period of time to release stress.
Acceleration Time	Refer to Section 5.3.2.4 for the Angle Control under Self-defined strategy.

D. Clamp Torque Control: when tightening, the tool stops after the relative torque is reached.

5



Item	Function description																												
Clamp Torque	Set a relative torque, and after the torque value is reached, the operation for this stage ends. <ul style="list-style-type: none"> <li>When the previous stage is in Torque Rate Control: Relative torque = (Final torque) - (Torque when snug point is reached)</li> <li>When the previous stage is not in Torque Rate Control: Relative torque = (Final torque) - (Torque of the previous stage)</li> <li>If this is the first stage, set the Clamp Torque to the target torque, which must not exceed the Max. Torque of this stage.</li> </ul>																												
Speed	Set the operation speed of this stage.																												
Max. Torque	Refer to Section 5.3.2.4 for the Angle Control under Self-defined strategy.																												
Min. Torque	Refer to Section 5.3.2.4 for the Angle Control under Self-defined strategy.																												
Max. Angle	Refer to Section 5.3.2.4 for the Angle Control under Self-defined strategy.																												
Min. Angle	Refer to Section 5.3.2.4 for the Angle Control under Self-defined strategy.																												
Advanced Setting	<table border="1"> <tr> <td>Max. Operation Time</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Min. Operation Time</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Hold Time</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Pause Time</td><td>Refer to Section 5.3.2.4 for the Torque Control under Self-defined strategy.</td></tr> <tr> <td>Acceleration Time</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Max. Clamp Torque</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Min. Clamp Torque</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Max. Clamp Angle</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Min. Clamp Angle</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Two-stage mode</td><td> <table border="1"> <tr> <td>Torque of 1st Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Pause Time after 1st Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Acc. Time of 2nd Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Speed of 2nd Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> </table> </td></tr> </table>	Max. Operation Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Min. Operation Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Hold Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Pause Time	Refer to Section 5.3.2.4 for the Torque Control under Self-defined strategy.	Acceleration Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Max. Clamp Torque	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Min. Clamp Torque	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Max. Clamp Angle	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Min. Clamp Angle	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Two-stage mode	<table border="1"> <tr> <td>Torque of 1st Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Pause Time after 1st Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Acc. Time of 2nd Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Speed of 2nd Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> </table>	Torque of 1st Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Pause Time after 1st Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Acc. Time of 2nd Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Speed of 2nd Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.
Max. Operation Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Min. Operation Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Hold Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Pause Time	Refer to Section 5.3.2.4 for the Torque Control under Self-defined strategy.																												
Acceleration Time	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Max. Clamp Torque	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Min. Clamp Torque	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Max. Clamp Angle	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Min. Clamp Angle	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Two-stage mode	<table border="1"> <tr> <td>Torque of 1st Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Pause Time after 1st Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Acc. Time of 2nd Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> <tr> <td>Speed of 2nd Stage</td><td>Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.</td></tr> </table>	Torque of 1st Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Pause Time after 1st Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Acc. Time of 2nd Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.	Speed of 2nd Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																				
Torque of 1st Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Pause Time after 1st Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Acc. Time of 2nd Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												
Speed of 2nd Stage	Refer to Section 5.3.2.1 for the Tightening stage under Standard strategy.																												

E. Clamp Angle Control: when tightening, the tool stops after the relative angle is reached.

**Item**

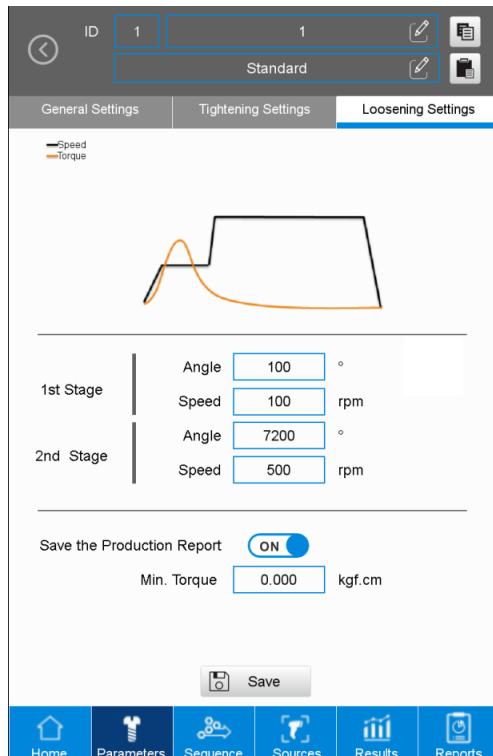
**Function description**

Clamp Angle	Set a relative angle, and after the angle value is reached, the operation for this stage ends.   - When the previous stage is in Torque Rate Control: Relative angle = (Final tightening angle) - (Angle when snug point is reached) - When the previous stage is not in Torque Rate Control: Relative angle = (Final tightening angle) - (Angle of the previous stage) - If this is the first stage, set the Clamp Angle to the target angle, which must not exceed the Max. Angle of this stage.	
Speed	Set the operation speed of this stage.	
Max. Torque		
Min. Torque		
Max. Angle		
Min. Angle		
Advanced Setting	Max. Operation Time	
Min. Operation Time		
Pause Time		
Acceleration Time		
Max. Clamp Torque		
Min. Clamp Torque		
Max. Clamp Angle		
Min. Clamp Angle		

### 5.3.3 Loosening settings

The screen of the **Loosening Settings** tab is the same (except the curve graphs) for all tightening strategies. In this tab, you can set the loosening parameters of two stages.

This section takes the Loosening Settings screen of Standard strategy as an example.



Item		Function description
1st Stage	Angle	After the set angle is reached, the system switches to the second stage. The angle set for this stage must be sufficient for the screwdriver to remove the screw properly.
	Speed	The torque in the 1 <sup>st</sup> stage is higher than that in the 2 <sup>nd</sup> Stage, so the speed should not be set too high. The default speed is 100 rpm.
2nd Stage	Angle	Set a fixed reverse angle, and the loosening operation automatically stops when the set angle is reached. Note: the system regards that the loosening operation has ended when the set angle is reached or the servo screwdriver is withdrawn during the loosening process.
	Speed	This can be set higher than the speed of the 1 <sup>st</sup> stage, but should not exceed the max. speed for the tool. The default value is 70% of the tool max. speed.
Save the Production Report	Save the result of loosening operation, which can be checked in the <b>Reports</b> page.	
Min. Torque	Set the lower limit of the torque for this stage. You can turn this function on or off.	For identifying whether the screw is properly loosened. When the actual torque is lower than this torque setting, it triggers an alarm.

## 5.4 Save a tightening parameter

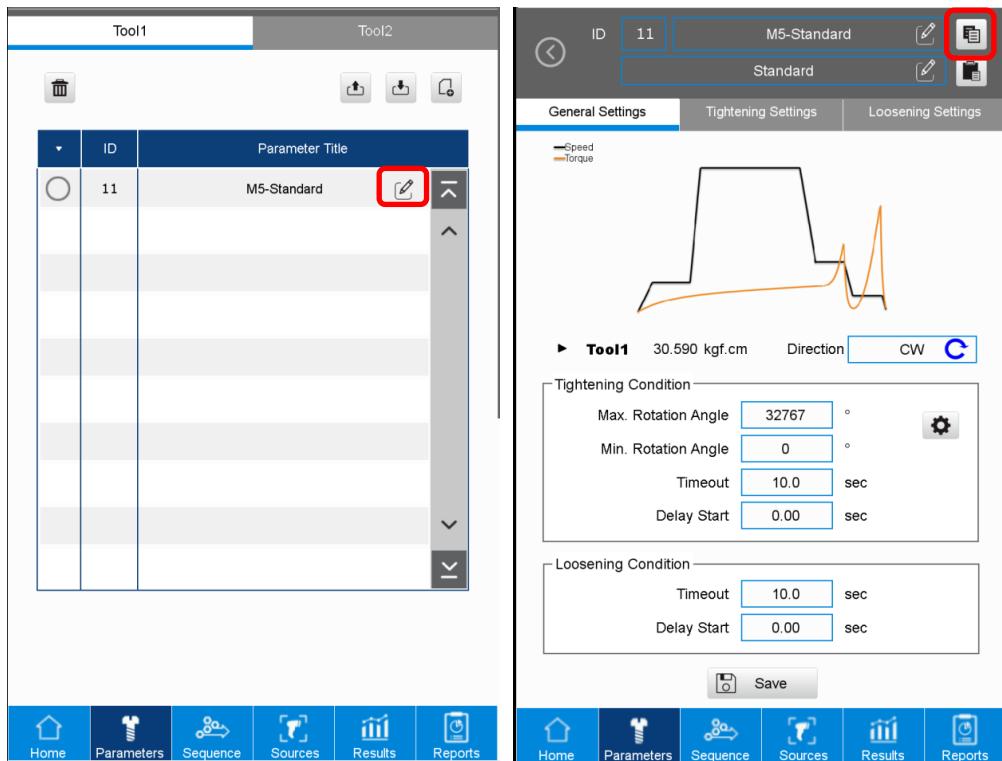
The **Save** button is available in the following situations:

1. After creating a tightening parameter and completing the settings.
2. After modifying an existing tightening parameter.
3. If you have edited a running tightening parameter and then you click **Save**, the **Results** page refreshes the tightening parameter contents.

## 5.5 Copy / paste a tightening parameter

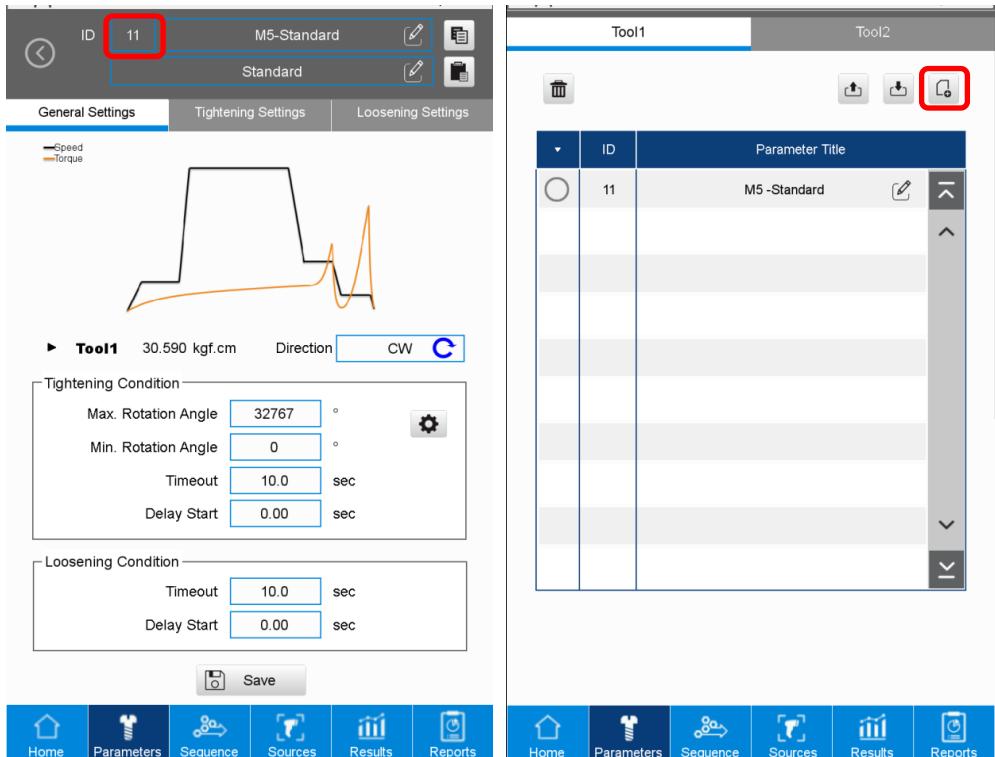
The system provides the **Copy** (  ) and **Paste** (  ) functions for editing the tightening parameters more efficiently. The following example illustrates the operation steps.

1. Click the  button to the right of the parameter title to enter the parameter editing screen, and then click  to copy the contents of the tightening parameter.

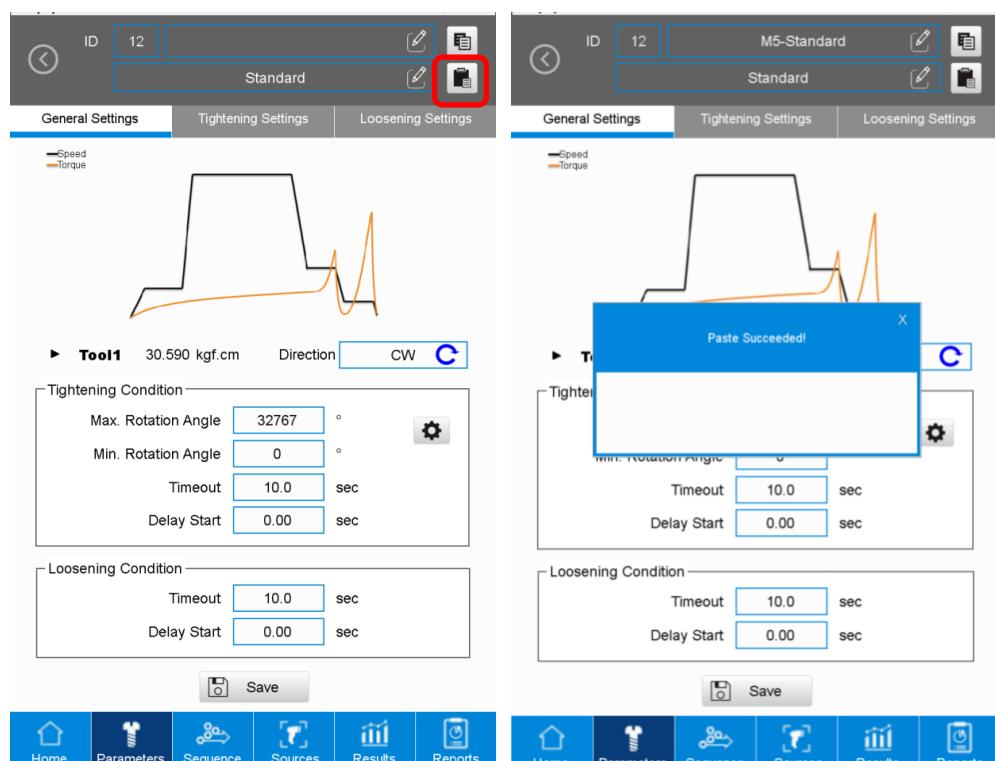


2. Click the ID field to return to the parameter list, and then click  to create a new tightening parameter.

5

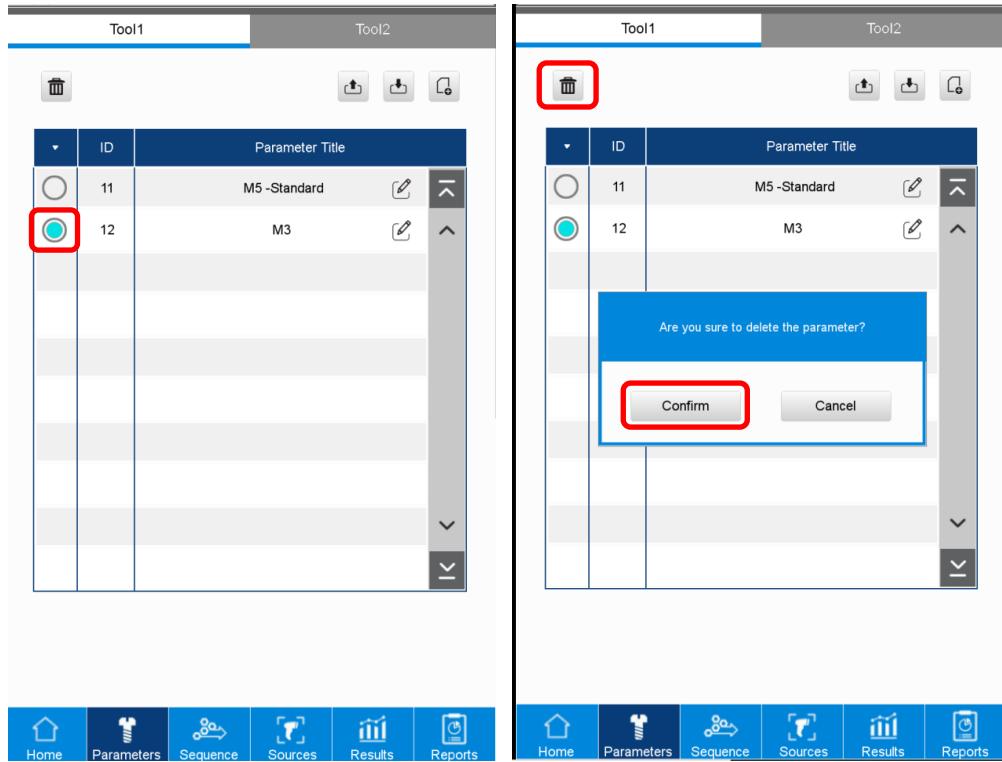


3. Enter the editing screen of the newly created parameter. Click  to paste the copied contents, and the screen displays a window showing pasting successful.



## 5.6 Delete a tightening parameter

In the parameter list, click the radio button to the left of the parameter, click  , and then click **Confirm** in the confirmation window to delete the parameter.

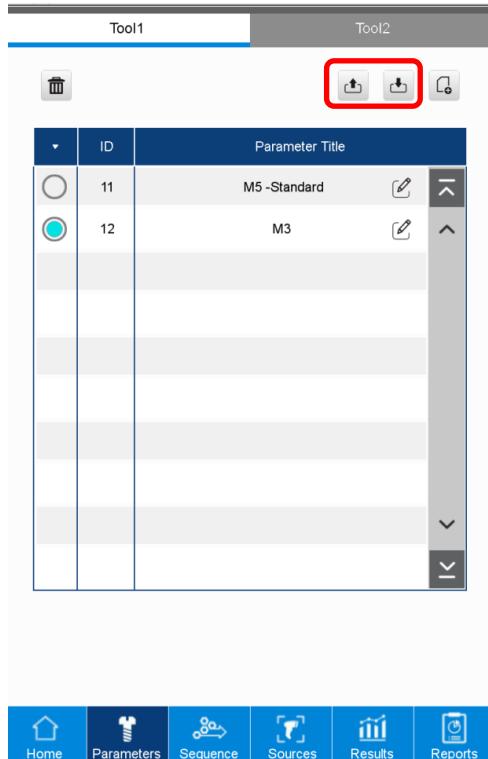


5

## 5.7 Export / import a tightening parameter

You can use a USB flash drive with the export (  ) and import (  ) functions for data backup and management.

5



# Sequence (Tightening sequence)

---

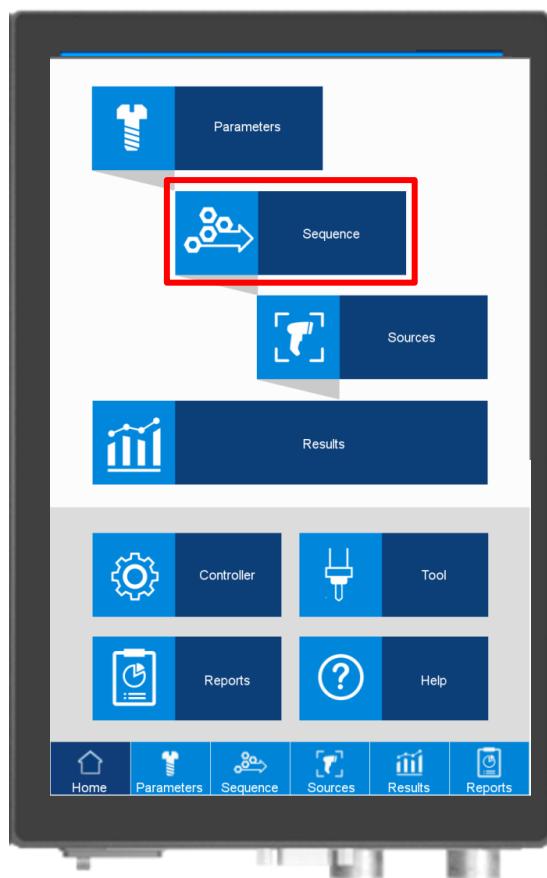
# 6

This chapter introduces the **Sequence** page of the smart screwdriving controller. You can create the screw tightening sequences for different tightening requirements, and export data to / import data from the USB flash drive.

6.1	Sequence page overview .....	6-2
6.2	Create a tightening sequence .....	6-4
6.3	Save a tightening sequence.....	6-8
6.4	Copy / paste a tightening sequence.....	6-9
6.5	Delete a tightening sequence.....	6-11
6.6	Export / import a tightening sequence .....	6-12

## 6.1 Sequence page overview

6



You can create and configure the tightening sequences in the **Sequence** page. Up to 500 sets of tightening sequences can be created; each set can store a maximum of 100 tightening parameters.

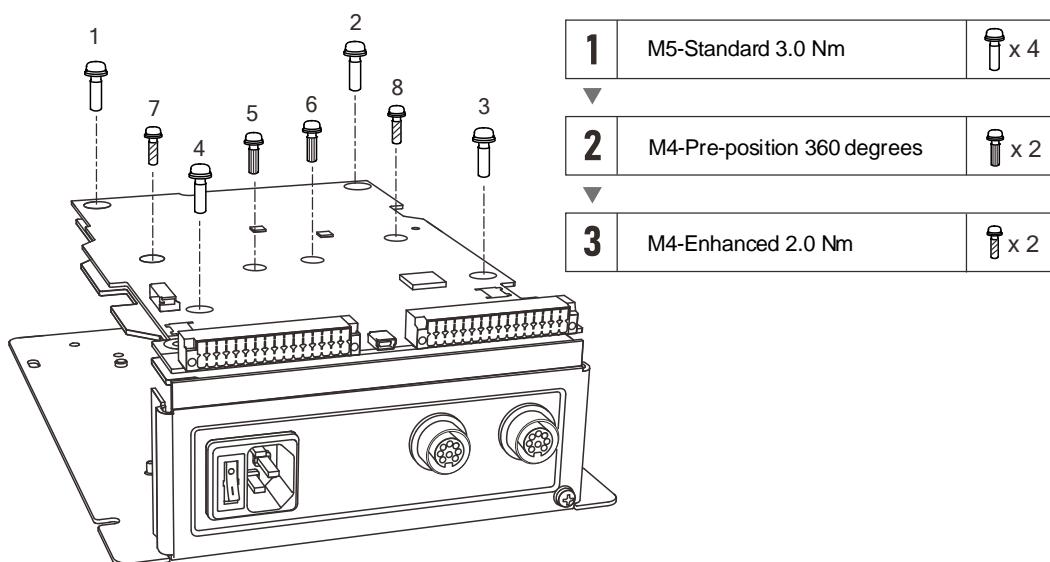
The **Sequence** page displays the ID, Mode, and Sequence Title fields, and the content of the Mode field indicates the combination of tool parameters in the tightening sequence.

- Tool 1: the tightening sequence simply includes the tightening parameters of Tool 1.
- Tool 2: the tightening sequence simply includes the tightening parameters of Tool 2.
- Mix: the tightening sequence includes the tightening parameters of both Tool 1 and Tool 2.

The example of screw tightening with a tightening sequence is as follows:

ID	Mode	Sequence Title
1	Tool1	ControllerA
2	Tool2	ControllerB
3	Mix	ControllerC

ID	Tool	Parameter Title	Qty.	Bit ID
1	Tool1	M5-Standard3.0Nm	4	0
2	Tool1	M4-PrePosition360	2	0
3	Tool1	M4-Enhance2.0Nm	2	0



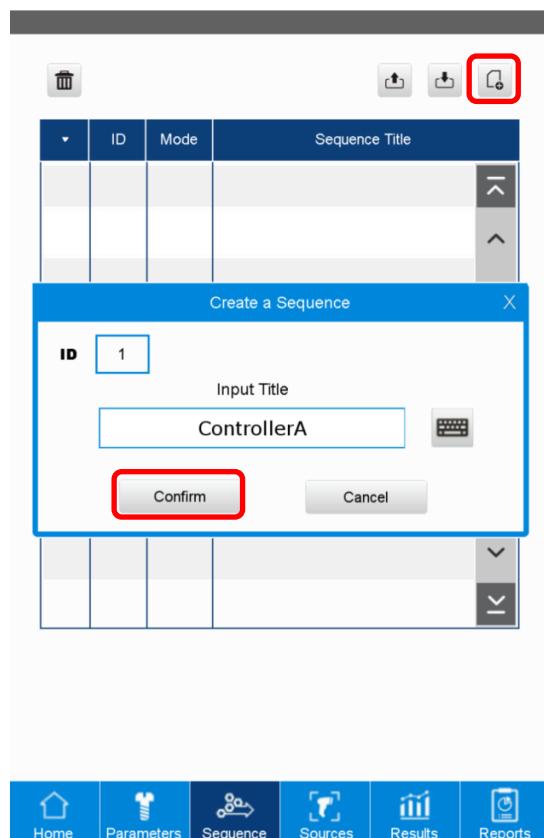
## 6.2 Create a tightening sequence

Each tightening sequence can configure a maximum of 100 sets of tightening parameters.

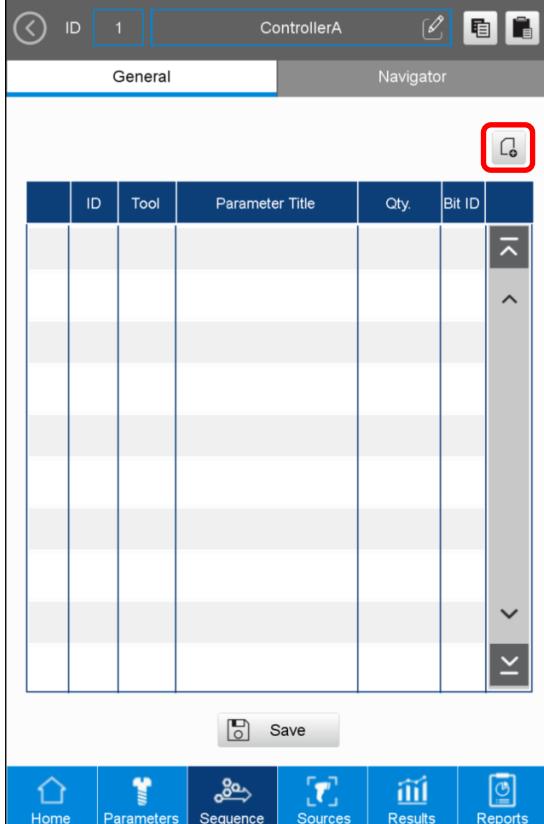
Steps for creating a tightening sequence are detailed as follows:

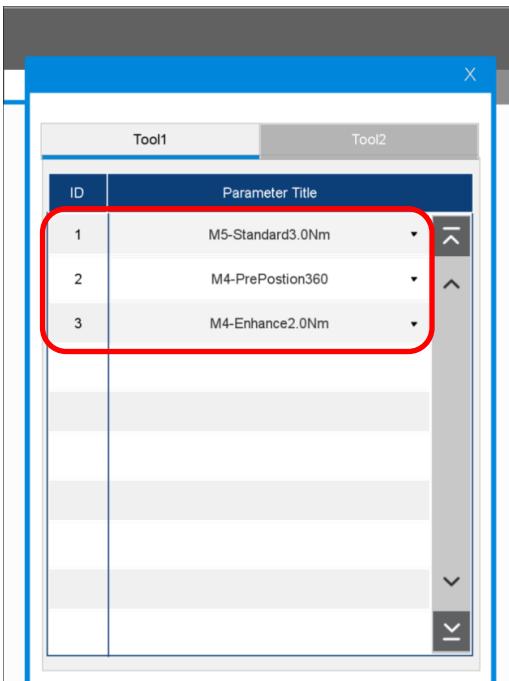
6

1. Click , input the title of the tightening sequence, and then click **Confirm**.



2. After entering the tightening sequence configuration screen, click  to show the list of all tightening parameters. Click the desired parameter to add it to the configuration screen.

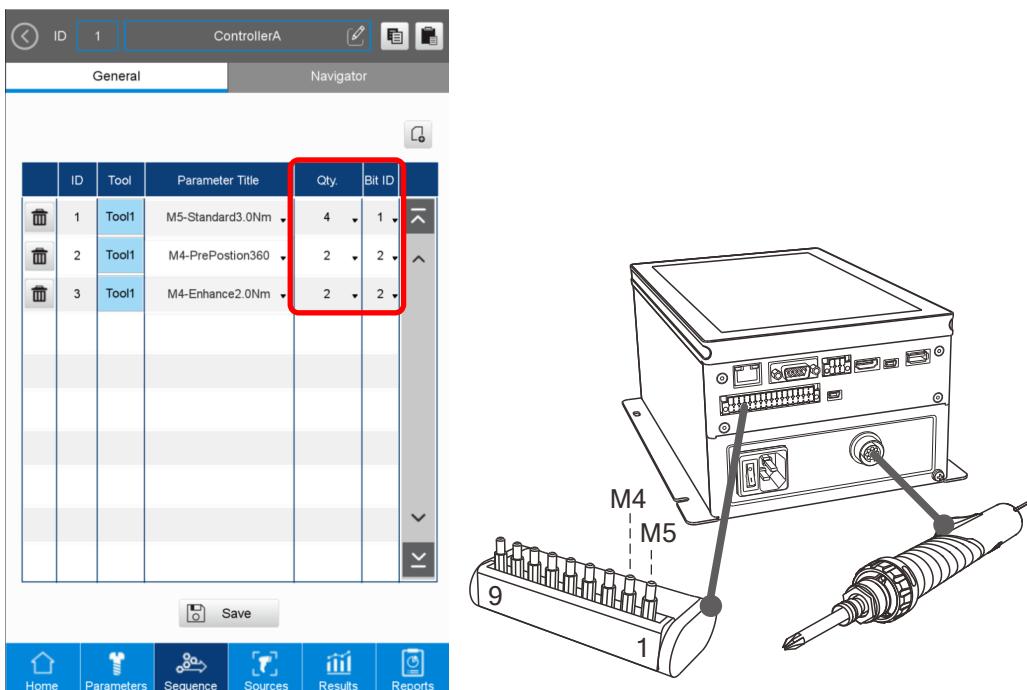
6




ID	Tool	Parameter Title	Qty.	Bit ID
1	Tool1	M5-Standard3.0Nm	0	0
2	Tool1	M4-PrePosition360	0	0
3	Tool1	M4-Enhance2.0Nm	0	0

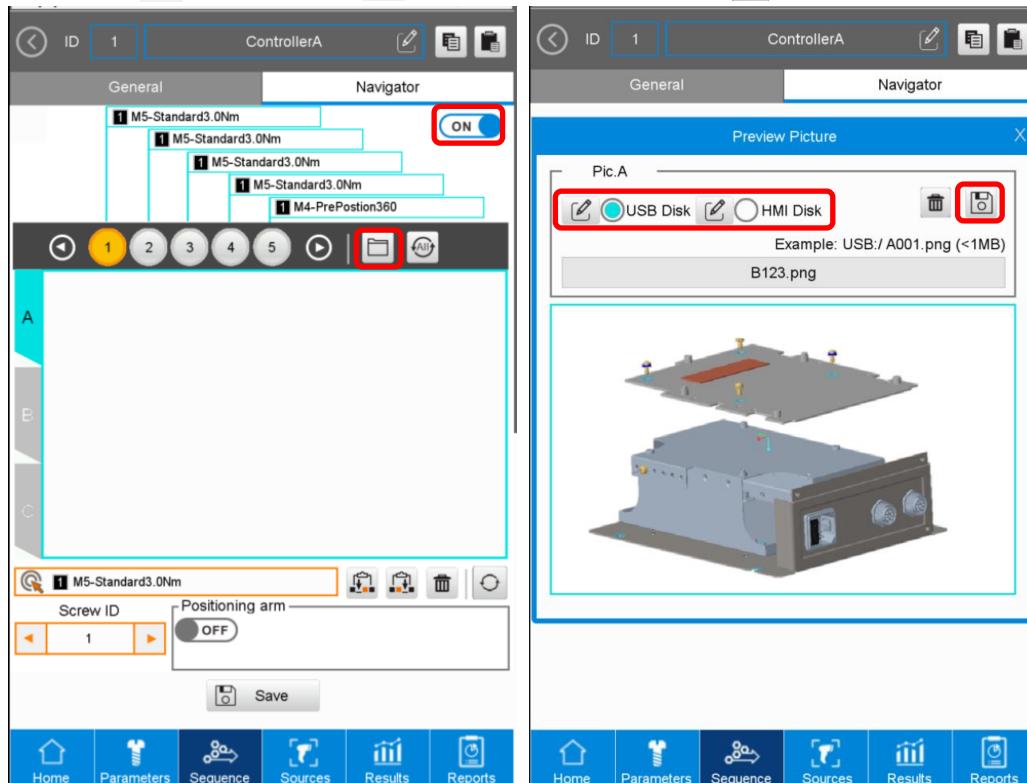
3. Set the fields of Qty. (the number of times to execute this parameter) and Bit ID (the corresponding bit ID number, 0: no corresponding bit) for each tightening parameter.

6

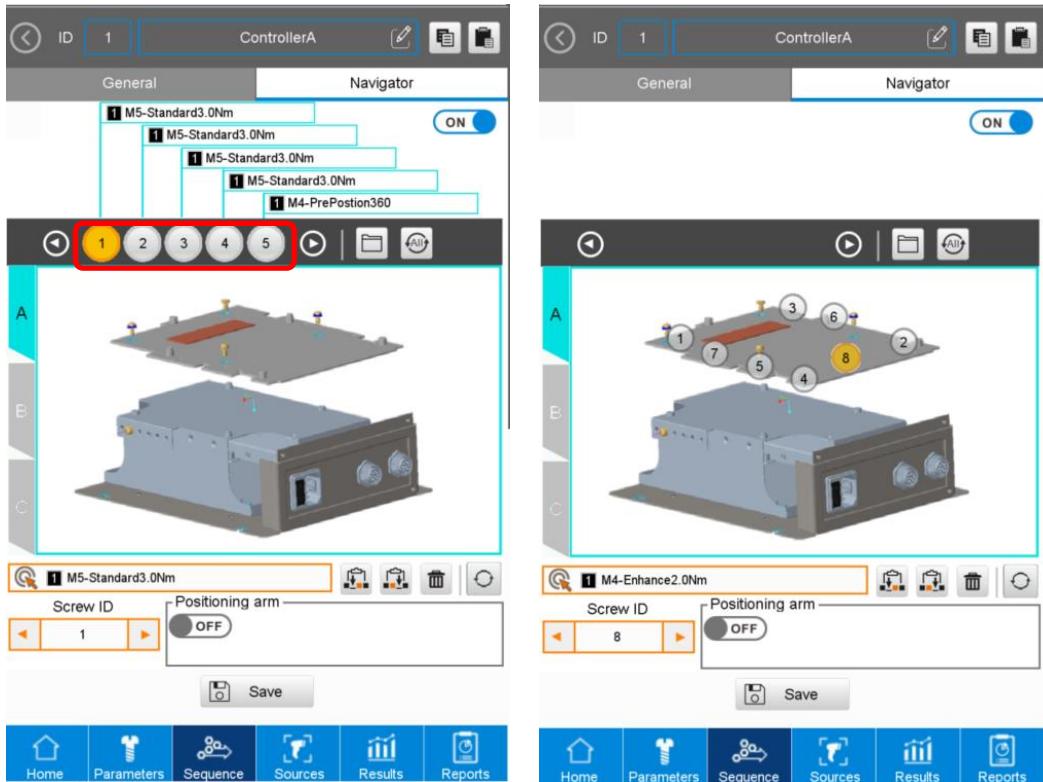


4. Go to the **Navigator** tab. This optional function supports PNG or JPG image files with the size no more than 1 MB.

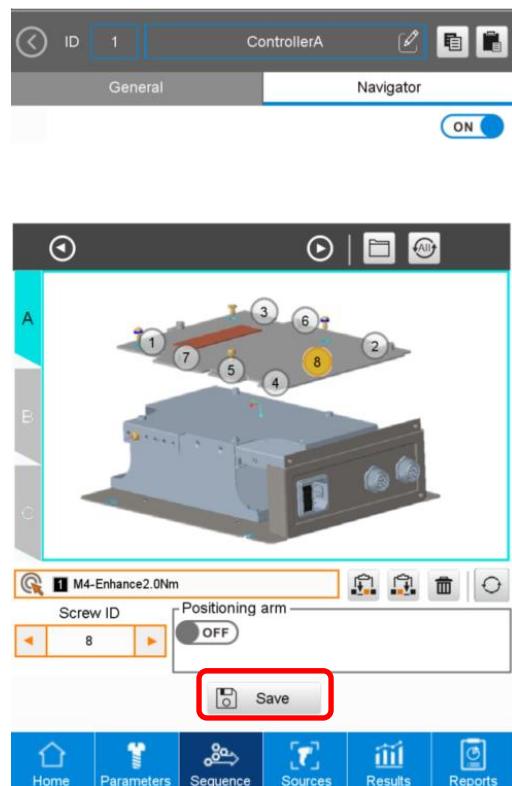
Click to open the Preview Picture window. Then, select an image from the USB flash drive or the HMI internal memory (need to load images to the HMI through FTP in advance) by clicking **USB Disk** or **HMI Disk**. And then, click to save the image.



5. Drag the screw IDs to the desired positions on the image.



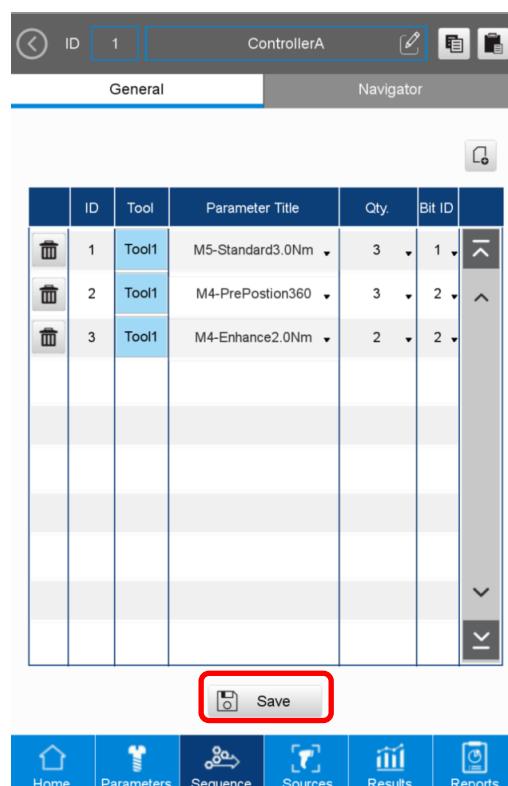
6. Click **Save** to save the settings.



## 6.3 Save a tightening sequence

The **Save** button in the tightening sequence configuration screen is available in the following situations:

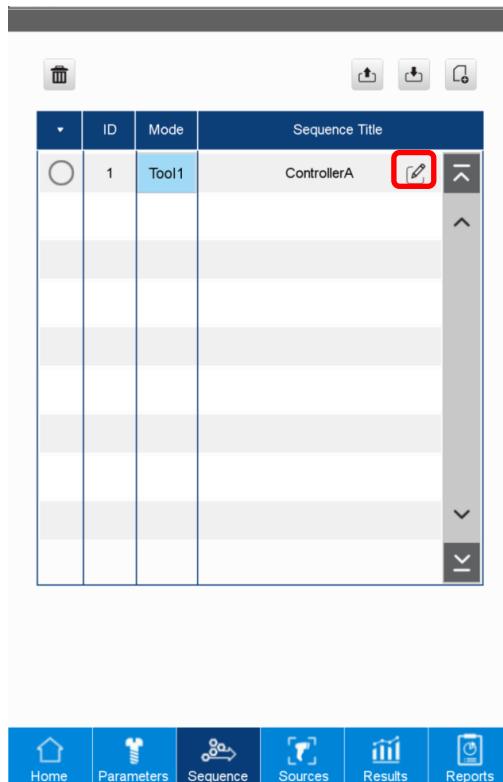
- After creating a tightening sequence and completing the settings.
- After modifying an existing tightening sequence.
- If you have edited a running tightening sequence and then you click **Save**, the **Results** page refreshes the tightening sequence contents and resets the total screw quantity, parameter quantity, and screw quantity of the parameter.



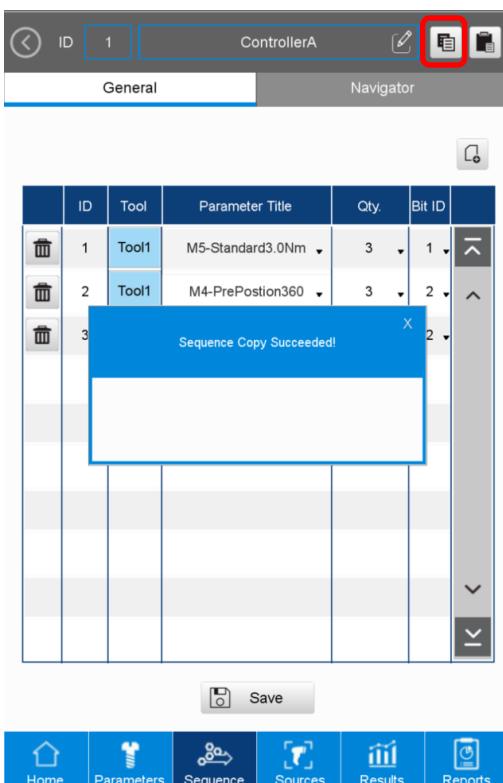
## 6.4 Copy / paste a tightening sequence

The system provides the Copy (  ) and Paste (  ) functions for editing the tightening sequences more efficiently. The following examples illustrate the operation steps.

1. Click the  button to the right of the sequence title.



2. Click  to copy the contents of the selected tightening sequence.



6

3. Click the ID field to return to the list of tightening sequences, and then click to create a new tightening sequence and input a sequence title.

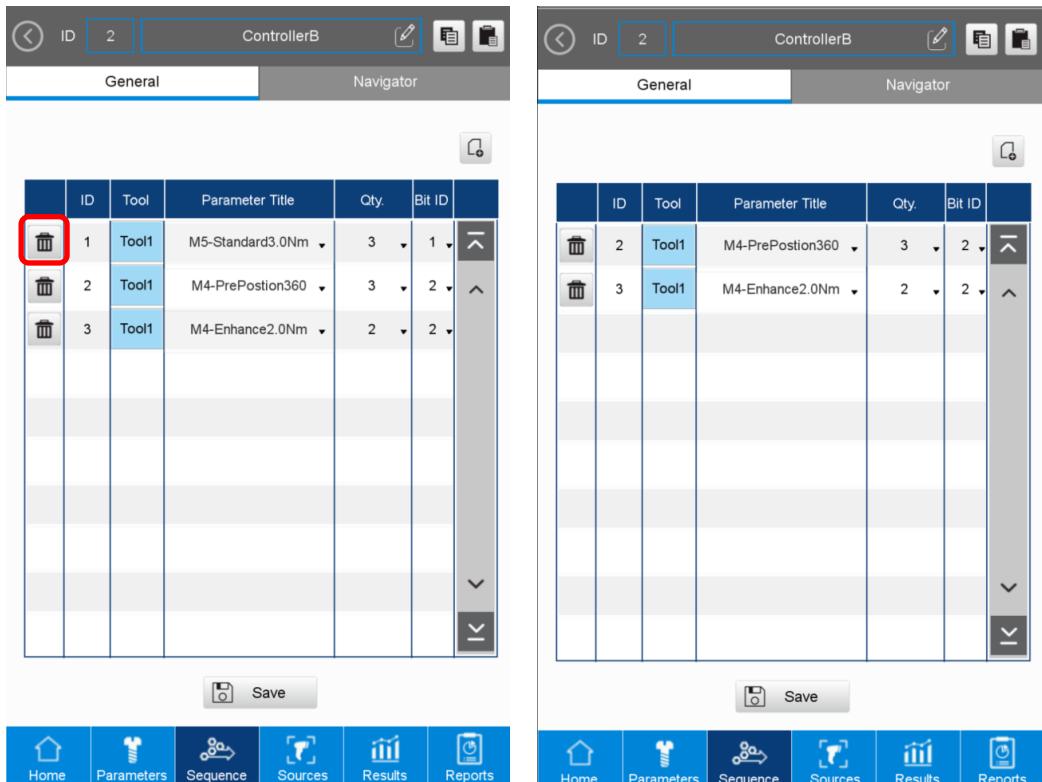
ID	Mode	Sequence Title
1	Tool1	ControllerA
2	Tool1	
3	Tool1	

4. Click the button to the right of the newly created tightening sequence. Then, click to paste the copied contents in the configuration screen of the new sequence, and then click **Save**.

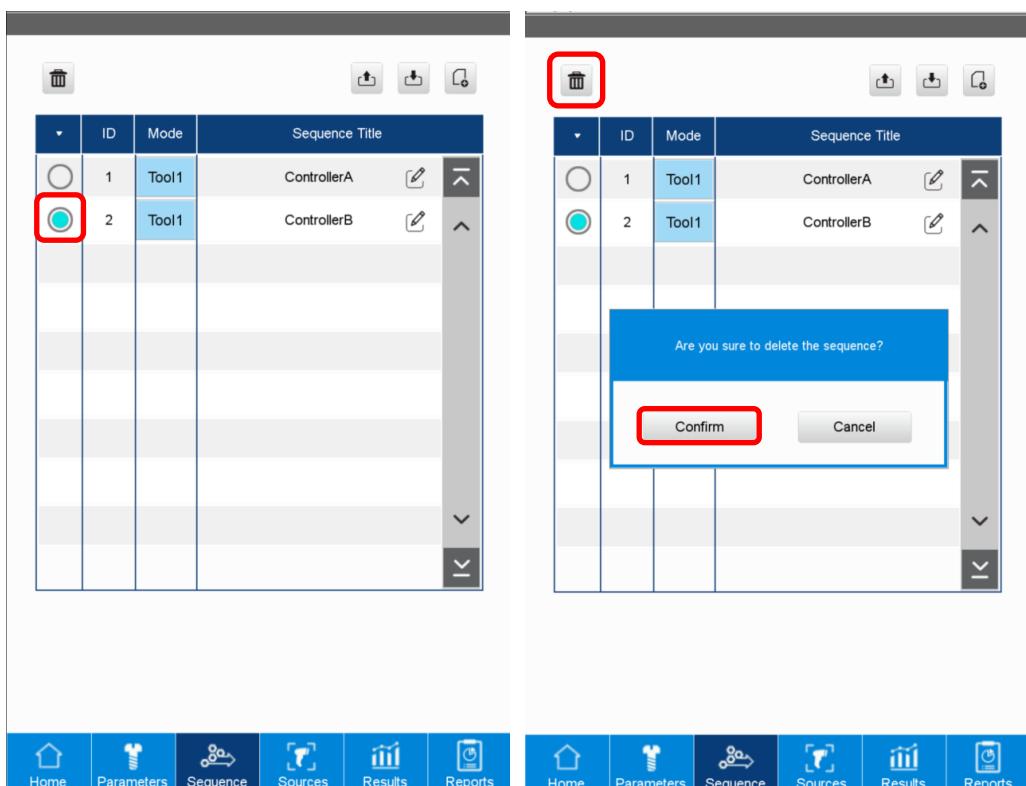
ID	Tool	Parameter Title	Qty.	Bit ID
1	Tool1	M5-Standard3.0Nm	3	1
2	Tool1	M4-PrePostion360	3	2
3	Tool1	M4-Enhance2.0Nm	2	2

## 6.5 Delete a tightening sequence

- To delete a single parameter in the tightening sequence, click the  button to the left of the specific parameter.



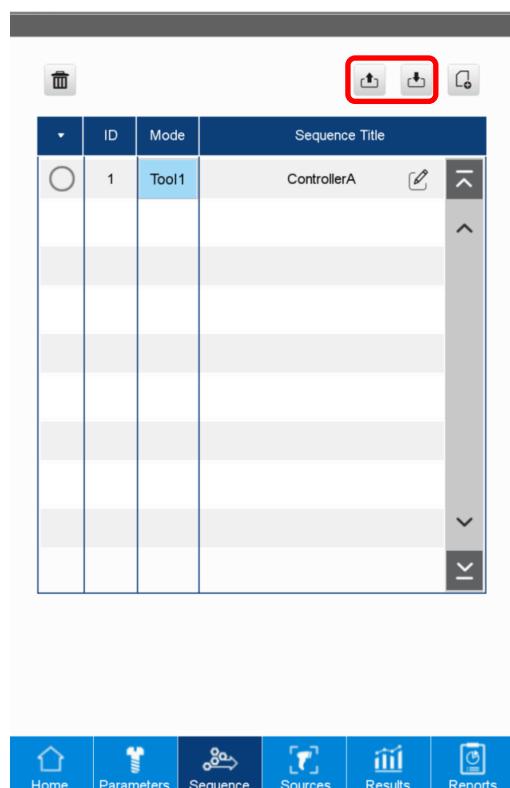
- To delete the entire set of tightening sequence, click the radio button on the left, click , and then click **Confirm** in the confirmation window.



## 6.6 Export / import a tightening sequence

You can use a USB flash drive with the export (  ) and import (  ) functions for data backup and management.

6



# Sources (Tightening source)

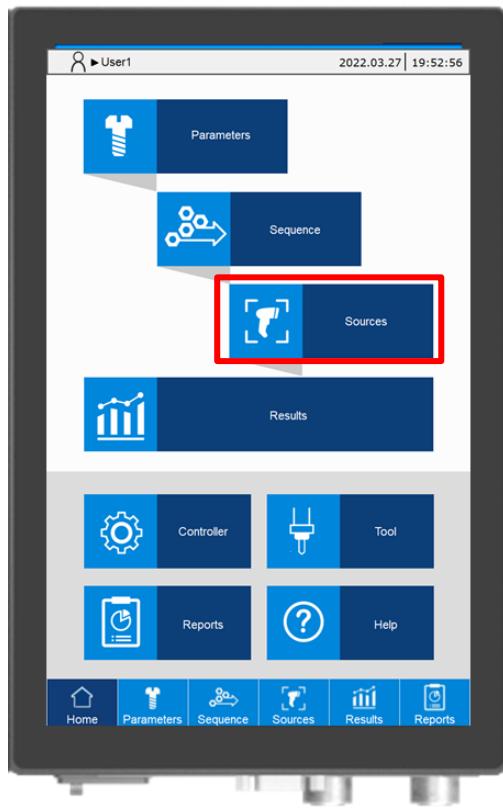
7

---

This chapter introduces the **Sources** page of the smart screwdriving controller. You can specify the operating mode of the system, and choose the switching method, which allows you to manually set or use the screw bit selector or the barcode scanner to call the tightening source (tightening parameters or tightening sequence) for execution.

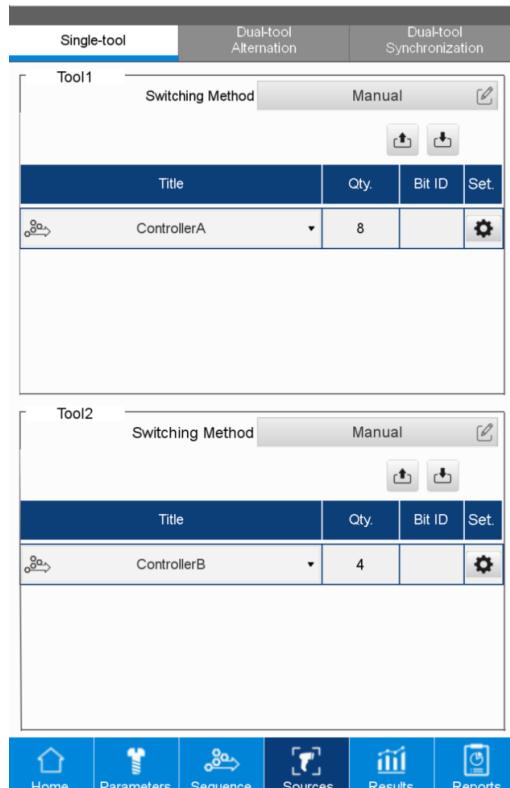
7.1	Operating mode .....	7-2
7.2	Switching Method .....	7-4
7.2.1	Manual (Manual setting) .....	7-5
7.2.2	Screw Bit Selector.....	7-7
7.2.3	Barcode Scanner.....	7-8
7.3	Copy / paste a tightening source .....	7-9
7.4	Delete a tightening source .....	7-11
7.5	Export / import a tightening source .....	7-12

## 7.1 Operating mode

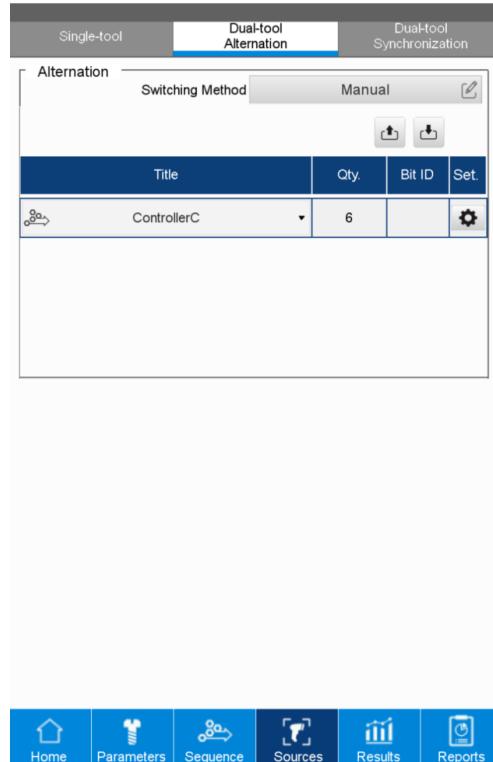


In the **Sources** page, set the operating mode of the system to one of the following:

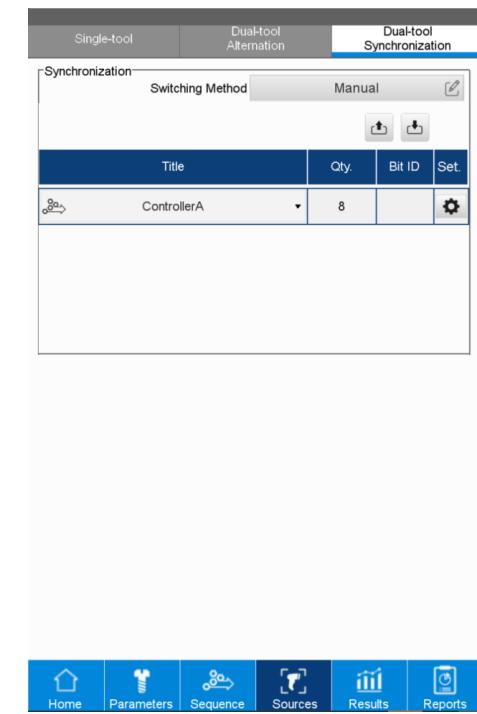
- Single-tool: set the tightening source for Tool 1 and Tool 2 separately. The two tools operate independently.



- Dual-tool Alternation: select the tightening sequence which includes tightening parameters of both Tool 1 and Tool 2. The two tools operate alternately according to the configuration of the sequence.



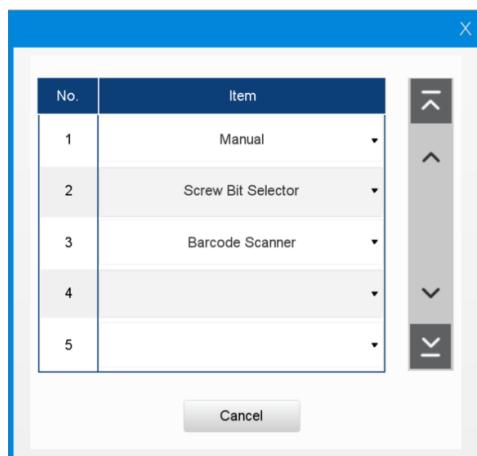
- Dual-tool Synchronization: select any of the tightening sources. The two tools operate synchronously according to the configuration of the tightening source.



## 7.2 Switching Method

In each operating mode, choose one of the following methods to switch the tightening source.

- Manual (Manual setting): manually specify the tightening source to be operated.
- Screw Bit Selector: pick up the screw bit to switch to the corresponding tightening source.
- Barcode Scanner: scan the barcode to switch to the corresponding tightening source.

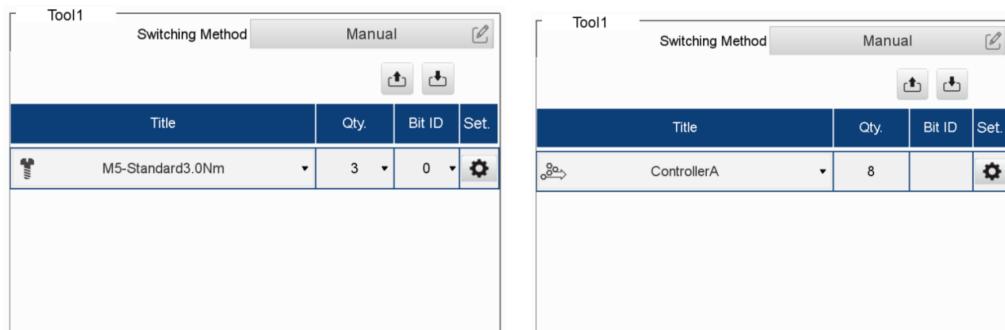


### 7.2.1 Manual (Manual setting)

When you set the Switching Method to **Manual**, follow these steps.

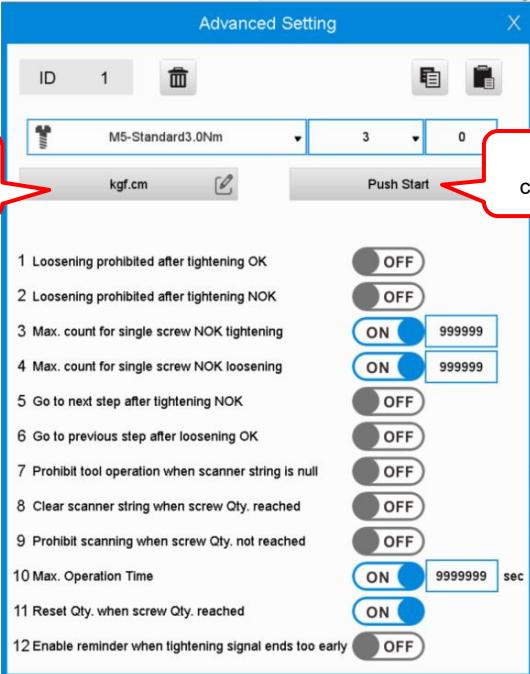
1. Click the ▾ button to the right of the Title field and select one tightening source at a time for operation.
2. Set the operating conditions of the tightening source. Refer to the following table.

7



Item	Description	
Title	Select a tightening parameter. 	Select a tightening sequence. 
Qty.	Set the number of times to execute the parameter.	Displays the total screw quantity required for the tightening sequence.
Bit ID	Set the corresponding bit ID number (0: no corresponding bit).	Displays the corresponding bit ID number set in the tightening sequence.

7

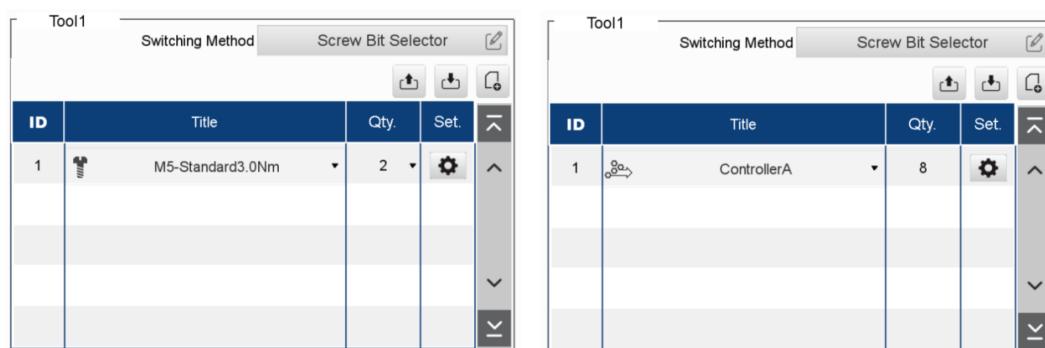
Item	Description																														
	<p>The advanced setting for the operating conditions.</p>  <p>Torque unit</p> <p>Start condition</p> <p>1 Loosening prohibited after tightening OK 2 Loosening prohibited after tightening NOK 3 Max. count for single screw NOK tightening 4 Max. count for single screw NOK loosening 5 Go to next step after tightening NOK 6 Go to previous step after loosening OK 7 Prohibit tool operation when scanner string is null 8 Clear scanner string when screw Qty. reached 9 Prohibit scanning when screw Qty. not reached 10 Max. Operation Time 11 Reset Qty. when screw Qty. reached 12 Enable reminder when tightening signal ends too early</p>																														
Set.	<table border="1"> <thead> <tr> <th>Item</th><th>Description</th></tr> </thead> <tbody> <tr> <td>Torque unit</td><td>N.m, kgf.cm, lbf.ft, lbf.in, ozf.ft, ozf.in, cNm</td></tr> <tr> <td>Start condition</td><td>Push Start, DI, Lever Start, Push Start or Lever Start, Push Start and Lever Start</td></tr> <tr> <td>Loosening prohibited after tightening OK</td><td>Protection condition switch</td></tr> <tr> <td>Loosening prohibited after tightening NOK</td><td>Protection condition switch</td></tr> <tr> <td>Max. count for single screw NOK tightening</td><td>Protection condition switch with the maximum count setting</td></tr> <tr> <td>Max. count for single screw NOK loosening</td><td>Protection condition switch with the maximum count setting</td></tr> <tr> <td>Go to next step after tightening NOK</td><td>Function switch</td></tr> <tr> <td>Go to previous step after loosening OK</td><td>Function switch</td></tr> <tr> <td>Prohibit tool operation when scanner string is null</td><td>Protection condition switch</td></tr> <tr> <td>Clear scanner string when screw Qty. reached</td><td>Function switch</td></tr> <tr> <td>Prohibit scanning when screw Qty. not reached</td><td>Function switch</td></tr> <tr> <td>Max. Operation Time</td><td>Protection condition switch with the maximum setting of the total operation time in units of seconds</td></tr> <tr> <td>Reset Qty. when screw Qty. reached</td><td>Function switch</td></tr> <tr> <td>Enable reminder when tightening signal ends too early</td><td>Function switch</td></tr> </tbody> </table>	Item	Description	Torque unit	N.m, kgf.cm, lbf.ft, lbf.in, ozf.ft, ozf.in, cNm	Start condition	Push Start, DI, Lever Start, Push Start or Lever Start, Push Start and Lever Start	Loosening prohibited after tightening OK	Protection condition switch	Loosening prohibited after tightening NOK	Protection condition switch	Max. count for single screw NOK tightening	Protection condition switch with the maximum count setting	Max. count for single screw NOK loosening	Protection condition switch with the maximum count setting	Go to next step after tightening NOK	Function switch	Go to previous step after loosening OK	Function switch	Prohibit tool operation when scanner string is null	Protection condition switch	Clear scanner string when screw Qty. reached	Function switch	Prohibit scanning when screw Qty. not reached	Function switch	Max. Operation Time	Protection condition switch with the maximum setting of the total operation time in units of seconds	Reset Qty. when screw Qty. reached	Function switch	Enable reminder when tightening signal ends too early	Function switch
Item	Description																														
Torque unit	N.m, kgf.cm, lbf.ft, lbf.in, ozf.ft, ozf.in, cNm																														
Start condition	Push Start, DI, Lever Start, Push Start or Lever Start, Push Start and Lever Start																														
Loosening prohibited after tightening OK	Protection condition switch																														
Loosening prohibited after tightening NOK	Protection condition switch																														
Max. count for single screw NOK tightening	Protection condition switch with the maximum count setting																														
Max. count for single screw NOK loosening	Protection condition switch with the maximum count setting																														
Go to next step after tightening NOK	Function switch																														
Go to previous step after loosening OK	Function switch																														
Prohibit tool operation when scanner string is null	Protection condition switch																														
Clear scanner string when screw Qty. reached	Function switch																														
Prohibit scanning when screw Qty. not reached	Function switch																														
Max. Operation Time	Protection condition switch with the maximum setting of the total operation time in units of seconds																														
Reset Qty. when screw Qty. reached	Function switch																														
Enable reminder when tightening signal ends too early	Function switch																														

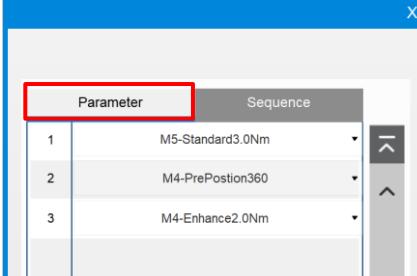
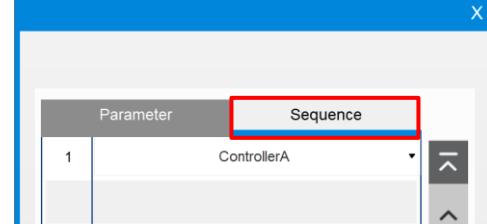
## 7.2.2 Screw Bit Selector

When you set the Switching Method to **Screw Bit Selector**, follow these steps.

1. Click  to specify a bit ID number.
2. Click the  button to the right of the Title field to select the tightening source to correspond to the bit ID number.
3. Set the operating conditions of the tightening source. Refer to the following table.
4. After completing the settings, when you pick up the bit from the screw bit selector, the system switches to the corresponding tightening source.

Note: the system switches the tightening source by referring to the Bit ID Output Table. Refer to Section 9.3 Peripheral Device.

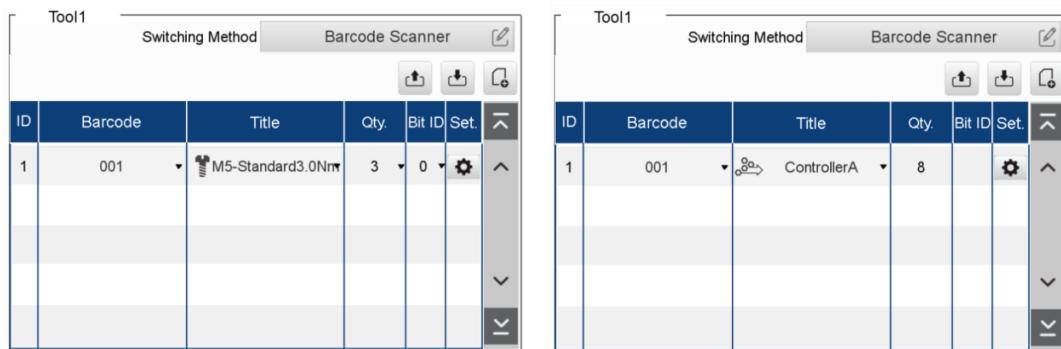


Item	Description	
ID	The bit ID number.	
Title	Select a tightening parameter. 	Select a tightening sequence.  Note: this window only shows the tightening sequences which include parameters set with the same bit ID.
Qty.	Set the number of screws required for the operation.	Displays the total screw quantity required for the tightening sequence.
Set.	The advanced setting for the operating conditions. Refer to the description in Section 7.2.1.	

### 7.2.3 Barcode Scanner

When you set the Switching Method to the **Barcode Scanner**, follow these steps.

1. Click to add an ID, and then click the button to the right of the Title field to select a tightening source.
2. Set the operating conditions for the tightening source. Refer to the following table.
3. After completing the settings, use the scanner to scan the barcode. The system then compares the string and switches to the corresponding tightening source.

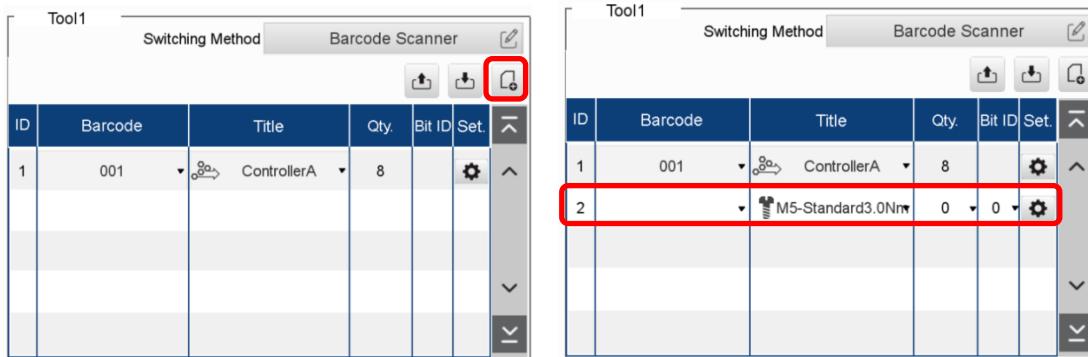


Item	Description	
ID	The sequential numbering of the tightening source in the list.	
Barcode	Set the barcode string corresponding to the tightening source.	
Title	Select a tightening parameter. 	Select a tightening sequence. 
Qty.	Set the number of screws required for the operation.	Displays the total screw quantity required for the tightening sequence.
Bit ID	Set the corresponding bit ID number (0: no corresponding bit).	Displays the corresponding bit ID number set in the tightening sequence.
Set.	The advanced setting for the operating conditions. Refer to the description in Section 7.2.1.	

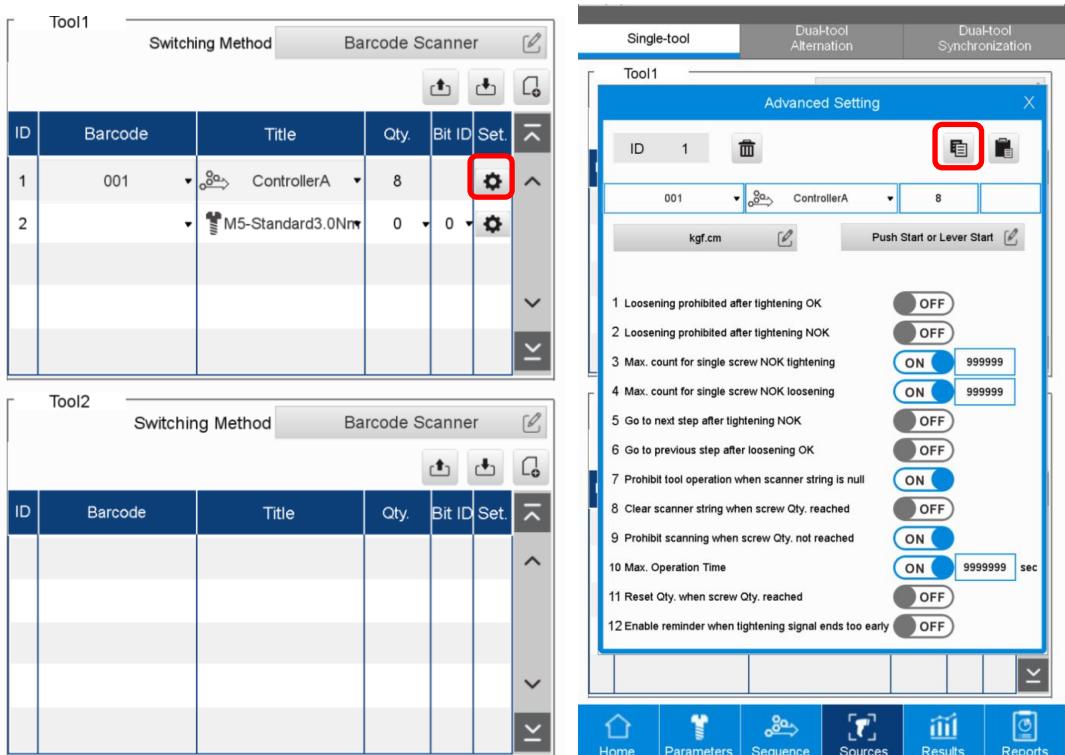
## 7.3 Copy / paste a tightening source

The system provides the Copy (  ) and Paste (  ) functions for editing the tightening sources more efficiently. The following examples illustrate the operation steps.

1. Click  to create a new ID (ID 2).

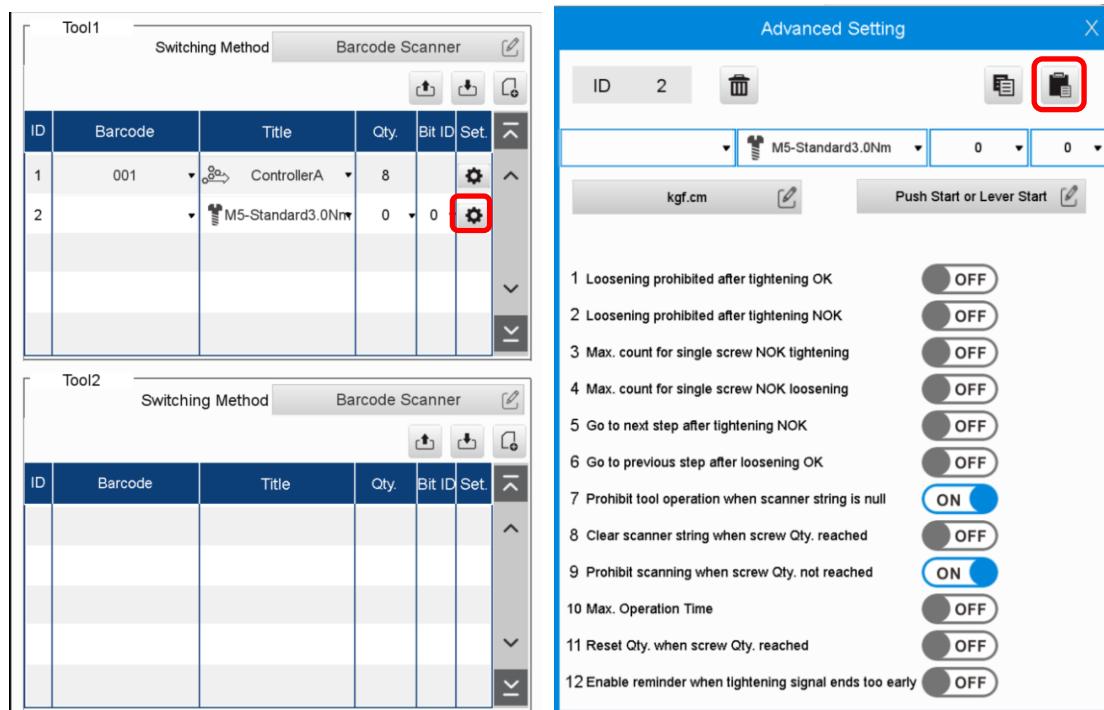


2. Click  to open the Advanced Setting window of ID 1, and then click  to copy the source title, Qty. setting, and the contents of Advanced Setting.

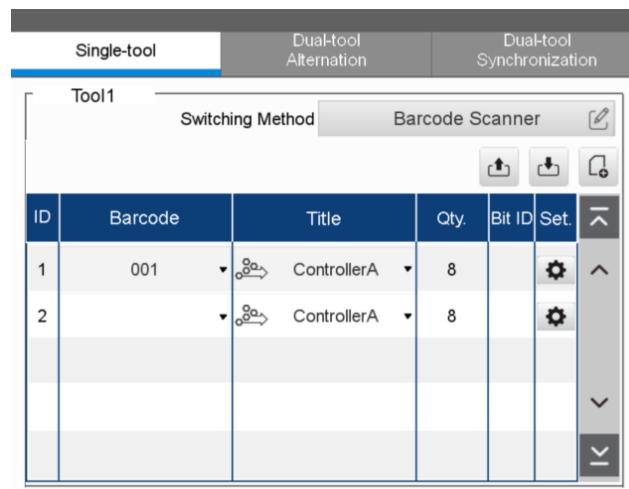


7

3. Return to the Sources list, click to open the Advanced Setting window of ID 2, and click to paste the copied contents.



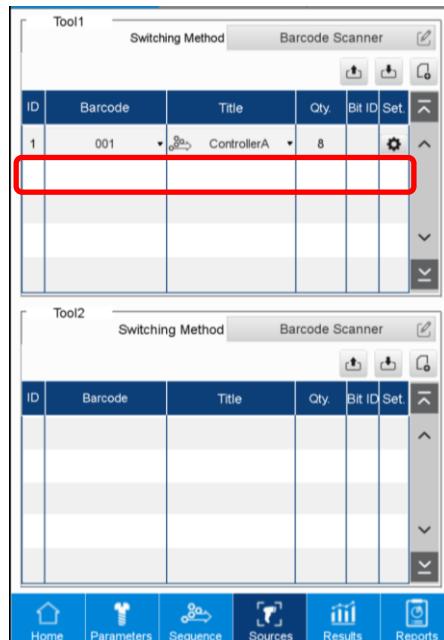
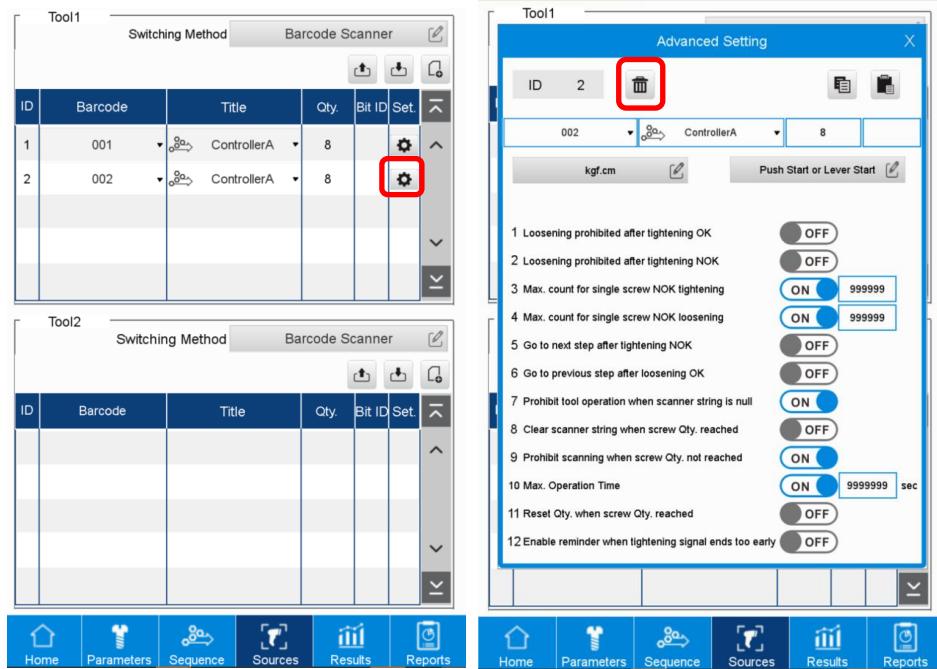
4. Return to the Sources list, where you can see the copy and paste is complete.



## 7.4 Delete a tightening source

To delete a tightening source, click  to open its Advanced Setting window, and then click  to delete the source from the list.

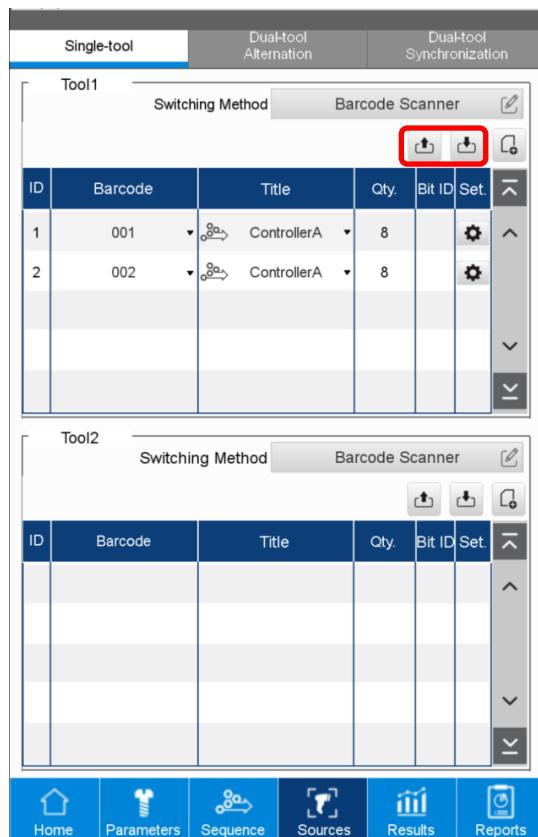
7



## 7.5 Export / import a tightening source

You can use a USB flash drive with the Export (  ) and Import (  ) functions for data backup and management.

7



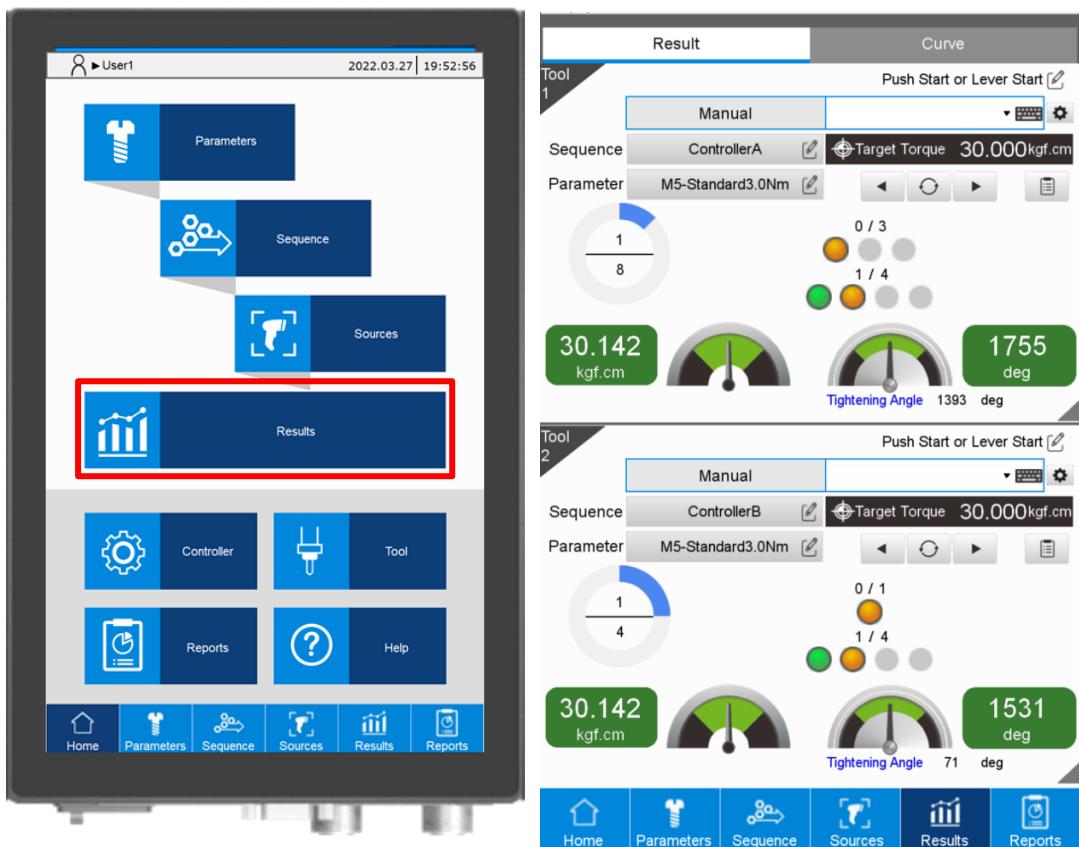
# 8

## Results

This chapter introduces the **Results** page of the smart screwdriving controller. This function provides information of the current tightening operation and the operating curves.

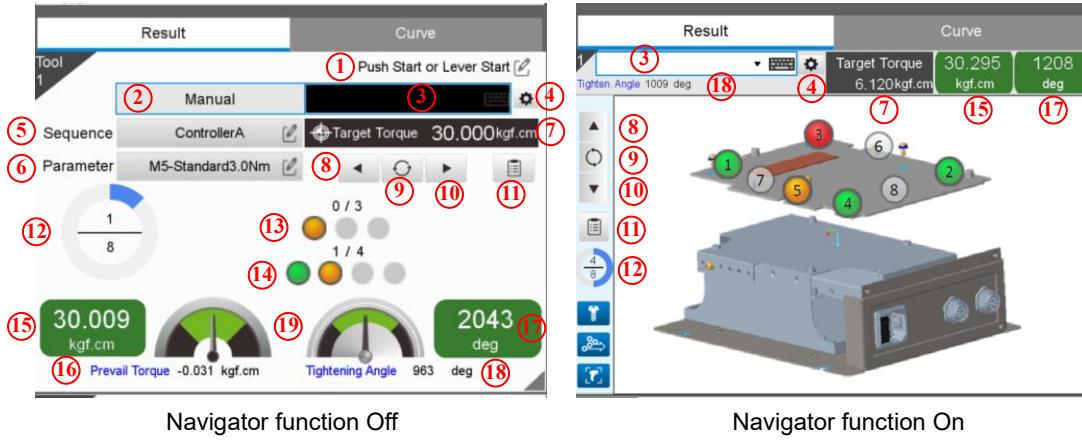
8.1 Operation results (Result).....	8-2
8.2 Operating curve (Curve).....	8-8
8.3 HDMI output.....	8-9
8.4 VNC remote connection.....	8-9

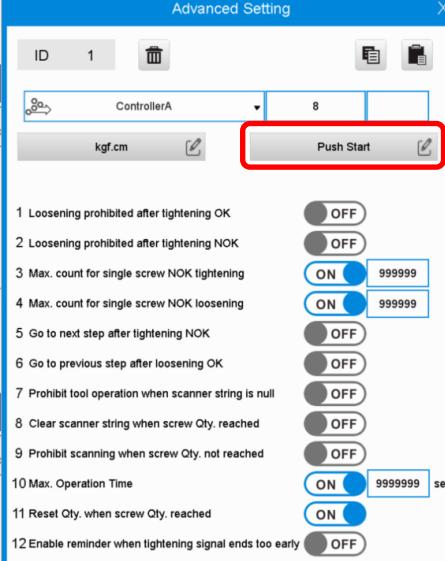
## 8.1 Operation results (Result)

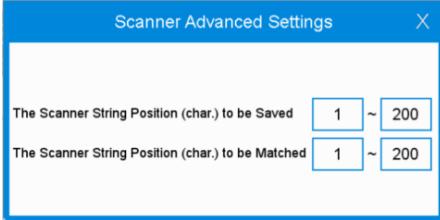


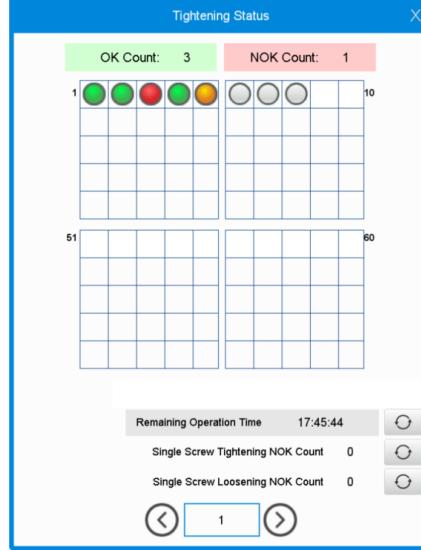
The **Results** page provides information of the current tightening operation. After each tightening is completed, the screen shows information such as the screw tightening status, final torque, and total angle, so that the operator can easily check the operation status.

Description of the screen of **Result** tab is as follows:



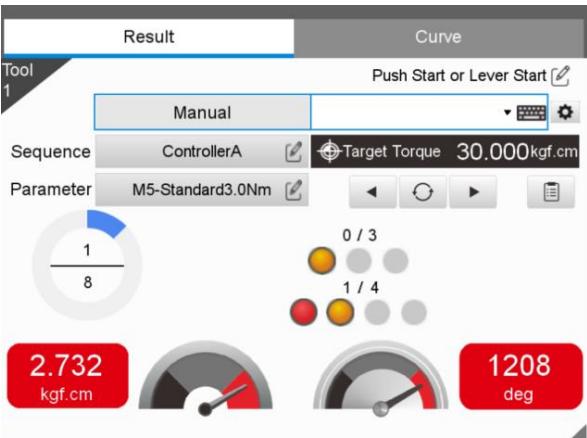
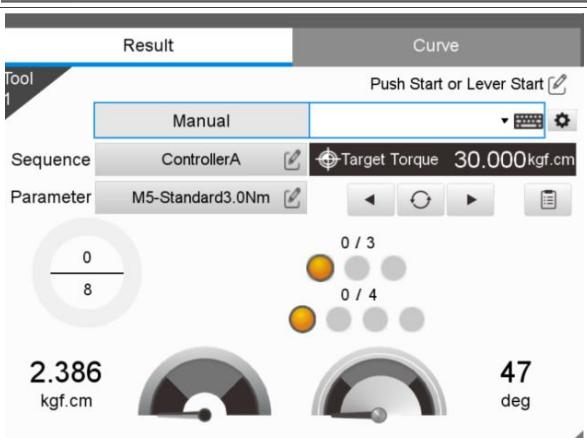
Item	Name	Description
1	Tool start condition	Displays the start condition of the transducerized smart screwdriver. Click to open the Advanced Setting window of the tightening source (see the following figure), and then click the edit field marked with a red box to change the tool start condition.
		
2	Switching method	Displays the switching method of the tightening source in operation.
3	Barcode string	Scan the barcode to show the string or manually input the string.

Item	Name	Description
4	Scanner Advanced Settings	 <ul style="list-style-type: none"> <li>The Scanner String Position (char.) to be Saved: save the characters of the specified positions in the scanner string and record the characters in the reports.</li> <li>The Scanner String Position (char.) to be Matched: when the switching method is Barcode Scanner, the system matches the characters of the specified positions in the scanner string against the tightening source strings. If finding a match, the system calls the corresponding parameter or sequence.</li> </ul> <p>For example, when the scanner string is SD3F30S0T23010001, if you set The Scanner String Position (char.) to be Saved as 9 - 17 and The Scanner String Position (char.) to be Matched as 1 - 8, the system matches "SD3F30S0" against the tightening source strings and records "T23010001" in the reports.</p>
5	Sequence	The tightening sequence in operation. Click the sequence title to directly link to the editing window of the specific sequence.
6	Parameter	The tightening parameter in operation. Click the parameter title to directly link to the editing window of the specific parameter.
7	Target torque or angle	Displays the final target torque or target angle of the operation.
8	Previous step	Force to execute the parameter of the previous screw.
9	Progress reset	Reset the total screw quantity, parameter quantity, and screw quantity of the parameter.
10	Next step	Force to execute the parameter of the next screw.

Item	Name	Description
11	Tightening Status	 <p>The lights indicate the screw tightening status.</p> <ul style="list-style-type: none"> <li>Green: tightening OK.</li> <li>Red: tightening NOK.</li> <li>Yellow: ready or in progress.</li> </ul> <p>Remaining Operation Time: the remaining time to execute tightening.</p> <p>Single Screw Tightening NOK Count: the cumulative tightening NOK counts of a single screw.</p> <p>Single Screw Loosening NOK Count: the cumulative loosening NOK counts of a single screw.</p>
12	Total screw quantity	The quantity of completed screws / total screw quantity (999999 represents an unlimited number), displayed with the progress bar.
13	Parameter quantity	The quantity of completed tightening parameters / total quantity of tightening parameters, displayed with the light indicators.
14	Screw quantity of the parameter	The quantity of completed screws in the tightening parameter / total screw quantity of the tightening parameter, displayed with the light indicators.
15	Final torque	Displays the final torque of the tightening task.
16	Prevail torque	Displays the prevail torque if the prevail torque function is enabled.
17	Total angle	Displays the final total angle of the tightening task.
18	Tightening angle	Displays the tightening angle of the final stage.

8

8

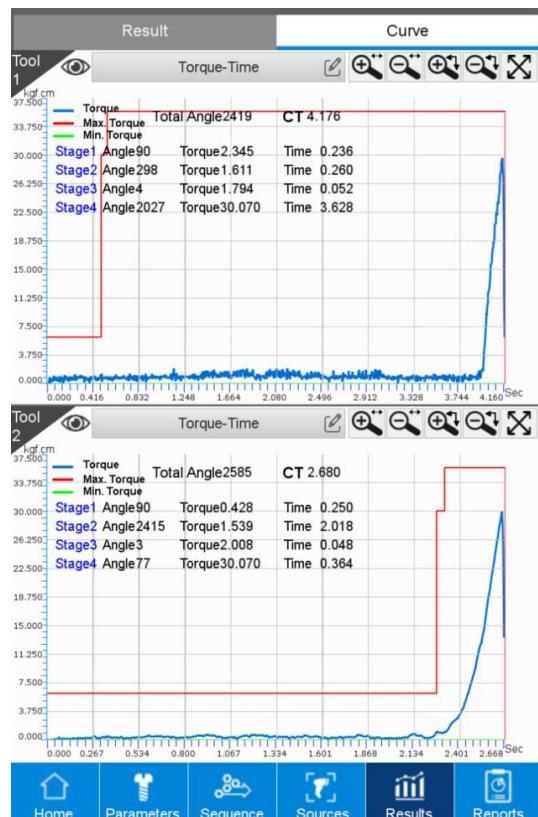
Item	Name	Description
		Displays the screw tightening status:
19	Color of light indicators and meter	<p>Green: tightening OK</p> 
		<p>Red: tightening NOK</p> 
		<p>The light is yellow and the meter is gray: ready or in progress</p> 

The **Result** tab display changes depending on the operating mode set in the **Sources** page.

Single-tool mode	Dual-tool Alternation mode
Dual-tool Synchronization mode	

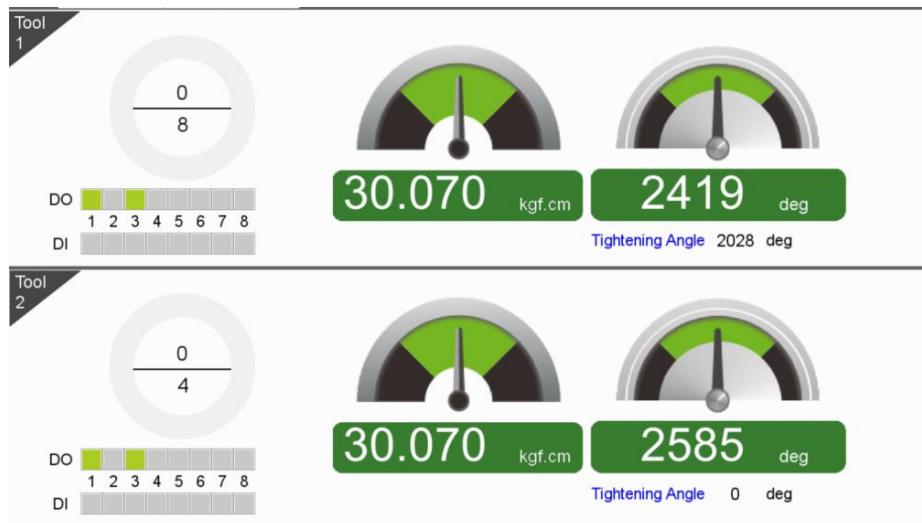
## 8.2 Operating curve (Curve)

You can check the operating curve in the **Curve** tab of the **Results** page each time the tightening is complete. This function displays the tightening results in an intuitive way and records the values (including angle, torque, and time) at each stage of the tightening process, facilitating the fine-tuning of key parameters.



### 8.3 HDMI output

Through the HDMI output port on the controller, you can synchronously project the simplified Result screen (shown as follows) to an external monitor.



### 8.4 VNC remote connection

You can establish a remote connection to the controller through VNC software to synchronously project the controller screen to the computer for operation. Refer to Section 9.1 for the details of Ethernet Settings.

(This page is intentionally left blank.)

# 9

## Controller

This chapter introduces the smart screwdriving controller information and settings, including the system settings, DI/DO, peripheral device, communication (Modbus), and service station.

9.1	System Settings .....	9-2
9.2	DI/DO .....	9-11
9.3	Peripheral Device .....	9-12
9.4	Communication (Modbus) .....	9-14
9.5	Service Station .....	9-15

## 9.1 System Settings

9



System Settings	DI/DO	Peripheral Device	Communication	Service Station
<a href="#">Language Setting</a>	<a href="#">Degree</a>	<a href="#">kgf.cm</a>	<a href="#">DI</a>	<a href="#">Sampling Rate for Curves</a>
<a href="#">Default Angle Unit</a>	<a href="#">English</a>	<a href="#">Display the Limits of All Stages for Curves</a>	<a href="#">Enable</a>	<a href="#">Changes from 10 ms to 4 ms when Start Torque is reached</a>
<a href="#">Default Torque Unit</a>	<a href="#">Degree</a>	<a href="#">Display Operation Warning Window</a>	<a href="#">Enable</a>	<a href="#">when Start Torque is reached</a>
<a href="#">Default Tool Start Condition</a>	<a href="#">kgf.cm</a>	<a href="#">Export Result File for Each Screw</a>	<a href="#">Disable</a>	<a href="#">when Start Torque is reached</a>
<a href="#">Screen Settings</a>	<a href="#">Log In</a>	<a href="#">Send Result TCP for Each Screw</a>	<a href="#">Disable</a>	<a href="#">when Start Torque is reached</a>
<a href="#">Permissions</a>	<a href="#">Page Permissions</a>	<a href="#">Always Monitor the Tool Current</a>	<a href="#">Enable</a>	<a href="#">when Start Torque is reached</a>
<a href="#">Ethernet Settings</a>	<a href="#">Modbus RS485 Settings</a>	<a href="#">Compensation for Tool Temperature Rise</a>	<a href="#">Enable</a>	<a href="#">when Start Torque is reached</a>
<a href="#">System Menu</a>	<a href="#">Factory Reset</a>	<a href="#">Controller Temperature</a>	<a href="#">51</a>	<a href="#">°C</a>
<a href="#">Export / Import</a>				
Firmware Version	0.50.00.0147.0118(124)			
<span>◀</span> <span>1</span> <span>▶</span>				
<a href="#">Home</a>	<a href="#">Parameters</a>	<a href="#">Sequence</a>	<a href="#">Sources</a>	<a href="#">Results</a>

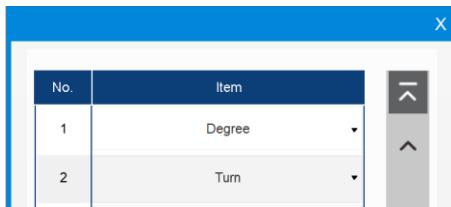
System Settings	DI/DO	Peripheral Device	Communication	Service Station
<a href="#">Two-stage Mode under Self-defined Torque Control</a>	<a href="#">Enable</a>	<a href="#">Display the Limits of All Stages for Curves</a>	<a href="#">Enable</a>	<a href="#">Changes from 10 ms to 4 ms when Start Torque is reached</a>
<a href="#">Display Operation Warning Window</a>	<a href="#">Enable</a>	<a href="#">Export Result File for Each Screw</a>	<a href="#">Disable</a>	<a href="#">when Start Torque is reached</a>
<a href="#">Send Result TCP for Each Screw</a>	<a href="#">Disable</a>	<a href="#">Always Monitor the Tool Current</a>	<a href="#">Enable</a>	<a href="#">when Start Torque is reached</a>
<a href="#">Sampling Rate for Curves</a>	<a href="#">Changes from 10 ms to 4 ms when Start Torque is reached</a>	<a href="#">Compensation for Tool Temperature Rise</a>	<a href="#">Enable</a>	<a href="#">when Start Torque is reached</a>
<a href="#">Always Monitor the Tool Current</a>	<a href="#">Enable</a>	<a href="#">Controller Temperature</a>	<a href="#">51</a>	<a href="#">°C</a>
<a href="#">Compensation for Tool Temperature Rise</a>	<a href="#">Enable</a>	<a href="#">Controller Temperature</a>	<a href="#">51</a>	<a href="#">°C</a>
<a href="#">Controller Temperature</a>	<a href="#">51</a>	<a href="#">°C</a>		
<span>◀</span> <span>2</span> <span>▶</span>				
<a href="#">Home</a>	<a href="#">Parameters</a>	<a href="#">Sequence</a>	<a href="#">Sources</a>	<a href="#">Results</a>

The **System Settings** tab contains the following settings.

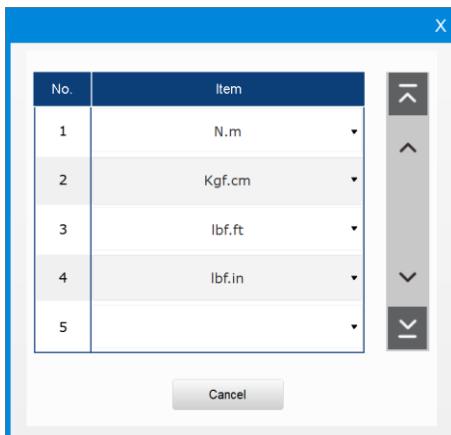
1. Language Setting: the available options are Traditional Chinese (繁體中文), English, and Simplified Chinese (简体中文).



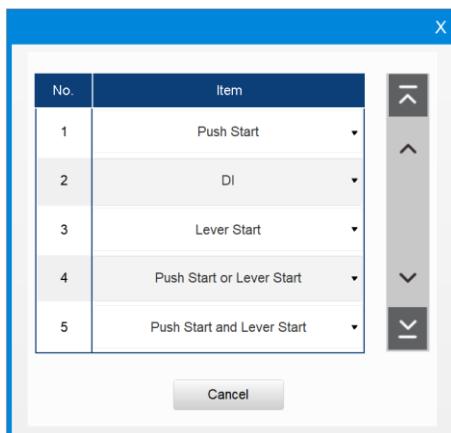
2. Default Angle Unit: switch the angle unit to degrees or turns.



3. Default Torque Unit: switch the torque unit to N.m, Kgf.cm, lbf.ft, or lbf.in.

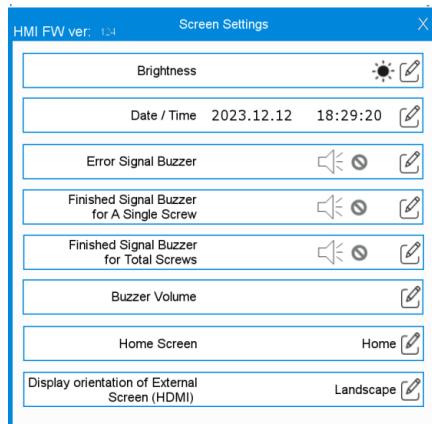


4. Default Tool Start Condition: the available options are Push Start, DI, Lever Start, Push Start or Lever Start, Push Start and Lever Start.



## 5. Screen Settings:

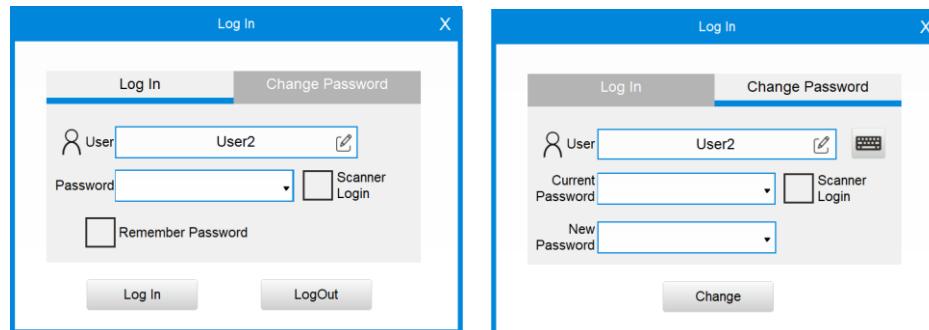
9



Item	Description										
Brightness	Adjust the screen brightness. 										
Date / Time	Set the date and time of the system. 										
Error Signal Buzzer Finished Signal Buzzer for A Single Screw Finished Signal Buzzer for Total Screws	Set the buzzer sound patterns for the corresponding signals. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Diagram</th> <th>Buzzer sound pattern</th> </tr> </thead> <tbody> <tr> <td></td> <td>Mute</td> </tr> <tr> <td></td> <td>One long beep</td> </tr> <tr> <td></td> <td>One short beep</td> </tr> <tr> <td></td> <td>Two short beeps</td> </tr> </tbody> </table>	Diagram	Buzzer sound pattern		Mute		One long beep		One short beep		Two short beeps
Diagram	Buzzer sound pattern										
	Mute										
	One long beep										
	One short beep										
	Two short beeps										
Buzzer Volume	Set the volume for Error Signal Buzzer and Finished Signal Buzzers, and the buttons. 										
Home Screen	Set the startup page of the system. 										
Display orientation of External Screen (HDMI)	Set the display orientation when connecting the controller to an external monitor through the HDMI output port. 										

## 6. Permissions

- Log In: log in to accounts of different permission levels or change the password.



User	Default password	Description
Admin	99	The highest permission level that can access and edit all pages of the controller.
User1	1	Log in as Admin to set the permissions of page access and edit for each account in the Permissions widow.
User2	2	
User3	3	
User4	4	
User5	5	

### ■ Page Permissions

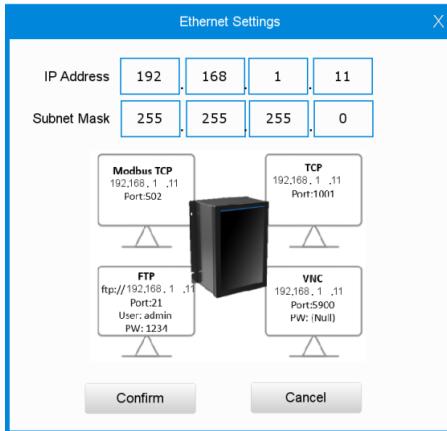
Logged in as Admin: you can modify the items that can be accessed and edited by all other permission levels.

Not logged in (same as User1 permissions): the controller main screen shows prohibition symbols on the items that cannot be accessed.

--	--

7. Ethernet Settings: set the network IP address (default: 192.168.1.11) and subnet mask (default: 255.255.255.0) of the smart screwdriving system.

9



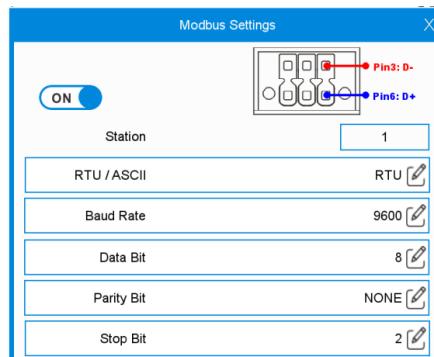
If you want to operate the controller through the PC, use either of the following methods to connect to the controller.

- VNC remote connection: install a VNC software, add a connecting device, enter the controller IP address and the port number (5900), and log in without a password. Then, the controller screen is synchronously projected to the computer.
- FTP connection: install FileZilla, enter the controller IP address in the Host field, “admin” in the Username field, “1234” in the Password field, “21” in the Port field, and then click **Quickconnect** to connect to the HMI internal memory for operation.

Note: the default port of each connection is listed as follows.

Connection	Default port
Modbus TCP	502
TCP	1001
VNC	5900
FTP	21

8. Modbus RS485 Settings: set the RS-485 communication parameters.



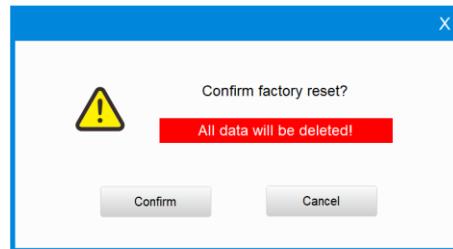
Item	Description
<input checked="" type="checkbox"/> ON	ON: function On; OFF: function Off
Station	1 to 255
RTU / ASCII	RTU or ASCII
Baud Rate	9600, 19200, or 38400
Data Bit	8-bit or 7-bit
Parity Bit	NONE, ODD, or EVEN
Stop Bit	2-bit or 1-bit

9. System Menu: switch to the BIOS system menu of the controller.



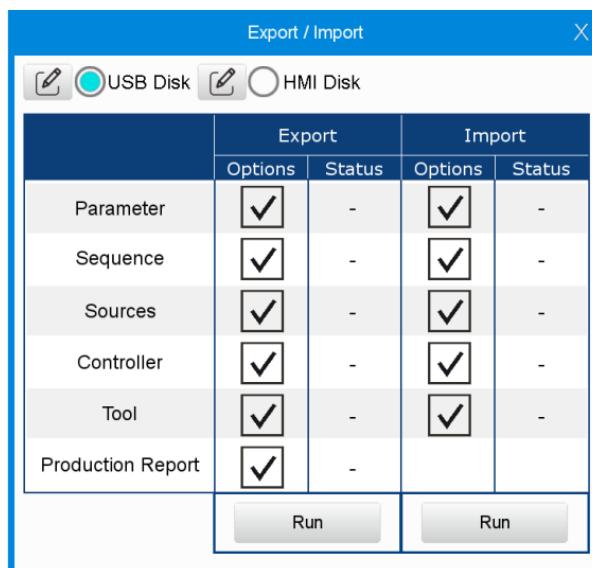
Note: operation by professional personnel is recommended.

10. Factory Reset: clear all system data and restore the Ethernet settings to the default.



Note: if you use the account of the highest permissions (Admin) for factory reset, the passwords for all accounts will be restored to the default.

11. Export / Import: export or import the selected system data (CSV file).



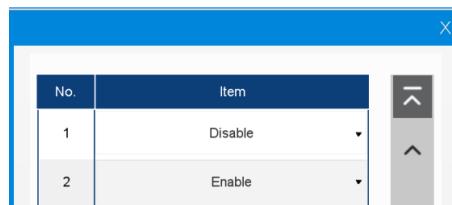
Item	Export	Import
USB Disk	Export the selected system data to the USB flash drive.	To copy the data of controller A to controller B, first export the data of controller A to the USB flash drive, and then use the Import function on controller B to update the data to controller B.
HMI Disk	Export the selected system data to the HMI internal memory, and then obtain the system data through FTP.	To copy the data of controller A to controller B, first export the data of controller A to the HMI internal memory, obtain the data through FTP, and then use the Import function on controller B to update the data to controller B.

12. Firmware Version: displays the firmware version of the smart screwdriving system. The example and descriptions are as follows.

0.50.00.0147.0118(124)      (1) HMI software version  
 (1)      (2)      (3)      (2) Motor control firmware version  
                                       (3) HMI kernel version

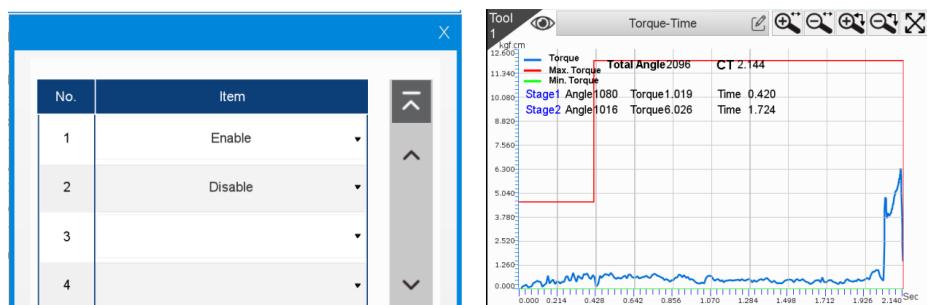
9

13. Two-stage Mode under Self-defined Torque Control: this function is enabled by default when the final stage of self-defined strategy is set to torque control or clamp torque control.



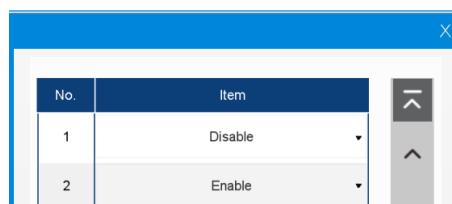
14. Display the Limits of All Stages for Curves

- Enable: display the upper and lower limits of all stages (as shown in the following figure on the right).
- Disable: only display the upper and lower limits of the final stage.

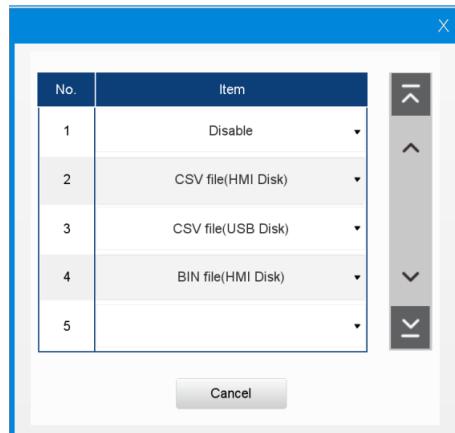


15. Display Operation Warning Window

- Enable: display the prompt window when a warning occurs.
- Disable: do not display the prompt window when a warning occurs.



16. Export Result File for Each Screw: export the production report of each tightening result as a CSV or BIN file.



Item	Time for file generation after one single screw is finished	Filename	How to read the file
Disable	-	-	-
CSV file (HMI Disk)	2.5 s	Production report ID (start overwriting from the 1 <sup>st</sup> entry when 200,000 entries are reached)	Through FTP
CSV file (USB Disk)	3 s	Insert a USB flash drive to the Host connector on the controller	
BIN file (HMI Disk) (the HMI kernel version must be 124 or later)	1 s	Last two digits of the Production report ID (start overwriting from the 1 <sup>st</sup> entry when 100 entries are reached)	Through FTP and with a BIN file viewer

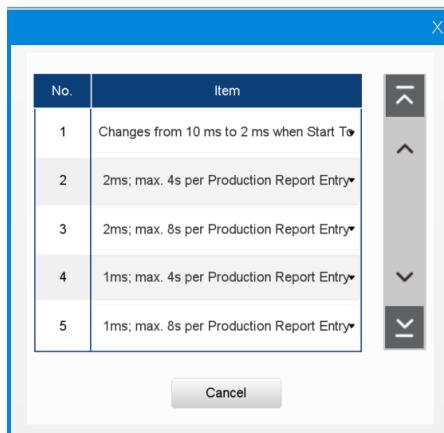
17. Send Result TCP for Each Screw: automatically sends TCP packets of the tightening result (refer to Appendix B #60 for the TCP content) when each screw is finished.

No.	Item
1	Disable
2	Scale, Time, Torque
3	Scale, Angle, Torque
4	Scale, Angle, Torque Rate
5	Result, Scale, Time, Torque
6	Result, Scale, Angle, Torque
7	Result, Scale, Angle, Torque Rate

Note: the HMI kernel version must be 118 or later.

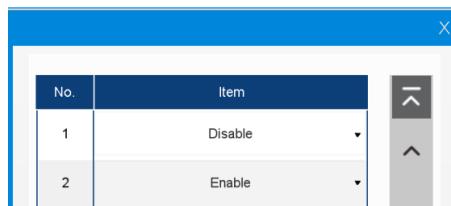
## 18. Sampling Rate for Curves

9

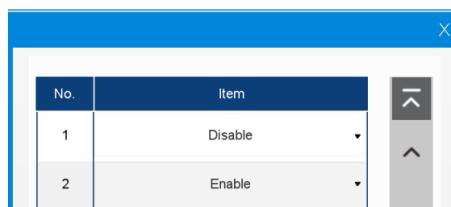


Item	Sampling rate	Max. data points of the curve	Max. recording time of each tightening
Changes from 10 ms to 2 ms when Start Torque is reached	10 ms (when tightening torque < start torque)	2000	20 s (when the sampling rate is always 10 ms)
	2 ms (when tightening torque ≥ start torque)		4 s (when the sampling rate is always 2 ms)
2ms; max. 4s per Production Report Entry	2 ms	2000	4 s
2ms; max. 8s per Production Report Entry	2 ms	4000	8 s
1ms; max. 4s per Production Report Entry	1 ms	4000	4 s
1ms; max. 8s per Production Report Entry	1 ms	8000	8 s

## 19. Always Monitor the Tool Current: always monitor the output current of the tool during the tightening process.



## 20. Compensation for Tool Temperature Rise: calibrate the corresponding setting values according to the tool temperature.



## 21. Controller Temperature: displays the current temperature of the controller in units of °C.

## 9.2 DI/DO

You can customize the functions of DO1 to DO8 and DI1 to DI8 and set the DI/O as NO (normally open) or NC (normally closed) contacts.

9

Tool1					Tool2	
Status	Point	NO / NC	Description			
	DO1		Ready			
	DO2		Running			
	DO3		Tightening OK			
	DO4		Tightening NOK			
	DO5		Loosening OK			
	DO6		Loosening NOK			
	DO7		Not in Use			
	DO8		Not in Use			

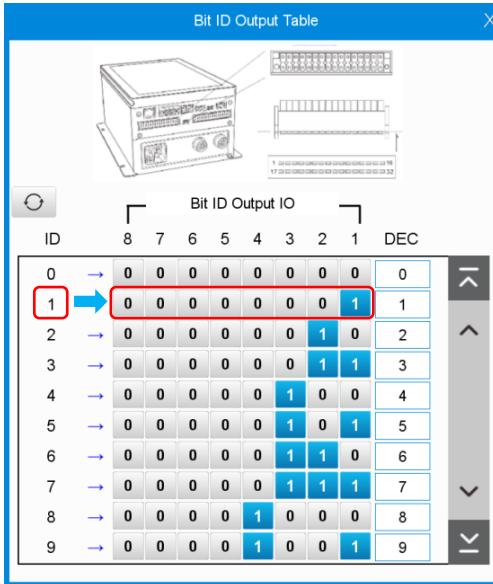
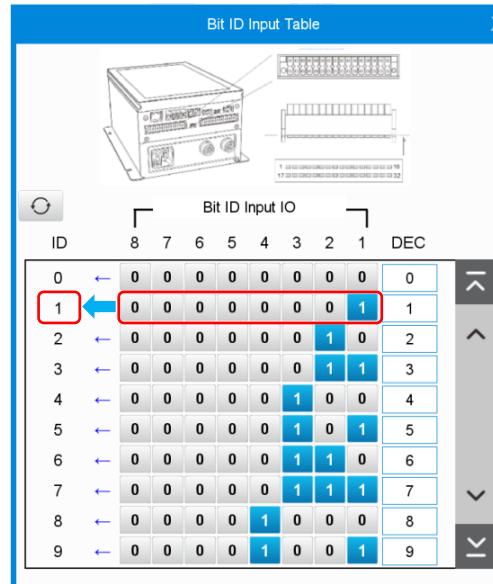
DO functions		Function code	DI functions
Ready		01	Start Tightening
Running		02	Start Loosening
Tightening OK		03	Emergency Stop
Tightening NOK		04	Clear Error
Loosening OK		05	Reset Total Screw Quantity
Loosening NOK		06	Next Step
Total Screw Quantity Reached		07	Previous Step
Device Alarms or Tightening Errors		08	Start Tightening (Pulse Signal)
Reserved		09	Start Tightening (Pulse Signal)
Reserved		10	Start Tightening (Dual-tool)
Reserved		11	Start Loosening (Dual-tool)
Reserved		12	Reset Operation Time
Status of CW / CCW Switch		13	Reset Single Screw Tightening + Loosening NOK Count
Rotation direction		14	Prohibit Tool Operation
Tightening Result Sent to Feeder		15	Clear Communication Flag
Parameter ID Output Bit 1 - 8		16 - 23	Reserved
Screw Progress Output Bit 1 - 8		24 - 31	Reserved
Sequence ID Output Bit 1 - 8		32 - 39	Reserved
Bit ID Output Bit 1 - 8		40 - 47	Bit ID Input Bit 1 - 8

### 9.3 Peripheral Device

When connecting external devices to the controller, use the conversion tables in the **Peripheral Device** tab to check or change the IO settings since the indexing method of DI/O varies from manufacturers. Make sure to first set the corresponding DO / DI functions (refer to Section 9.2) before using the output and input conversion tables.



### 1. Bit ID

Output Conversion Table	Input Conversion Table
<p>Check the "Bit ID Output Bit 1 - 8" setting value of each Bit ID, and then output the values with the DO signals.</p> <p>Example: According to the Bit ID Output Table, the "Bit ID Output Bit 1 - 8" setting value of Bit ID 1 is 00000001.</p> 	<p>After the DI signals are input, check the "Bit ID Input Bit 1 - 8" setting value to find out the corresponding Bit ID.</p> <p>Example: According to the Bit ID Input Table, the "Bit ID Input Bit 1 - 8" setting value is 00000001, so you can find that the corresponding Bit ID is 1.</p> 

### 2. Parameter ID

Output Conversion Table: check the "Parameter ID Output Bit 1 - 8" setting value of each tightening parameter ID, and then output the values with the DO signals.

### 3. Screw Progress

Output Conversion Table: check the "Screw Progress Output Bit 1 - 8" setting value of each screw, and then output the values with the DO signals.

### 4. Sequence ID

Output Conversion Table: check the "Sequence ID Output Bit 1 - 8" setting value of each tightening sequence ID, and then output the values with the DO signals.

## 9.4 Communication (Modbus)

The **Communication** tab provides the handshake data of Modbus TCP and Modbus RTU communication for you to debug during communication test. Refer to Appendix A for an overview of the Modbus communication interface and the function code descriptions.

There are eight subtabs which you can switch by clicking or on the screen.

- The **Status** subtab displays the real-time operational status of the system.
- The other seven subtabs display handshake data between the host system and the screwdriving system main functions of **Parameters**, **Sequence**, **Sources**, **Results**, **Controller**, **Tool**, and **Reports** respectively.

System Settings	DI/DO	Peripheral Device	<b>Communication</b>	Service Station																																																		
Status <b>Real-time Status</b> <table border="1" style="width: 100%; border-collapse: collapse; text-align: left;"> <tr><td>Tightening ID set for ecc. switch method 01 32 1</td></tr> <tr><td>PAR-SEQ set for ecc. switch method 01 32 1</td></tr> <tr><td>SEQ ID of current switching method 02 34 2</td></tr> <tr><td>PAR ID of current switching method 03 9 35 1</td></tr> <tr><td>    Current target torque 04 5995 36 29999</td></tr> <tr><td>    Current target torque 05 0 37 0</td></tr> <tr><td>    Current target torque 06 0 38 0</td></tr> <tr><td>Screw progress of current parameter (L) 07 7 39 0</td></tr> <tr><td>Screw progress of current parameter (H) 08 0 3A 0</td></tr> <tr><td>Screw progress of current sequence (L) 09 7 3B 0</td></tr> <tr><td>Screw progress of current sequence (H) 10 0 3C 0</td></tr> <tr><td>Tightening OK-count (L) 11 0 3D 0</td></tr> <tr><td>Tightening OK-count (H) 12 0 3E 0</td></tr> <tr><td>Single screw tightening NOK-count (L) 08 0 3F 0</td></tr> <tr><td>Single screw tightening NOK-count (H) 09 0 40 0</td></tr> <tr><td>Loosening OK-count (L) 0F 2 41 0</td></tr> <tr><td>Loosening OK-count (H) 10 0 42 0</td></tr> <tr><td>Single screw loosening NOK-count (L) 08 0 43 0</td></tr> <tr><td>Single screw loosening NOK-count (H) 12 0 44 0</td></tr> <tr><td>Total stage max. torque 13 2001 45 31498</td></tr> <tr><td>Final stage min. torque 14 0 46 24003</td></tr> <tr><td>    Current stage min. torque 01 1 47 1</td></tr> <tr><td>Executing tightening / Executing loosening 02 48 0</td></tr> <tr><td>    Current bit ID 17 0 49 0</td></tr> <tr><td>Communication Firmware Version 18 1 4A 1</td></tr> <tr><td>    Flag cleared 19 0 4B 0</td></tr> <tr><td>Total screw Qty. of current sequence (L) 1A 10 4C 4</td></tr> <tr><td>Total screw Qty. of current sequence (H) 1B 0 4D 0</td></tr> <tr><td>Total Screw Qty. of current parameter 1C 0 4E 0</td></tr> <tr><td>Total Screw Qty. of current parameter (L) 1D 10 4F 4</td></tr> <tr><td>Total screw Qty. of current sequence (H) 1E 0 50 0</td></tr> <tr><td>All screws of current parameter finished 1F 0 51 0</td></tr> <tr><td>    Current parameter finished 20 0 52 0</td></tr> <tr><td>    Current screw finished 21 0 53 0</td></tr> <tr><td>Setting parameters (Waiting...) 22 0 54 0</td></tr> <tr><td>    Final + prevail torque 23 6026 65 0</td></tr> <tr><td>    Total angle 24 2096 66 0</td></tr> <tr><td>    Angle range 25 1013 67 0</td></tr> <tr><td>Tightening result (E:OK 2:NOK 3:Part 4:Error) 26 0 68 0</td></tr> <tr><td>Loosening result (E:OK 2:NOK) 27 1 69 0</td></tr> <tr><td>    Curve creation finished 28 1 6A 0</td></tr> <tr><td>Tightening operation restricted status 29 0 6B 0</td></tr> <tr><td>Parameter settings OK / NOK 2A 0 6C 0</td></tr> <tr><td>    Final torque 2B 6026 6D 0</td></tr> <tr><td>    Prevail torque 2C 0 6E 0</td></tr> <tr><td>    Final current 2B 289 6F 0</td></tr> <tr><td>Cause to restrict tightening operation 2E 0 6G 0</td></tr> <tr><td>Cause to restrict loosening operation 2F 0 6I 0</td></tr> <tr><td>    Remaining operation time(L) 30 1549 62 0</td></tr> <tr><td>    Remaining operation time(H) 31 152 63 0</td></tr> </table>					Tightening ID set for ecc. switch method 01 32 1	PAR-SEQ set for ecc. switch method 01 32 1	SEQ ID of current switching method 02 34 2	PAR ID of current switching method 03 9 35 1	Current target torque 04 5995 36 29999	Current target torque 05 0 37 0	Current target torque 06 0 38 0	Screw progress of current parameter (L) 07 7 39 0	Screw progress of current parameter (H) 08 0 3A 0	Screw progress of current sequence (L) 09 7 3B 0	Screw progress of current sequence (H) 10 0 3C 0	Tightening OK-count (L) 11 0 3D 0	Tightening OK-count (H) 12 0 3E 0	Single screw tightening NOK-count (L) 08 0 3F 0	Single screw tightening NOK-count (H) 09 0 40 0	Loosening OK-count (L) 0F 2 41 0	Loosening OK-count (H) 10 0 42 0	Single screw loosening NOK-count (L) 08 0 43 0	Single screw loosening NOK-count (H) 12 0 44 0	Total stage max. torque 13 2001 45 31498	Final stage min. torque 14 0 46 24003	Current stage min. torque 01 1 47 1	Executing tightening / Executing loosening 02 48 0	Current bit ID 17 0 49 0	Communication Firmware Version 18 1 4A 1	Flag cleared 19 0 4B 0	Total screw Qty. of current sequence (L) 1A 10 4C 4	Total screw Qty. of current sequence (H) 1B 0 4D 0	Total Screw Qty. of current parameter 1C 0 4E 0	Total Screw Qty. of current parameter (L) 1D 10 4F 4	Total screw Qty. of current sequence (H) 1E 0 50 0	All screws of current parameter finished 1F 0 51 0	Current parameter finished 20 0 52 0	Current screw finished 21 0 53 0	Setting parameters (Waiting...) 22 0 54 0	Final + prevail torque 23 6026 65 0	Total angle 24 2096 66 0	Angle range 25 1013 67 0	Tightening result (E:OK 2:NOK 3:Part 4:Error) 26 0 68 0	Loosening result (E:OK 2:NOK) 27 1 69 0	Curve creation finished 28 1 6A 0	Tightening operation restricted status 29 0 6B 0	Parameter settings OK / NOK 2A 0 6C 0	Final torque 2B 6026 6D 0	Prevail torque 2C 0 6E 0	Final current 2B 289 6F 0	Cause to restrict tightening operation 2E 0 6G 0	Cause to restrict loosening operation 2F 0 6I 0	Remaining operation time(L) 30 1549 62 0	Remaining operation time(H) 31 152 63 0
Tightening ID set for ecc. switch method 01 32 1																																																						
PAR-SEQ set for ecc. switch method 01 32 1																																																						
SEQ ID of current switching method 02 34 2																																																						
PAR ID of current switching method 03 9 35 1																																																						
Current target torque 04 5995 36 29999																																																						
Current target torque 05 0 37 0																																																						
Current target torque 06 0 38 0																																																						
Screw progress of current parameter (L) 07 7 39 0																																																						
Screw progress of current parameter (H) 08 0 3A 0																																																						
Screw progress of current sequence (L) 09 7 3B 0																																																						
Screw progress of current sequence (H) 10 0 3C 0																																																						
Tightening OK-count (L) 11 0 3D 0																																																						
Tightening OK-count (H) 12 0 3E 0																																																						
Single screw tightening NOK-count (L) 08 0 3F 0																																																						
Single screw tightening NOK-count (H) 09 0 40 0																																																						
Loosening OK-count (L) 0F 2 41 0																																																						
Loosening OK-count (H) 10 0 42 0																																																						
Single screw loosening NOK-count (L) 08 0 43 0																																																						
Single screw loosening NOK-count (H) 12 0 44 0																																																						
Total stage max. torque 13 2001 45 31498																																																						
Final stage min. torque 14 0 46 24003																																																						
Current stage min. torque 01 1 47 1																																																						
Executing tightening / Executing loosening 02 48 0																																																						
Current bit ID 17 0 49 0																																																						
Communication Firmware Version 18 1 4A 1																																																						
Flag cleared 19 0 4B 0																																																						
Total screw Qty. of current sequence (L) 1A 10 4C 4																																																						
Total screw Qty. of current sequence (H) 1B 0 4D 0																																																						
Total Screw Qty. of current parameter 1C 0 4E 0																																																						
Total Screw Qty. of current parameter (L) 1D 10 4F 4																																																						
Total screw Qty. of current sequence (H) 1E 0 50 0																																																						
All screws of current parameter finished 1F 0 51 0																																																						
Current parameter finished 20 0 52 0																																																						
Current screw finished 21 0 53 0																																																						
Setting parameters (Waiting...) 22 0 54 0																																																						
Final + prevail torque 23 6026 65 0																																																						
Total angle 24 2096 66 0																																																						
Angle range 25 1013 67 0																																																						
Tightening result (E:OK 2:NOK 3:Part 4:Error) 26 0 68 0																																																						
Loosening result (E:OK 2:NOK) 27 1 69 0																																																						
Curve creation finished 28 1 6A 0																																																						
Tightening operation restricted status 29 0 6B 0																																																						
Parameter settings OK / NOK 2A 0 6C 0																																																						
Final torque 2B 6026 6D 0																																																						
Prevail torque 2C 0 6E 0																																																						
Final current 2B 289 6F 0																																																						
Cause to restrict tightening operation 2E 0 6G 0																																																						
Cause to restrict loosening operation 2F 0 6I 0																																																						
Remaining operation time(L) 30 1549 62 0																																																						
Remaining operation time(H) 31 152 63 0																																																						
Parameters <b>#100..#150 Parameter</b> <table border="1" style="width: 100%; border-collapse: collapse; text-align: left;"> <tr><td>Code C8 0</td></tr> <tr><td>Ver. C9 0</td></tr> <tr><td>Tool CA 0</td></tr> <tr><td>ID CB 0</td></tr> <tr><td>- CC 0</td></tr> <tr><td>- CD 0</td></tr> <tr><td>CMD Req. CE 0</td></tr> <tr><td colspan="2">CMD Resp. CF 0</td></tr> <tr><td colspan="2">1.OK 2:NOK DB 0</td></tr> <tr><td colspan="2">Error Code D1 0</td></tr> </table>					Code C8 0	Ver. C9 0	Tool CA 0	ID CB 0	- CC 0	- CD 0	CMD Req. CE 0	CMD Resp. CF 0		1.OK 2:NOK DB 0		Error Code D1 0																																						
Code C8 0																																																						
Ver. C9 0																																																						
Tool CA 0																																																						
ID CB 0																																																						
- CC 0																																																						
- CD 0																																																						
CMD Req. CE 0																																																						
CMD Resp. CF 0																																																						
1.OK 2:NOK DB 0																																																						
Error Code D1 0																																																						
Sequence <b>D2-E5 Parameter title</b> <table border="1" style="width: 100%; border-collapse: collapse; text-align: left;"> <tr><td>Min. tightening angle E6 0</td></tr> <tr><td>Persist time E7 0</td></tr> <tr><td>Prevail torque to be linked E8 0</td></tr> <tr><td>Max. loosening time E9 0</td></tr> <tr><td>Max. tightening angle E8 0</td></tr> <tr><td>Max. loosening angle E9 0</td></tr> <tr><td>Delay before tightening starts ED 0</td></tr> <tr><td>Delay before loosening starts EE 0</td></tr> <tr><td>Start torq for tightening angle E1 0</td></tr> <tr><td>Start torq for snug angle E0 0</td></tr> </table>					Min. tightening angle E6 0	Persist time E7 0	Prevail torque to be linked E8 0	Max. loosening time E9 0	Max. tightening angle E8 0	Max. loosening angle E9 0	Delay before tightening starts ED 0	Delay before loosening starts EE 0	Start torq for tightening angle E1 0	Start torq for snug angle E0 0																																								
Min. tightening angle E6 0																																																						
Persist time E7 0																																																						
Prevail torque to be linked E8 0																																																						
Max. loosening time E9 0																																																						
Max. tightening angle E8 0																																																						
Max. loosening angle E9 0																																																						
Delay before tightening starts ED 0																																																						
Delay before loosening starts EE 0																																																						
Start torq for tightening angle E1 0																																																						
Start torq for snug angle E0 0																																																						
Sources <b>D1-D4 Parameter</b> <table border="1" style="width: 100%; border-collapse: collapse; text-align: left;"> <tr><td>Control mode FA 0 12C 0 16C 0 19C 0 1CA 0 1F4 0</td></tr> <tr><td>Tightening direction FB 0 12D 0 16F 0 19D 0 1CB 0 1F5 0</td></tr> <tr><td>Rotation speed FC 0 12E 0 160 0 192 0 1CA 0 1F6 0</td></tr> <tr><td>Target torque FD 0 12F 0 161 0 193 0 1C6 0 1F7 0</td></tr> <tr><td>Target angle FE 0 13B 0 162 0 194 0 1C7 0 1F8 0</td></tr> <tr><td>Target torque rate FF 0 131 0 163 0 195 0 1C7 0 1F9 0</td></tr> <tr><td>Angle interval for torque range 101 0 132 0 165 0 197 0 1C9 0 1F8 0</td></tr> <tr><td>Acceleration time 101 0 133 0 165 0 197 0 1CA 0 1F9 0</td></tr> <tr><td>Max. angle 102 0 134 0 166 0 198 0 1CA 0 1FC 0</td></tr> <tr><td>Max. torque 103 0 135 0 167 0 199 0 1CA 0 1FB 0</td></tr> <tr><td>Max. operating torque 104 0 136 0 168 0 19A 0 1CC 0 1FE 0</td></tr> <tr><td>Min. torque 105 0 137 0 169 0 19B 0 1CB 0 1FD 0</td></tr> <tr><td>Max. operating time 106 0 138 0 160 0 19C 0 1CE 0 200 0</td></tr> <tr><td>Min. operation time 107 0 139 0 168 0 19D 0 1CF 0 201 0</td></tr> <tr><td>Prevail torque On / Off 108 0 13A 0 169 0 19E 0 1D9 0 202 0</td></tr> <tr><td>Angle range for prevail torque calc. 109 0 13B 0 169 0 19F 0 1B1 0 203 0</td></tr> <tr><td>Pause time 10A 0 13C 0 160 0 1A8 0 1B2 0 204 0</td></tr> <tr><td>Max. Clamp Torque 10C 0 13D 0 161 0 1A9 0 1B3 0 205 0</td></tr> <tr><td>Min. Clamp Torque 10C 0 13E 0 170 0 1A2 0 1B4 0 206 0</td></tr> <tr><td>Max. Clamp Angle 10D 0 13F 0 171 0 1A3 0 1B5 0 207 0</td></tr> <tr><td>Min. Clamp Angle 10E 0 140 0 172 0 1A4 0 1B6 0 208 0</td></tr> <tr><td>1st Target Torque 10F 0 141 0 173 0 1A5 0 1B7 0 209 0</td></tr> <tr><td>1st Pause Time 110 0 142 0 174 0 1A6 0 1B8 0 210 0</td></tr> <tr><td>Final Pause Time 111 0 143 0 175 0 1A7 0 1B9 0 211 0</td></tr> <tr><td>Final Speed 112 0 144 0 176 0 1A8 0 1BA 0 20C 0</td></tr> </table>					Control mode FA 0 12C 0 16C 0 19C 0 1CA 0 1F4 0	Tightening direction FB 0 12D 0 16F 0 19D 0 1CB 0 1F5 0	Rotation speed FC 0 12E 0 160 0 192 0 1CA 0 1F6 0	Target torque FD 0 12F 0 161 0 193 0 1C6 0 1F7 0	Target angle FE 0 13B 0 162 0 194 0 1C7 0 1F8 0	Target torque rate FF 0 131 0 163 0 195 0 1C7 0 1F9 0	Angle interval for torque range 101 0 132 0 165 0 197 0 1C9 0 1F8 0	Acceleration time 101 0 133 0 165 0 197 0 1CA 0 1F9 0	Max. angle 102 0 134 0 166 0 198 0 1CA 0 1FC 0	Max. torque 103 0 135 0 167 0 199 0 1CA 0 1FB 0	Max. operating torque 104 0 136 0 168 0 19A 0 1CC 0 1FE 0	Min. torque 105 0 137 0 169 0 19B 0 1CB 0 1FD 0	Max. operating time 106 0 138 0 160 0 19C 0 1CE 0 200 0	Min. operation time 107 0 139 0 168 0 19D 0 1CF 0 201 0	Prevail torque On / Off 108 0 13A 0 169 0 19E 0 1D9 0 202 0	Angle range for prevail torque calc. 109 0 13B 0 169 0 19F 0 1B1 0 203 0	Pause time 10A 0 13C 0 160 0 1A8 0 1B2 0 204 0	Max. Clamp Torque 10C 0 13D 0 161 0 1A9 0 1B3 0 205 0	Min. Clamp Torque 10C 0 13E 0 170 0 1A2 0 1B4 0 206 0	Max. Clamp Angle 10D 0 13F 0 171 0 1A3 0 1B5 0 207 0	Min. Clamp Angle 10E 0 140 0 172 0 1A4 0 1B6 0 208 0	1st Target Torque 10F 0 141 0 173 0 1A5 0 1B7 0 209 0	1st Pause Time 110 0 142 0 174 0 1A6 0 1B8 0 210 0	Final Pause Time 111 0 143 0 175 0 1A7 0 1B9 0 211 0	Final Speed 112 0 144 0 176 0 1A8 0 1BA 0 20C 0																									
Control mode FA 0 12C 0 16C 0 19C 0 1CA 0 1F4 0																																																						
Tightening direction FB 0 12D 0 16F 0 19D 0 1CB 0 1F5 0																																																						
Rotation speed FC 0 12E 0 160 0 192 0 1CA 0 1F6 0																																																						
Target torque FD 0 12F 0 161 0 193 0 1C6 0 1F7 0																																																						
Target angle FE 0 13B 0 162 0 194 0 1C7 0 1F8 0																																																						
Target torque rate FF 0 131 0 163 0 195 0 1C7 0 1F9 0																																																						
Angle interval for torque range 101 0 132 0 165 0 197 0 1C9 0 1F8 0																																																						
Acceleration time 101 0 133 0 165 0 197 0 1CA 0 1F9 0																																																						
Max. angle 102 0 134 0 166 0 198 0 1CA 0 1FC 0																																																						
Max. torque 103 0 135 0 167 0 199 0 1CA 0 1FB 0																																																						
Max. operating torque 104 0 136 0 168 0 19A 0 1CC 0 1FE 0																																																						
Min. torque 105 0 137 0 169 0 19B 0 1CB 0 1FD 0																																																						
Max. operating time 106 0 138 0 160 0 19C 0 1CE 0 200 0																																																						
Min. operation time 107 0 139 0 168 0 19D 0 1CF 0 201 0																																																						
Prevail torque On / Off 108 0 13A 0 169 0 19E 0 1D9 0 202 0																																																						
Angle range for prevail torque calc. 109 0 13B 0 169 0 19F 0 1B1 0 203 0																																																						
Pause time 10A 0 13C 0 160 0 1A8 0 1B2 0 204 0																																																						
Max. Clamp Torque 10C 0 13D 0 161 0 1A9 0 1B3 0 205 0																																																						
Min. Clamp Torque 10C 0 13E 0 170 0 1A2 0 1B4 0 206 0																																																						
Max. Clamp Angle 10D 0 13F 0 171 0 1A3 0 1B5 0 207 0																																																						
Min. Clamp Angle 10E 0 140 0 172 0 1A4 0 1B6 0 208 0																																																						
1st Target Torque 10F 0 141 0 173 0 1A5 0 1B7 0 209 0																																																						
1st Pause Time 110 0 142 0 174 0 1A6 0 1B8 0 210 0																																																						
Final Pause Time 111 0 143 0 175 0 1A7 0 1B9 0 211 0																																																						
Final Speed 112 0 144 0 176 0 1A8 0 1BA 0 20C 0																																																						
Results <b>1st loosening angle#26</b> <table border="1" style="width: 100%; border-collapse: collapse; text-align: left;"> <tr><td>1st loosening speed#27 0</td></tr> <tr><td>2nd loosening angle#28 0</td></tr> <tr><td>2nd loosening speed#29 0</td></tr> <tr><td>Loosening direction#2A 0</td></tr> <tr><td>Detect loosening torque#2B 0</td></tr> </table>					1st loosening speed#27 0	2nd loosening angle#28 0	2nd loosening speed#29 0	Loosening direction#2A 0	Detect loosening torque#2B 0																																													
1st loosening speed#27 0																																																						
2nd loosening angle#28 0																																																						
2nd loosening speed#29 0																																																						
Loosening direction#2A 0																																																						
Detect loosening torque#2B 0																																																						
Reports <b>Home</b>																																																						

## 9.5 Service Station

The **Service Station** tab displays the operating parameters of Tool 1 and Tool 2, which provides a clear view of the operational status.

The screenshot shows the SD3 Controller software interface. The top navigation bar includes tabs for System Settings, DI/DO, Peripheral Device, Communication, and Service Station. The Service Station tab is currently selected. Below the tabs, there are two main sections labeled Tool1 and Tool2. Each section contains three sub-sections: General, Stage 1-6, and Stage 7-8. The General section lists various numerical values. The Stage 1-6 and Stage 7-8 sections show a grid of data points. Navigation arrows and a page number indicator (1) are located at the bottom of the main content area. At the very bottom, there is a row of links for Home, Parameters, Sequence, Sources, Results, and Reports.

(This page is intentionally left blank.)

9

# 10

## Tool

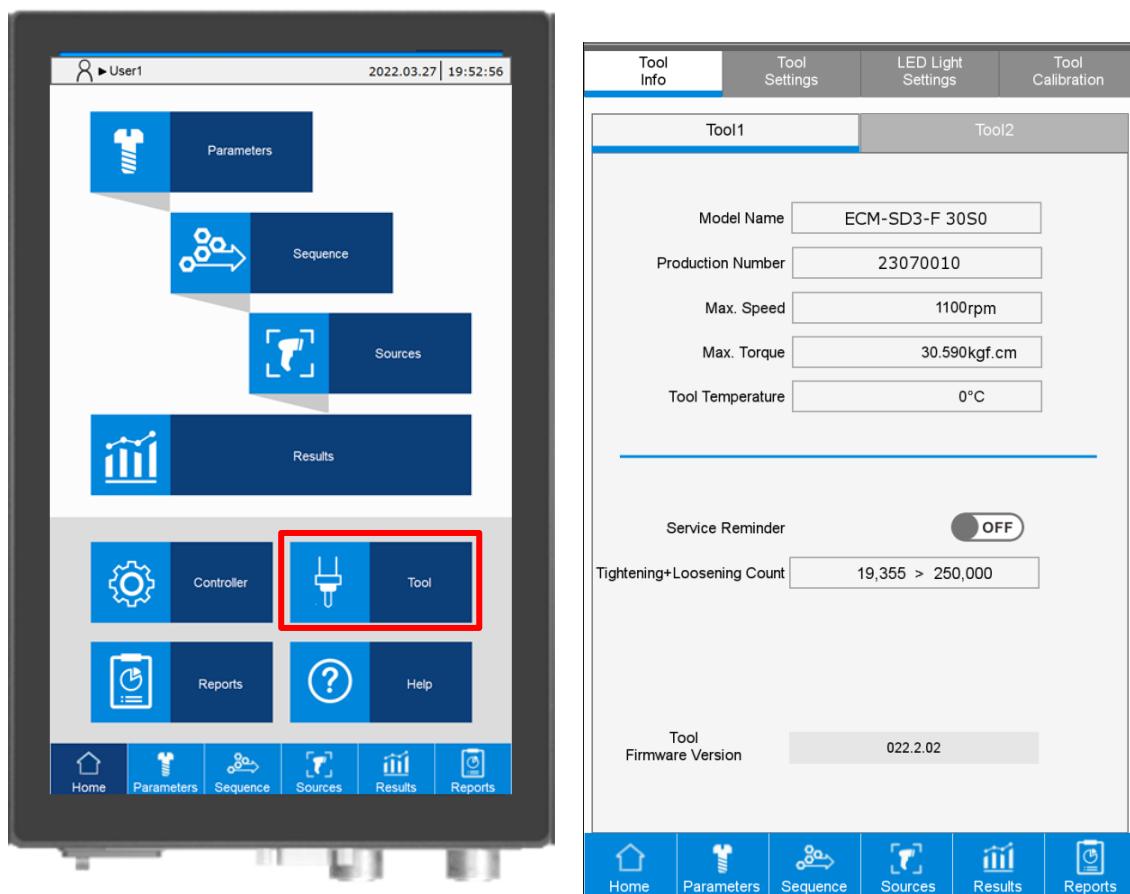
---

This chapter introduces the **Tool** page of the smart screwdriving controller, which allows you to access and configure the transducerized smart screwdriver information and settings, including the Tool Info, Tool Settings, LED Light Settings, and Tool Calibration.

10.1	Tool Info.....	10-2
10.2	Tool Settings.....	10-3
10.3	LED Light Settings .....	10-4
10.4	Tool Calibration .....	10-5

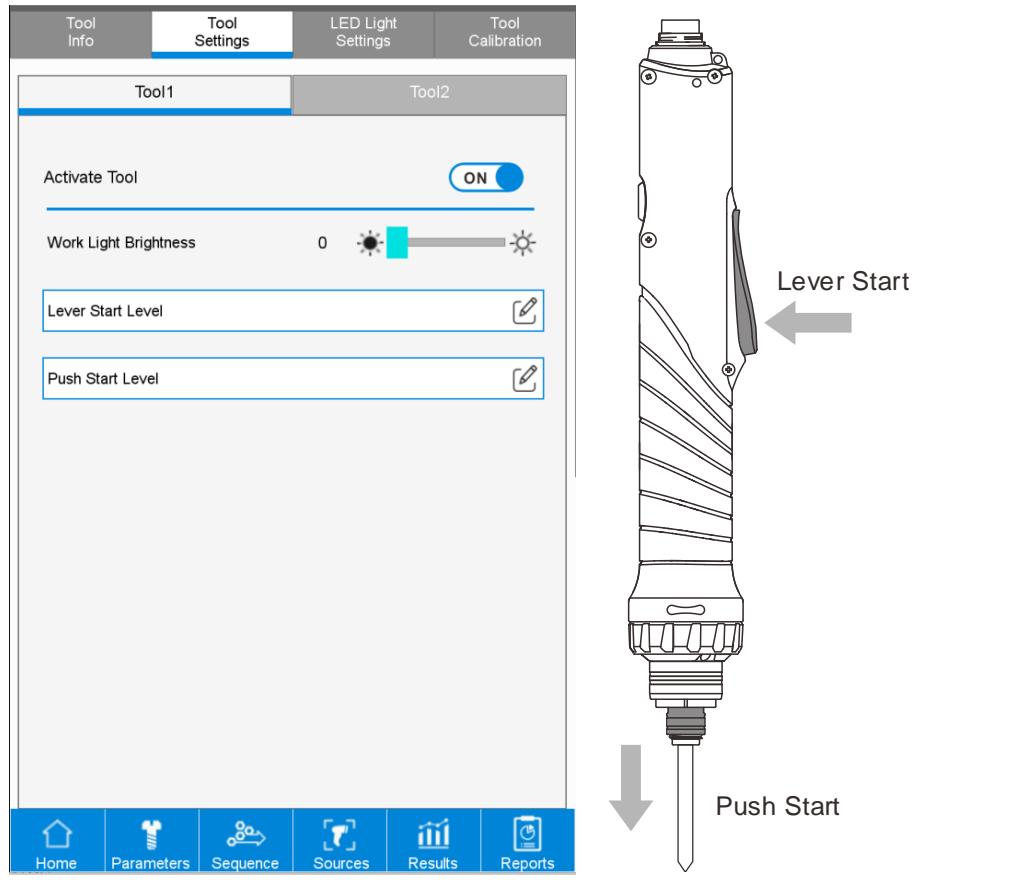
## 10.1 Tool Info

10



Item	Description
Model Name	
Production Number	Displays the information of the currently used smart screwdriver.
Max. Speed	
Max. Torque	
Tool Temperature	Displays the current temperature (°C) of the smart screwdriver.
Service Reminder	If the function is switched to On, when the Tightening + Loosening Count exceeds the suggested count for maintenance (250,000 counts), the system displays the alarm WN5002 or WN6002 (Send the tool back for service).
Tightening + Loosening Count	Displays the total tightening count + total loosening count of the smart screwdriver.
Tool Firmware Version	Displays the firmware version number of the smart screwdriver.

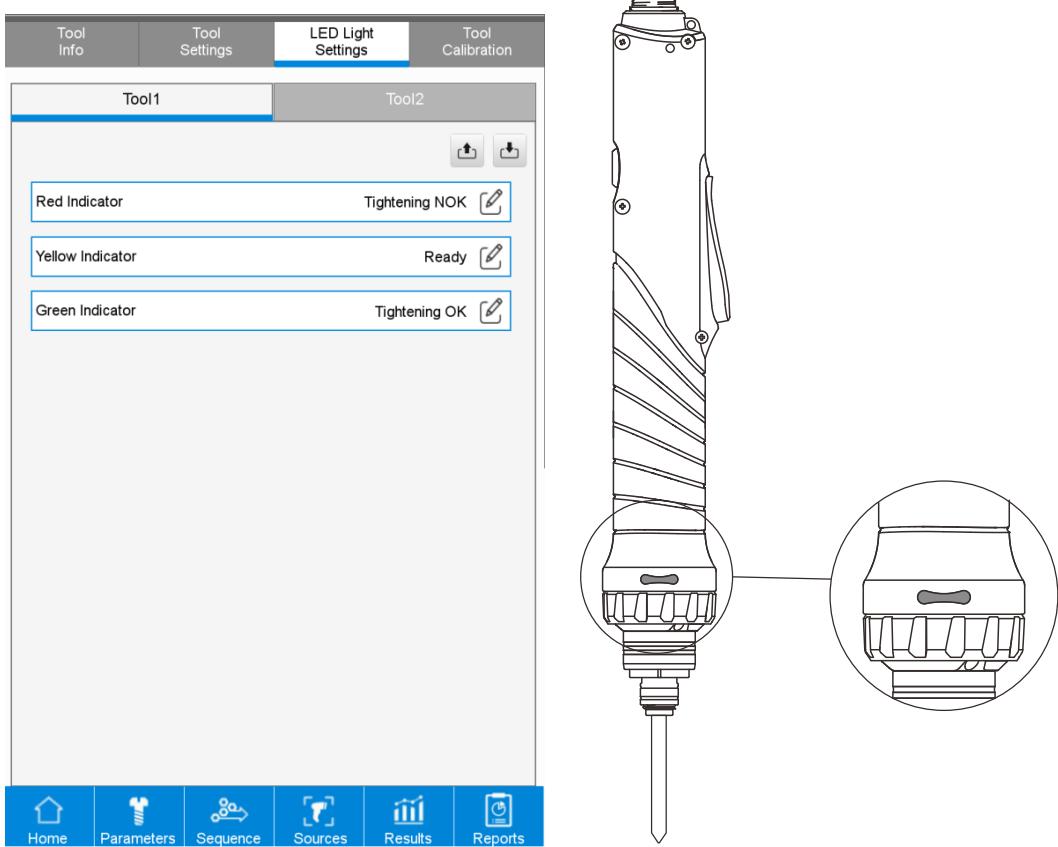
## 10.2 Tool Settings



Item	Description
Activate Tool	Activate the smart screwdriver to have it ready for the tightening operation.
Work Light Brightness	Adjust the brightness for the work light LED indicator of the smart screwdriver. 0: Off 100: maximum brightness
Lever Start Level	Adjust the On Level and Off Level for the lever start signals of the smart screwdriver. Click  to reset the On Level and Off Level.
Push Start Level	Press the lever button or push the screwdriver all the way down, and the signal level (black) moves leftward. Then, set the On Level (red) higher than the signal level.   Leave the lever button unpressed or the screwdriver unpushed, and the signal level (black) is at the rightmost end. Then, set the Off Level (green) lower than the signal level.    On Level 477 Off Level 2948  On Level 3725 Off Level 2948

## 10.3 LED Light Settings

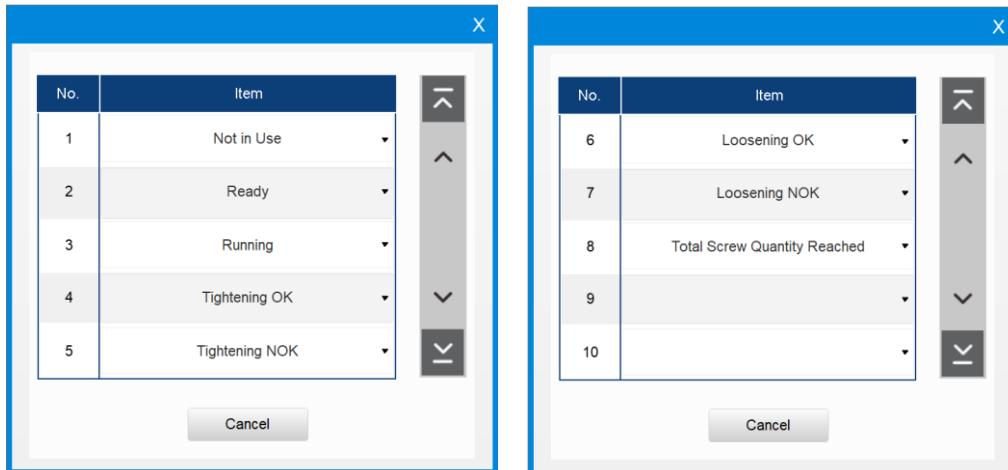
10



In the **LED Light Settings** tab, you can set the displayed status of each indicator light for the status LED indicator of the smart screwdriver.

If the red, yellow, and green indicator lights are all set to indicate the same status, since the three indicator lights cannot be On simultaneously, the LED indicator will be On in the sequence of red → yellow → green.

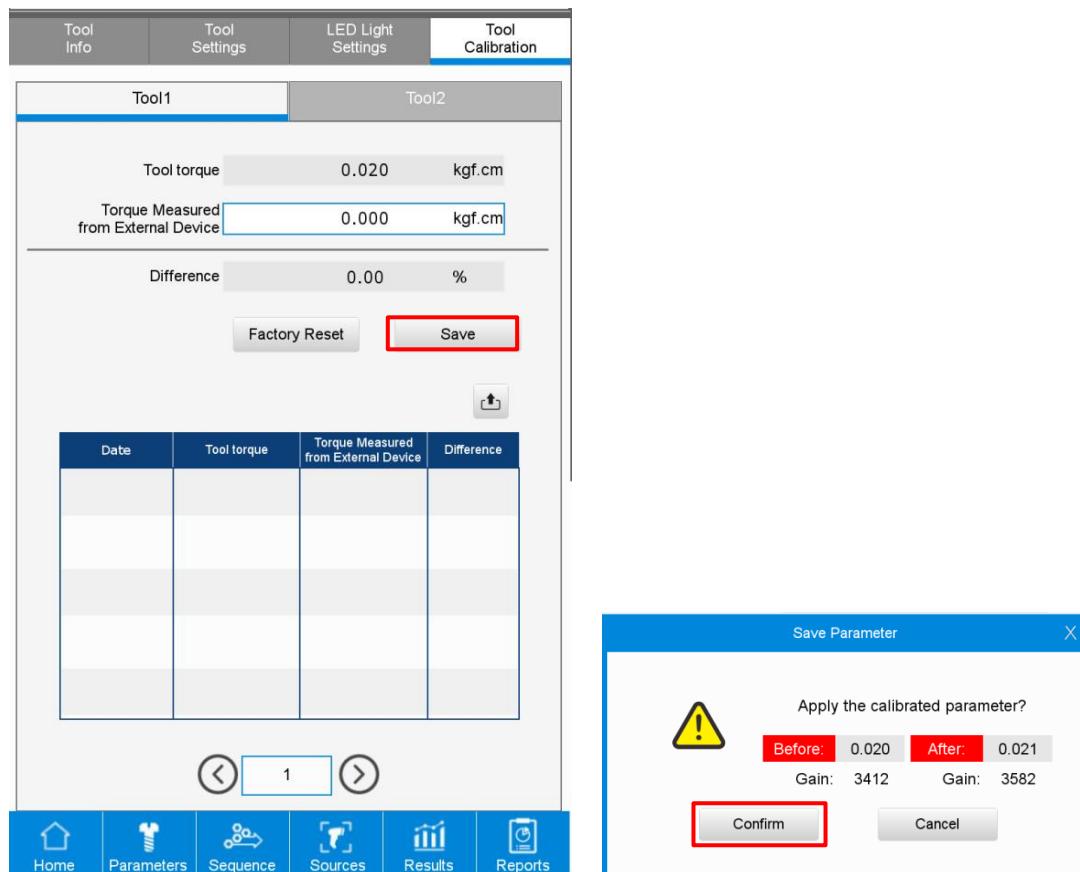
The indicator lights can be set to the following statuses:



## 10.4 Tool Calibration

Use the **Tool Calibration** tab along with a third-party calibration device to calibrate the torque and adjust the precision of the smart screwdriver.

Select a tightening parameter with the tightening strategy set as Enhanced. Operate the screwdriver with this parameter along with the third-party calibration device. After completion, the Tool torque field displays the final torque of the tightening task. Then, manually input the torque value measured by the calibration device to the Torque Measured from External Device field. Click **Save**, and the system automatically calculates the calibrated torque value. Finally, click **Confirm** to complete the calibration procedure.



(This page is intentionally left blank.)

10

# 11

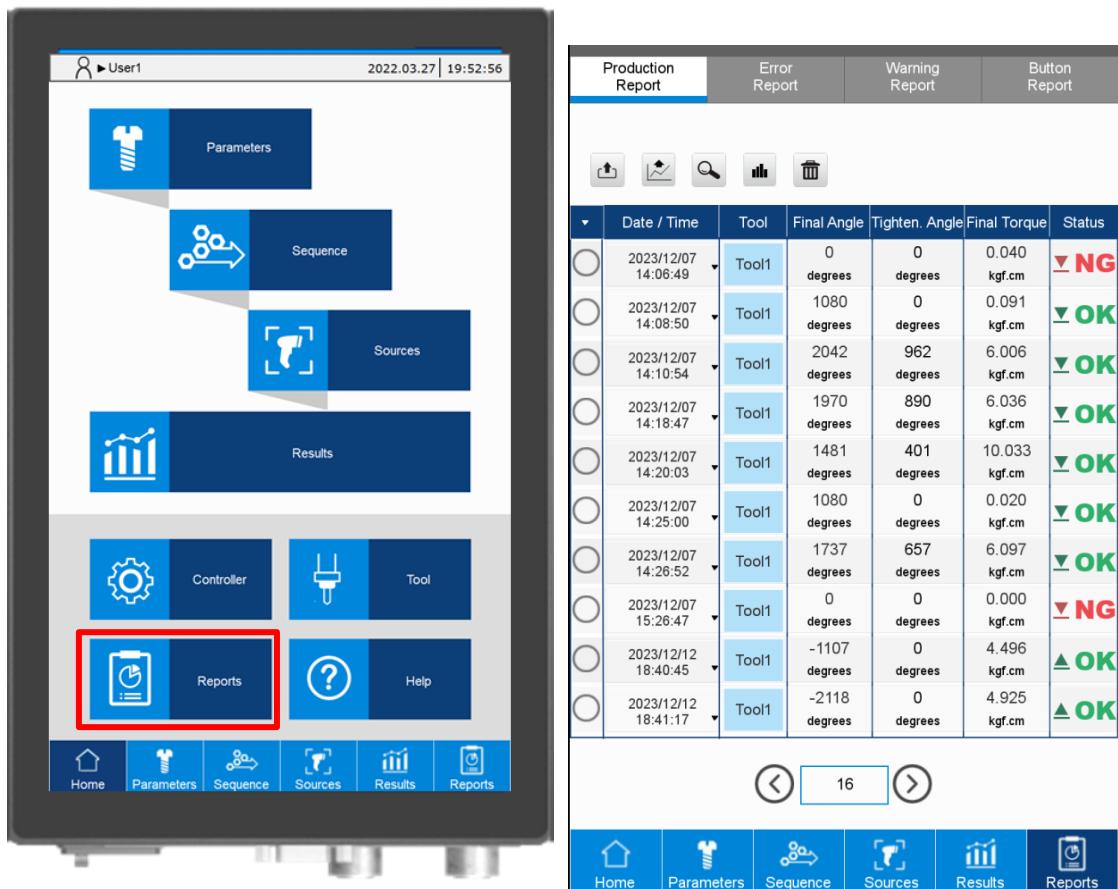
## Reports

This chapter introduces the **Reports** page of the smart screwdriving controller, including the Production Report, Error Report, Warning Report, and Button Report.

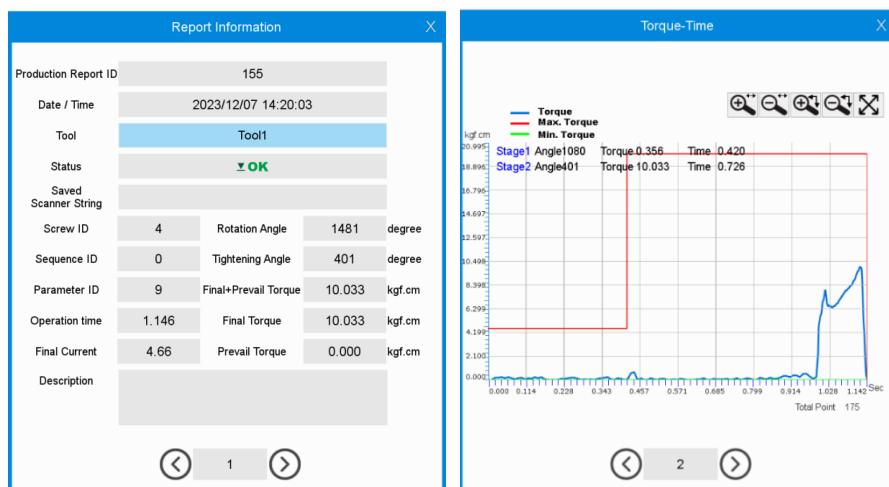
11.1	Production Report .....	11-2
11.2	Error Report.....	11-3
11.3	Warning Report .....	11-4
11.4	Button Report.....	11-5

## 11.1 Production Report

The system records and displays the information of each tightening task in the **Production Report** tab. Up to 200,000 entries can be saved; once the limit is reached, the system will proceed to overwrite the records from the first entry. In addition, you can export the entries as excel files with the (Export all operating results) and (Export the operating result and curve of a single screw) buttons.



To view the operating result and operating curve of a single entry, use to search for a specific entry or directly click any of the entries.



## 11.2 Error Report

The **Error Report** tab displays the entries of device alarm (AL) and tightening error (NG) of the system, with which you can analyze the cause of the frequently occurring errors. Click each entry to view the detailed description.

11

Date / Time	AL/NG Code	Description
2023/12/07 15:26:47	AL1011	Tool communication error
2023/12/12 18:46:15	AL1013	Emergency stop
2023/12/12 18:46:15	AL2013	Emergency stop
2023/12/12 18:46:36	AL1013	Emergency stop
2023/12/12 18:47:06	AL1013	Emergency stop
2023/12/12 18:56:44	NG3002	Tightening signal ends too early
2023/12/12 18:57:18	NG3002	Tightening signal ends too early
2023/12/12 18:59:01	NG3002	Tightening signal ends too early

**AL/NG Description**

**NG3002**

**Tightening signal ends too early**

Condition: during the tightening process, the tightening signal disappears.

Cause:

1. During the tightening process, the electric screwdriver is withdrawn early.
2. Transmission of the tightening DI signal is poor.

Checking method:

1. After tightening is complete, turn off the tightening signal.
2. Use the DO signal to activate the tightening and check if the tightening signal transmission is poor.
3. Perform Push Start to check if the signal wire of Push Start has a poor contact.
4. Perform Lever Start to check if signal wire of Lever Start has a poor contact.

How to clear?

Unscrew and then re-tighten the screw.

7

Home | Parameters | Sequence | Sources | Results | Reports

## 11.3 Warning Report

The **Warning Report** tab displays the entries of operation warning (WN) of the system, with which you can check the warnings caused by misoperations. Click any of the entries to view the detailed description.

11

The screenshot shows the SD3 Series software interface. At the top, there is a navigation bar with four tabs: Production Report, Error Report, Warning Report (which is highlighted in blue), and Button Report. Below the navigation bar is a toolbar with a trash icon and a search bar. The main area contains a table with columns for Date / Time, WN Code, and Description. A yellow warning icon is positioned above the table. The table data is as follows:

Date / Time	WN Code	Description
2023/11/30 15:43:31	WN5007	Tool final current exceeded the range!
1970/01/01 00:00:00	WN5003	Parameters not set!
1970/01/01 00:00:00	WN5058	Tightening: parameters do not match the tool
2023/12/06 13:18:57	WN6057	Tightening: parameters exceeded the tool spec.
2023/12/06 13:19:19	WN6057	Tightening: parameters exceeded the tool spec.
2023/12/06 13:19:53	WN6086	Loosening: parameters exceed the tool spec.
2023/12/06 13:20:41	WN6086	Loosening: parameters exceed the tool spec.
2023/12/06 13:45:23	WN6057	Tightening: parameters exceeded the tool spec.
2023/12/06 13:45:31	WN6057	Tightening: parameters exceeded the tool spec.
2023/12/06 13:45:40	WN6057	Tightening: parameters exceeded the tool spec.

Below the table are navigation arrows (left, right, first, last) and a page number (1). At the bottom is a footer with icons for Home, Parameters, Sequence, Sources, Results, and Reports.

A separate window titled "WN Description" is open, showing the details for the warning entry with WN Code WN5058. The description reads: "Tightening: parameters do not match the tool".

## 11.4 Button Report

The **Button Report** tab displays the main button operations of the system.

Production Report		Error Report	Warning Report	Button Report
Date / Time	Button ID	User	Before	After
2023/11/24 10:51:24	4000	User1	0	1
2023/12/06 13:24:38	4000	User1	0	1
2023/12/06 13:31:00	4000	User1	0	1
2023/12/06 13:34:54	4000	User1	0	1
2023/12/06 13:35:49	4000	User1	0	1
2023/12/06 13:37:07	4002	User1	0	1
2023/12/06 13:44:50	4000	User1	0	1

(⟨) 2 (⟩)

The corresponding operations of each Button ID are as follows:

Button ID		Corresponding operation
Tool 1	Tool 2	
04000	14000	Reset the operation progress
04001	14001	Force execute the previous step
04002	14002	Force execute the next step
04003	14003	Reset the operation time
04004	14004	Clear the single screw tightening NOK count
04005	14005	Clear the single screw loosening NOK count
04006	14006	Clear the single screw tightening status
07000		Clear the production report entries

(This page is intentionally left blank.)

11

# 12

## Troubleshooting

---

This chapter provides alarm descriptions and the corrective actions you can use for troubleshooting.

12.1	Alarm list.....	12-2
12.1.1	Device alarms .....	12-2
12.1.2	Tightening errors .....	12-3
12.1.3	Operation warnings .....	12-7
12.2	Causes and corrective actions .....	12-8
12.2.1	Description of device alarms .....	12-8
12.2.2	Description of tightening errors .....	12-13
12.2.3	Description of operation warnings.....	12-44

The alarms include device alarms, tightening errors, and operation warnings. The definition of each is as follows (the nnn in the alarm display indicates numbers).

Alarm types	Alarm display		Description
	Tool 1	Tool 2	
Device alarms	AL1nnn	AL2nnn	The alarm messages for hardware signal and encoder signal.
Tightening errors	NG3nnn	NG4nnn	The errors generated during tightening.
Operation warnings	WN5nnn	WN6nnn	The warning messages caused by misoperation.

## 12.1 Alarm list

### 12.1.1 Device alarms

Alarm display	Alarm name
<b>AL1001 &amp; AL2001</b>	Overcurrent
<b>AL1004 &amp; AL2004</b>	Tool combination error
<b>AL1006 &amp; AL2006</b>	Overload
<b>AL1007 &amp; AL2007</b>	Excessive deviation of Speed command
<b>AL1011 &amp; AL2011</b>	Tool communication error
<b>AL1013 &amp; AL2013</b>	Emergency stop
<b>AL1016 &amp; AL2016</b>	MOSFET overheat
<b>AL1036 &amp; AL2036</b>	No response from tool encoder
<b>AL1037 &amp; AL2037</b>	Tool encoder communication error
<b>AL1038 &amp; AL2038</b>	Tool encoder alarm
<b>AL1039 &amp; AL2039</b>	Tool encoder warning
<b>AL1070 &amp; AL2070</b>	Tool control board did not complete the read / write procedure
<b>AL1083 &amp; AL2083</b>	Controller outputs excessive current
<b>AL1087 &amp; AL2087</b> <b>AL1887 &amp; AL2887</b>	Tool torque exceeded the sensor spec.
<b>AL1088 &amp; AL2088</b> <b>AL1888 &amp; AL2888</b>	Tool torque sensor error
<b>AL1090 &amp; AL2090</b> <b>AL1890 &amp; AL2890</b>	No response from tool torque sensor
<b>AL1091 &amp; AL2091</b> <b>AL1891 &amp; AL2891</b>	Tool torque sensor communication error
<b>AL1092 &amp; AL2092</b> <b>AL1892 &amp; AL2892</b>	Tool torque sensor alarm
<b>AL1093 &amp; AL2093</b> <b>AL1893 &amp; AL2893</b>	Tool torque sensor initialization failed
<b>AL1094 &amp; AL2094</b> <b>AL1894 &amp; AL2894</b>	Tool temperature error when the power is on
<b>AL1095 &amp; AL2095</b> <b>AL1895 &amp; AL2895</b>	Tool temperature error
<b>AL1099 &amp; AL2099</b>	EEPROM not reset after firmware update

Note: if the triggered alarm is not included in the alarm list, contact your local distributor or technical staff.

### 12.1.2 Tightening errors

Alarm display	Alarm name
<b>NG3000 &amp; NG4000</b>	Unknown parameter
<b>NG3002 &amp; NG4002</b>	Tightening signal ends too early
<b>NG3011 &amp; NG4011</b>	Tightening: lower than the min. rotation angle
<b>NG3012 &amp; NG4012</b>	Tightening: exceeded the max. rotation angle
<b>NG3013 &amp; NG4013</b>	Tightening: timeout
<b>NG3014 &amp; NG4014</b>	Tightening: exceeded tool max. current
<b>NG3015 &amp; NG4015</b>	Tightening: error occurs during parameter setting
<b>NG3032 &amp; NG4032</b>	Loosening: exceeded the max. rotation angle
<b>NG3033 &amp; NG4033</b>	Loosening: timeout
<b>NG3034 &amp; NG4034</b>	Loosening: exceeded tool max. current
<b>NG3035 &amp; NG4035</b>	Loosening: error occurs during parameter setting
<b>NG3110 &amp; NG4110</b>	Start stage: operation error
<b>NG3111 &amp; NG4111</b>	Start stage: exceeded the tool torque protection range Start stage: exceeded the tightening torque protection range
<b>NG3112 &amp; NG4112</b>	Start stage: exceeded the max. operation time
<b>NG3113 &amp; NG4113</b>	Start stage: lower than the min. operation time
<b>NG3120 &amp; NG4120</b>	Start stage: exceeded tool max. current
<b>NG3121 &amp; NG4121</b>	Start stage: lower than tool min. current
<b>NG3122 &amp; NG4122</b>	Start stage: exceeded the max. angle
<b>NG3123 &amp; NG4123</b>	Start stage: lower than the min. angle
<b>NG3124 &amp; NG4124</b>	Start stage: exceeded the max. torque
<b>NG3125 &amp; NG4125</b>	Start stage: lower than the min. torque
<b>NG3210 &amp; NG4210</b>	Rundown stage: operation error
<b>NG3211 &amp; NG4211</b>	Rundown stage: exceeded the tool torque protection range Rundown stage: exceeded the tightening torque protection range
<b>NG3212 &amp; NG4212</b>	Rundown stage: exceeded the max. operation time
<b>NG3213 &amp; NG4213</b>	Rundown stage: lower than the min. operation time
<b>NG3220 &amp; NG4220</b>	Rundown stage: exceeded tool max. current
<b>NG3221 &amp; NG4221</b>	Rundown stage: lower than tool min. current
<b>NG3222 &amp; NG4222</b>	Rundown stage: exceeded the max. angle
<b>NG3223 &amp; NG4223</b>	Rundown stage: lower than the min. angle
<b>NG3224 &amp; NG4224</b>	Rundown stage: exceeded the max. torque
<b>NG3225 &amp; NG4225</b>	Rundown stage: lower than the min. torque
<b>NG3310 &amp; NG4310</b>	Pre-tightening stage: operation error
<b>NG3311 &amp; NG4311</b>	Pre-tightening stage: exceeded the tool torque protection range Pre-tightening stage: exceeded the tightening torque protection range
<b>NG3312 &amp; NG4312</b>	Pre-tightening stage: exceeded the max. operation time
<b>NG3313 &amp; NG4313</b>	Pre-tightening stage: lower than the min. operation time
<b>NG3320 &amp; NG4320</b>	Pre-tightening stage: exceeded tool max. current
<b>NG3321 &amp; NG4321</b>	Pre-tightening stage: lower than tool min. current
<b>NG3322 &amp; NG4322</b>	Pre-tightening stage: exceeded the max. angle

Alarm display	Alarm name
<b>NG3323 &amp; NG4323</b>	Pre-tightening stage: lower than the min. angle
<b>NG3324 &amp; NG4324</b>	Pre-tightening stage: exceeded the max. torque
<b>NG3325 &amp; NG4325</b>	Pre-tightening stage: lower than the min. torque
<b>NG3410 &amp; NG4410</b>	Tightening stage: operation error
<b>NG3411 &amp; NG4411</b>	Tightening stage: exceeded the tool torque protection range Tightening stage: exceeded the tightening torque protection range
<b>NG3412 &amp; NG4412</b>	Tightening stage: exceeded the max. operation time
<b>NG3413 &amp; NG4413</b>	Tightening stage: lower than the min. operation time
<b>NG3420 &amp; NG4420</b>	Tightening stage: exceeded tool max. current
<b>NG3421 &amp; NG4421</b>	Tightening stage: lower than tool min. current
<b>NG3422 &amp; NG4422</b>	Tightening stage: exceeded the max. angle
<b>NG3423 &amp; NG4423</b>	Tightening stage: lower than the min. angle
<b>NG3424 &amp; NG4424</b>	Tightening stage: exceeded the max. torque
<b>NG3425 &amp; NG4425</b>	Tightening stage: lower than the min. torque
<b>NG3426 &amp; NG4426</b>	Tightening stage: exceeded the max. clamp torque
<b>NG3427 &amp; NG4427</b>	Tightening stage: lower than the min. clamp torque
<b>NG3428 &amp; NG4428</b>	Tightening stage: exceeded the max. clamp angle
<b>NG3429 &amp; NG4429</b>	Tightening stage: lower than the min. clamp angle
<b>NG3510 &amp; NG4510</b>	Rundown stage (torque rate): operation error
<b>NG3511 &amp; NG4511</b>	Rundown stage (torque rate): exceeded the tightening torque protection range
<b>NG3512 &amp; NG4512</b>	Rundown stage (torque rate): exceeded the max. operation time
<b>NG3513 &amp; NG4513</b>	Rundown stage (torque rate): lower than the min. operation time
<b>NG3520 &amp; NG4520</b>	Rundown stage (torque rate): exceeded tool max. current
<b>NG3521 &amp; NG4521</b>	Rundown stage (torque rate): lower than tool min. current
<b>NG3522 &amp; NG4522</b>	Rundown stage (torque rate): exceeded the max. angle
<b>NG3523 &amp; NG4523</b>	Rundown stage (torque rate): lower than the min. angle
<b>NG3524 &amp; NG4524</b>	Rundown stage (torque rate): exceeded the max. torque
<b>NG3525 &amp; NG4525</b>	Rundown stage (torque rate): lower than the min. torque
<b>NG3881 &amp; NG4881</b>	Loosening stage: lower than the set torque
<b>NG3891 &amp; NG4891</b>	Loosening stage: exceeded the tool torque protection range
<b>NG3A10 &amp; NG4A10</b>	Stage 1: operation error
<b>NG3A11 &amp; NG4A11</b>	Stage 1: exceeded the tightening torque protection range
<b>NG3A12 &amp; NG4A12</b>	Stage 1: exceeded the max. operation time
<b>NG3A13 &amp; NG4A13</b>	Stage 1: lower than the min. operation time
<b>NG3A20 &amp; NG4A20</b>	Stage 1: exceeded tool max. current
<b>NG3A21 &amp; NG4A21</b>	Stage 1: lower than tool min. current
<b>NG3A22 &amp; NG4A22</b>	Stage 1: exceeded the max. angle
<b>NG3A23 &amp; NG4A23</b>	Stage 1: lower than the min. angle
<b>NG3A24 &amp; NG4A24</b>	Stage 1: exceeded the max. torque
<b>NG3A25 &amp; NG4A25</b>	Stage 1: lower than the min. torque
<b>NG3A26 &amp; NG4A26</b>	Stage 1: exceeded the max. clamp torque

Alarm display	Alarm name
<b>NG3A27 &amp; NG4A27</b>	Stage 1: lower than the min. clamp torque
<b>NG3A28 &amp; NG4A28</b>	Stage 1: exceeded the max. clamp angle
<b>NG3A29 &amp; NG4A29</b>	Stage 1: lower than the min. clamp angle
<b>NG3B10 &amp; NG4B10</b>	Stage 2: operation error
<b>NG3B11 &amp; NG4B11</b>	Stage 2: exceeded the tightening torque protection range
<b>NG3B12 &amp; NG4B12</b>	Stage 2: exceeded the max. operation time
<b>NG3B13 &amp; NG4B13</b>	Stage 2: lower than the min. operation time
<b>NG3B20 &amp; NG4B20</b>	Stage 2: exceeded tool max. current
<b>NG3B21 &amp; NG4B21</b>	Stage 2: lower than tool min. current
<b>NG3B22 &amp; NG4B22</b>	Stage 2: exceeded the max. angle
<b>NG3B23 &amp; NG4B23</b>	Stage 2: lower than the min. angle
<b>NG3B24 &amp; NG4B24</b>	Stage 2: exceeded the max. torque
<b>NG3B25 &amp; NG4B25</b>	Stage 2: lower than the min. torque
<b>NG3B26 &amp; NG4B26</b>	Stage 2: exceeded the max. clamp torque
<b>NG3B27 &amp; NG4B27</b>	Stage 2: lower than the min. clamp torque
<b>NG3B28 &amp; NG4B28</b>	Stage 2: exceeded the max. clamp angle
<b>NG3B29 &amp; NG4B29</b>	Stage 2: lower than the min. clamp angle
<b>NG3C10 &amp; NG4C10</b>	Stage 3: operation error
<b>NG3C11 &amp; NG4C11</b>	Stage 3: exceeded the tightening torque protection range
<b>NG3C12 &amp; NG4C12</b>	Stage 3: exceeded the max. operation time
<b>NG3C13 &amp; NG4C13</b>	Stage 3: lower than the min. operation time
<b>NG3C20 &amp; NG4C20</b>	Stage 3: exceeded tool max. current
<b>NG3C21 &amp; NG4C21</b>	Stage 3: lower than tool min. current
<b>NG3C22 &amp; NG4C22</b>	Stage 3: exceeded the max. angle
<b>NG3C23 &amp; NG4C23</b>	Stage 3: lower than the min. angle
<b>NG3C24 &amp; NG4C24</b>	Stage 3: exceeded the max. torque
<b>NG3C25 &amp; NG4C25</b>	Stage 3: lower than the min. torque
<b>NG3C26 &amp; NG4C26</b>	Stage 3: exceeded the max. clamp torque
<b>NG3C27 &amp; NG4C27</b>	Stage 3: lower than the min. clamp torque
<b>NG3C28 &amp; NG4C28</b>	Stage 3: exceeded the max. clamp angle
<b>NG3C29 &amp; NG4C29</b>	Stage 3: lower than the min. clamp angle
<b>NG3D10 &amp; NG4D10</b>	Stage 4: operation error
<b>NG3D11 &amp; NG4D11</b>	Stage 4: exceeded the tightening torque protection range
<b>NG3D12 &amp; NG4D12</b>	Stage 4: exceeded the max. operation time
<b>NG3D13 &amp; NG4D13</b>	Stage 4: lower than the min. operation time
<b>NG3D20 &amp; NG4D20</b>	Stage 4: exceeded tool max. current
<b>NG3D21 &amp; NG4D21</b>	Stage 4: lower than tool min. current
<b>NG3D22 &amp; NG4D22</b>	Stage 4: exceeded the max. angle
<b>NG3D23 &amp; NG4D23</b>	Stage 4: lower than the min. angle
<b>NG3D24 &amp; NG4D24</b>	Stage 4: exceeded the max. torque
<b>NG3D25 &amp; NG4D25</b>	Stage 4: lower than the min. torque

Alarm display	Alarm name
<b>NG3D26 &amp; NG4D26</b>	Stage 4: exceeded the max. clamp torque
<b>NG3D27 &amp; NG4D27</b>	Stage 4: lower than the min. clamp torque
<b>NG3D28 &amp; NG4D28</b>	Stage 4: exceeded the max. clamp angle
<b>NG3D29 &amp; NG4D29</b>	Stage 4: lower than the min. clamp angle
<b>NG3E10 &amp; NG4E10</b>	Stage 5: operation error
<b>NG3E11 &amp; NG4E11</b>	Stage 5: exceeded the tightening torque protection range
<b>NG3E12 &amp; NG4E12</b>	Stage 5: exceeded the max. operation time
<b>NG3E13 &amp; NG4E13</b>	Stage 5: lower than the min. operation time
<b>NG3E20 &amp; NG4E20</b>	Stage 5: exceeded tool max. current
<b>NG3E21 &amp; NG4E21</b>	Stage 5: lower than tool min. current
<b>NG3E22 &amp; NG4E22</b>	Stage 5: exceeded the max. angle
<b>NG3E23 &amp; NG4E23</b>	Stage 5: lower than the min. angle
<b>NG3E24 &amp; NG4E24</b>	Stage 5: exceeded the max. torque
<b>NG3E25 &amp; NG4E25</b>	Stage 5: lower than the min. torque
<b>NG3E26 &amp; NG4E26</b>	Stage 5: exceeded the max. clamp torque
<b>NG3E27 &amp; NG4E27</b>	Stage 5: lower than the min. clamp torque
<b>NG3E28 &amp; NG4E28</b>	Stage 5: exceeded the max. clamp angle
<b>NG3E29 &amp; NG4E29</b>	Stage 5: lower than the min. clamp angle
<b>NG3F10 &amp; NG4F10</b>	Stage 6: operation error
<b>NG3F11 &amp; NG4F11</b>	Stage 6: exceeded the tightening torque protection range
<b>NG3F12 &amp; NG4F12</b>	Stage 6: exceeded the max. operation time
<b>NG3F13 &amp; NG4F13</b>	Stage 6: lower than the min. operation time
<b>NG3F20 &amp; NG4F20</b>	Stage 6: exceeded tool max. current
<b>NG3F21 &amp; NG4F21</b>	Stage 6: lower than tool min. current
<b>NG3F22 &amp; NG4F22</b>	Stage 6: exceeded the max. angle
<b>NG3F23 &amp; NG4F23</b>	Stage 6: lower than the min. angle
<b>NG3F24 &amp; NG4F24</b>	Stage 6: exceeded the max. torque
<b>NG3F25 &amp; NG4F25</b>	Stage 6: lower than the min. torque
<b>NG3F26 &amp; NG4F26</b>	Stage 6: exceeded the max. clamp torque
<b>NG3F27 &amp; NG4F27</b>	Stage 6: lower than the min. clamp torque
<b>NG3F28 &amp; NG4F28</b>	Stage 6: exceeded the max. clamp angle
<b>NG3F29 &amp; NG4F29</b>	Stage 6: lower than the min. clamp angle

Note: if the triggered alarm is not included in the alarm list, contact your local distributor or technical staff.

### 12.1.3 Operation warnings

Alarm display	Alarm name
<b>WN5001 &amp; WN6001</b>	Quantity not reached. String scanning prohibited.
<b>WN5002 &amp; WN6002</b>	Send the tool back for service
<b>WN5003 &amp; WN6003</b>	Parameters not set
<b>WN5004 &amp; WN6004</b>	Unknown tool model
<b>WN5005 &amp; WN6005</b>	Cannot perform tightening and loosening at the same time
<b>WN5006 &amp; WN6006</b>	Parameter setting prohibited when tool is in operation
<b>WN5007 &amp; WN6007</b>	Tool final current exceeded the range
<b>WN5051 &amp; WN6051</b>	Exceeded the max. count for NOK tightening
<b>WN5052 &amp; WN6052</b>	The scanner string is null. Tightening prohibited.
<b>WN5053 &amp; WN6053</b>	Screw quantity reached. Tightening prohibited.
<b>WN5054 &amp; WN6054</b>	Exceeded max. operation time
<b>WN5055 &amp; WN6055</b>	Incorrect parameter setting. Tightening prohibited.
<b>WN5056 &amp; WN6056</b>	Tightening prohibited by remote communication or DI
<b>WN5057 &amp; WN6057</b>	Tightening: parameter exceeded the tool spec.
<b>WN5058 &amp; WN6058</b>	Tightening: parameter does not match the tool
<b>WN5081 &amp; WN6081</b>	Loosening prohibited after tightening OK
<b>WN5082 &amp; WN6082</b>	Loosening prohibited after tightening NOK
<b>WN5083 &amp; WN6083</b>	Exceeded the max. count for NOK loosening
<b>WN5084 &amp; WN6084</b>	Incorrect parameter setting. Loosening prohibited.
<b>WN5085 &amp; WN6085</b>	Loosening prohibited by remote communication or DI
<b>WN5086 &amp; WN6086</b>	Loosening: parameter exceeded the tool spec.

Note: if the triggered alarm is not included in the alarm list, contact your local distributor or technical staff.

## 12.2 Causes and corrective actions

### 12.2.1 Description of device alarms

AL1001 & AL2001 Overcurrent	
Trigger condition and cause	<p>Condition: main circuit current is greater than 1.5 times the maximum instantaneous current of the controller.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The controller output is short-circuited.</li> <li>2. The screwdriver wiring is in error.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check the connection between the screwdriver and the controller and make sure the wire is not short-circuited. Do not expose the metal part of the wiring.</li> <li>2. If the alarm occurs once the controller is connected to power or the screwdriver starts operating, send your controller back to the distributor or contact Delta.</li> </ol>
How to clear the alarm?	Cycle power on the controller.
AL1004 & AL2004 Tool combination error	
Trigger condition and cause	<p>Condition: an incorrect screwdriver is used with the controller.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. Combination error of the controller and screwdriver. The screwdriver specification cannot be identified.</li> <li>2. The encoder of the screwdriver is loose.</li> <li>3. The encoder of the screwdriver is damaged.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Perform cross-comparison of other working screwdrivers to check if the specification of the current screwdriver is incorrect. If so, replace the current screwdriver with a correct one.</li> <li>2. Re-connect the controller and the screwdriver, make sure the connectors are firmly connected, and then cycle power on the controller.</li> </ol> <p>If the issue persists, send your screwdriver back to the distributor or contact Delta.</p>
How to clear the alarm?	Cycle power on the controller.
AL1006 & AL2006 Overload	
Trigger condition and cause	<p>Condition: screwdriver and controller are overloaded.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The load is over the rated range and the controller is in a continuous overload condition.</li> <li>2. Improper setting of controller system parameters.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use a screwdriver with higher capacity, or increase the interval between each operation.</li> <li>2. Check if the parameters are set improperly.             <ol style="list-style-type: none"> <li>A. The speed set for the tightening stage is too low.</li> <li>B. Acceleration / deceleration setting (constant) is too high.</li> </ol> </li> <li>3. Check if the cable between the controller and the screwdriver is properly connected. Perform cross-comparison of other working cables.</li> <li>4. Check if the shaft of the screwdriver is stuck.</li> </ol> <p>If the issue persists, send your controller back to the distributor or contact Delta.</p>
How to clear the alarm?	Alarm reset.

<b>AL1007 &amp; AL2007 Excessive deviation of Speed command</b>	
Trigger condition and cause	<p>Condition: the difference between speed command and speed feedback exceeded the allowable range.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. Drastic change in the input command for speed.</li> <li>2. Improper setting of the speed deviation warning condition.</li> </ol>
Checking method and corrective action	Check if the acceleration / deceleration setting (constant) has caused drastic change in the command.
How to clear the alarm?	Alarm reset.

<b>AL1011 &amp; AL2011 Tool communication error</b>	
Trigger condition and cause	<p>Condition: the encoder signal is in error.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The encoder wiring is incorrect.</li> <li>2. The connectors are loose.</li> <li>3. The encoder wiring is poor.</li> <li>4. Connection to the encoder is cut off due to interference.</li> <li>5. The encoder or the MCU board is damaged.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the wiring follows the instructions in the user manual. If not, connect the wire correctly.</li> <li>2. Check if the cable between the controller and screwdriver is firmly connected. If not, correctly connect the cable again.</li> <li>3. Check the cable between the controller and screwdriver to see if there is any poor wiring or damaged cable. If so, replace the connector and the cable.</li> <li>4. Perform cross-comparison of other working controllers or screwdrivers. If the issue persists, send your screwdriver back to the distributor or contact Delta.</li> </ol>
How to clear the alarm?	Cycle power on the controller.

<b>AL1013 &amp; AL2013 Emergency stop</b>	
Trigger condition and cause	The emergency stop (DI) is triggered.
Checking method and corrective action	Make sure the emergency stop (DI) is off.
How to clear the alarm?	This alarm is automatically cleared when the emergency stop (DI) is set to off.

<b>AL1016 &amp; AL2016 MOSFET overheat</b>	
Trigger condition and cause	<p>Condition: MOSFET error.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The load is over the rated range and the controller is in a continuous overload condition.</li> <li>2. The controller output is short-circuited.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the average load of the screwdriver is too high.</li> <li>2. Check if the ambient temperature is too high.</li> <li>3. Check if the connection cable of the screwdriver is damaged.</li> </ol>
How to clear the alarm?	Cycle power on the controller.

<b>AL1036 &amp; AL2036 No response from tool encoder</b>	
Trigger condition and cause	<p>Condition: encoder internal error or the digital torque sensor is in error.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The encoder sends out an alarm signal, but the controller reads back the encoder alarm status without showing an error.</li> <li>2. The CRC error has occurred to the encoder 10 times consecutively.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the screwdriver and the controller are properly grounded.</li> <li>2. Check if there is any foreign object inside the screwdriver. If so, send your screwdriver back to the distributor or contact Delta.</li> <li>3. Check if the cable between the controller and screwdriver is firmly connected. If not, correctly connect the cable again.</li> </ol> <p>If the issue persists, send your screwdriver back to the distributor or contact Delta.</p>
How to clear the alarm?	Alarm reset or cycle power on the controller.
<b>AL1037 &amp; AL2037 Tool encoder communication error</b>	
Trigger condition and cause	The CRC error has occurred to the encoder 2 cumulative times.
Checking method and corrective action	Check if the screwdriver and the controller are properly grounded.
How to clear the alarm?	Cycle power on the controller.
<b>AL1038 &amp; AL2038 Tool encoder alarm</b>	
Trigger condition and cause	The encoder returns an alarm.
Checking method and corrective action	Send your screwdriver back to the distributor or contact Delta.
How to clear the alarm?	Cycle power on the controller.
<b>AL1039 &amp; AL2039 Tool encoder warning</b>	
Trigger condition and cause	The encoder returns a warning.
Checking method and corrective action	Send your screwdriver back to the distributor or contact Delta.
How to clear the alarm?	Cycle power on the controller.
<b>AL1070 &amp; AL2070 Tool control board did not complete the read / write procedure</b>	
Trigger condition and cause	When performing barcode string writing or other related actions, the related commands are incomplete.
Checking method and corrective action	Check if the wiring is correct or if the connector is loose, and then connect the wire correctly.
How to clear the alarm?	Cycle power on the controller.

<b>AL1083 &amp; AL2083 Controller outputs excessive current</b>	
Trigger condition and cause	When the controller output current is over the allowable level specified by the firmware, this alarm is triggered to protect the MOSFET from overheating or burning due to the high current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>Check the connection cable of the screwdriver for exposed metal wires or torn wires, which can cause a short circuit. In this case, replace the cable and prevent the metal wire from being exposed to troubleshoot the short circuit.</li> <li>Check if the controller output wiring is correct.</li> </ol>
How to clear the alarm?	Cycle power on the controller.
<b>AL1087 &amp; AL2087 &amp; AL1887 &amp; AL2887 Tool torque exceeded the sensor spec.</b>	
Trigger condition and cause	<p>Condition: the controller does not detect a screwdriver connection, or the torque sensor is in error.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>The controller is not connected to the screwdriver.</li> <li>The connection cable of the screwdriver is loose on both ends.</li> <li>The connection cable of the screwdriver is not working.</li> <li>The screwdriver is not working.</li> <li>The actual torque exceeded the range of the torque sensor.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>Check if the controller is connected to the screwdriver.</li> <li>Reinstall the connection cable of the screwdriver.</li> <li>Perform cross-comparison of other working cables to check for a faulty cable. If so, replace the cable.</li> <li>If the alarm occurs once the controller is connected to power, perform cross-comparison of other working screwdrivers to check for a faulty screwdriver. If so, replace the screwdriver.</li> </ol> <p>If the issue persists, send your screwdriver back to the distributor or contact Delta.</p>
How to clear the alarm?	Cycle power on the controller.
<b>AL1088 &amp; AL2088 &amp; AL1888 &amp; AL2888 Tool torque sensor error</b>	
Trigger condition and cause	<p>Condition: the torque sensor is in error.</p> <p>Cause: use the controller current sensor and the tool torque sensor to measure the current values and compare them to check if the tool torque sensor is in error.</p>
Checking method and corrective action	The torque sensor is degraded; send your screwdriver back to the distributor or contact Delta.
How to clear the alarm?	Cycle power on the controller.
<b>AL1090 &amp; AL2090 &amp; AL1890 &amp; AL2890 No response from tool torque sensor</b>	
Trigger condition and cause	The CRC error has occurred to the torque sensor 10 times consecutively.
Checking method and corrective action	Check if the cable between the controller and screwdriver is firmly connected. If not, correctly connect the cable again.
How to clear the alarm?	Cycle power on the controller.

<b>AL1091 &amp; AL2091 &amp; AL1891 &amp; AL2891 Tool torque sensor communication error</b>	
Trigger condition and cause	The CRC error has occurred to the torque sensor 2 cumulative times.
Checking method and corrective action	Check if the screwdriver and the controller are properly grounded.
How to clear the alarm?	Cycle power on the controller.
<b>AL1092 &amp; AL2092 &amp; AL1892 &amp; AL2892 Tool torque sensor alarm</b>	
Trigger condition and cause	The torque sensor returns an alarm.
Checking method and corrective action	Send your screwdriver back to the distributor or contact Delta.
How to clear the alarm?	Cycle power on the controller.
<b>AL1093 &amp; AL2093 &amp; AL1893 &amp; AL2893 Tool torque sensor initialization failed</b>	
Trigger condition and cause	The internal parameter of the torque sensor is in error when the controller is connected to power.
Checking method and corrective action	Send your screwdriver back to the distributor or contact Delta.
How to clear the alarm?	Cycle power on the controller.
<b>AL1094 &amp; AL2094 &amp; AL1894 &amp; AL2894 Tool temperature error when the power is on</b>	
Trigger condition and cause	When the controller is connected to power, the read initial temperature of the torque sensor EEPROM exceeded the range of 5 to 45°C (41 to 113°F).
Checking method and corrective action	Send your screwdriver back to the distributor or contact Delta.
How to clear the alarm?	Cycle power on the controller.
<b>AL1095 &amp; AL2095 &amp; AL1895 &amp; AL2895 Tool temperature error</b>	
Trigger condition and cause	The read internal temperature of the torque sensor exceeded the range of -20 to +80°C (-4 to +176°F).
Checking method and corrective action	Send your screwdriver back to the distributor or contact Delta.
How to clear the alarm?	Cycle power on the controller.
<b>AL1099 &amp; AL2099 EEPROM not reset after firmware update</b>	
Trigger condition and cause	After the firmware version is updated, EEPROM is not reset yet.
Checking method and corrective action	Make sure the firmware update is complete, then remove the SLAVE-B USB cable, and then cycle power on the controller.
How to clear the alarm?	Cycle power on the controller.

## 12.2.2 Description of tightening errors

NG3000 & NG4000 Unknown parameter	
Trigger condition and cause	<p>Condition: when the tightening process starts, the parameter configuration is incorrect.</p> <p>Cause: the controller cannot identify the parameter.</p>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Make sure the parameter is not being configured when the screwdriver is started.</li> <li>2. Check if the controller is configuring any parameter.</li> <li>3. Make sure the parameter is already configured before you perform tightening or loosening.</li> </ol>
How to clear the alarm?	Modify the parameter configuration and perform tightening or loosening again.

NG3002 & NG4002 Tightening signal ends too early	
Trigger condition and cause	<p>Condition: during the tightening process, the tightening signal disappears.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. During the tightening process, the screwdriver is withdrawn early.</li> <li>2. Transmission of the tightening signal is poor.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Maintain the tightening signal until the tightening is complete.</li> <li>2. If the tool start condition is DI, check if the tightening signal transmission is poor.</li> <li>3. If the tool start condition is push start, check if the push start device has poor contact.</li> <li>4. If the tool start condition is lever start, check if the lever on the screwdriver has poor contact.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

NG3011 & NG4011 Tightening: lower than the min. rotation angle	
Trigger condition and cause	<p>Condition: during the tightening process, the rotation angle is smaller than the minimum tightening angle setting.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The tightening fails because the process does not meet the set tightening condition.</li> <li>2. The minimum tightening angle is not properly set.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Correct the tightening condition.</li> <li>2. Correct the setting of the minimum tightening angle.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

NG3012 & NG4012 Tightening: exceeded the max. rotation angle	
Trigger condition and cause	<p>Condition: during the tightening process, the rotation angle exceeded the maximum tightening angle setting.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The tightening fails because the process does not meet the set tightening condition.</li> <li>2. The maximum tightening angle is not properly set.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Correct the tightening condition.</li> <li>2. Correct the setting of the maximum tightening angle.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3013 &amp; NG4013 Tightening: timeout</b>	
Trigger condition and cause	<p>Condition: the total operation time is exceeded before the tightening is complete.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The tightening fails because the process does not meet the set tightening condition.</li> <li>2. The total operation time is not properly set.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Correct the tightening condition.</li> <li>2. Correct the timeout setting for tightening.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3014 &amp; NG4014 Tightening: exceeded tool max. current</b>	
Trigger condition and cause	During the tightening process, the tool current exceeded its maximum current specification.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the tool current has exceeded the maximum current during the tightening process.</li> <li>2. Check if the controller current feedback is abnormal.</li> </ol>
How to clear the alarm?	Cycle power on the controller.
<b>NG3015 &amp; NG4015 Tightening: error occurs during parameter setting</b>	
Trigger condition and cause	When the tightening process starts, an internal error occurs to the controller.
Checking method and corrective action	Call the parameter of tightening source again.
How to clear the alarm?	Cycle power on the controller.
<b>NG3032 &amp; NG4032 Loosening: exceeded the max. rotation angle</b>	
Trigger condition and cause	<p>Condition: during the loosening process, the rotation angle exceeded the maximum loosening angle setting.</p> <p>Cause: the maximum loosening angle is not properly set.</p>
Checking method and corrective action	Correct the setting of the maximum loosening angle.
How to clear the alarm?	Re-loosen the screw.
<b>NG3033 &amp; NG4033 Loosening: timeout</b>	
Trigger condition and cause	<p>Condition: the total operation time is exceeded before the loosening is complete.</p> <p>Cause: the total operation time is not properly set.</p>
Checking method and corrective action	Correct the timeout setting for loosening.
How to clear the alarm?	Re-loosen the screw.

<b>NG3034 &amp; NG4034 Loosening: exceeded tool max. current</b>	
Trigger condition and cause	During the loosening process, the tool current exceeded its maximum current specification.
Checking method and corrective action	<ol style="list-style-type: none"> <li>Check if the tool current has exceeded the maximum current during the loosening process.</li> <li>Check if the controller current feedback is abnormal.</li> </ol>
How to clear the alarm?	Cycle power on the controller.

<b>NG3035 &amp; NG4035 Loosening: error occurs during parameter setting</b>	
Trigger condition and cause	During the process of setting the loosening parameter, an internal error occurs to the controller.
Checking method and corrective action	Call the loosening parameter again.
How to clear the alarm?	Cycle power on the controller.

<b>NG3110 &amp; NG4110 Start stage: operation error</b>	
Trigger condition and cause	<p>Condition: the controller returns an error during the tightening process.  Cause:</p> <ol style="list-style-type: none"> <li>The torque of the start stage exceeded the tool maximum torque.</li> <li>During the tightening process, the tool is in the Servo Off state.</li> </ol>
Checking method and corrective action	Check if the torque of the start stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3111 &amp; NG4111 Start stage: exceeded the tool torque protection range</b>	
<b>Start stage: exceeded the tightening torque protection range</b>	
Trigger condition and cause	<p>Condition: the torque of the start stage exceeded the protection range.  Cause:</p> <ol style="list-style-type: none"> <li>Exceeded the tightening torque protection range (standard strategy).</li> <li>Exceeded the tool maximum torque (pre-position strategy).</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>Check if the tool has reached a foreign object before this stage is complete.</li> <li>Check if the speed for the start stage is too high.</li> <li>Check if the setting of the start torque and start angle is appropriate. <ul style="list-style-type: none"> <li>■ The torque setting in the start stage cannot be greater than that in the tightening stage (standard strategy).</li> <li>■ The torque setting in the start stage cannot be greater than the tool maximum torque (pre-position strategy).</li> </ul> </li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3112 &amp; NG4112 Start stage: exceeded the max. operation time</b>	
Trigger condition and cause	Exceeded the maximum operation time of the start stage.
Checking method and corrective action	Check if the setting for the maximum operation time of the start stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3113 &amp; NG4113 Start stage: lower than the min. operation time</b>	
Trigger condition and cause	Shorter than the minimum operation time of the start stage.
Checking method and corrective action	Check if the setting for the minimum operation time of the start stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3120 &amp; NG4120 Start stage: exceeded tool max. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of the start stage is too high.</li> <li>4. Check if the torque of the start stage is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3121 &amp; NG4121 Start stage: lower than tool min. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of the start stage is too high.</li> <li>4. Check if the torque of the start stage is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3122 &amp; NG4122 Start stage: exceeded the max. angle</b>	
Trigger condition and cause	The angle of the start stage exceeded the Max. Rotation Angle set in the <b>General Settings</b> tab.
Checking method and corrective action	Check if the Max. Rotation Angle set in the <b>General Settings</b> tab is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3123 &amp; NG4123 Start stage: lower than the min. angle</b>	
Trigger condition and cause	The angle of the start stage is lower than the Min. Rotation Angle set in the <b>General Settings</b> tab.
Checking method and corrective action	Check if the Min. Rotation Angle set in the <b>General Settings</b> tab is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3124 &amp; NG4124 Start stage: exceeded the max. torque</b>	
Trigger condition and cause	Exceeded the maximum torque of the start stage.
Checking method and corrective action	Check if the setting for the maximum torque of the start stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3125 &amp; NG4125 Start stage: lower than the min. torque</b>	
Trigger condition and cause	Lower than the minimum torque of the start stage.
Checking method and corrective action	Check if the setting for the minimum torque of the start stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3210 &amp; NG4210 Rundown stage: operation error</b>	
Trigger condition and cause	<p>Condition: the controller returns an error during the tightening process.            Cause:</p> <ol style="list-style-type: none"> <li>1. The torque of the rundown stage exceeded the tool maximum torque.</li> <li>2. During the tightening process, the tool is in the Servo Off state.</li> </ol>
Checking method and corrective action	Check if the torque of the rundown stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3211 &amp; NG4211 Rundown stage: exceeded the tool torque protection range Rundown stage: exceeded the tightening torque protection range</b>	
Trigger condition and cause	<p>Condition: the torque of the rundown stage exceeded the protection range.            Cause:</p> <ol style="list-style-type: none"> <li>1. Exceeded the tightening torque protection range (standard strategy).</li> <li>2. Exceeded the tool maximum torque (pre-position strategy).</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the tool has reached a foreign object before this stage is complete.</li> <li>2. Check if the speed of the rundown stage is too high.</li> <li>3. Check if the setting of the rundown angle, rundown torque, or torque rate for the rundown stage is appropriate.</li> <li>4. Check if the speed of the previous stage is too high.</li> <li>5. Check if the angle of the previous stage is set too large.</li> </ol> <ul style="list-style-type: none"> <li>■ The torque setting in the rundown stage cannot be greater than that in the tightening stage (standard strategy).</li> <li>■ The torque setting in the rundown stage cannot be greater than the tool maximum torque (pre-position strategy).</li> </ul>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3212 &amp; NG4212 Rundown stage: exceeded the max. operation time</b>	
Trigger condition and cause	Exceeded the maximum operation time of the rundown stage.
Checking method and corrective action	Check if the setting for the maximum operation time of the rundown stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3213 &amp; NG4213 Rundown stage: lower than the min. operation time</b>	
Trigger condition and cause	Shorter than the minimum operation time of the rundown stage.
Checking method and corrective action	Check if the setting for the minimum operation time of the rundown stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3220 &amp; NG4220 Rundown stage: exceeded tool max. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of the rundown stage is too high.</li> <li>4. Check if the torque of the rundown stage is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3221 &amp; NG4221 Rundown stage: lower than tool min. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of the rundown stage is too high.</li> <li>4. Check if the torque of the rundown stage is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3222 &amp; NG4222 Rundown stage: exceeded the max. angle</b>	
Trigger condition and cause	Exceeded the maximum angle of the rundown stage.
Checking method and corrective action	Check if the setting for the maximum angle of the rundown stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3223 &amp; NG4223 Rundown stage: lower than the min. angle</b>	
Trigger condition and cause	Lower than the minimum angle of the rundown stage.
Checking method and corrective action	Check if the setting for the minimum angle of the rundown stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3224 &amp; NG4224 Rundown stage: exceeded the max. torque</b>	
Trigger condition and cause	Exceeded the maximum torque of the rundown stage.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the setting for the maximum torque of the rundown stage is appropriate.</li> <li>2. Check if the speed of the previous stage is too high.</li> <li>3. Check if the angle of the previous stage is set too large.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3225 &amp; NG4225 Rundown stage: lower than the min. torque</b>	
Trigger condition and cause	Lower than the minimum torque of the rundown stage.
Checking method and corrective action	Check if the setting for the minimum torque of the rundown stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3310 &amp; NG4310 Pre-tightening stage: operation error</b>	
Trigger condition and cause	<p>Condition: the controller returns an error during the tightening process.  Cause:</p> <ol style="list-style-type: none"> <li>1. The torque of the pre-tightening stage exceeded the tool maximum torque.</li> <li>2. During the tightening process, the tool is in the Servo Off state.</li> </ol>
Checking method and corrective action	Check if the torque of the pre-tightening stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3311 &amp; NG4311 Pre-tightening stage: exceeded the tool torque protection range Pre-tightening stage: exceeded the tightening torque protection range</b>	
Trigger condition and cause	<p>Condition: the torque of the pre-tightening stage exceeded the protection range.  Cause: exceeded the tightening torque protection range (standard strategy).</p>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the tool has reached a foreign object before this stage is complete.</li> <li>2. Check if the speed of the pre-tightening stage is too high.</li> <li>3. Check if the setting for the pre-tightening torque or torque rate of the pre-tightening stage is appropriate.</li> <li>4. Check if the speed of the previous stage is too high.</li> <li>5. Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol> <p>■ The torque setting in the pre-tightening stage cannot be greater than that in the tightening stage.</p>
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3312 & NG4312 Pre-tightening stage: exceeded the max. operation time**

Trigger condition and cause	Exceeded the maximum operation time of the pre-tightening stage.
Checking method and corrective action	Check if the setting for the maximum operation time of the pre-tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3313 & NG4313 Pre-tightening stage: lower than the min. operation time**

Trigger condition and cause	Shorter than the minimum operation time of the pre-tightening stage.
Checking method and corrective action	Check if the setting for the minimum operation time of the pre-tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3320 & NG4320 Pre-tightening stage: exceeded tool max. current**

Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of the pre-tightening stage is too high.</li> <li>4. Check if the torque of the pre-tightening stage is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3321 & NG4321 Pre-tightening stage: lower than tool min. current**

Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of the pre-tightening stage is too high.</li> <li>4. Check if the torque of the pre-tightening stage is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3322 & NG4322 Pre-tightening stage: exceeded the max. angle**

Trigger condition and cause	Exceeded the maximum angle of the pre-tightening stage.
Checking method and corrective action	Check if the setting for the maximum angle of the pre-tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3323 &amp; NG4323 Pre-tightening stage: lower than the min. angle</b>	
Trigger condition and cause	Lower than the minimum angle of the pre-tightening stage.
Checking method and corrective action	Check if the setting for the minimum angle of the pre-tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3324 &amp; NG4324 Pre-tightening stage: exceeded the max. torque</b>	
Trigger condition and cause	The torque of the pre-tightening stage exceeded the tool maximum torque.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the setting for the torque of the pre-tightening stage is appropriate.</li> <li>2. Check if the speed of the previous stage is too high.</li> <li>3. Check if the angle, torque, or torque rate of the previous stage is set too large.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3325 &amp; NG4325 Pre-tightening stage: lower than the min. torque</b>	
Trigger condition and cause	The torque of the pre-tightening stage is lower than the tool minimum torque.
Checking method and corrective action	Check if the setting for the torque of the pre-tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3410 &amp; NG4410 Tightening stage: operation error</b>	
Trigger condition and cause	<p>Condition: the controller returns an error during the tightening process.          Cause:</p> <ol style="list-style-type: none"> <li>1. The torque of the tightening stage exceeded the tool maximum torque.</li> <li>2. During the tightening process, the tool is in the Servo Off state.</li> </ol>
Checking method and corrective action	Check if the torque of the tightening stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.

12

<b>NG3411 &amp; NG4411 Tightening stage: exceeded the tool torque protection range Tightening stage: exceeded the tightening torque protection range</b>	
Trigger condition and cause	<p>Condition: the torque of the tightening stage exceeded the protection range.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. Exceeded the tightening torque protection range (standard strategy).</li> <li>2. Exceeded the tool maximum torque (enhanced strategy).</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the setting of the tightening torque protection range is appropriate.</li> <li>2. Check if the speed of the tightening stage is too high.</li> <li>3. Check if the setting for the target angle, target torque, clamp torque, or clamp angle of the tightening stage is too large.</li> <li>4. Check if the speed of the previous stage is too high (standard strategy).</li> <li>5. Check if the torque or torque rate of the previous stage is set too large (standard strategy).</li> </ol> <p>■ The torque setting in the tightening stage cannot be greater than the tool maximum torque.</p>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3412 &amp; NG4412 Tightening stage: exceeded the max. operation time</b>	
Trigger condition and cause	Exceeded the maximum operation time of the tightening stage.
Checking method and corrective action	Check if the setting for the maximum operation time of the tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3413 &amp; NG4413 Tightening stage: lower than the min. operation time</b>	
Trigger condition and cause	Shorter than the minimum operation time of the tightening stage.
Checking method and corrective action	Check if the setting for the minimum operation time of the tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3420 &amp; NG4420 Tightening stage: exceeded tool max. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of the tightening stage is too high.</li> <li>4. Check if the torque of the tightening stage is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3421 &amp; NG4421 Tightening stage: lower than tool min. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of the tightening stage is too high.</li> <li>4. Check if the torque of the tightening stage is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3422 &amp; NG4422 Tightening stage: exceeded the max. angle</b>	
Trigger condition and cause	Exceeded the maximum angle of the tightening stage.
Checking method and corrective action	Check if the setting for the maximum angle of the tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3423 &amp; NG4423 Tightening stage: lower than the min. angle</b>	
Trigger condition and cause	Lower than the minimum angle of the tightening stage.
Checking method and corrective action	Check if the setting for the minimum angle of the tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3424 &amp; NG4424 Tightening stage: exceeded the max. torque</b>	
Trigger condition and cause	Exceeded the maximum torque of the tightening stage.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the setting for the maximum torque of the tightening stage is appropriate.</li> <li>2. Check if the speed of the previous stage is too high (standard strategy).</li> <li>3. Check if the torque or torque rate of the previous stage is set too large (standard strategy).</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3425 &amp; NG4425 Tightening stage: lower than the min. torque</b>	
Trigger condition and cause	Lower than the minimum torque of the tightening stage.
Checking method and corrective action	Check if the setting for the minimum torque of the tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3426 & NG4426 Tightening stage: exceeded the max. clamp torque**

Trigger condition and cause	Exceeded the maximum clamp torque of the tightening stage (standard strategy).
Checking method and corrective action	Check if the setting for the maximum clamp torque of the tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3427 & NG4427 Tightening stage: lower than the min. clamp torque**

Trigger condition and cause	Lower than the minimum clamp torque of the tightening stage (standard strategy).
Checking method and corrective action	Check if the setting for the minimum clamp torque of the tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3428 & NG4428 Tightening stage: exceeded the max. clamp angle**

Trigger condition and cause	Exceeded the maximum clamp angle of the tightening stage (standard strategy).
Checking method and corrective action	Check if the setting for the maximum clamp angle of the tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3429 & NG4429 Tightening stage: lower than the min. clamp angle**

Trigger condition and cause	Lower than the minimum clamp angle of the tightening stage (standard strategy).
Checking method and corrective action	Check if the setting for the minimum clamp angle of the tightening stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3510 & NG4510 Rundown stage (torque rate): operation error**

Trigger condition and cause	Condition: the controller returns an error during the tightening process. Cause: 1. The torque of the rundown stage exceeded the tool maximum torque. 2. During the tightening process, the tool is in the Servo Off state.
Checking method and corrective action	Check if the torque of the rundown stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3511 &amp; NG4511 Rundown stage (torque rate): exceeded the tightening torque protection range</b>	
Trigger condition and cause	<p>Condition: the torque of the rundown stage exceeded the protection range.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. Exceeded the tightening torque protection range (standard strategy).</li> <li>2. Exceeded the tool maximum torque (pre-position strategy).</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the tool has reached a foreign object before this stage is complete.</li> <li>2. Check if the speed of the rundown stage is too high.</li> <li>3. Check if the settings of the torque rate and the angle interval for torque rate calculation are appropriate.</li> <li>4. Check if the speed of the previous stage is too high.</li> <li>5. Check if the angle of the previous stage is set too large.</li> </ol> <ul style="list-style-type: none"> <li>■ The torque setting in the rundown stage cannot be greater than that in the tightening stage (standard strategy).</li> <li>■ The torque setting in the rundown stage cannot be greater than the tool maximum torque (pre-position strategy).</li> </ul>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3512 &amp; NG4512 Rundown stage (torque rate): exceeded the max. operation time</b>	
Trigger condition and cause	Exceeded the maximum operation time of the rundown stage.
Checking method and corrective action	Check if the setting for the maximum operation time of the rundown stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3513 &amp; NG4513 Rundown stage (torque rate): lower than the min. operation time</b>	
Trigger condition and cause	Shorter than the minimum operation time of the rundown stage.
Checking method and corrective action	Check if the setting for the minimum operation time of the rundown stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3520 &amp; NG4520 Rundown stage (torque rate): exceeded tool max. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of the rundown stage is too high.</li> <li>4. Check if the torque of the rundown stage is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3521 &amp; NG4521 Rundown stage (torque rate): lower than tool min. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of the rundown stage is too high.</li> <li>4. Check if the torque of the rundown stage is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3522 &amp; NG4522 Rundown stage (torque rate): exceeded the max. angle</b>	
Trigger condition and cause	Exceeded the maximum angle of the rundown stage.
Checking method and corrective action	Check if the setting for the maximum angle of the rundown stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3523 &amp; NG4523 Rundown stage (torque rate): lower than the min. angle</b>	
Trigger condition and cause	Lower than the minimum angle of the rundown stage.
Checking method and corrective action	Check if the setting for the minimum angle of the rundown stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3524 &amp; NG4524 Rundown stage (torque rate): exceeded the max. torque</b>	
Trigger condition and cause	Exceeded the maximum torque of the rundown stage.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the setting for the maximum torque of the rundown stage is appropriate.</li> <li>2. Check if the speed of the previous stage is too high.</li> <li>3. Check if the angle of the previous stage is set too large.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3525 &amp; NG4525 Rundown stage (torque rate): lower than the min. torque</b>	
Trigger condition and cause	Lower than the minimum torque of the rundown stage.
Checking method and corrective action	Check if the setting for the minimum torque of the rundown stage is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3881 &amp; NG4881 Loosening stage: lower than the set torque</b>	
Trigger condition and cause	The torque during loosening operation is lower than the minimum torque of the loosening stage.
Checking method and corrective action	Check if the setting for the minimum torque of the loosening stage is appropriate.
How to clear the alarm?	Loosen the screw again.
<b>NG3891 &amp; NG4891 Loosening stage: exceeded the tool torque protection range</b>	
Trigger condition and cause	The torque of the loosening stage exceeded the tool maximum torque.
Checking method and corrective action	The torque setting in the loosening stage cannot be greater than the tool maximum torque.
How to clear the alarm?	Loosen the screw again.
<b>NG3A10 &amp; NG4A10 Stage 1: operation error</b>	
Trigger condition and cause	<p>Condition: the controller returns an error during the tightening process.            Cause:</p> <ol style="list-style-type: none"> <li>1. The torque of this stage exceeded the tool maximum torque.</li> <li>2. During the tightening process, the tool is in the Servo Off state.</li> </ol>
Checking method and corrective action	Check if the torque of this stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A11 &amp; NG4A11 Stage 1: exceeded the tightening torque protection range</b>	
Trigger condition and cause	The torque of Stage 1 exceeded the protection range.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the tool has reached a foreign object before this stage is complete.</li> <li>2. Check if the speed of Stage 1 is too high.</li> <li>3. Check if the setting of the torque rate or the angle interval for torque rate calculation is appropriate.</li> </ol> <p>■ The torque setting in Stage 1 cannot be greater than the tool maximum torque.</p>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A12 &amp; NG4A12 Stage 1: exceeded the max. operation time</b>	
Trigger condition and cause	Exceeded the maximum operation time of Stage 1.
Checking method and corrective action	Check if the setting for the maximum operation time of Stage 1 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3A13 &amp; NG4A13 Stage 1: lower than the min. operation time</b>	
Trigger condition and cause	Shorter than the minimum operation time of Stage 1.
Checking method and corrective action	Check if the setting for the minimum operation time of Stage 1 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A20 &amp; NG4A20 Stage 1: exceeded tool max. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 1 is too high.</li> <li>4. Check if the torque of Stage 1 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A21 &amp; NG4A21 Stage 1: lower than tool min. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 1 is too high.</li> <li>4. Check if the torque of Stage 1 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A22 &amp; NG4A22 Stage 1: exceeded the max. angle</b>	
Trigger condition and cause	Exceeded the maximum angle of Stage 1.
Checking method and corrective action	Check if the setting for the maximum angle of Stage 1 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A23 &amp; NG4A23 Stage 1: lower than the min. angle</b>	
Trigger condition and cause	Lower than the minimum angle of Stage 1.
Checking method and corrective action	Check if the setting for the minimum angle of Stage 1 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3A24 &amp; NG4A24 Stage 1: exceeded the max. torque</b>	
Trigger condition and cause	Exceeded the maximum torque of Stage 1.
Checking method and corrective action	Check if the setting for the maximum torque of Stage 1 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A25 &amp; NG4A25 Stage 1: lower than the min. torque</b>	
Trigger condition and cause	Lower than the minimum torque of Stage 1.
Checking method and corrective action	Check if the setting for the minimum torque of Stage 1 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A26 &amp; NG4A26 Stage 1: exceeded the max. clamp torque</b>	
Trigger condition and cause	Exceeded the maximum clamp torque of Stage 1.
Checking method and corrective action	Check if the setting for the maximum clamp torque of Stage 1 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A27 &amp; NG4A27 Stage 1: lower than the min. clamp torque</b>	
Trigger condition and cause	Lower than the minimum clamp torque of Stage 1.
Checking method and corrective action	Check if the setting for the minimum clamp torque of Stage 1 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A28 &amp; NG4A28 Stage 1: exceeded the max. clamp angle</b>	
Trigger condition and cause	Exceeded the maximum clamp angle of Stage 1.
Checking method and corrective action	Check if the setting for the maximum clamp angle of Stage 1 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3A29 &amp; NG4A29 Stage 1: lower than the min. clamp angle</b>	
Trigger condition and cause	Lower than the minimum clamp angle of Stage 1.
Checking method and corrective action	Check if the setting for the minimum clamp angle of Stage 1 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3B10 &amp; NG4B10 Stage 2: operation error</b>	
Trigger condition and cause	<p>Condition: the controller returns an error during the tightening process.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The torque of this stage exceeded the tool maximum torque.</li> <li>2. During the tightening process, the tool is in the Servo Off state.</li> </ol>
Checking method and corrective action	Check if the torque of this stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3B11 &amp; NG4B11 Stage 2: exceeded the tightening torque protection range</b>	
Trigger condition and cause	The torque of Stage 2 exceeded the protection range.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the tool has reached a foreign object before this stage is complete.</li> <li>2. Check if the speed of Stage 2 is too high.</li> <li>3. Check if the setting of the torque rate or the angle interval for torque rate calculation is appropriate.</li> <li>4. Check if the speed of the previous stage is too high.</li> <li>5. Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol> <p>■ The torque setting in Stage 2 cannot be greater than the tool maximum torque.</p>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3B12 &amp; NG4B12 Stage 2: exceeded the max. operation time</b>	
Trigger condition and cause	Exceeded the maximum operation time of Stage 2.
Checking method and corrective action	Check if the setting for the maximum operation time of Stage 2 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3B13 &amp; NG4B13 Stage 2: lower than the min. operation time</b>	
Trigger condition and cause	Shorter than the minimum operation time of Stage 2.
Checking method and corrective action	Check if the setting for the minimum operation time of Stage 2 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3B20 &amp; NG4B20 Stage 2: exceeded tool max. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 2 is too high.</li> <li>4. Check if the torque of Stage 2 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3B21 &amp; NG4B21 Stage 2: lower than tool min. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 2 is too high.</li> <li>4. Check if the torque of Stage 2 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3B22 &amp; NG4B22 Stage 2: exceeded the max. angle</b>	
Trigger condition and cause	Exceeded the maximum angle of Stage 2.
Checking method and corrective action	Check if the setting for the maximum angle of Stage 2 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3B23 &amp; NG4B23 Stage 2: lower than the min. angle</b>	
Trigger condition and cause	Lower than the minimum angle of Stage 2.
Checking method and corrective action	Check if the setting for the minimum angle of Stage 2 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3B24 &amp; NG4B24 Stage 2: exceeded the max. torque</b>	
Trigger condition and cause	Exceeded the maximum torque of Stage 2.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the setting for the maximum torque of Stage 2 is appropriate.</li> <li>2. Check if the speed of the previous stage is too high.</li> <li>3. Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3B25 &amp; NG4B25 Stage 2: lower than the min. torque</b>	
Trigger condition and cause	Lower than the minimum torque of Stage 2.
Checking method and corrective action	Check if the setting for the minimum torque of Stage 2 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3B26 & NG4B26 Stage 2: exceeded the max. clamp torque**

Trigger condition and cause	Exceeded the maximum clamp torque of Stage 2.
Checking method and corrective action	Check if the setting for the maximum clamp torque of Stage 2 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3B27 & NG4B27 Stage 2: lower than the min. clamp torque**

Trigger condition and cause	Lower than the minimum clamp torque of Stage 2.
Checking method and corrective action	Check if the setting for the minimum clamp torque of Stage 2 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3B28 & NG4B28 Stage 2: exceeded the max. clamp angle**

Trigger condition and cause	Exceeded the maximum clamp angle of Stage 2.
Checking method and corrective action	Check if the setting for the maximum clamp angle of Stage 2 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3B29 & NG4B29 Stage 2: lower than the min. clamp angle**

Trigger condition and cause	Lower than the minimum clamp angle of Stage 2.
Checking method and corrective action	Check if the setting for the minimum clamp angle of Stage 2 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3C10 & NG4C10 Stage 3: operation error**

Trigger condition and cause	Condition: the controller returns an error during the tightening process. Cause: 1. The torque of this stage exceeded the tool maximum torque. 2. During the tightening process, the tool is in the Servo Off state.
Checking method and corrective action	Check if the torque of this stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3C11 &amp; NG4C11 Stage 3: exceeded the tightening torque protection range</b>	
Trigger condition and cause	The torque of Stage 3 exceeded the protection range.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the tool has reached a foreign object before this stage is complete.</li> <li>2. Check if the speed of Stage 3 is too high.</li> <li>3. Check if the setting of the torque rate or the angle interval for torque rate calculation is appropriate.</li> <li>4. Check if the speed of the previous stage is too high.</li> <li>5. Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol> <p>■ The torque setting in Stage 3 cannot be greater than the tool maximum torque.</p>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3C12 &amp; NG4C12 Stage 3: exceeded the max. operation time</b>	
Trigger condition and cause	Exceeded the maximum operation time of Stage 3.
Checking method and corrective action	Check if the setting for the maximum operation time of Stage 3 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3C13 &amp; NG4C13 Stage 3: lower than the min. operation time</b>	
Trigger condition and cause	Shorter than the minimum operation time of Stage 3.
Checking method and corrective action	Check if the setting for the minimum operation time of Stage 3 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3C20 &amp; NG4C20 Stage 3: exceeded tool max. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 3 is too high.</li> <li>4. Check if the torque of Stage 3 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3C21 &amp; NG4C21 Stage 3: lower than tool min. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 3 is too high.</li> <li>4. Check if the torque of Stage 3 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3C22 &amp; NG4C22 Stage 3: exceeded the max. angle</b>	
Trigger condition and cause	Exceeded the maximum angle of Stage 3.
Checking method and corrective action	Check if the setting for the maximum angle of Stage 3 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3C23 &amp; NG4C23 Stage 3: lower than the min. angle</b>	
Trigger condition and cause	Lower than the minimum angle of Stage 3.
Checking method and corrective action	Check if the setting for the minimum angle of Stage 3 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3C24 &amp; NG4C24 Stage 3: exceeded the max. torque</b>	
Trigger condition and cause	Exceeded the maximum torque of Stage 3.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the setting for the maximum torque of Stage 3 is appropriate.</li> <li>2. Check if the speed of the previous stage is too high.</li> <li>3. Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3C25 &amp; NG4C25 Stage 3: lower than the min. torque</b>	
Trigger condition and cause	Lower than the minimum torque of Stage 3.
Checking method and corrective action	Check if the setting for the minimum torque of Stage 3 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3C26 &amp; NG4C26 Stage 3: exceeded the max. clamp torque</b>	
Trigger condition and cause	Exceeded the maximum clamp torque of Stage 3.
Checking method and corrective action	Check if the setting for the maximum clamp torque of Stage 3 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3C27 &amp; NG4C27 Stage 3: lower than the min. clamp torque</b>	
Trigger condition and cause	Lower than the minimum clamp torque of Stage 3.
Checking method and corrective action	Check if the setting for the minimum clamp torque of Stage 3 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3C28 &amp; NG4C28 Stage 3: exceeded the max. clamp angle</b>	
Trigger condition and cause	Exceeded the maximum clamp angle of Stage 3.
Checking method and corrective action	Check if the setting for the maximum clamp angle of Stage 3 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3C29 &amp; NG4C29 Stage 3: lower than the min. clamp angle</b>	
Trigger condition and cause	Lower than the minimum clamp angle of Stage 3
Checking method and corrective action	Check if the setting for the minimum clamp angle of Stage 3 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3D10 &amp; NG4D10 Stage 4: operation error</b>	
Trigger condition and cause	<p>Condition: the controller returns an error during the tightening process.            Cause:</p> <ol style="list-style-type: none"> <li>1. The torque of this stage exceeded the tool maximum torque.</li> <li>2. During the tightening process, the tool is in the Servo Off state.</li> </ol>
Checking method and corrective action	Check if the torque of this stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3D11 &amp; NG4D11 Stage 4: exceeded the tightening torque protection range</b>	
Trigger condition and cause	The torque of Stage 4 exceeded the protection range.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the tool has reached a foreign object before this stage is complete.</li> <li>2. Check if the speed of Stage 4 is too high.</li> <li>3. Check if the setting of the torque rate or the angle interval for torque rate calculation is appropriate.</li> <li>4. Check if the speed of the previous stage is too high.</li> <li>5. Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol> <p>■ The torque setting in Stage 4 cannot be greater than the tool maximum torque.</p>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3D12 &amp; NG4D12 Stage 4: exceeded the max. operation time</b>	
Trigger condition and cause	Exceeded the maximum operation time of Stage 4.
Checking method and corrective action	Check if the setting for the maximum operation time of Stage 4 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3D13 &amp; NG4D13 Stage 4: lower than the min. operation time</b>	
Trigger condition and cause	Shorter than the minimum operation time of Stage 4.
Checking method and corrective action	Check if the setting for the minimum operation time of Stage 4 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3D20 &amp; NG4D20 Stage 4: exceeded tool max. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 4 is too high.</li> <li>4. Check if the torque of Stage 4 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3D21 &amp; NG4D21 Stage 4: lower than tool min. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 4 is too high.</li> <li>4. Check if the torque of Stage 4 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3D22 &amp; NG4D22 Stage 4: exceeded the max. angle</b>	
Trigger condition and cause	Exceeded the maximum angle of Stage 4.
Checking method and corrective action	Check if the setting for the maximum angle of Stage 4 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3D23 &amp; NG4D23 Stage 4: lower than the min. angle</b>	
Trigger condition and cause	Lower than the minimum angle of Stage 4.
Checking method and corrective action	Check if the setting for the minimum angle of Stage 4 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3D24 &amp; NG4D24 Stage 4: exceeded the max. torque</b>	
Trigger condition and cause	Exceeded the maximum torque of Stage 4.
Checking method and corrective action	<ol style="list-style-type: none"> <li>Check if the setting for the maximum torque of Stage 4 is appropriate.</li> <li>Check if the speed of the previous stage is too high.</li> <li>Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3D25 &amp; NG4D25 Stage 4: lower than the min. torque</b>	
Trigger condition and cause	Lower than the minimum torque of Stage 4.
Checking method and corrective action	Check if the setting for the minimum torque of Stage 4 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3D26 &amp; NG4D26 Stage 4: exceeded the max. clamp torque</b>	
Trigger condition and cause	Exceeded the maximum clamp torque of Stage 4.
Checking method and corrective action	Check if the setting for the maximum clamp torque of Stage 4 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3D27 &amp; NG4D27 Stage 4: lower than the min. clamp torque</b>	
Trigger condition and cause	Lower than the minimum clamp torque of Stage 4.
Checking method and corrective action	Check if the setting for the minimum clamp torque of Stage 4 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3D28 &amp; NG4D28 Stage 4: exceeded the max. clamp angle</b>	
Trigger condition and cause	Exceeded the maximum clamp angle of Stage 4.
Checking method and corrective action	Check if the setting for the maximum clamp angle of Stage 4 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3D29 &amp; NG4D29 Stage 4: lower than the min. clamp angle</b>	
Trigger condition and cause	Lower than the minimum clamp angle of Stage 4.
Checking method and corrective action	Check if the setting for the minimum clamp angle of Stage 4 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3E10 &amp; NG4E10 Stage 5: operation error</b>	
Trigger condition and cause	<p>Condition: the controller returns an error during the tightening process.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The torque of this stage exceeded the tool maximum torque.</li> <li>2. During the tightening process, the tool is in the Servo Off state.</li> </ol>
Checking method and corrective action	Check if the torque of this stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3E11 &amp; NG4E11 Stage 5: exceeded the tightening torque protection range</b>	
Trigger condition and cause	The torque of Stage 5 exceeded the protection range.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the tool has reached a foreign object before this stage is complete.</li> <li>2. Check if the speed of Stage 5 is too high.</li> <li>3. Check if the setting of the torque rate or the angle interval for torque rate calculation is appropriate.</li> <li>4. Check if the speed of the previous stage is too high.</li> <li>5. Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol> <p>■ The torque setting in Stage 5 cannot be greater than the tool maximum torque.</p>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3E12 &amp; NG4E12 Stage 5: exceeded the max. operation time</b>	
Trigger condition and cause	Exceeded the maximum operation time of Stage 5.
Checking method and corrective action	Check if the setting for the maximum operation time of Stage 5 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3E13 &amp; NG4E13 Stage 5: lower than the min. operation time</b>	
Trigger condition and cause	Shorter than the minimum operation time of Stage 5.
Checking method and corrective action	Check if the setting for the minimum operation time of Stage 5 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3E20 &amp; NG4E20 Stage 5: exceeded tool max. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 5 is too high.</li> <li>4. Check if the torque of Stage 5 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3E21 &amp; NG4E21 Stage 5: lower than tool min. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 5 is too high.</li> <li>4. Check if the torque of Stage 5 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3E22 &amp; NG4E22 Stage 5: exceeded the max. angle</b>	
Trigger condition and cause	Exceeded the maximum angle of Stage 5.
Checking method and corrective action	Check if the setting for the maximum angle of Stage 5 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3E23 &amp; NG4E23 Stage 5: lower than the min. angle</b>	
Trigger condition and cause	Lower than the minimum angle of Stage 5.
Checking method and corrective action	Check if the setting for the minimum angle of Stage 5 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3E24 &amp; NG4E24 Stage 5: exceeded the max. torque</b>	
Trigger condition and cause	Exceeded the maximum torque of Stage 5.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the setting for the maximum torque of Stage 5 is appropriate.</li> <li>2. Check if the speed of the previous stage is too high.</li> <li>3. Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3E25 &amp; NG4E25 Stage 5: lower than the min. torque</b>	
Trigger condition and cause	Lower than the minimum torque of Stage 5.
Checking method and corrective action	Check if the setting for the minimum torque of Stage 5 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3E26 & NG4E26 Stage 5: exceeded the max. clamp torque**

Trigger condition and cause	Exceeded the maximum clamp torque of Stage 5.
Checking method and corrective action	Check if the setting for the maximum clamp torque of Stage 5 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3E27 & NG4E27 Stage 5: lower than the min. clamp torque**

Trigger condition and cause	Lower than the minimum clamp torque of Stage 5.
Checking method and corrective action	Check if the setting for the minimum clamp torque of Stage 5 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3E28 & NG4E28 Stage 5: exceeded the max. clamp angle**

Trigger condition and cause	Exceeded the maximum clamp angle of Stage 5.
Checking method and corrective action	Check if the setting for the maximum clamp angle of Stage 5 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3E29 & NG4E29 Stage 5: lower than the min. clamp angle**

Trigger condition and cause	Lower than the minimum clamp angle of Stage 5.
Checking method and corrective action	Check if the setting for the minimum clamp angle of Stage 5 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

**NG3F10 & NG4F10 Stage 6: operation error**

Trigger condition and cause	Condition: the controller returns an error during the tightening process. Cause: 1. The torque of this stage exceeded the tool maximum torque. 2. During the tightening process, the tool is in the Servo Off state.
Checking method and corrective action	Check if the torque of this stage is within the tool specification.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3F11 &amp; NG4F11 Stage 6: exceeded the tightening torque protection range</b>	
Trigger condition and cause	The torque of Stage 6 exceeded the protection range.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the tool has reached a foreign object before this stage is complete.</li> <li>2. Check if the speed of Stage 6 is too high.</li> <li>3. Check if the setting of the torque rate or the angle interval for torque rate calculation is appropriate.</li> <li>4. Check if the speed of the previous stage is too high.</li> <li>5. Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol> <p>■ The torque setting in Stage 6 cannot be greater than the tool maximum torque</p>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3F12 &amp; NG4F12 Stage 6: exceeded the max. operation time</b>	
Trigger condition and cause	Exceeded the maximum operation time of Stage 6.
Checking method and corrective action	Check if the setting for the maximum operation time of Stage 6 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3F13 &amp; NG4F13 Stage 6: lower than the min. operation time</b>	
Trigger condition and cause	Shorter than the minimum operation time of Stage 6.
Checking method and corrective action	Check if the setting for the minimum operation time of Stage 6 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3F20 &amp; NG4F20 Stage 6: exceeded tool max. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 6 is too high.</li> <li>4. Check if the torque of Stage 6 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3F21 &amp; NG4F21 Stage 6: lower than tool min. current</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it is lower than the tool minimum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the speed of Stage 6 is too high.</li> <li>4. Check if the torque of Stage 6 is within the tool specification.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3F22 &amp; NG4F22 Stage 6: exceeded the max. angle</b>	
Trigger condition and cause	Exceeded the maximum angle of Stage 6.
Checking method and corrective action	Check if the setting for the maximum angle of Stage 6 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3F23 &amp; NG4F23 Stage 6: lower than the min. angle</b>	
Trigger condition and cause	Lower than the minimum angle of Stage 6.
Checking method and corrective action	Check if the setting for the minimum angle of Stage 6 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3F24 &amp; NG4F24 Stage 6: exceeded the max. torque</b>	
Trigger condition and cause	Exceeded the maximum torque of Stage 6.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the setting for the maximum torque of Stage 6 is appropriate.</li> <li>2. Check if the speed of the previous stage is too high.</li> <li>3. Check if the torque, angle, or torque rate of the previous stage is set too large.</li> </ol>
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3F25 &amp; NG4F25 Stage 6: lower than the min. torque</b>	
Trigger condition and cause	Lower than the minimum torque of Stage 6.
Checking method and corrective action	Check if the setting for the minimum torque of Stage 6 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3F26 &amp; NG4F26 Stage 6: exceeded the max. clamp torque</b>	
Trigger condition and cause	Lower than the minimum clamp angle of Stage 6.
Checking method and corrective action	Check if the setting for the minimum clamp angle of Stage 6 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3F27 &amp; NG4F27 Stage 6: lower than the min. clamp torque</b>	
Trigger condition and cause	Lower than the minimum clamp torque of Stage 6.
Checking method and corrective action	Check if the setting for the minimum clamp torque of Stage 6 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

<b>NG3F28 &amp; NG4F28 Stage 6: exceeded the max. clamp angle</b>	
Trigger condition and cause	Exceeded the maximum clamp angle of Stage 6.
Checking method and corrective action	Check if the setting for the maximum clamp angle of Stage 6 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.
<b>NG3F29 &amp; NG4F29 Stage 6: lower than the min. clamp angle</b>	
Trigger condition and cause	Lower than the minimum clamp angle of Stage 6.
Checking method and corrective action	Check if the setting for the minimum clamp angle of Stage 6 is appropriate.
How to clear the alarm?	Loosen and then re-tighten the screw.

### 12.2.3 Description of operation warnings

<b>WN5001 &amp; WN6001 Quantity not reached. String scanning prohibited.</b>	
Trigger condition and cause	String setting is prohibited until the operation progress is complete.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Input the string after the settings for total screw quantity, parameter quantity, and screw quantity of the parameter are reached.</li> <li>2. Input the string after progress reset.</li> </ol>
How to clear the alarm?	After the total screw quantity is reached, set the string again.
<b>WN5002 &amp; WN6002 Send the tool back for service</b>	
Trigger condition and cause	<p>Condition: the total tightening and loosening count exceeded the suggested count for maintenance.</p> <p>Cause: the tool service reminder is triggered.</p>
Checking method and corrective action	Send the screwdriver back to the factory for maintenance.
How to clear the alarm?	Send the screwdriver back to the factory for maintenance.
<b>WN5003 &amp; WN6003 Parameters not set</b>	
Trigger condition and cause	<p>Condition: the parameter configuration is incomplete.</p> <p>Cause:</p> <ol style="list-style-type: none"> <li>1. The tightening source is not configured.</li> <li>2. The parameter configuration is not complete when the screwdriver starts to operate.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the parameters of the tightening source are configured.</li> <li>2. Make sure the Ready signal (DI) is on before you start tightening.</li> </ol>
How to clear the alarm?	Restart the tightening operation.
<b>WN5004 &amp; WN6004 Unknown tool model and spec.</b>	
Trigger condition and cause	The controller cannot identify the specifications and model number of the screwdriver.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if the controller and the screwdriver are connected correctly.</li> <li>2. Check if the controller supports the specifications of the connected screwdriver.</li> </ol>
How to clear the alarm?	Send the screwdriver back to the factory.
<b>WN5005 &amp; WN6005 Cannot perform tightening and loosening at the same time</b>	
Trigger condition and cause	The controller receives both the Start Tightening signal and the Start Loosening signal at the same time.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Check if there is any incorrect operation of the tool.</li> <li>2. Check if the timing for sending the Start Tightening signal is in conflict with that for sending the Start Loosening signal.</li> </ol>
How to clear the alarm?	Check the performed operation and then restart the screwdriver.

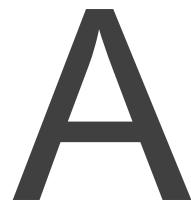
<b>WN5006 &amp; WN6006 Parameter setting prohibited when tool is in operation</b>	
Trigger condition and cause	The tightening or loosening process starts before the parameter configuration is complete.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Make sure the parameter configuration is complete before you start tightening or loosening.</li> <li>2. Avoid configuring any parameter during operation.</li> </ol>
How to clear the alarm?	Reconfigure the parameter, and then restart the tightening or loosening.
<b>WN5007 &amp; WN6007 Tool final current exceeded the range</b>	
Trigger condition and cause	After the final tightening torque value is converted into an electric current value, it exceeds the tool maximum current.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the controller current sensor and the tool torque sensor to measure the current values and then compare them to check if the screwdriver is degraded.</li> <li>2. Check if the torque sensor is damaged.</li> <li>3. Check if the tightening speed is too high.</li> </ol>
How to clear the alarm?	<ol style="list-style-type: none"> <li>1. Loosen and then re-tighten the screw.</li> <li>2. Disable the "Final Current Detection" function under the Advanced Setting in the <b>General Settings</b> tab of the parameter editing page.</li> </ol>
<b>WN5051 &amp; WN6051 Exceeded the max. count for NOK tightening</b>	
Trigger condition and cause	Exceeded the allowable NOK count for tightening.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Identify the main cause of NOK tightening. If the failure is an infrequent occurrence, modify the "Max. count for NOK tightening" in the Advanced Setting of the <b>Sources</b> page.</li> <li>2. Reset the screw progress.</li> </ol>
How to clear the alarm?	Modify the setting and then re-tighten the screw.
<b>WN5052 &amp; WN6052 The scanner string is null. Tightening prohibited.</b>	
Trigger condition and cause	The barcode string is null, so tightening is prohibited.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Input the barcode string.</li> <li>2. Disable the "Prohibit tool operation when the scanner string is null" function in the Advanced Setting of the <b>Sources</b> page.</li> </ol>
How to clear the alarm?	Modify the setting and then re-tighten the screw.
<b>WN5053 &amp; WN6053 Screw quantity reached. Tightening prohibited.</b>	
Trigger condition and cause	The screw quantity to be tightened is reached, so tightening is prohibited.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Call a new tightening parameter or tightening sequence.</li> <li>2. Reset the screw progress.</li> </ol>
How to clear the alarm?	Modify the setting and then re-tighten the screw.

<b>WN5054 &amp; WN6054 Exceeded max. operation time</b>	
Trigger condition and cause	The tightening process exceeded the maximum operation time.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Modify the time set for "Max. Operation Time" in the Advanced Setting of the <b>Sources</b> page.</li> <li>2. Reset the screw progress.</li> </ol>
How to clear the alarm?	Modify the setting and then re-tighten the screw.
<b>WN5055 &amp; WN6055 Incorrect parameter setting. Tightening prohibited.</b>	
Trigger condition and cause	<p>Condition: the parameter setting is incorrect, so tightening is prohibited.          Cause:</p> <ol style="list-style-type: none"> <li>1. The tightening source is not configured.</li> <li>2. The tightening parameter or tightening sequence is deleted.</li> </ol>
Checking method and corrective action	Go to the <b>Sources</b> page and modify the tightening parameter or tightening sequence.
How to clear the alarm?	Select another tightening parameter or modify the tightening sequence, and then re-tighten the screw.
<b>WN5056 &amp; WN6056 Tightening prohibited by remote communication or DI</b>	
Trigger condition and cause	<ol style="list-style-type: none"> <li>1. Tightening operation is prohibited by remote communication.</li> <li>2. Tightening operation is prohibited by DI.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the Modbus communication function code #406 to remove the restriction.</li> <li>2. Check if the DI function is set as Prohibit Tool Operation and the contact is normally closed (NC).</li> </ol>
How to clear the alarm?	Modify the restriction setting through communication or DI, and then re-tighten the screw.
<b>WN5057 &amp; WN6057 Tightening: parameter exceeded the tool spec.</b>	
Trigger condition and cause	<p>Condition: the parameter setting exceeded the tool specification, so tightening is prohibited.          Cause:</p> <ol style="list-style-type: none"> <li>1. The parameter setting exceeded the maximum specification of the tool.</li> <li>2. The parameter setting configured through communication is not appropriate.</li> <li>3. The parameter setting imported from the USB flash drive is not appropriate.</li> </ol>
Checking method and corrective action	Modify the content of the parameter.
How to clear the alarm?	Modify the parameter and then re-tighten the screw.
<b>WN5058 &amp; WN6058 Tightening: parameter does not match the tool</b>	
Trigger condition and cause	The operating parameter does not match the tool, so tightening is prohibited.
Checking method and corrective action	Modify the content of the parameter.
How to clear the alarm?	Modify the parameter and then re-tighten the screw.

<b>WN5081 &amp; WN6081 Loosening prohibited after tightening OK</b>	
Trigger condition and cause	When the tightening result is OK, the loosening is prohibited.
Checking method and corrective action	Modify the Advanced Setting in the <b>Sources</b> page.
How to clear the alarm?	Modify the setting and then re-loosen the screw.
<b>WN5082 &amp; WN6082 Loosening prohibited after tightening NOK</b>	
Trigger condition and cause	When the tightening result is NOK, the loosening is prohibited.
Checking method and corrective action	Modify the Advanced Setting in the <b>Sources</b> page.
How to clear the alarm?	Modify the setting and then re-loosen the screw.
<b>WN5083 &amp; WN6083 Exceeded the max. count for NOK loosening</b>	
Trigger condition and cause	Exceeded the allowable NOK count for loosening.
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Modify the Advanced Setting in the <b>Sources</b> page.</li> <li>2. Reset the screw progress.</li> </ol>
How to clear the alarm?	Modify the setting and then re-loosen the screw.
<b>WN5084 &amp; WN6084 Incorrect parameter setting. Loosening prohibited.</b>	
Trigger condition and cause	<p>Condition: the parameter setting is incorrect, so loosening is prohibited.            Cause:</p> <ol style="list-style-type: none"> <li>1. The tightening source is not configured.</li> <li>2. The tightening parameter or tightening sequence is deleted.</li> </ol>
Checking method and corrective action	Modify the settings in the <b>Sources</b> page.
How to clear the alarm?	Modify the settings and then re-loosen the screw.
<b>WN5085 &amp; WN6085 Loosening prohibited by remote communication or DI</b>	
Trigger condition and cause	<ol style="list-style-type: none"> <li>1. Loosening operation is prohibited by remote communication.</li> <li>2. Loosening operation is prohibited by DI.</li> </ol>
Checking method and corrective action	<ol style="list-style-type: none"> <li>1. Use the Modbus communication function code #407 to remove the restriction.</li> <li>2. Check if the DI function is set to Prohibit Tool Operation and the contact is normally closed (NC).</li> </ol>
How to clear the alarm?	Modify the restriction setting through communication or DI, and then re-loosen the screw.

<b>WN5086 &amp; WN6086 Loosening: parameter exceeded the tool spec.</b>	
Trigger condition and cause	<p>Condition: the parameter setting exceeded the tool specification, so loosening is prohibited.</p> <p>Cause:</p> <ol style="list-style-type: none"><li>1. The parameter setting exceeded the maximum specification of the tool.</li><li>2. The parameter setting configured through communication is not appropriate.</li><li>3. The parameter setting imported from the USB flash drive is not appropriate.</li></ol>
Checking method and corrective action	Modify the content of the parameter.
How to clear the alarm?	Modify the parameter and then re-loosen the screw.

# Modbus Communication - Function Codes



This chapter introduces the handshake method and information of the Modbus TCP and Modbus RTU communication interfaces provided by the smart screwdriving controller. You can operate the controller remotely through these interfaces.

A.1	System structure .....	A-5
A.2	Operational status of the smart screwdriving system .....	A-10
A.3	Handshake data of the smart screwdriving system .....	A-14
A.3.1	Parameters operations .....	A-17
	#100 Write the parameter.....	A-17
	#110 Write to delete the parameter .....	A-21
	#150 Read the parameter .....	A-22
A.3.2	Sequence operations .....	A-23
	#200 Write the sequence .....	A-23
	#201 Write the navigator coordinates.....	A-25
	#202 Write the navigator image codes .....	A-27
	#203 Write the coordinates of positioning arm .....	A-29
	#210 Write to delete the sequence .....	A-31
	#250 Read the sequence .....	A-32
	#251 Read the navigator coordinates .....	A-33
	#252 Read the navigator image codes .....	A-34
	#253 Read the coordinates of positioning arm .....	A-35
A.3.3	Sources operations .....	A-36
	#300 Write the operating mode and switching method of source.....	A-36
	#301 Write the contents of a single source.....	A-37
	#302 Write to switch parameter under manual setting .....	A-40
	#303 Write to switch sequence under manual setting .....	A-41
	#310 Write to delete the source .....	A-42
	#350 Read the operating mode and switching method of source .....	A-43
	#351 Read the contents of a single source .....	A-45
A.3.4	Results operations .....	A-47
	#400 Write the switching method of source .....	A-47

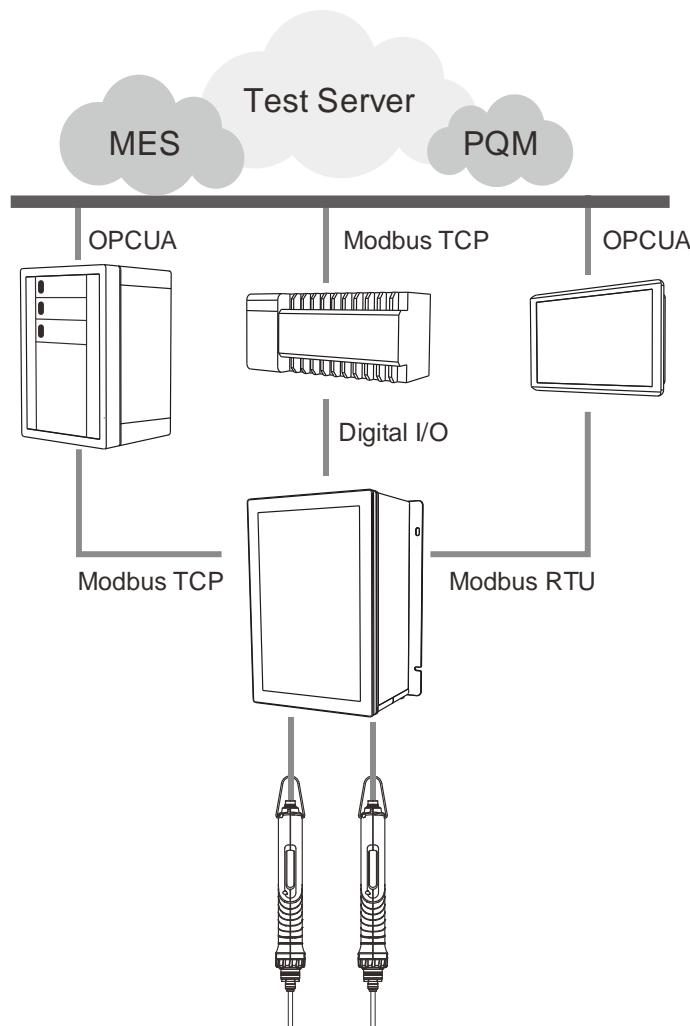
#401 Write the barcode string .....	A-48
#402 Write to clear all errors .....	A-49
#403 Write to reset the operation progress .....	A-50
#404 Write to force execute the previous step .....	A-51
#405 Write to force execute the next step .....	A-52
#406 Write to restrict tightening operation .....	A-53
#407 Write to restrict loosening operation .....	A-54
#408 Write the scanner advanced settings .....	A-55
#409 Write to clear the single screw tightening NOK count .....	A-57
#410 Write to clear the single screw loosening NOK count .....	A-58
#411 Write to reset the operation time .....	A-59
#412 Write to reset the operation status .....	A-60
#450 Read the switching method of source .....	A-61
#451 Read the barcode string .....	A-62
#452 Read the scanner advanced settings .....	A-63
#453 Read the tightening status indicator .....	A-64
<b>A.3.5 Controller operations .....</b>	<b>A-65</b>
#500 Write the request for permissions login .....	A-65
#501 Write the request for password change .....	A-66
#502 Write the request for permissions logout .....	A-68
#503 Write the page permissions .....	A-69
#504 Write the Ethernet settings .....	A-70
#505 Write the request for factory reset .....	A-72
#506 Write the buzzer sound pattern .....	A-73
#507 Write the DI/DO functions .....	A-74
#508 Write the DI/DO conversion table .....	A-76
#509 Write the default torque unit .....	A-78
#510 Write the default tool start condition .....	A-79
#511 Write NO / NC contact setting for a single DI/DO .....	A-80
#512 Write to export all system data .....	A-81
#513 Write to import all system data .....	A-82
#514 Write the default two-stage mode under self-defined torque control .....	A-83
#515 Write the display of upper limit for each stage of curves .....	A-84
#516 Write the display of operation warning window .....	A-85
#517 Write file format of the exported result for each screw .....	A-86
#518 Write the sampling rate for curves .....	A-87
#519 Write the function of always monitoring the current .....	A-88
#520 Write the compensation for tool temperature rise .....	A-89
#521 Write the peripheral device settings .....	A-90
#522 Write the TCP data content of the result for each screw .....	A-92

#523 Write the monitor function when parameters do not match the tool .....	A-93
#524 Write the default angle unit .....	A-94
#525 Write the volume of buzzer and operation screen buttons .....	A-95
#526 Write the display orientation of external screen.....	A-96
#527 Write the home screen.....	A-97
#528 Write the RS-485 settings.....	A-98
#529 Write the function of converting curve data to positive values .....	A-100
#550 Read the Ethernet settings.....	A-101
#551 Read the page permissions.....	A-102
#552 Read the firmware version .....	A-103
#553 Read the DI/DO functions .....	A-104
#554 Read the DI/DO conversion table .....	A-105
#555 Read the default torque unit .....	A-107
#556 Read the default tool start condition .....	A-108
#557 Read NO / NC contact setting for a single DI/DO .....	A-109
#558 Read the default two-stage mode under self-defined torque control .....	A-110
#559 Read the display of upper limit for each stage of curves .....	A-111
#560 Read the display of operation warning window .....	A-112
#561 Read file format of the exported result for each screw .....	A-113
#562 Read the sampling rate for curves .....	A-114
#563 Read the function of always monitoring the current .....	A-115
#564 Read the compensation for tool temperature rise .....	A-116
#565 Read the peripheral device settings .....	A-117
#566 Read the TCP data content of the result for each screw .....	A-118
#567 Read the monitor function when parameters do not match the tool .....	A-119
#568 Read the default angle unit .....	A-120
#569 Read the volume of buzzer and operation screen buttons .....	A-121
#570 Read the display orientation of external screen .....	A-122
#571 Read the home screen.....	A-123
#572 Read the RS-485 settings.....	A-124
#573 Read the function of converting curve data to positive values .....	A-125
A.3.6 Tool operations .....	A-126
#600 Write to activate the tool .....	A-126
#601 Write to enable service reminder .....	A-127
#602 Write the lever start level .....	A-128
#603 Write the push start level .....	A-129
#604 Write the work light brightness .....	A-130
#606 Write the LED light settings .....	A-131
#607 Write to calibrate the tool .....	A-133
#650 Read the tool information.....	A-134

A

#651 Read the lever start level.....	A-135
#652 Read the push start level.....	A-136
#653 Read the work light brightness.....	A-137
#655 Read the LED light settings.....	A-138
#656 Read the tool calibration setting .....	A-140
#657 Read the tool firmware version .....	A-141
#658 Read the status of service reminder.....	A-142
#659 Read the status of tool activation.....	A-143
A.3.7 Reports operations .....	A-144
#700 Clear the production report entries.....	A-144
#701 Clear the error and warning report entries .....	A-145
#702 Clear the production report files .....	A-146
#750 Find and read the production report entries .....	A-147
#751 Find and read curves .....	A-152
#752 Find and read the error report entries .....	A-169
#753 Find and read the warning report entries .....	A-170
#754 Find and read the button report entries .....	A-172

## A.1 System structure



A

The Delta smart screwdriving system provides multiple communication protocols: Modbus TCP (Ethernet), Modbus RTU (RS-485) and TCP/IP. It allows peripheral IIoT equipment to obtain information from the smart screwdriving controller, and then collect data to construct host computer systems, such as MES and PQM. The connection between the IIoT equipment and the smart screwdriving system is not limited by the hardware platform. Therefore, any equipment that supports the protocol (such as PC, PLC, or HMI) is able to control the smart screwdriving system and obtain tightening data.

The Modbus handshake information in this chapter consists of:

1. Operational status of the smart screwdriving system.
2. Handshake data of the smart screwdriving system.

### Modbus TCP Slave

The smart screwdriving system supports Modbus TCP communications with the default IP: 192.168.1.11; Port: 502. After successfully connected, the system starts detecting the keepalive time. You need to maintain periodic data handshaking within 30 seconds; if there is no data handshaking within 30 seconds, the system will be automatically disconnected.

### Modbus RTU Slave

The smart screwdriving system supports Modbus RTU (Remote Terminal Unit) communication. The default station number is 1, transmission speed is 9600, data bit is 8-bit, parity bit is NONE, and stop bit is 2-bit.

The supported functions are: 03H (read multiple word data), 06H (write single word data), and 10H (write multiple word data).

Start	Minimum silent interval: 10 ms
Slave address	Communication address: 1 byte
Function	Function code: 1 byte
Data (n-1)	
.....	Data content: n word = 2n bytes n ≤ 10 (the maximum words of a single read/write is 10)
Data (0)	
CRC	Error check: 1 byte
End	Minimum silent interval: 10 ms

Note: in the RTU mode, there must be a minimum silent interval of 10 ms before and after transmission.

#### 1. Function code 03H (read multiple word data)

The following example illustrates how the master issues a read command to slave no. 1.

The slave reads 3 consecutive word data starting from address 0x00CF. The slave then returns the content of 0x0096 read from address 0x00CF, 0x0001 read from address 0x00D0, and 0x0000 read from address 0x00D1. The maximum words of a single read is 10.

Command message (Master):

Slave address	01H
Function	03H
Starting data address	00H (high)
	CFH (low)
Number of data (in words)	00H
	03H
CRC Low	35H (low)
CRC High	F4H (high)

Response message (Slave):

Slave address	01H
Function	03H
Number of data (in bytes)	06H
Content of starting data address 00CFH	00H (high)
	96H (low)
Content of second data address 00D0H	00H (high)
	01H (low)
Content of third data address 00D1H	00H (high)
	00H (low)
CRC Low	38H (low)
CRC High	A8H (high)

## 2. Function code 06H (write single word data)

The following example illustrates how the master issues a write command to slave no. 1.

The slave writes the data 0x0064 to address 0x00C8, and then responds to the master once the writing is complete.

Command message (Master):

Slave address	01H
Function	06H
Starting data address	00H (high)
	C8H (low)
Data content	00H (high)
	64H (low)
CRC Low	09H (low)
CRC High	DFH (high)

Response message (Slave):

Slave address	01H
Function	06H
Starting data address	02H (high)
	00H (low)
Data content	00H (high)
	64H (low)
CRC Low	09H (low)
CRC High	DFH (high)

## 3. Function code 10H (write multiple word data)

The following example illustrates how the master issues a write command to slave no. 1.

The slave writes 7 word data (0x0096, 0x0000, 0x0000, 0x0001, 0x0000, 0x0000, and 0x0001) respectively to 7 addresses starting from 0x00C8. That is, the slave writes 0x0096 to address 0x00C8, 0x0000 to address 0x00C9, 0x0000 to address 0x00CA, 0x0001 to address 0x00CB, 0x0000 to address 0x00CC, 0x0000 to address 0x00CD, and 0x0001 to address 0x00CE.

The maximum words of a single write is 10. The slave responds to the master once the writing is complete.

Command message (Master):

Slave address	01H
Function	10H
Starting data address	00H (high)
	C8H (low)
Number of data (in words)	00H (high)
	07H (low)
Number of data (in bytes)	0EH
First data content	00H (high)
	96H (low)
Second data content	00H (high)
	00H (low)
Third data content	00H (high)
	00H (low)
Fourth data content	00H (high)
	01H (low)

Response message (Slave):

Slave address	01H
Function	10H
Starting data address	00H (high)
	C8H (low)
Number of data (in words)	00H (high)
	07H (low)
CRC Low	00H (low)
CRC High	35H (high)

A

Fifth data content	00H (high) 00H (low)
Sixth data content	00H (high) 00H (low)
Seventh data content	00H (high) 01H (low)
CRC Low	A2H (low)
CRC High	A6H (high)

#### 4. CRC error check (RTU mode)

The following steps illustrate how to calculate the CRC value.

1. Load a 16-bit register with the content of FFFFH, and take it as the CRC register.
2. Perform Exclusive OR operation on the first byte of the command message with the low byte of the 16-bit CRC register, and then return the result to the CRC register.
3. Check the least significant bit (LSB) of the CRC register. If the LSB is 0, shift the CRC register value one bit to the right; if the LSB is 1, after shifting the CRC register value one bit to the right, perform Exclusive OR operation on the shifted value with A001H. Perform this step 8 times.
4. Repeat steps 2 to 3 until all bytes have been fully processed. The final content of the CRC register is the CRC value.

After the CRC value is calculated, first input the low byte of the CRC value, then the high byte into the command message.

For example, if the result of CRC calculation is 0xDF09, input 0x09 first and then 0xDF, as shown in the following table.

Slave address	01H
Function	06H
Starting data address	00H (high) C8H (low)
Number of data (in words)	00H (high) 64H (low)
CRC Low	09H (low)
CRC High	DFH (high)

### Example of CRC generating program

The following example uses the C language to generate the CRC value. This function requires two parameters:

```

unsigned char* data;
unsigned char length;
//This function returns the CRC value in unsigned integer.
unsigned int crc_chk(unsigned char* data, unsigned char length) {
    int j;
    unsigned int reg_crc=0xFFFF;

    while( length-- ) {
        reg_crc^= *data++;
        for (j=0; j<8; j++ ) {
            if( reg_crc & 0x01 ) { /*LSB(bit 0 ) = 1 */
                reg_crc = (reg_crc >> 1)^0xA001;
            } else {
                reg_crc = (reg_crc>>1);
            }
        }
    }
    return reg_crc;
}

```

A

### Transmission process error report

The following is an example of the response message from the slave when an error occurs.

Slave address	01H
Error code	83H
Exception code	04H
CRC Low	40H
CRC High	F3H

Descriptions of exception codes:

Exception code (1 byte)	Description
01	Station number does not exist.
02	Unable to recognize the function code: not 03, 06, or 10.
03	Value error: the set value exceeded the maximum or minimum range.
04	Exceeded the maximum words: exceeded the maximum words (10) for a single access.
05	Number error: accessed number is set to 0.

**Precautions:** use either Modbus TCP Slave or Modbus RTU Slave; both of which share the same Modbus handshake addresses.

## A.2 Operational status of the smart screwdriving system

Obtain real-time information of the smart screwdriving system from the operational status area.

The data refreshes every 0.3 seconds. Refer to the following Modbus address table.

Modbus (Hex)		Tool 1 status / Tool 2 status	R/W
Tool 1	Tool 2		
0	32	Tightening ID set for cur. switch method	R
1	33	PAR/SEQ set for cur. switch method	R
2	34	SEQ ID of current switching method	R
3	35	PAR ID of current switching method	R
4	36	Current target torque	R
5	37	Current target angle	R
6	38	Current parameter progress	R
7	39	Screw progress of current parameter (L)	R
8	3A	Screw progress of current parameter (H)	R
9	3B	Screw progress of current sequence (L)	R
A	3C	Screw progress of current sequence (H)	R
B	3D	Tightening OK count (L)	R
C	3E	Tightening OK count (H)	R
D	3F	Single screw tightening NOK count (L)	R
E	40	Single screw tightening NOK count (H)	R
F	41	Loosening OK count (L)	R
10	42	Loosening OK count (H)	R
11	43	Single screw loosening NOK count (L)	R
12	44	Single screw loosening NOK count (H)	R
13	45	Final stage max. torque	R
14	46	Final stage min. torque	R
15	47	Current torque unit <sup>*1</sup>	R
16	48	Tightening / Loosening in operation <sup>*2</sup>	R
17	49	Bit ID of current switching method	R
18	4A	Version of operational status <sup>*3</sup>	R
19	4B	Clear the flag <sup>*4</sup>	W
1A	4C	Total screw Qty. of current sequence (L)	R
1B	4D	Total screw Qty. of current sequence (H)	R
1C	4E	Parameter Qty. of current sequence	R
1D	4F	Screw Qty. of current parameter (L)	R
1E	50	Screw Qty. of current parameter (H)	R
1F	51	All screws of current parameter finished	R/W
20	52	Current parameter finished	R/W
21	53	Current screw finished	R/W
22	54	Setting parameters (Waiting...)	R
23	55	Final + Prevail torque	R
24	56	Total angle	R
25	57	Tightening angle	R
26	58	Tightening result (1: OK; 2: NOK; 5: Pass)	R/W
27	59	Loosening result (1: OK; 2: NOK)	R/W
28	5A	Curve creation finished	R/W
29	5B	Restrict tightening status	R

Modbus (Hex)		Tool 1 status / Tool 2 status	R/W
Tool 1	Tool 2		
2A	5C	Parameter settings OK / NOK	R
2B	5D	Final torque	R
2C	5E	Prevail torque	R
2D	5F	Final current	R
2E	60	Cause to restrict tightening operation <sup>*5</sup>	R
2F	61	Cause to restrict loosening operation <sup>*6</sup>	R
30	62	Remaining operation time (L)	R
31	63	Remaining operation time (H)	R
1F40	2008	Current target torque (L)	R
1F41	2009	Current target torque (H)	R
1F42	200A	Final stage max. torque (L)	R
1F43	200B	Final stage max. torque (H)	R
1F44	200C	Final stage min. torque (L)	R
1F45	200D	Final stage min. torque (H)	R
1F46	200E	Final + Prevail torque (L)	R
1F47	200F	Final + Prevail torque (H)	R
1F48	2010	Final torque (L)	R
1F49	2011	Final torque (H)	R
1F4A	2012	Prevail torque (L)	R
1F4B	2013	Prevail torque (H)	R
1F4C	2014	Tightening OK count (L)	R
1F4D	2015	Tightening OK count (H)	R
1F4E	2016	Tightening NOK count (L)	R
1F4F	2017	Tightening NOK count (H)	R
1F50	2018	Tightening OK + NOK count (L)	R
1F51	2019	Tightening OK + NOK count (H)	R
1F52	201A	Ready	R
1F53	201B	Max. angle of final stage	R
1F54	201C	Min. angle of final stage	R
1F55	201D	Max. total angle	R
1F56	201E	Min. total angle	R
1F57	201F	Year	R
1F58	2020	Month	R
1F59	2021	Day	R
1F5A	2022	Hour	R
1F5B	2023	Minute	R
1F5C	2024	Second	R
1F5D	2025	Tightening result is 1: OK or 2: NOK; to be cleared in next operation	R
1F5E	2026	Loosening result is 1: OK or 2: NOK; to be cleared in next operation	R
1F5F	2027	Tightening result is 5: Pass; to be cleared in next operation	R
1F60	2028	Current position of positioning arm X axis (L)	R
1F61	2029	Current position of positioning arm X axis (H)	R
1F62	202A	Current position of positioning arm Y axis (L)	R
1F63	202B	Current position of positioning arm Y axis (H)	R
1F64	202C	Current position of positioning arm Z axis (L)	R
1F65	202D	Current position of positioning arm Z axis (H)	R
1F66	202E	Target position of positioning arm X axis (L)	R

A

Modbus (Hex)		Tool 1 status / Tool 2 status	R/W
Tool 1	Tool 2		
1F67	202F	Target position of positioning arm X axis (H)	R
1F68	2030	Target position of positioning arm Y axis (L)	R
1F69	2031	Target position of positioning arm Y axis (H)	R
1F6A	2032	Target position of positioning arm Z axis (L)	R
1F6B	2033	Target position of positioning arm Z axis (H)	R
1F6C	2034	Clamp torque (L)	R
1F6D	2035	Clamp torque (H)	R
1F6E	2036	Clamp angle	R
1F6F	2037	Snug torque (L)	R
1F70	2038	Snug torque (H)	R
1F71	2039	Tool operation prohibited <sup>*7</sup>	W
1F72 to 1FA3	2040 to 206C	Reserved	-
1FA4 to 2007	206D to 20D0	Barcode string (ASCII code; 100 words)	R

Modbus (Hex)	Tool 1 / Tool 2 common status	R/W	Modbus (Hex)	Tool 1 / Tool 2 common status	R/W
64	Tool 1 AL / NG / WN code <sup>*8</sup>	R	71	Reserved	-
65	Tool 2 AL / NG / WN code <sup>*8</sup>	R	72	All production report entries cleared	R/W
66	DO status (Bit 1 - 8: Tool 1; Bit 9 - 16: Tool 2)	R	73	Start overwriting from production report ID 1	R/W
67	DI status (Bit 1 - 8: Tool 1; Bit 9 - 16: Tool 2)	R	74	Start overwriting from error report ID 1	R/W
68	DI control (Bit 1 - 8: Tool 1; Bit 9 - 16: Tool 2)	R	75	Start overwriting from warning report ID 1	R/W
69	Current No. of error report entries	R	76	Start overwriting from button report ID 1	R/W
6A	Current No. of warning report entries	R	77	Keepalive	R
6B	Current No. of production report entries (L)	R	78	Single-tool / Dual-tool alternation / Dual-tool synchronization	R
6C	Current No. of production report entries (H)	R	79	Switching method of Tool 1	R
6D	Current No. of button report entries (L)	R	7A	Switching method of Tool 2	R
6E	Current No. of button report entries (H)	R	7B	Operating curve count	R
6F	Production report entry creation finished	R/W	7C to 95	Reserved	-
70	Clear the common flag <sup>*9</sup>	W	-	-	-

Note:

1. 0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in
2. Bit 0: tightening in progress; Bit 1: loosening in progress
3. 0: does not support operational statuses 0x1FA4 to 0x2007 and 0x2008 to 0x20CF

1: supports operational statuses 0x1FA4 to 0x2007 and 0x2008 to 0x20CF

4. Bit 0: clear the “All screws of current parameter finished” flag (0x1F, 0x51)  
Bit 1: clear the “Current parameter finished” flag (0x20, 0x52)  
Bit 2: clear the “Current screw finished” flag (0x21, 0x53)  
Bit 3: clear the “Curve creation finished” flag (0x28, 0x5A)  
Bit 4: clear the “Tightening result” flag (0x26, 0x58) and “Loosening result” flag (0x27, 0x59)
5. Bit 0: max. count for single screw NOK tightening  
Bit 1: prohibit tool operation when scanner string is null  
Bit 2: prohibit tool operation when screw Qty. reached  
Bit 3: max. operation time  
Bit 4: incorrect parameter sequence  
Bit 5: tightening operation restricted  
Bit 6: parameter check protection  
Bit 7: parameters do not match the tool
6. Bit 0: loosening prohibited after tightening OK  
Bit 1: loosening prohibited after tightening NOK  
Bit 2: max. count for single screw NOK loosening  
Bit 3: incorrect parameter sequence  
Bit 4: loosening operation restricted  
Bit 5: parameter range error
7. 0: remove restriction for tightening; remove restriction for loosening  
1001: restrict tightening operation; remove restriction for loosening  
1002: remove restriction for tightening; restrict loosening operation  
1003: restrict tightening operation; restrict loosening operation
8. 0x1001 - 0x1999: Tool 1 device alarm (AL); 0x2000 - 0x2999: Tool 2 device alarm (AL)  
0x3001 - 0x3999: Tool 1 tightening error (NG); 0x4000 - 0x4999: Tool 2 tightening error (NG)  
0x5001 - 0x5999: Tool 1 operation warning (WN); 0x6000 - 0x6999: Tool 2 operation warning (WN)
9. Bit 0: clear the “Production report entry creation finished” flag (0x6F)  
Bit 1: clear the “All production report entries cleared” flag (0x72)  
Bit 2: clear the “Start overwriting from production report ID 1” flag (0x73)  
Bit 3: clear the “Start overwriting from error report ID 1” flag (0x74)  
Bit 4: clear the “Start overwriting from warning report ID 1” flag (0x75)  
Bit 5: clear the “Start overwriting from button report ID 1” flag (0x76)

A

### A.3 Handshake data of the smart screwdriving system

You can operate all functions of the smart screwdriving controller with the function code table through handshaking. All function codes are listed as follows:

Parameters			
Function code	Function name	Function code	Function name
#100	Write the parameter	#150	Read the parameter
#110	Write to delete the parameter	-	-
Sequence			
Function code	Function name	Function code	Function name
#200	Write the sequence	#250	Read the sequence
#201	Write the navigator coordinates	#251	Read the navigator coordinates
#202	Write the navigator image codes	#252	Read the navigator image codes
#203	Write the coordinates of positioning arm	#253	Read the coordinates of positioning arm
#210	Write to delete the sequence	-	-
Sources			
Function code	Function name	Function code	Function name
#300	Write the operating mode and switching method of source	#350	Read the operating mode and switching method of source
#301	Write the contents of a single source	#351	Read the contents of a single source
#302	Write to switch parameter under manual setting	-	-
#303	Write to switch sequence under manual setting	-	-
#310	Write to delete the source	-	-
Results			
Function code	Function name	Function code	Function name
#400	Write the switching method of source	#450	Read the switching method of source
#401	Write the barcode string	#451	Read the barcode string
#402	Write to clear all errors	#452	Read the scanner advanced settings
#403	Write to reset the operation progress	#453	Read the tightening status indicator
#404	Write to force execute the previous step	-	-
#405	Write to force execute the next step	-	-
#406	Write to restrict tightening operation	-	-
#407	Write to restrict loosening operation	-	-
#408	Write the scanner advanced settings	-	-
#409	Write to clear the single screw tightening NOK count	-	-
#410	Write to clear the single screw loosening NOK count	-	-
#411	Write to reset the operation time	-	-
#412	Write to reset the operational status	-	-

Controller			
Function code	Function name	Function code	Function name
#500	Write the request for permissions login	#550	Read the Ethernet settings
#501	Write the request for password change	#551	Read the page permissions
#502	Write the request for permissions logout	#552	Read the firmware version
#503	Write the page permissions	#553	Read the DI/DO functions
#504	Write the Ethernet settings	#554	Read the DI/DO conversion table
#505	Write the request for factory reset	#555	Read the default torque unit
#506	Write the buzzer sound pattern	#556	Read the default tool start condition
#507	Write the DI/DO functions	#557	Read NO / NC contact setting for a single DI/DO
#508	Write the DI/DO conversion table	#558	Read the default two-stage mode under self-defined torque control
#509	Write the default torque unit	#559	Read the display of upper limit for each stage of curves
#510	Write the default tool start condition	#560	Read the display of operation warning window
#511	Write NO / NC contact setting for a single DI/DO	#561	Read the file format of the exported result for each screw
#512	Write to export all system data	#562	Read the sampling rate for curves
#513	Write to import all system data	#563	Read the function of always monitoring the current
#514	Write the default two-stage mode under self-defined torque control	#564	Read the compensation for tool temperature rise
#515	Write the display of upper limit for each stage of curves	#565	Read the peripheral device settings
#516	Write the display of operation warning window	#566	Read the TCP data content of the result for each screw
#517	Write the file format of the exported result for each screw	#567	Read the monitor function when parameters do not match the tool
#518	Write the sampling rate for curves	#568	Read the default angle unit
#519	Write the function of always monitoring the current	#569	Read the volume of buzzer and operation screen buttons
#520	Write the compensation for tool temperature rise	#570	Read the display orientation of external screen
#521	Write the peripheral device settings	#571	Read the home screen
#522	Write the TCP data content of the result for each screw	#572	Read the RS-485 settings
#523	Write the monitor function when parameters do not match the tool	#573	Read the function of converting curve data to positive values
#524	Write the default angle unit	-	-
#525	Write the volume of buzzer and operation screen buttons	-	-
#526	Write the display orientation of external screen	-	-
#527	Write the home screen	-	-
#528	Write the RS-485 settings	-	-
#529	Write the function of converting curve data to positive values	-	-

A

Tool			
Function code	Function name	Function code	Function name
#600	Write to activate the tool	#650	Read the tool information
#601	Write to enable service reminder	#651	Read the lever start level
#602	Write the lever start level	#652	Read the push start level
#603	Write the push start level	#653	Read the work light brightness
#604	Write the work light brightness	#655	Read the LED light settings
#606	Write the LED light settings	#656	Read the tool calibration setting
#607	Write to calibrate the tool	#657	Read the tool firmware version
-	-	#658	Read the status of service reminder
-	-	#659	Read the status of tool activation
Reports			
Function code	Function name	Function code	Function name
#700	Clear the production report entries	#750	Find and read the production report entries
#701	Clear the error and warning report entries	#751	Find and read curves
#702	Clear the production report files	#752	Find and read the error report entries
-	-	#753	Find and read the warning report entries
-	-	#754	Find and read the button report entries

A

### A.3.1 Parameters operations

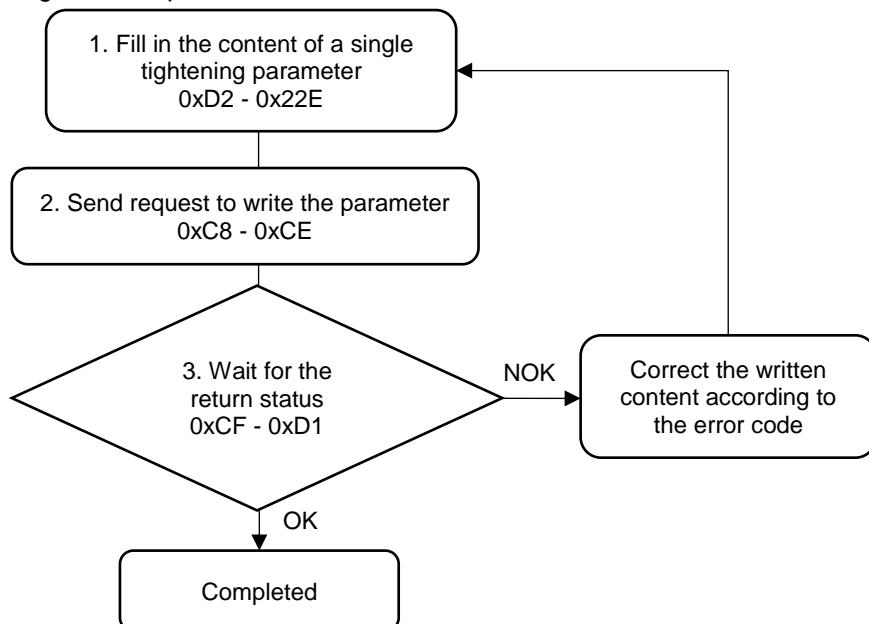
#### #100 Write the parameter

Content description:

Use function code #100 to set the tightening parameter.

- Add a tightening parameter.
- Modify an existing tightening parameter. First, read the parameter with function code #150. Then, modify and write the parameter with function code #100.

Handshake signal description:



- Fill in the tightening parameter content to 0xD2 - 0x22E.

Modbus (Hex)	Function	Description
D2 to E5	Parameter title	ASCII code (20 words)
E6	Min. tightening angle	Unit: degree (< 32767 degrees)
E7	Hold time switch of the final stage	Whether to stay in the Servo On state during the final stage (used with the Pause time setting)
E8	The prevail torque to be linked	The parameter ID to be linked
E9	Max. tightening time	Unit: 0.1 second (< 3276.7 seconds)
EA	Max. loosening time	Unit: 0.1 second (< 3276.7 seconds)
EB	Max. tightening angle	Unit: degree (< 32767 degrees)
EC	Max. loosening angle	Unit: degree (< 32767 degrees)
ED	Delay before tightening starts	Unit: 0.01 second (< 327.67 seconds)
EE	Delay before loosening starts	Unit: 0.01 second (< 327.67 seconds)
EF	Start torque for switching the curve sampling rate	Unit: 0.001 Nm

A

Modbus (Hex)						Function	Description
F0						Start torque rate for snug angle calculation	Unit: 0.0001 Nm/degree
F1						Snug point angle correction	Unit: 0.1 degree
F2						Final current detection	0: Off; 1: On
F3						Delay before outputting the tightening result to feeder	Unit: 0.1 second
F4						Tool precision compensation	-10.0% to +10.0% Unit: 0.1%
F5						Angle delay for torque rate reached	Unit: 0.1 degree
F6 - F9						Reserved	-
FA	12C	15E	190	1C2	1F4	Control method	0: angle; 1: torque; 2: torque rate; 3: clamp torque; 4: clamp angle
FB	12D	15F	191	1C3	1F5	Tightening direction	0: CW; 1: CCW
FC	12E	160	192	1C4	1F6	Rotation speed	Unit: rpm
FD	12F	161	193	1C5	1F7	Target torque	Unit: 0.001 Nm
FE	130	162	194	1C6	1F8	Target angle	Unit: degree
FF	131	163	195	1C7	1F9	Target torque rate	Unit: 0.0001 Nm/degree
100	132	164	196	1C8	1FA	Angle interval for torque rate calculation	Unit: 0.1 degree
101	133	165	197	1C9	1FB	Acceleration time	Unit: ms
102	134	166	198	1CA	1FC	Max. angle	Unit: degree
103	135	167	199	1CB	1FD	Min. angle	Unit: degree
104	136	168	19A	1CC	1FE	Max. torque	Unit: 0.001 Nm
105	137	169	19B	1CD	1FF	Min. torque	Unit: 0.001 Nm
106	138	16A	19C	1CE	200	Max. operation time	Unit: 0.01 second
107	139	16B	19D	1CF	201	Min. operation time	Unit: 0.01 second
108	13A	16C	19E	1D0	202	Prevail torque On / Off	0: Off; 1: On
109	13B	16D	19F	1D1	203	Angle range for prevail torque calculation	0 to 100%
10A	13C	16E	1A0	1D2	204	Pause time	Unit: ms
10B	13D	16F	1A1	1D3	205	Max. clamp torque	Unit: 0.001 Nm
10C	13E	170	1A2	1D4	206	Min. clamp torque	Unit: 0.001 Nm
10D	13F	171	1A3	1D5	207	Max. clamp angle	Unit: degree
10E	140	172	1A4	1D6	208	Min. clamp angle	Unit: degree
10F	141	173	1A5	1D7	209	Torque of 1st stage	Unit: 0.001 Nm
110	142	174	1A6	1D8	20A	Pause time after 1st stage	Unit: ms
111	143	175	1A7	1D9	20B	Acc. time of 2nd stage	Unit: ms
112	144	176	1A8	1DA	20C	Speed of final stage	Unit: rpm
113	145	177	1A9	1DB	20D	Deceleration time	Unit: ms
114 to 12B	146 to 15D	178 to 18F	1AA to 1C1	1DC to 1F3	20E to 225	Reserved	-
226						1st stage loosening angle	Unit: degree
227						1st stage loosening speed	Unit: rpm
228						2nd stage loosening angle	Unit: degree
229						2nd stage loosening speed	Unit: rpm

A

Modbus (Hex)	Function	Description
22A	Loosening direction	0: CW; 1: CCW
22B	Detect loosening torque	Unit: 0.001 Nm
22C	Production report saving	0: Off; 1: On
22D	1st stage loosening acceleration time	Unit: ms
22E	2nd stage loosening acceleration time	Unit: ms

A

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	100
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Parameter ID	1 to 500
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	100
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description
1	Start: Max. torque < Min. torque
2	Start: Max. angle < Min. angle
3	Rundown: Max. torque < Min. torque
4	Rundown: Max. angle < Min. angle
5	Pre-tightening: Max. torque < Min. torque
6	Pre-tightening: Max. angle < Min. angle
7	Tightening: Max. torque < Min. torque
8	Tightening: Max. angle < Min. angle
9	Check if the stage sequence of the tightening settings is correct
10	No parameters set for this stage
11	Rundown: The set torque < Min. torque
12	Rundown: The set torque > Max. torque
13	Pre-tightening: The set torque < Min. torque
14	Pre-tightening: The set torque > Max. torque
15	Tightening: The set torque < Min. torque
16	Tightening: The set torque > Max. torque
17	The set angle > 32767
18	The set torque > Tool spec. torque The set min. torque > Tool spec. torque
19	The set torque > Tool max. torque

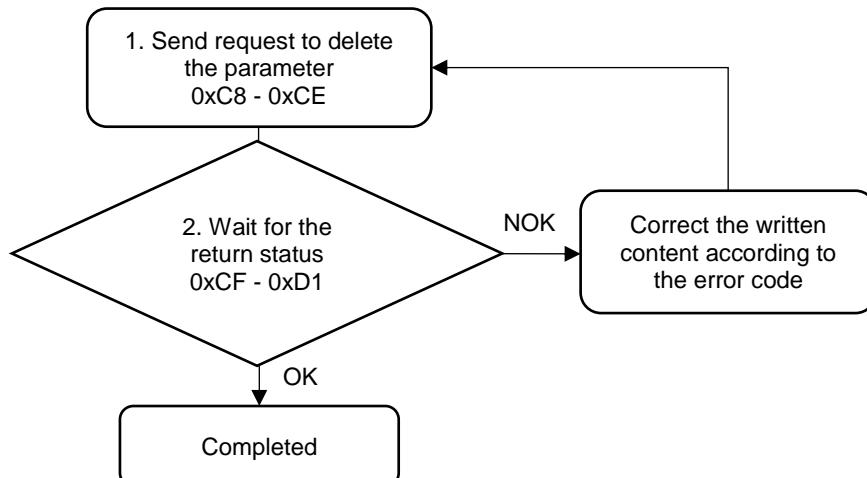
Code	Error description
20	The set speed > Tool max. speed
21	Rundown: Torque cannot be 0
22	Pre-tightening: Torque cannot be 0
23	Tightening: Torque cannot be 0
24	The set rundown torque > The set pre-tightening torque
25	The set rundown torque > The set tightening torque
26	The set pre-tightening torque > The set tightening torque
27	The set clamp torque > Max. clamp torque
28	Max. clamp torque < Min. clamp torque
29	Max. clamp torque > Tool max. torque
30	Tightening: The set speed < Min. speed
32	General: The set timeout > 32767
33	General: The set max. total angle > 32767
34	Start: Min. operation time > Max. operation time
35	Rundown: Min. operation time > Max. operation time
36	Pre-tightening: Min. operation time > Max. operation time
37	Tightening: Min. operation time > Max. operation time
38	General: The set tightening timeout > Max. operation time of the stage
39	Linked prevail torque cannot be 0
40	Cannot set multiple torque rates
41	Max. clamp angle < Min. clamp angle
42	Cannot set multiple clamp torques or angles
47	Tightening speed > Pre-tightening speed
48	Start speed > Rundown speed
49	Pre-tightening speed > Rundown speed
50	Tightening speed > Rundown speed
51	Start: Max. torque > Tightening torque
52	Start: Min. torque > Tightening torque
53	Rundown: Max. torque > Tightening torque
54	Rundown: Min. torque > Tightening torque
55	Rundown: Max. torque > Tightening torque
56	Rundown: Min. torque > Tightening torque
57	Pre-tightening: Max. torque > Tightening torque
58	Pre-tightening: Min. torque > Tightening torque
59	Parameter not applicable to this model
61	The set torque < Min. torque
62	The set torque > Max. torque
63	Max. torque < Min. torque
64	Max. angle < Min. angle
65	Min. operation time > Max. operation time
100	Parameter ID exceeds the range of 1 to 500
101	Tool 1 / Tool 2 must be 0 or 1
102	Title string is null
103	Title already exists

## #110 Write to delete the parameter

Content description:

Use function code #110 to delete the tightening parameter.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	110
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	The ID to be deleted	0: all the parameters 1 to 500: a single parameter
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	110
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	The ID to be deleted	Exceeds the range of 0 to 500

A

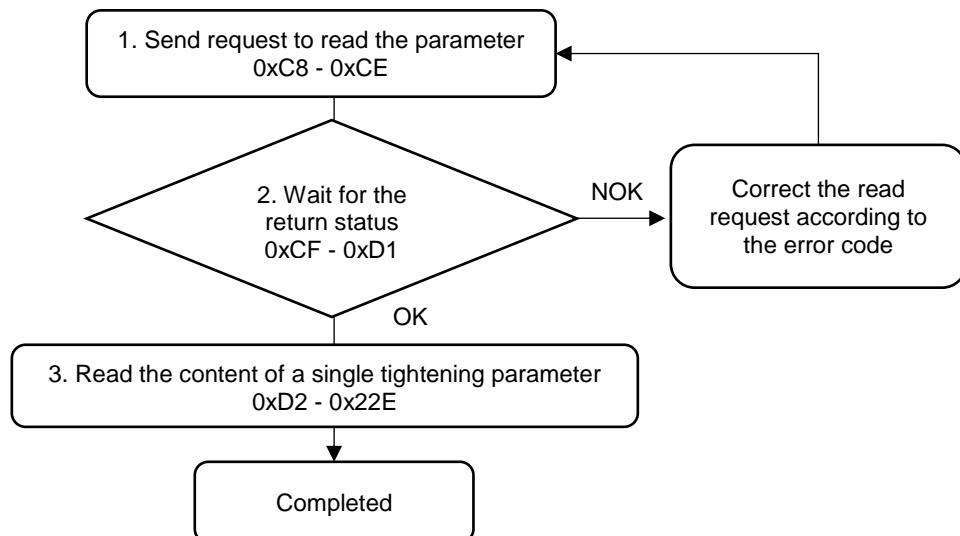
## #150 Read the parameter

Content description:

Use function code #150 to read the tightening parameter.

- Obtain the content of an existing tightening parameter.
- Check whether the tightening parameter has been set.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	150
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Parameter ID	1 to 500
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	150
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Parameter ID	Exceeds the range of 1 to 500
2	Tool 1 / Tool 2	Must be 0 or 1
3	Parameter content	Not set

- Read the parameter content in 0xD2 - 0x22E. Refer to function code #100 for the function list.

### A.3.2 Sequence operations

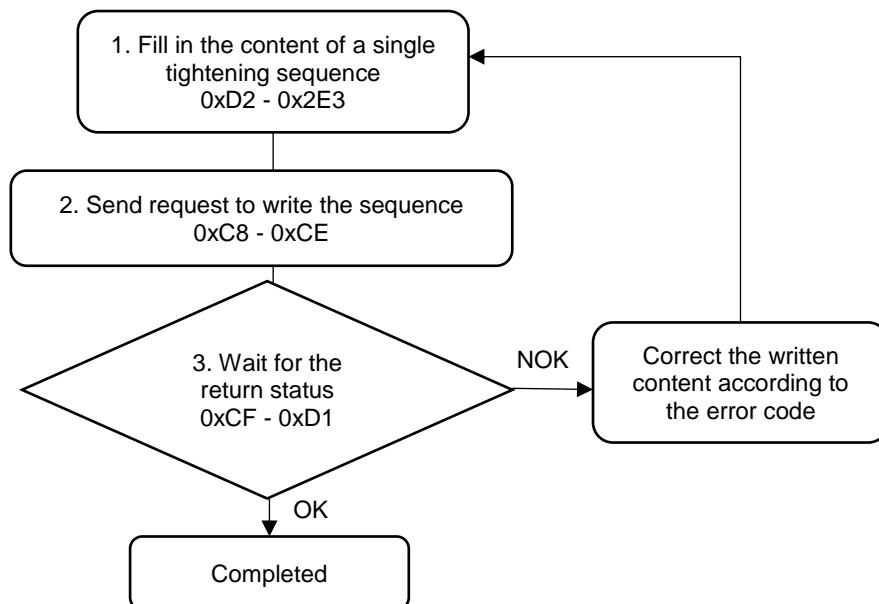
#### #200 Write the sequence

Content description:

Use function code #200 to set the tightening sequence.

- A. Add a tightening sequence.
- B. Modify an existing tightening sequence. First, read the sequence with function code #250. Then, modify and write the sequence with function code #200.

Handshake signal description:



- Fill in the tightening sequence content to 0xD2 - 0x2E3.

In each sequence, you can configure up to 100 sets of parameters.

Modbus (Hex)	Function	Description
D2 to E5	Sequence title	ASCII code (20 words)
E6	General / Navigator mode	0: General mode 1: Navigator mode
E7	Positioning arm function	0: Off 1: On
E8 to EF	Reserved	-
F0	Tool ID for Set 1	0: Tool 1 1: Tool 2
F1	Tool ID for Set 2	
F2	Tool ID for Set 3	
...	Tool ID for Set N	
151	Tool ID for Set 98	
152	Tool ID for Set 99	
153	Tool ID for Set 100	
154	Parameter ID for Set 1	1 to 500
155	Parameter ID for Set 2	1 to 500

Modbus (Hex)	Function	Description
156	Parameter ID for Set 3	1 to 500
...	Parameter ID for Set N	1 to 500
1B5	Parameter ID for Set 98	1 to 500
1B6	Parameter ID for Set 99	1 to 500
1B7	Parameter ID for Set 100	1 to 500
1B8	Screw quantity for Set 1 (L)	1 to 999999
1B9	Screw quantity for Set 1 (H)	
1BA	Screw quantity for Set 2 (L)	1 to 999999
1BB	Screw quantity for Set 2 (H)	
1BC	Screw quantity for Set 3 (L)	1 to 999999
1BD	Screw quantity for Set 3 (H)	
...	Screw quantity for Set N (L)	1 to 999999
...	Screw quantity for Set N (H)	
27A	Screw quantity for Set 98 (L)	1 to 999999
27B	Screw quantity for Set 98 (H)	
27C	Screw quantity for Set 99 (L)	1 to 999999
27D	Screw quantity for Set 99 (H)	
27E	Screw quantity for Set 100 (L)	1 to 999999
27F	Screw quantity for Set 100 (H)	
280	Bit ID for Set 1	0 to 255
281	Bit ID for Set 2	0 to 255
282	Bit ID for Set 3	0 to 255
...	Bit ID for Set N	0 to 255
2E1	Bit ID for Set 98	0 to 255
2E2	Bit ID for Set 99	0 to 255
2E3	Bit ID for Set 100	0 to 255

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	200
C9	Version number	0
CA	Sequence ID	1 to 500
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	200
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500
2	The quantity is 0	Cannot be set as 0
3	Total screw quantity > 999999	Must not exceed 999999
100	Title string is null	-
101	Title already exists	-

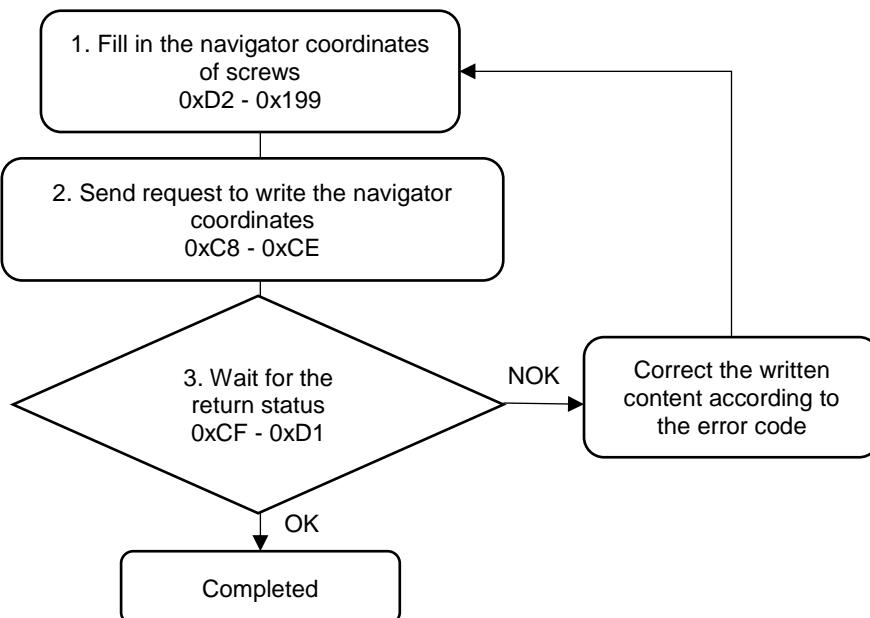
## #201 Write the navigator coordinates

Content description:

Use function code #201 to set the navigator coordinates of screws.

Note: first, set the coordinates of screws with function code #201. Then, set the navigator image codes corresponding to screws with function code #202.

Handshake signal description:



A

1. Fill in the navigator coordinates of up to 100 screws to 0xD2 - 0x199.

Modbus (Hex)	Function	Description
D2	Screw ID 1 - X axis position	0 - 740
D3	Screw ID 1 - Y axis position	0 - 460
D4	Screw ID 2 - X axis position	0 - 740
D5	Screw ID 2 - Y axis position	0 - 460
D6	Screw ID 3 - X axis position	0 - 740
D7	Screw ID 3 - Y axis position	0 - 460
...	Screw ID N - X axis position	0 - 740
...	Screw ID N - Y axis position	0 - 460
194	Screw ID 98 - X axis position	0 - 740
195	Screw ID 98 - Y axis position	0 - 460
196	Screw ID 99 - X axis position	0 - 740
197	Screw ID 99 - Y axis position	0 - 460
198	Screw ID 100 - X axis position	0 - 740
199	Screw ID 100 - Y axis position	0 - 460

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	201
C9	Version number	0
CA	Sequence ID	1 to 500
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	201
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500
2	Axis position exceeds the range	X axis: exceeds the range of 0 to 740 Y axis: exceeds the range of 0 to 460

## #202 Write the navigator image codes

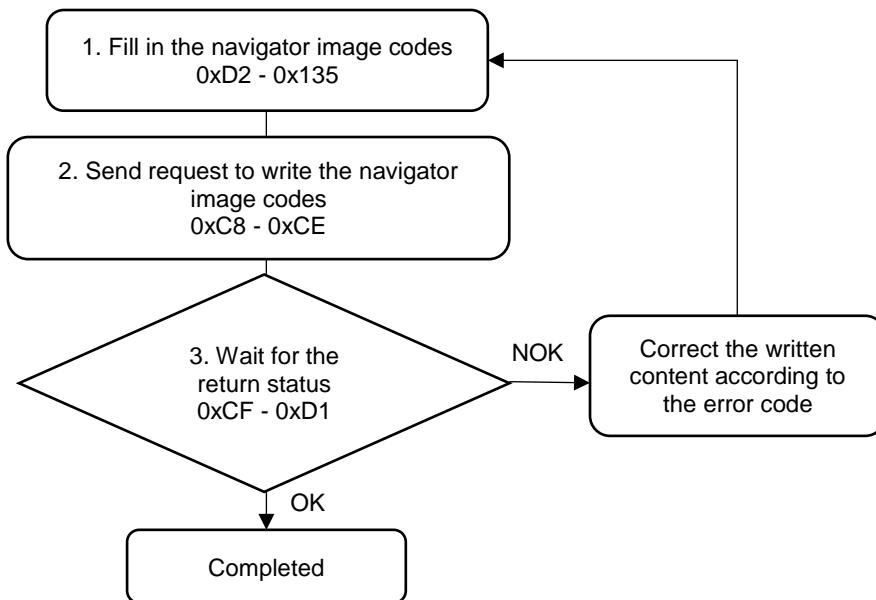
Content description:

Use function code #202 to set the navigator image codes corresponding to the screws.

Note: first, set the coordinates of screws with function code #201. Then, set the navigator image codes corresponding to the screws with function code #202.

A

Handshake signal description:



- Fill in the navigator image codes of up to 100 screws to 0xD2 - 0x135.

Modbus (Hex)	Function	Description
D2	Screw ID 1 - displayed image	
D3	Screw ID 2 - displayed image	
D4	Screw ID 3 - displayed image	
D5	Screw ID 4 - displayed image	
D6	Screw ID 5 - displayed image	
...	Screw ID N - displayed image	
131	Screw ID 96 - displayed image	0: no display 1: image A 2: image B 3: image C
132	Screw ID 97 - displayed image	
133	Screw ID 98 - displayed image	
134	Screw ID 99 - displayed image	
135	Screw ID 100 - displayed image	

- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	202
C9	Version number	0
CA	Sequence ID	1 to 500
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	202
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500
2	Image code exceeds the range	Exceeds the range of 0 to 3

## #203 Write the coordinates of positioning arm

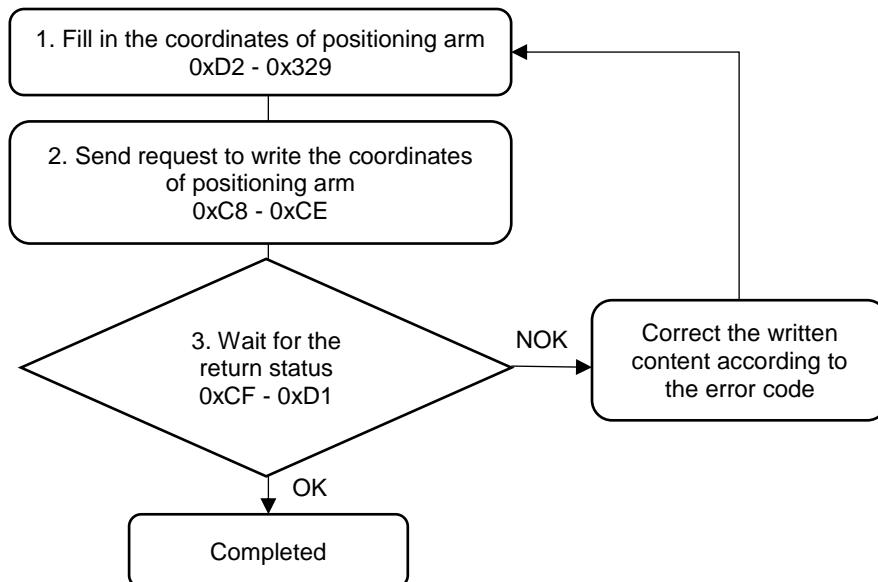
Content description:

Use function code #203 to set the coordinates of positioning arm.

Note: first, set the tightening sequence with function code #200. Then, set the coordinates of positioning arm with function code #203.

A

Handshake signal description:



- Fill in the coordinates of positioning arm for up to 100 screws to 0xD2 - 0x329.

Modbus (Hex)	Function	Description
D2	Screw ID 1 - positioning arm X axis position (L)	Unit: mm
D3	Screw ID 1 - positioning arm X axis position (H)	
D4	Screw ID 1 - positioning arm Y axis position (L)	Unit: mm
D5	Screw ID 1 - positioning arm Y axis position (H)	
D6	Screw ID 1 - positioning arm Z axis position (L)	Unit: mm
D7	Screw ID 1 - positioning arm Z axis position (H)	
D8	Screw ID 2 - positioning arm X axis position (L)	Unit: mm
D9	Screw ID 2 - positioning arm X axis position (H)	
DA	Screw ID 2 - positioning arm Y axis position (L)	Unit: mm
DB	Screw ID 2 - positioning arm Y axis position (H)	
DC	Screw ID 2 - positioning arm Z axis position (L)	Unit: mm
DD	Screw ID 2 - positioning arm Z axis position (H)	
DE	Screw ID 3 - positioning arm X axis position (L)	Unit: mm
DF	Screw ID 3 - positioning arm X axis position (H)	
E0	Screw ID 3 - positioning arm Y axis position (L)	Unit: mm
E1	Screw ID 3 - positioning arm Y axis position (H)	
E2	Screw ID 3 - positioning arm Z axis position (L)	Unit: mm
E3	Screw ID 3 - positioning arm Z axis position (H)	

Modbus (Hex)	Function	Description
...	Screw ID N - positioning arm X axis position (L)	Unit: mm
...	Screw ID N - positioning arm X axis position (H)	
...	Screw ID N - positioning arm Y axis position (L)	Unit: mm
...	Screw ID N - positioning arm Y axis position (H)	
...	Screw ID N - positioning arm Z axis position (L)	Unit: mm
...	Screw ID N - positioning arm Z axis position (H)	
318	Screw ID 98 - positioning arm X axis position (L)	Unit: mm
319	Screw ID 98 - positioning arm X axis position (H)	
31A	Screw ID 98 - positioning arm Y axis position (L)	Unit: mm
31B	Screw ID 98 - positioning arm Y axis position (H)	
31C	Screw ID 98 - positioning arm Z axis position (L)	Unit: mm
31D	Screw ID 98 - positioning arm Z axis position (H)	
31E	Screw ID 99 - positioning arm X axis position (L)	Unit: mm
31F	Screw ID 99 - positioning arm X axis position (H)	
320	Screw ID 99 - positioning arm Y axis position (L)	Unit: mm
321	Screw ID 99 - positioning arm Y axis position (H)	
322	Screw ID 99 - positioning arm Z axis position (L)	Unit: mm
323	Screw ID 99 - positioning arm Z axis position (H)	
324	Screw ID 100 - positioning arm X axis position (L)	Unit: mm
325	Screw ID 100 - positioning arm X axis position (H)	
326	Screw ID 100 - positioning arm Y axis position (L)	Unit: mm
327	Screw ID 100 - positioning arm Y axis position (H)	
328	Screw ID 100 - positioning arm Z axis position (L)	Unit: mm
329	Screw ID 100 - positioning arm Z axis position (H)	

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	203
C9	Version number	0
CA	Sequence ID	1 to 500
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	203
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

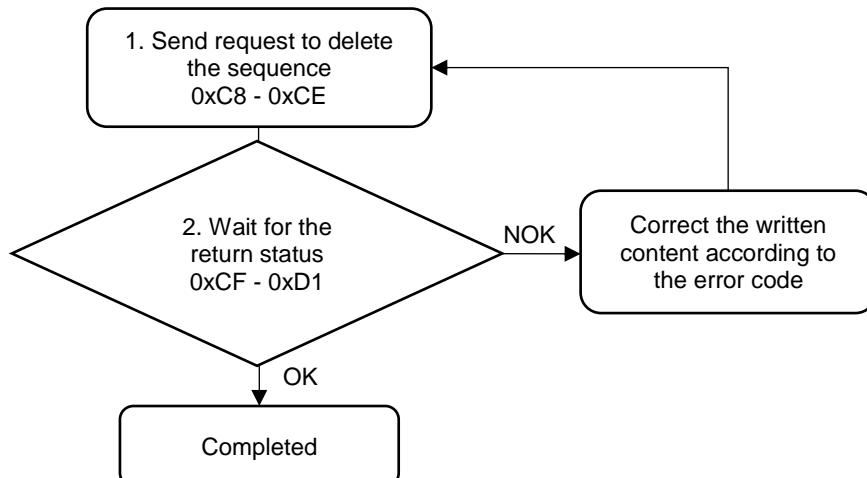
Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500

## #210 Write to delete the sequence

Content description:

Use function code #210 to delete the tightening sequence.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	210
C9	Version number	0
CA	The ID to be deleted	0: all the sequences 1 to 500: a single sequence
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	210
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	The ID to be deleted	Exceeds the range of 0 to 500

A

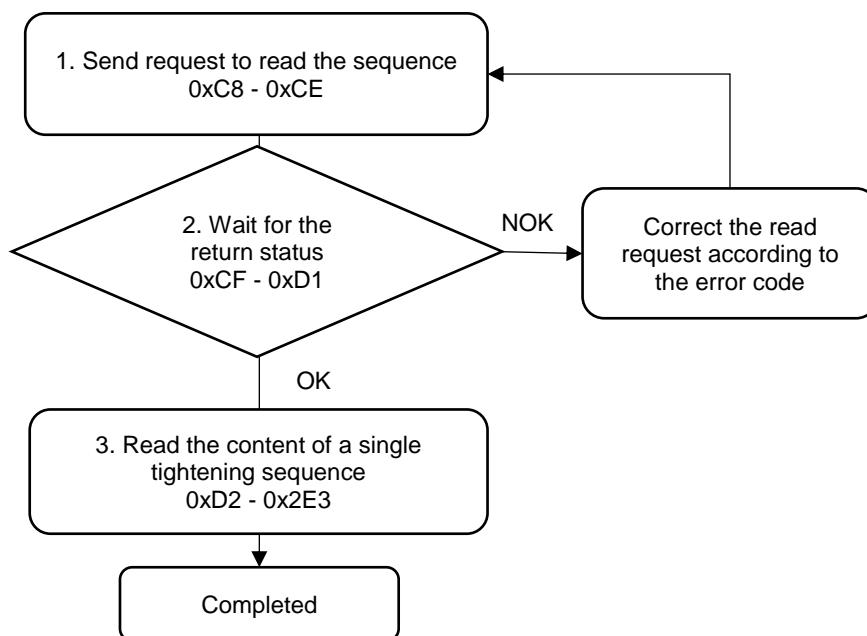
## #250 Read the sequence

Content description:

Use function code #250 to read the tightening sequence.

- A. Obtain the content of an existing tightening sequence.
- B. Check whether the tightening sequence has been set.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	250
C9	Version number	0
CA	Sequence ID	1 to 500
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	250
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500

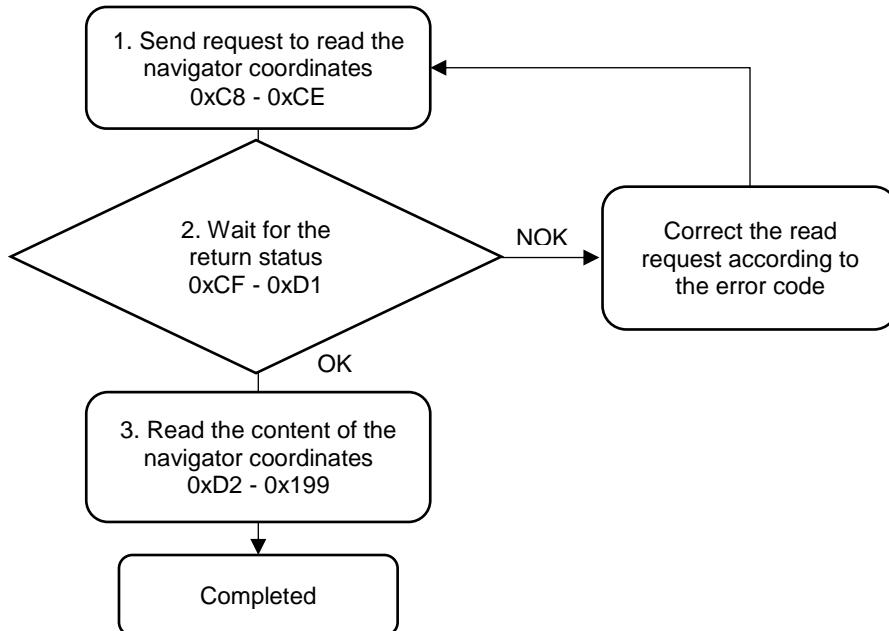
- Read the content of the tightening sequence in 0xD2 - 0x2E3. Refer to function code #200 for the function list.

## #251 Read the navigator coordinates

Content description:

Use function code #251 to read the navigator coordinates of screws.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	251
C9	Version number	0
CA	Sequence ID	1 to 500
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	251
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500

- Read the content of the navigator coordinates in 0xD2 - 0x199. Refer to function code #201 for the function list.

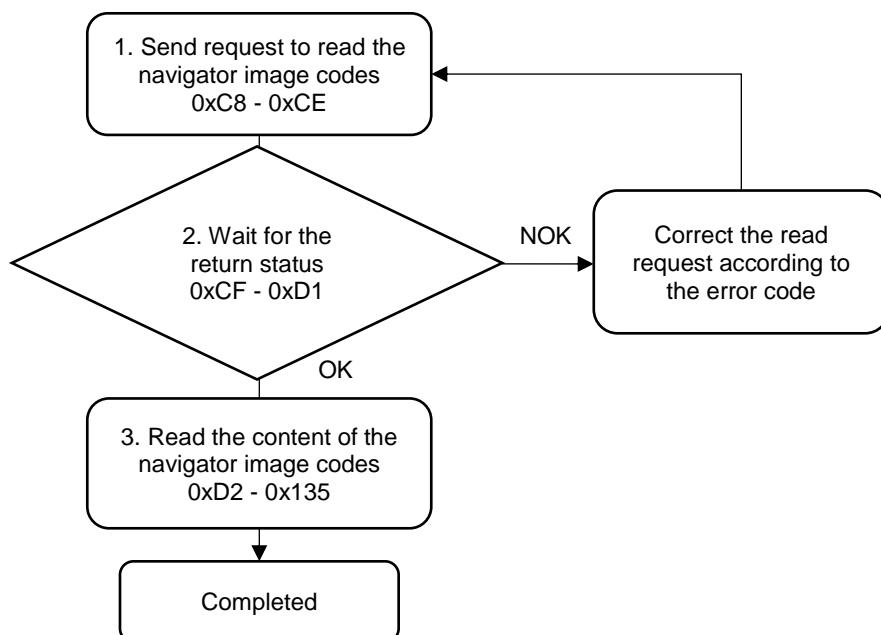
A

## #252 Read the navigator image codes

Content description:

Use function code #252 to read the navigator image codes corresponding to the screws.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	252
C9	Version number	0
CA	Sequence ID	1 to 500
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	252
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500

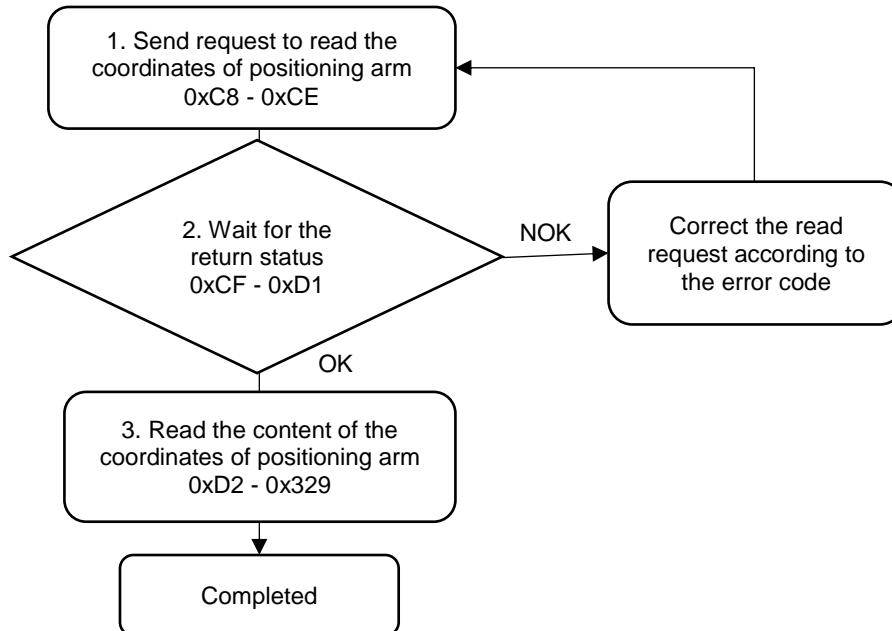
- Read the content of the navigator image codes corresponding to the screws in 0xD2 - 0x135. Refer to function code #202 for the function list.

## #253 Read the coordinates of positioning arm

Content description:

Use function code #253 to read the coordinates of positioning arm.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	253
C9	Version number	0
CA	Sequence ID	1 to 500
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	253
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500

- Read the content of the coordinates of positioning arm in 0xD2 - 0x329. Refer to function code #203 for the function list.

A

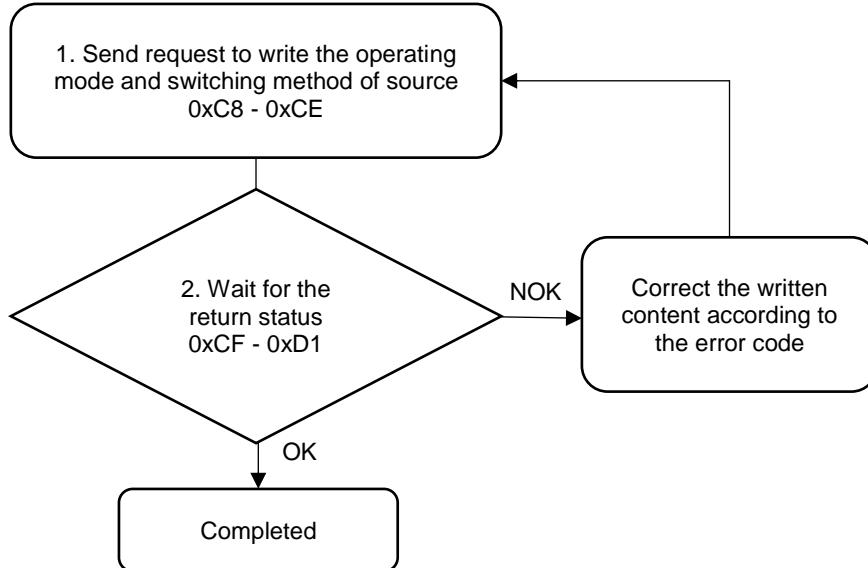
### A.3.3 Sources operations

#### #300 Write the operating mode and switching method of source

Content description:

Use function code #300 to switch the operating mode and switching method of the controller.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	300
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Operating mode	0: single-tool 1: dual-tool alternation 2: dual-tool synchronization
CC	Switching method	0: manual 1: screw bit selector 2: barcode scanner
CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	300
D0	Status	1: OK; 2: NOK
D1	Error code	-

A

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Operating mode	Exceeds the range of 0 to 2
2	Switching method	Exceeds the range of 0 to 2
3	Tool 1 / Tool 2	Must be 0 or 1
4	Cannot set to dual-tool alternation or dual-tool synchronization when only one tool is activated	-
5	Cannot use the screw bit selector mode under dual-tool alternation	-

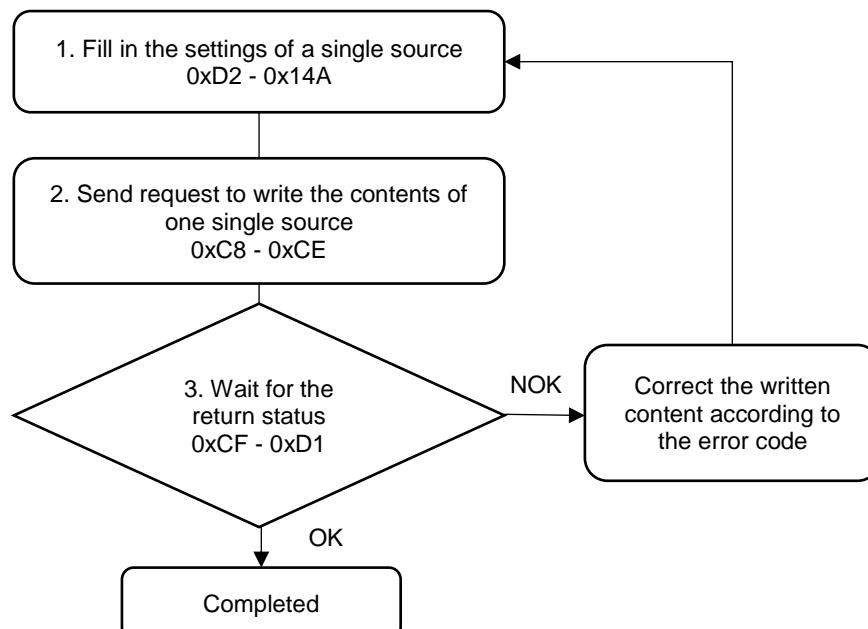
### #301 Write the contents of a single source

Content description:

Use function code #301 to set the tightening source.

- Add a single tightening source for each tool.
- Modify the settings for an existing tightening source. First, read the settings of a single source with function code #351. Then, modify and write the settings with function code #301.

Handshake signal description:



1. Fill in the settings of a single source to 0xD2 - 0x14A.

Modbus (Hex)	Function	Description
D2 to 135	Corresponding barcode string	ASCII code (100 words); only applicable when the switching method is Barcode Scanner
136	Source for the switching method	0: parameter 1: sequence
137	Parameter / Sequence ID	1 to 500
138	Total screw quantity (L)	1 to 999999
139	Total screw quantity (H)	
13A	Bit ID	0 to 255
13B	Advanced settings (L)	Bit 0: loosening prohibited after tightening OK Bit 1: loosening prohibited after tightening NOK Bit 2: max. count for single screw NOK tightening Bit 3: max. count for single screw NOK loosening Bit 4: go to next step after tightening NOK Bit 5: go to previous step after loosening OK Bit 6: prohibit tool operation when scanner string is null Bit 7: clear scanner string when screw Qty. reached Bit 8: prohibit scanning when screw Qty. not reached Bit 9: max. operation time Bit 10: reset Qty. when screw Qty. reached Bit 11: enable reminder when tightening signal ends too early
13C	Advanced settings (H)	
13D	Single screw tightening NOK count (L)	1 to 999999
13E	Single screw tightening NOK count (H)	
13F	Single screw loosening NOK count (L)	1 to 999999
140	Single screw loosening NOK count (H)	
141 to 144	Reserved	-
145	Max. operation time (L)	1 to 9999999
146	Max. operation time (H)	
147	The parameters to be used under dual-tool alternation mode	0: use parameters of Tool 1 1: use parameters of Tool 2
148	Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in
149	Start condition for Tool 1	0: push start 1: DI 2: lever start 3: push start or lever start 4: push start and lever start
14A	Start condition for Tool 2	

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	301
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	301
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Switching method ID	Exceeds the range of 1 to 500
2	Tool 1 / Tool 2	Must be 0 or 1
10	Source for the switching method	Must be 0 or 1
11	Sequence / Parameter ID	Exceeds the range of 1 to 500
12	Total screw quantity	Exceeds the range of 1 to 999999
13	Bit ID	Exceeds the range of 0 to 255
20	Single screw tightening NOK count	Exceeds the range of 1 to 999999
21	Single screw loosening NOK count	Exceeds the range of 1 to 999999
40	Max. operation time	Exceeds the range of 1 to 9999999
50	Cannot specify the tightening parameter	Cannot select the tightening parameter under dual-tool alternation
51	Sequence error	Must select the sequence which includes tightening parameters of both Tool 1 and Tool 2 under dual-tool alternation
100	Title string is null	-
101	Title already exists	-

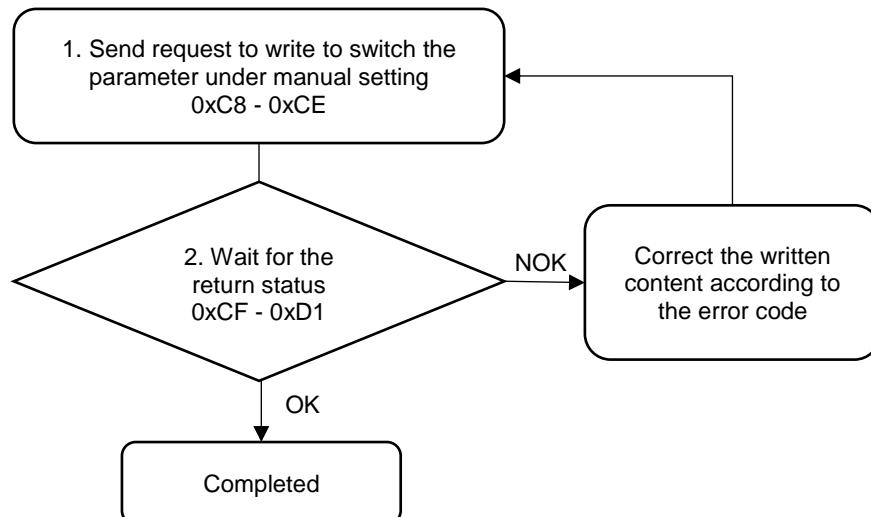
A

## #302 Write to switch parameter under manual setting

Content description:

Use function code #302 to switch the parameter ID and screw quantity when the switching method is set to manual setting.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	302
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Parameter ID	1 to 500
CC	Total screw quantity (L)	1 to 999999
CD	Total screw quantity (H)	
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	302
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Switching method error	Must be manual setting
2	Tool 1 / Tool 2	Must be 0 or 1
11	Parameter ID	Exceeds the range of 1 to 500
12	Total screw quantity	Exceeds the range of 1 to 999999
50	Cannot specify the tightening parameter	Cannot select the tightening parameter under dual-tool alternation

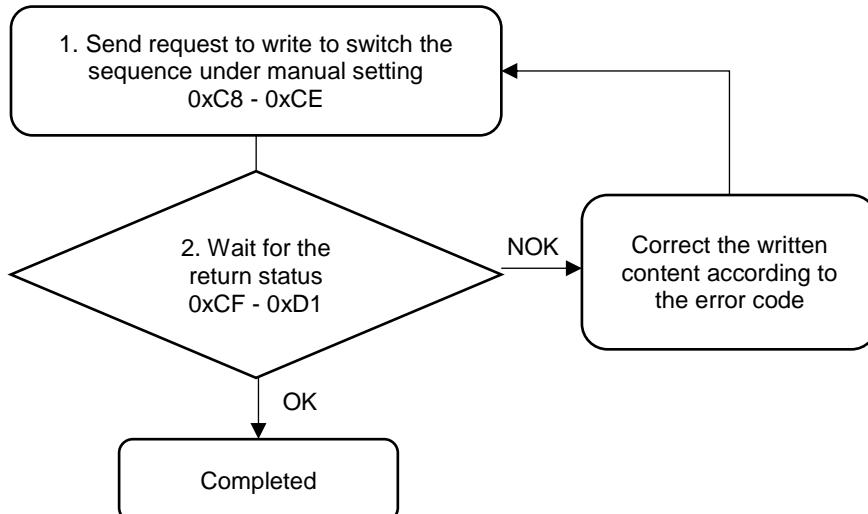
### #303 Write to switch sequence under manual setting

Content description:

Use function code #303 to switch the sequence ID when the switching method is set to manual setting.

A

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	303
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Sequence ID	1 to 500
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	303
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

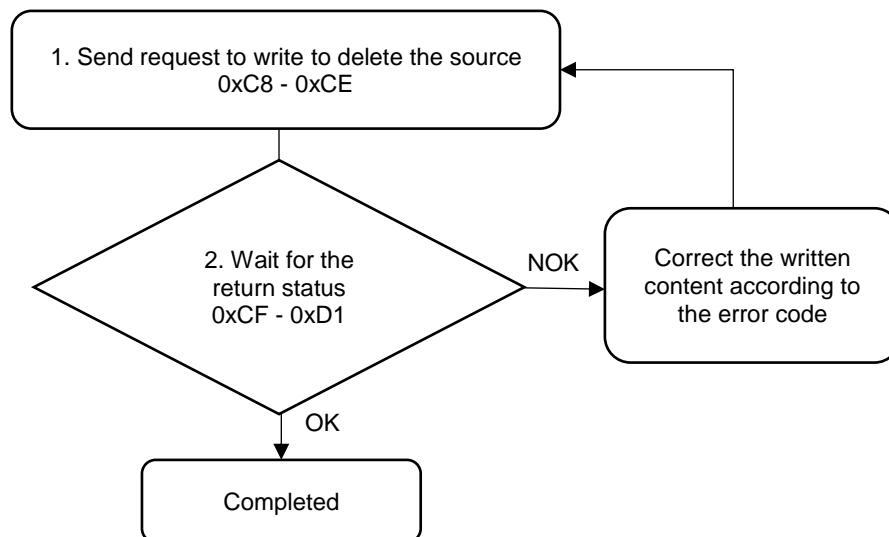
Code	Error description	Description
1	Switching method error	Must be manual setting
2	Tool 1 / Tool 2	Must be 0 or 1
11	Sequence ID	Exceeds the range of 1 to 500
50	Sequence error	Must select the sequence which includes tightening parameters of both Tool 1 and Tool 2 under dual-tool alternation

## #310 Write to delete the source

Content description:

Use function code #310 to delete the tightening source.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	310
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Operating mode	0: single-tool 1: dual-tool alternation 2: dual-tool synchronization
CC	Switching method	0: manual 1: screw bit selector 2: barcode scanner
CD	Switching method ID to be deleted	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500 Delete all: 0
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	310
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

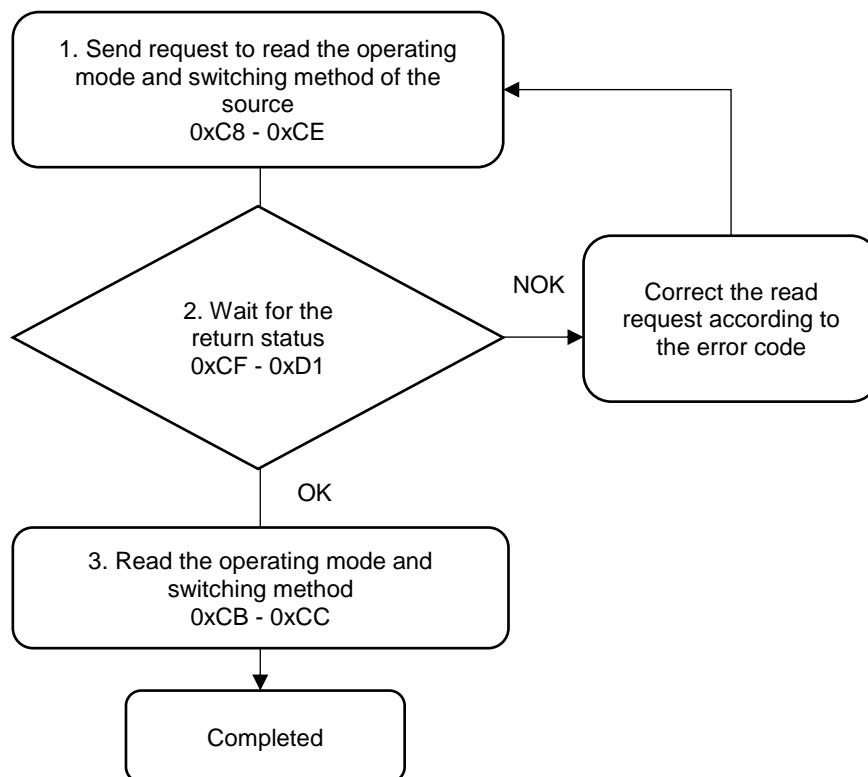
Code	Error description	Description
1	Operating mode	Exceeds the range of 0 to 2
2	Switching method	Exceeds the range of 0 to 2
3	Tool 1 / Tool 2	Must be 0 or 1
4	Cannot set to dual-tool alternation or dual-tool synchronization when only one tool is activated	-
5	Cannot use the screw bit selector mode under dual-tool alternation	-
6	Switching method ID to be deleted	Exceeds the range of 0 to 500

### #350 Read the operating mode and switching method of source

Content description:

Use function code #350 to read the current operating mode and switching method of the smart screwdriving controller.

Handshake signal description:



A

1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	350
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	350
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

3. Read the contents of operating mode and switching method in 0xCB - 0xCC.

Modbus (Hex)	Write / Read request	Read
CB	Operating mode	0: single-tool 1: dual-tool alternation 2: dual-tool synchronization
CC	Switching method	0: manual 1: screw bit selector 2: barcode scanner

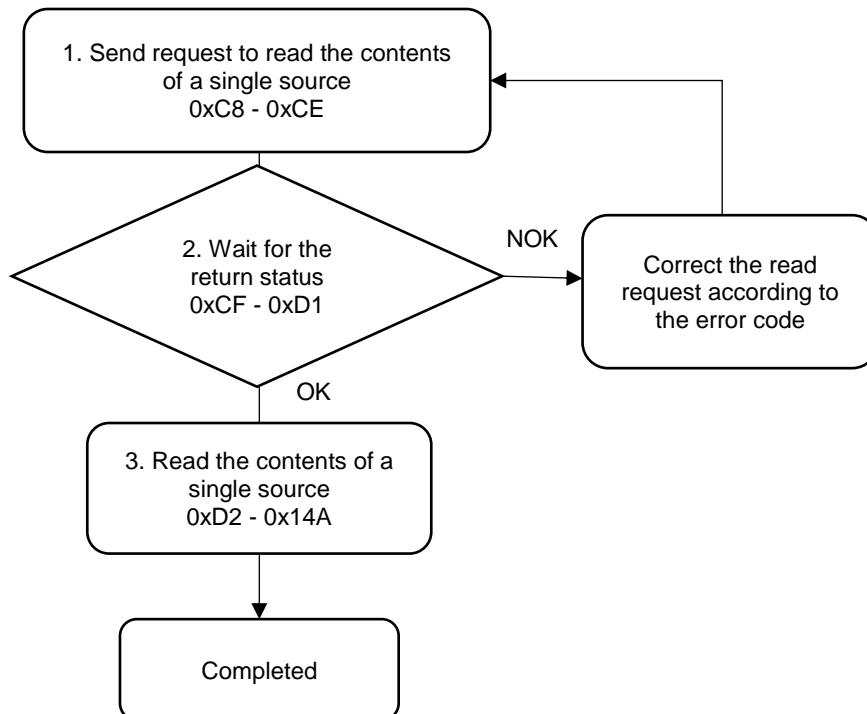
### #351 Read the contents of a single source

Content description:

Use function code #351 to read the settings of a single tightening source.

- Obtain the contents of an existing tightening source.
- Check whether the tightening source has been set.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	351
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

A

2. Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	351
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Switching method ID	Exceeds the range of 1 to 500
2	Tool 1 / Tool 2	Must be 0 or 1

3. Read the contents of a single source in 0xD2 - 0x14A. Refer to function code #301 for the function list.

### A.3.4 Results operations

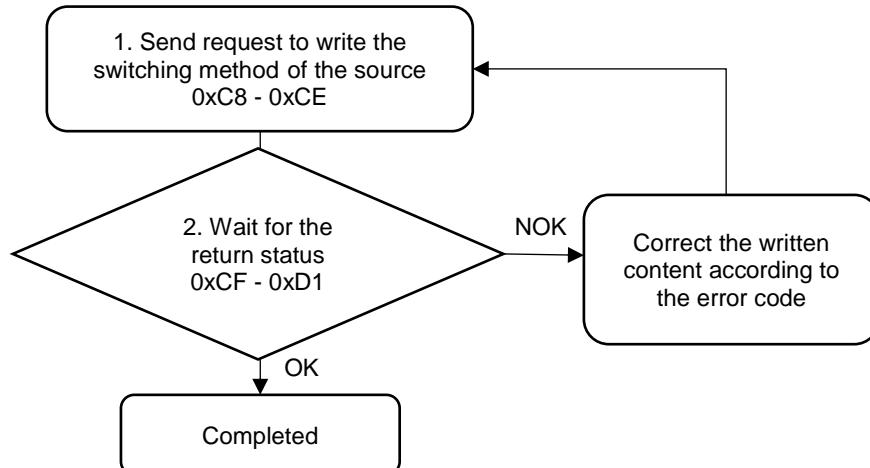
#### #400 Write the switching method of source

Content description:

Use function code #400 to switch the switching method of the tightening source in operation.

A

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	400
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	400
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Switching method ID	Manual: exceeds 1 Screw bit selector: exceeds the range of 1 to 255 Barcode scanner: exceeds the range of 1 to 500

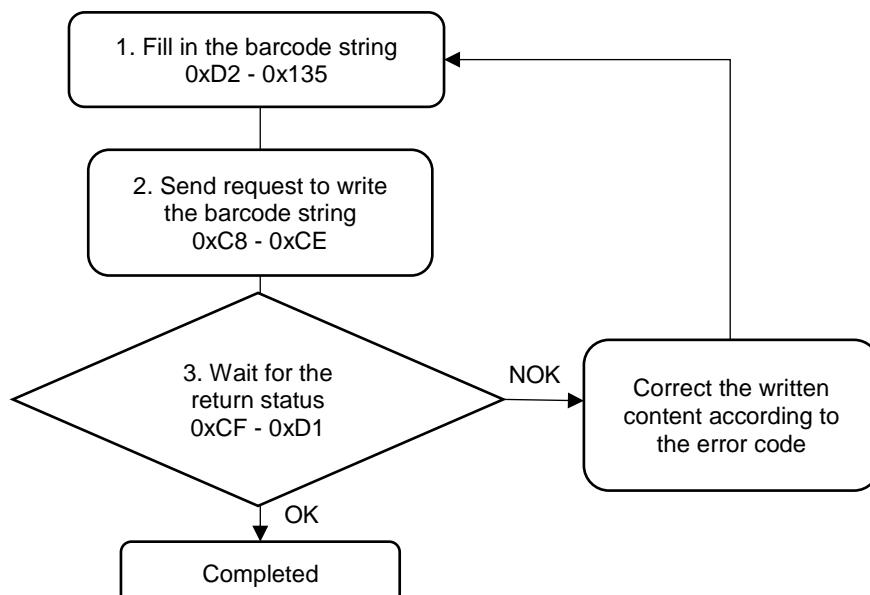
## #401 Write the barcode string

Content description:

Use function code #401 to input the barcode string.

- A. Input the barcode string to the controller.
- B. If the switching method is Barcode Scanner, when you scan the barcode, the content of the string is immediately matched and switched to the corresponding parameter or sequence.

Handshake signal description:



1. Fill in the barcode string to 0xD2 - 0x135.

Modbus (Hex)	Function	Description
D2 to 135	Barcode string	ASCII code (100 words)

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	401
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	401
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

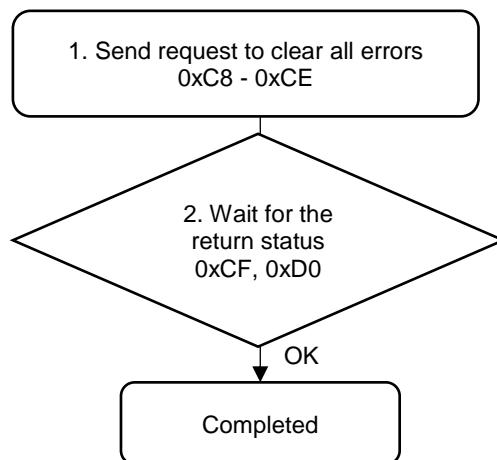
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Matching failed	Failed to match the strings in Barcode Scanner mode

## #402 Write to clear all errors

Content description:

Use function code #402 to clear all the AL, NG, and WN alarms.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	402
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	402
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

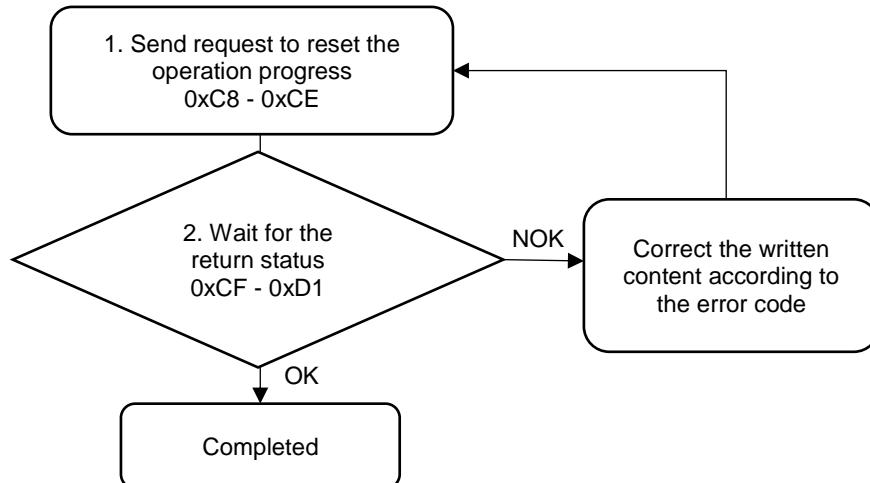
A

## #403 Write to reset the operation progress

Content description:

Use function code #403 to reset the operation progress (total screw quantity, parameter quantity, and screw quantity of the parameter).

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	403
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	403
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

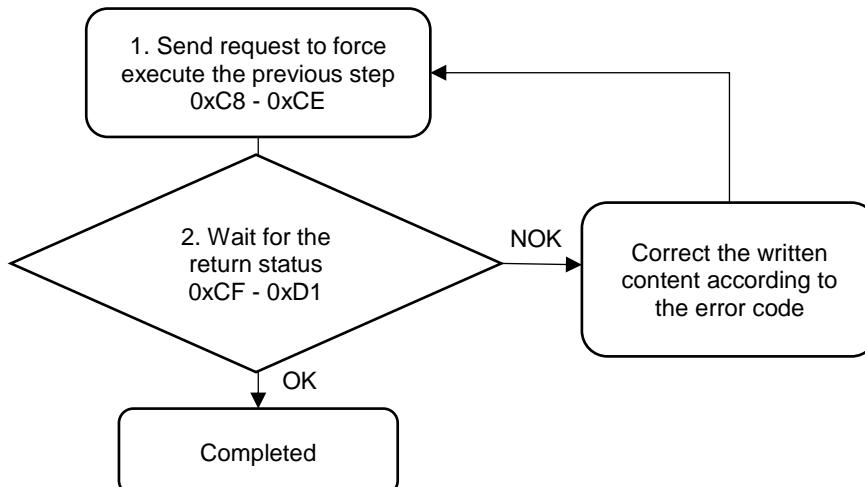
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #404 Write to force execute the previous step

Content description:

Use function code #404 to execute the parameter of the previous screw.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	404
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	404
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

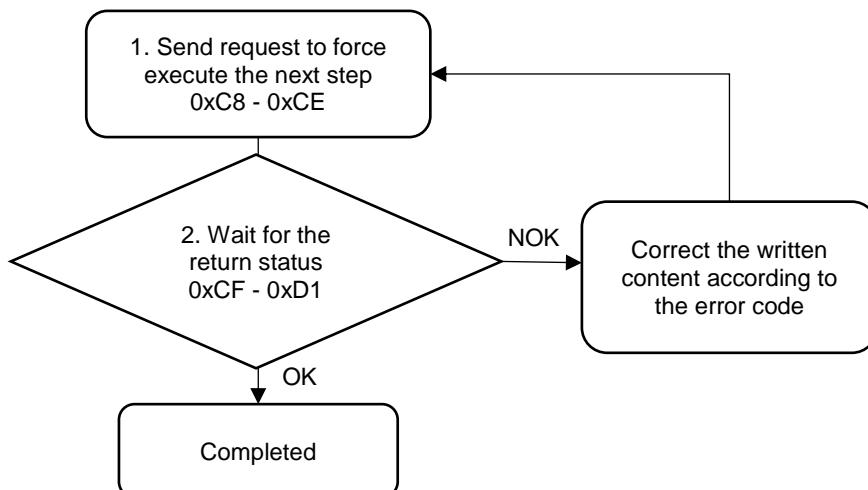
A

## #405 Write to force execute the next step

Content description:

Use function code #405 to execute the parameter of the next screw.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	405
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	405
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

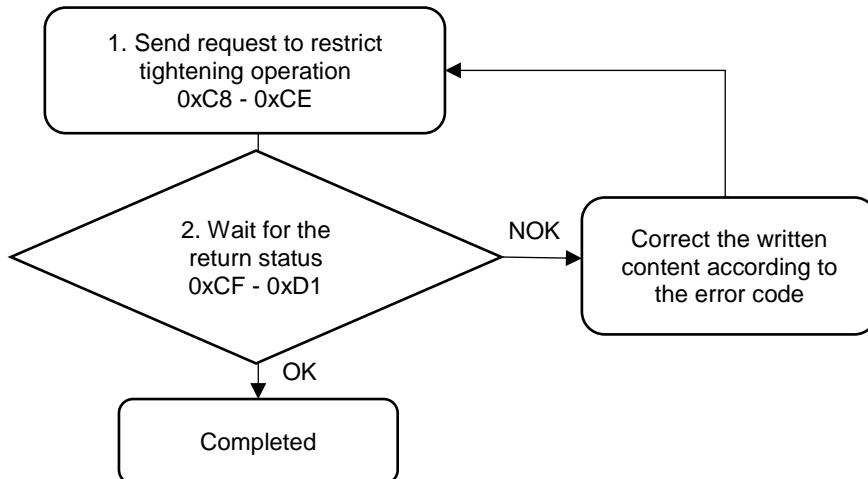
## #406 Write to restrict tightening operation

Content description:

Use function code #406 to restrict the transducerized smart screwdriver from performing tightening operations until you use function code #406 again to remove the restriction.

A

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	406
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Restrict operation / Remove restriction	0: remove restriction 1: restrict operation
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	406
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

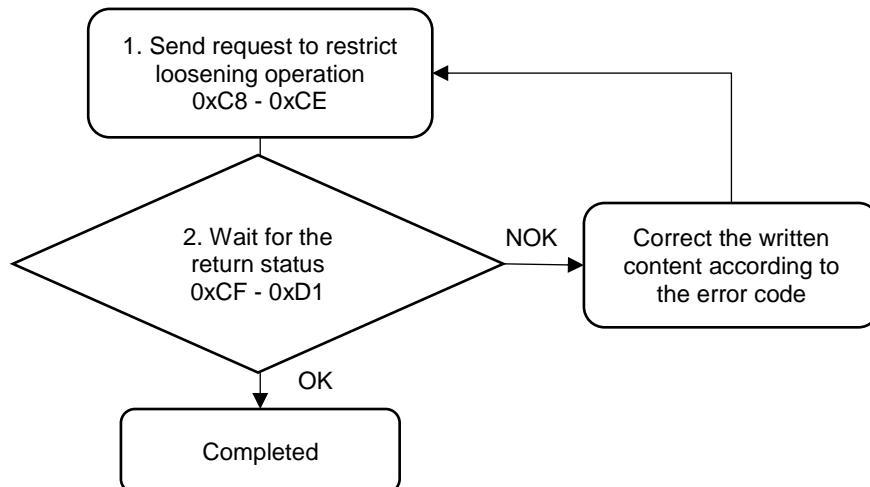
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #407 Write to restrict loosening operation

Content description:

Use function code #407 to restrict the transducerized smart screwdriver from performing loosening operations until you use function code #407 again to remove the restriction.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	407
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Restrict operation / Remove restriction	0: remove restriction 1: restrict operation
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	407
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

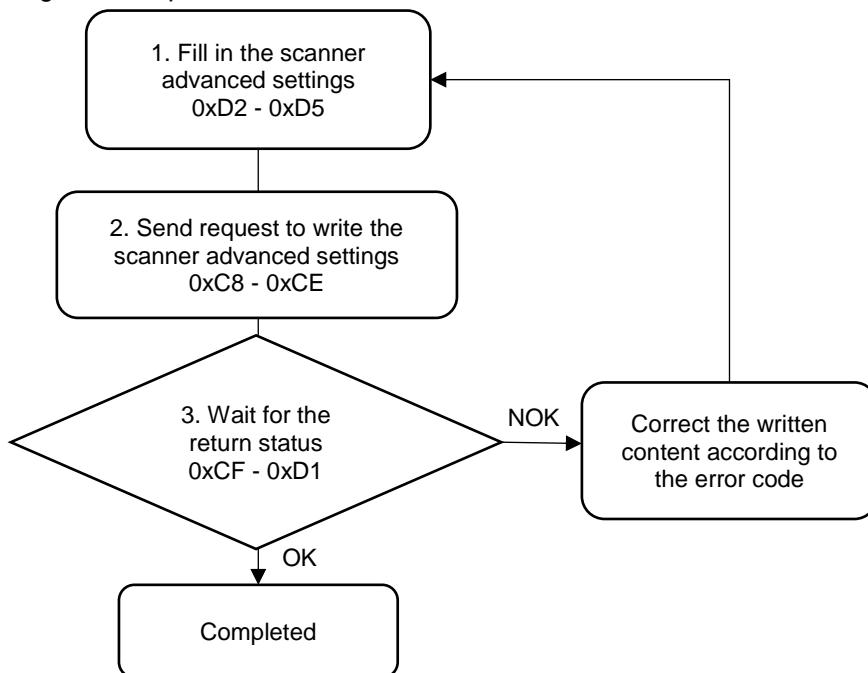
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #408 Write the scanner advanced settings

Content description:

Use function code #408 to set the scanner advanced settings.

Handshake signal description:



- Fill in the scanner advanced settings to 0xD2 - 0xD5.

Modbus (Hex)	Function	Description
D2	Start position (char.) for saving scanner string	1 to 200
D3	End position (char.) for saving scanner string	1 to 200
D4	Start position (char.) for matching scanner string	1 to 200
D5	End position (char.) for matching scanner string	1 to 200

Example 1: when the barcode string is "ABCDE", if you set 2 to 0xD2 and 4 to 0xD3, the system then saves the 3-character string "BCD" to the Results screen.

Example 2: when the barcode string is "ABCDE" and the switching method is Barcode Scanner, if you set 2 to 0xD4 and 4 to 0xD5, the system then matches the 3-character string "BCD" against the corresponding strings of the 500 sets of parameters or sequences.

- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	408
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	408
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Scanner advanced setting value out of range	Exceeds the range of 1 to 200

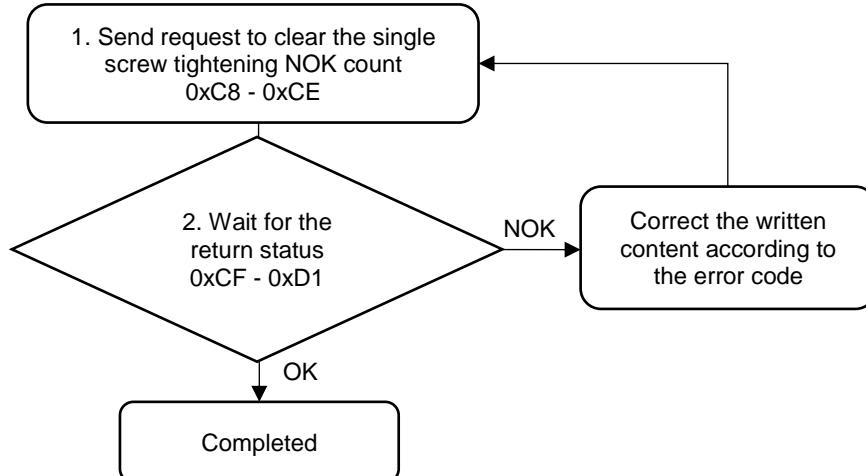
## #409 Write to clear the single screw tightening NOK count

Content description:

Use function code #409 to clear the single screw tightening NOK count.

Modbus (Hex)		Tool 1 status / Tool 2 status	R/W
Tool 1	Tool 2		
D	3F	Single screw tightening NOK count (L)	R
E	40	Single screw tightening NOK count (H)	R

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	409
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	409
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

A

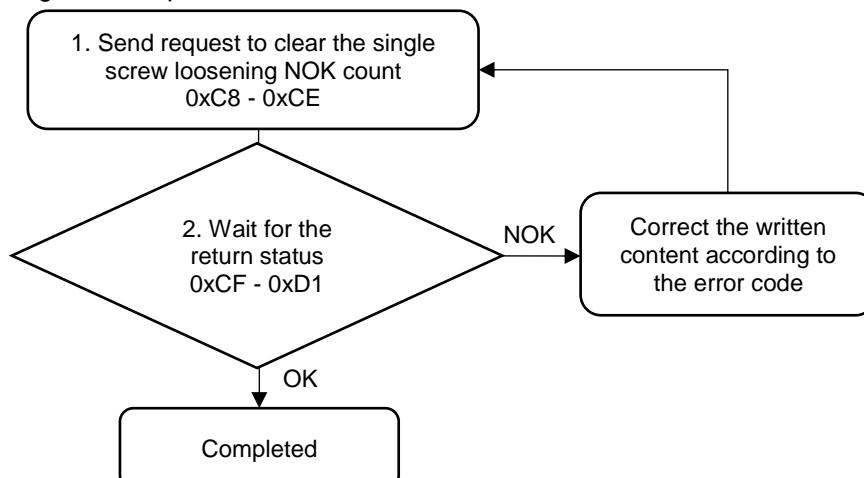
## #410 Write to clear the single screw loosening NOK count

Content description:

Use function code #410 to clear the single screw loosening NOK count.

Modbus (Hex)		Tool 1 status / Tool 2 status	R/W
Tool 1	Tool 2		
11	43	Single screw loosening NOK count (L)	R
12	44	Single screw loosening NOK count (H)	R

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	410
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	410
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

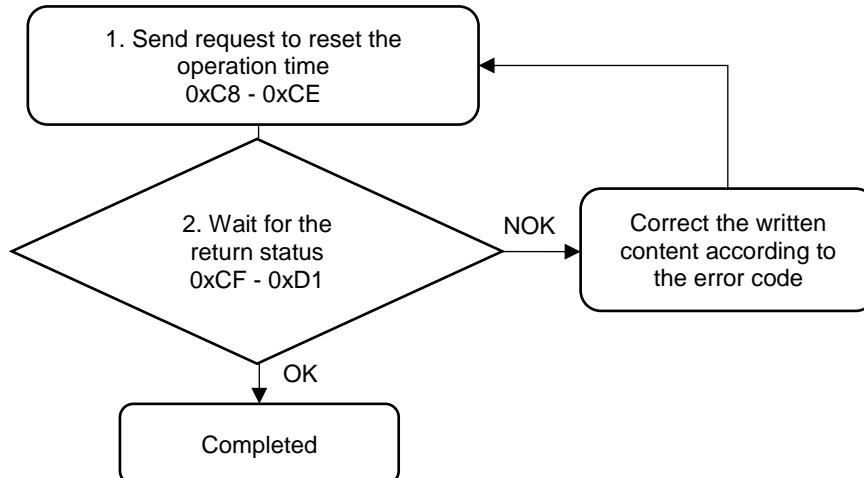
## #411 Write to reset the operation time

Content description:

Use function code #411 to restart the timer for counting the remaining operation time.

Modbus (Hex)		Tool 1 status / Tool 2 status	R/W
Tool 1	Tool 2		
30	62	Remaining operation time (L)	R
31	63	Remaining operation time (H)	R

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	411
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	411
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

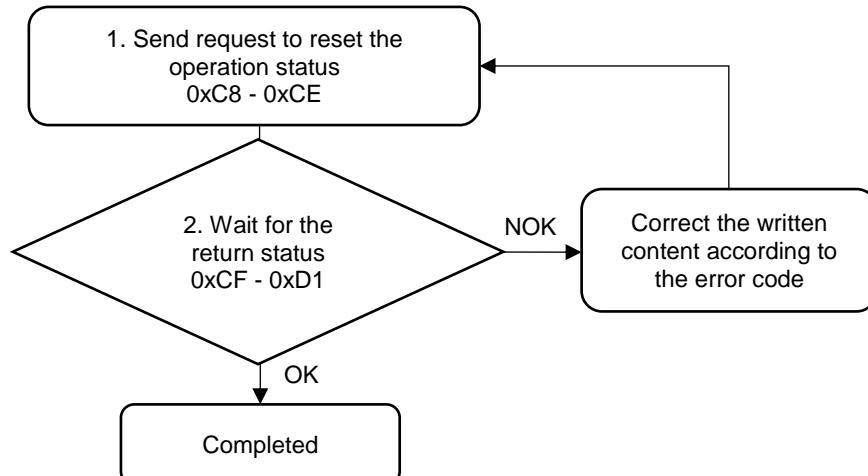
A

## #412 Write to reset the operation status

Content description:

Use function code #412 to reset the operation status, including the operation progress and other tightening information.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	412
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	412
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

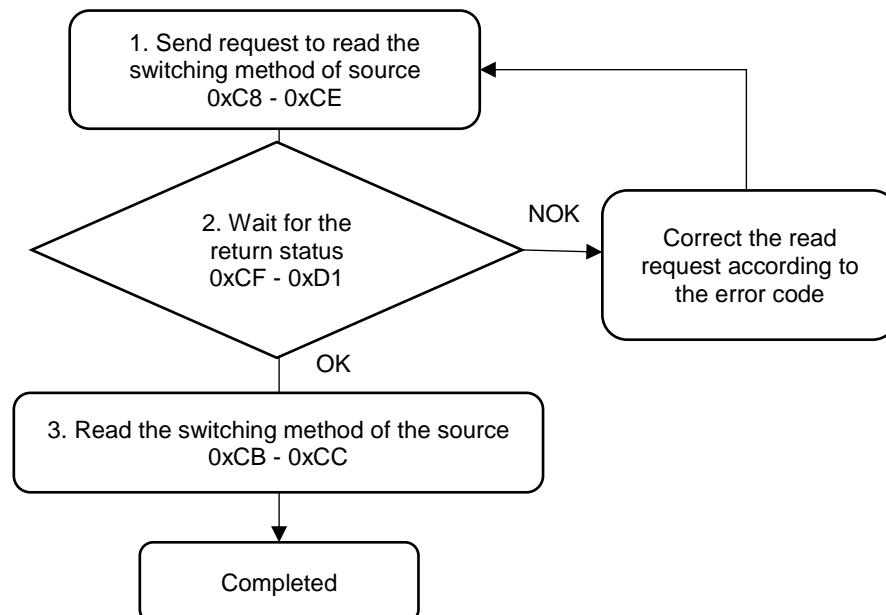
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #450 Read the switching method of source

Content description:

Use function code #450 to read the switching method of the tightening source in operation.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	450
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	450
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

- Read the switching method of the source in 0xCB.

Modbus (Hex)	Write / Read request	Read
CB	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500 (0: the controller is not running)

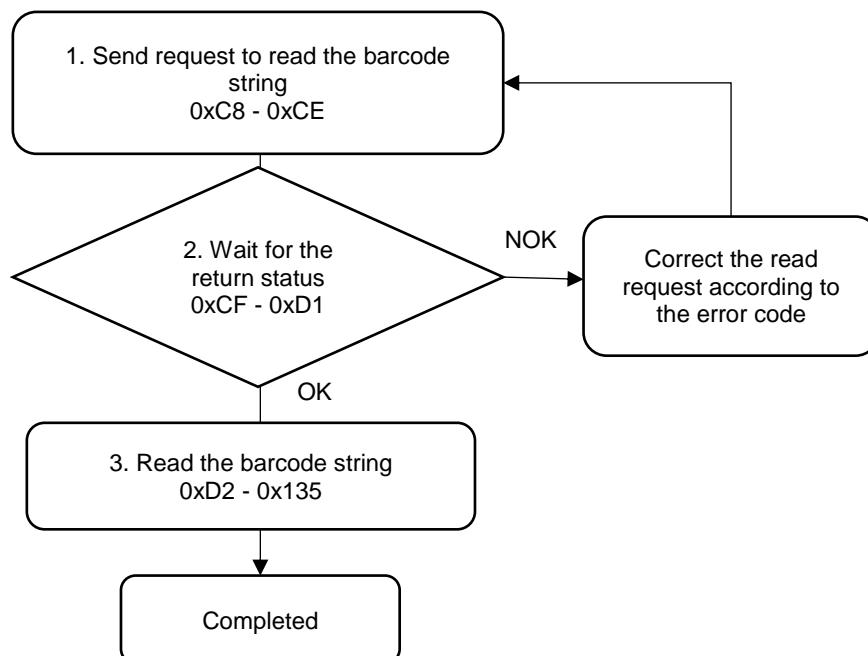
A

## #451 Read the barcode string

Content description:

Use function code #451 to read the content of the barcode string.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	451
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	451
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

- Read the barcode string in 0xD2 - 0x135.

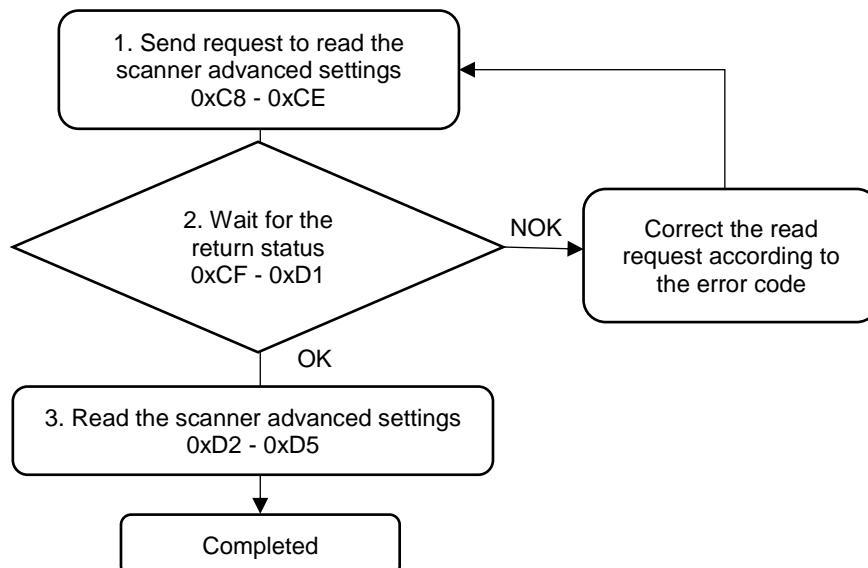
Modbus (Hex)	Function	Description
D2 to 135	Barcode string	ASCII code (100 words)

## #452 Read the scanner advanced settings

Content description:

Use function code #452 to read the Scanner Advanced Settings.

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	452
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	452
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

3. Read the scanner advanced settings in 0xD2 - 0xD5.

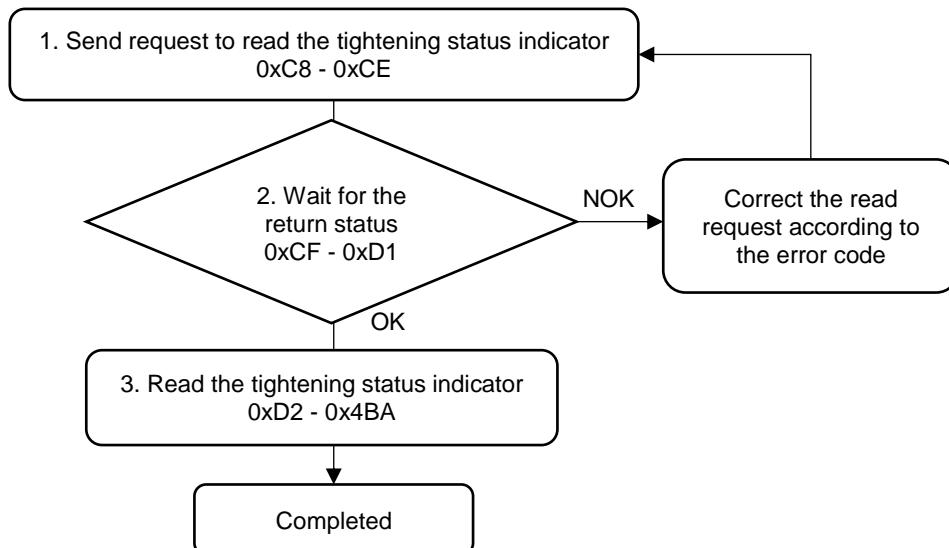
Modbus (Hex)	Function	Description
D2	Start position (char.) for saving scanner string	1 to 200
D3	End position (char.) for saving scanner string	1 to 200
D4	Start position (char.) for matching scanner string	1 to 200
D5	End position (char.) for matching scanner string	1 to 200

## #453 Read the tightening status indicator

Content description:

Use function code #453 to read the tightening status indicator for up to 1000 screws.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	453
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	453
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

- Read the tightening status indicator in 0xD2 - 0x4BA.

Modbus (Hex)	Function	Description
D2	Tightening status indicator for screw ID 1	2: green 8: red
D3	Tightening status indicator for screw ID 2	
D4	Tightening status indicator for screw ID 3	
...	Tightening status indicator for screw ID N	
4BA	Tightening status indicator for screw ID 1000	

### A.3.5 Controller operations

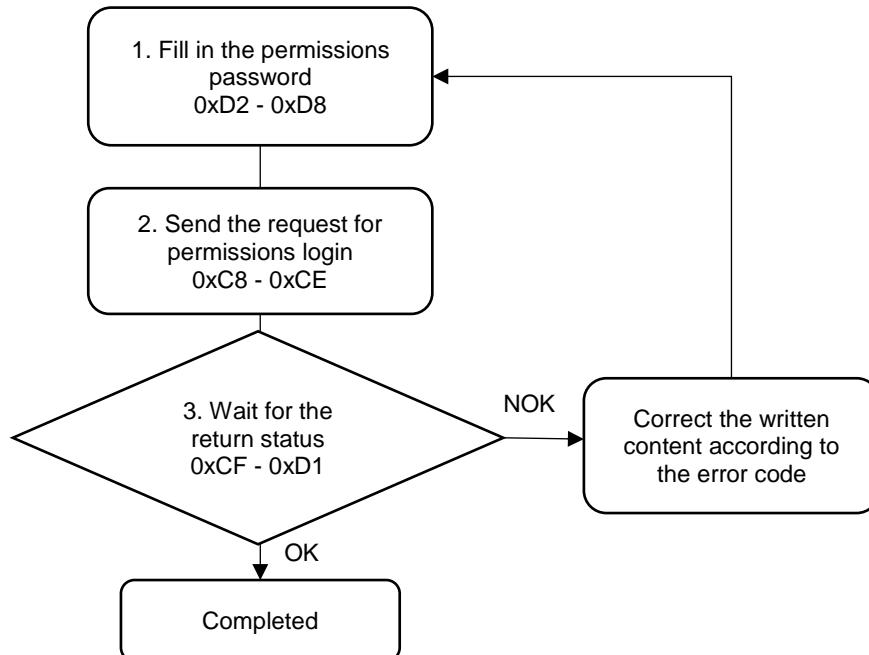
#### #500 Write the request for permissions login

Content description:

Use function code #500 to switch the controller permissions account through the host controller.

A

Handshake signal description:



1. Fill in the permissions password to 0xD2 - 0xD8.

Modbus (Hex)	Function	Description
D2 to D8	Permissions password	Numbers converted to ASCII code (10 words)

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	500
C9	Version number	0
CA	Permissions account	1: User1 2: User2 3: User3 4: User4 5: User5 6: Admin (highest level)
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	500
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

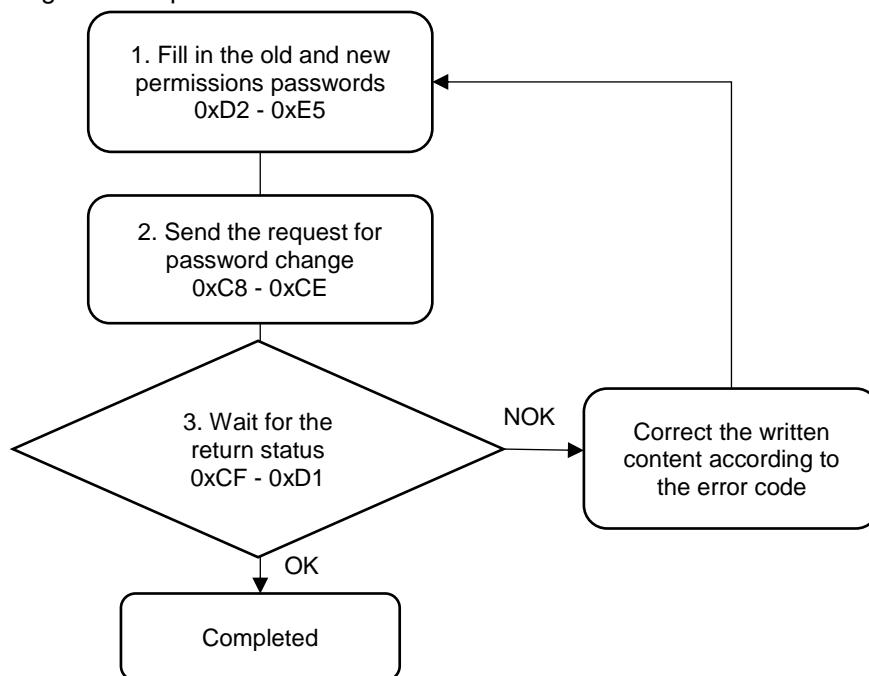
Code	Error description	Description
1	Permissions account	Exceeds the range of 1 to 6
2	Login failed	-

### #501 Write the request for password change

Content description:

Use function code #501 to change the permissions password of controller through the host controller.

Handshake signal description:



1. Fill in the old permissions password to 0xD2 - 0xDB, and the new permissions password to 0xDC - 0xE5.

Modbus (Hex)	Function	Description
D2 to DB	Old password	Numbers converted to ASCII code (10 words)
DC to E5	New password	Numbers converted to ASCII code (10 words)

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	501
C9	Version number	0
CA	Permissions account	1: User1 2: User2 3: User3 4: User4 5: User5 6: Admin (highest level)
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	501
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Permissions account	Exceeds the range of 1 to 6
2	Password change failed	-

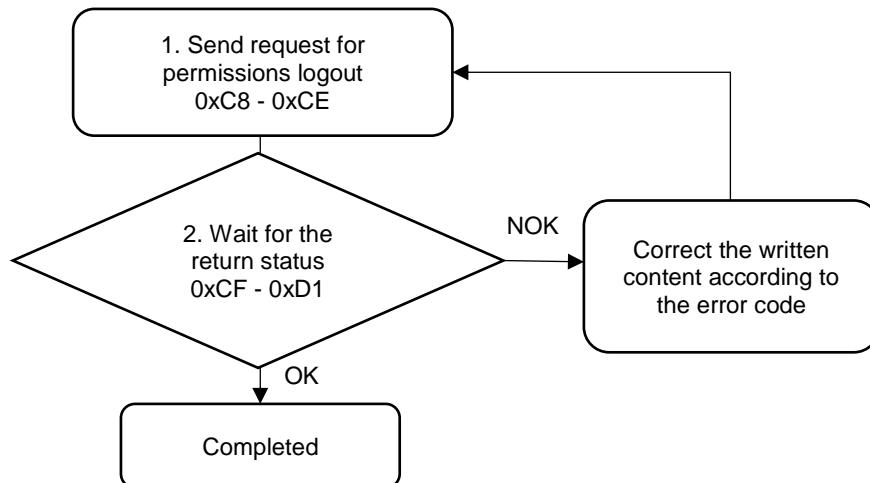
A

## #502 Write the request for permissions logout

Content description:

Use function code #502 to log out of the controller permissions account through the host controller. The default permissions account after logout is User1.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	502
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	502
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

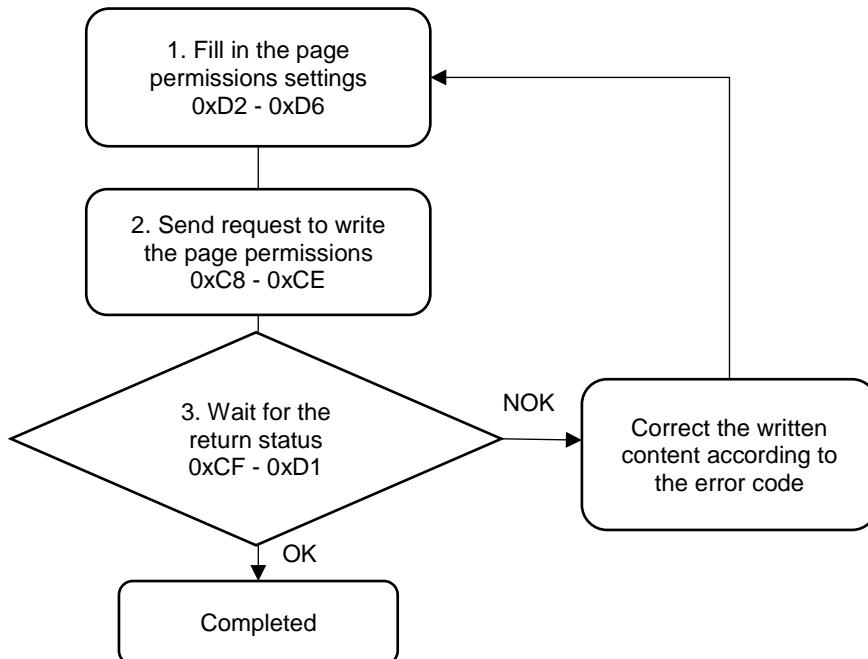
Code	Error description	Description
1	Logout failed	-

## #503 Write the page permissions

Content description:

Use function code #503 to set the permissions of page access and edit for different accounts.

Handshake signal description:



- Fill in the page permissions settings to 0xD2 - 0xD6.

Modbus (Hex)	Function	Description
D2	User1 page permissions	Bit 0: Parameters Bit 1: Sequence
D3	User2 page permissions	Bit 2: Sources Bit 3: Controller
D4	User3 page permissions	Bit 4: Tool Bit 5: operation for screw progress
D5	User4 page permissions	Bit 6: clearing of the production report entries
D6	User5 page permissions	Bit 7: clearing of the error, warning, and button report entries

- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	503
C9	Version number	0
CA	Confirm command	99
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

A

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	503
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

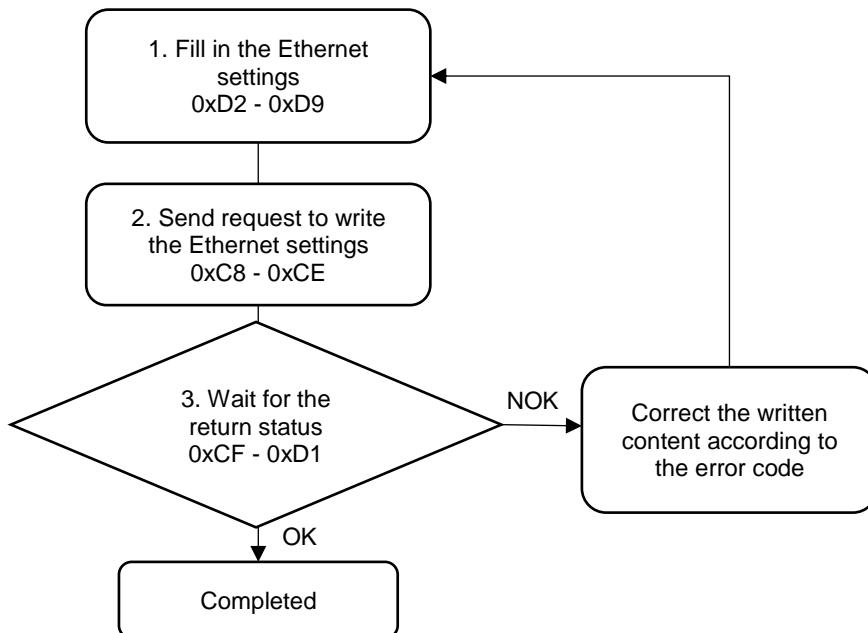
Code	Error description	Description
1	Confirm command	Must be 99

## #504 Write the Ethernet settings

Content description:

Use function code #504 to write the Ethernet settings.

Handshake signal description:



1. Fill in the content of Ethernet settings to 0xD2 - 0xD9.

Modbus (Hex)	Function	Description
D2	IP1 address	Default: 192
D3	IP2 address	Default: 168
D4	IP3 address	Default: 1
D5	IP4 address	Default: 11
D6	Subnet mask 1	Default: 255
D7	Subnet mask 2	Default: 255
D8	Subnet mask 3	Default: 255
D9	Subnet mask 4	Default: 0

2. Fill in the write request to 0xC8 - 0xCE.

A

Modbus (Hex)	Write / Read request	Write
C8	Function code	504
C9	Version number	0
CA	Confirm command	99
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	504
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

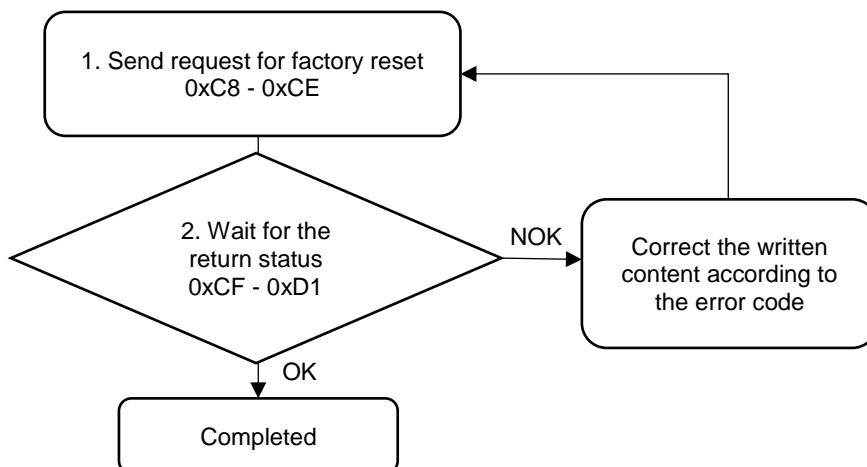
Code	Error description	Description
1	Confirm command	Must be 99

## #505 Write the request for factory reset

Content description:

Use function code #505 to write the request for factory reset.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	505
C9	Version number	0
CA	Confirm command	99
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

Note:

- After factory reset, all data will be deleted and all settings will be restored to default.
- If you use the account of the highest permissions (Admin) for factory reset, the Ethernet settings will be restored to default, and the error reports and warning reports will be cleared.
- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	505
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

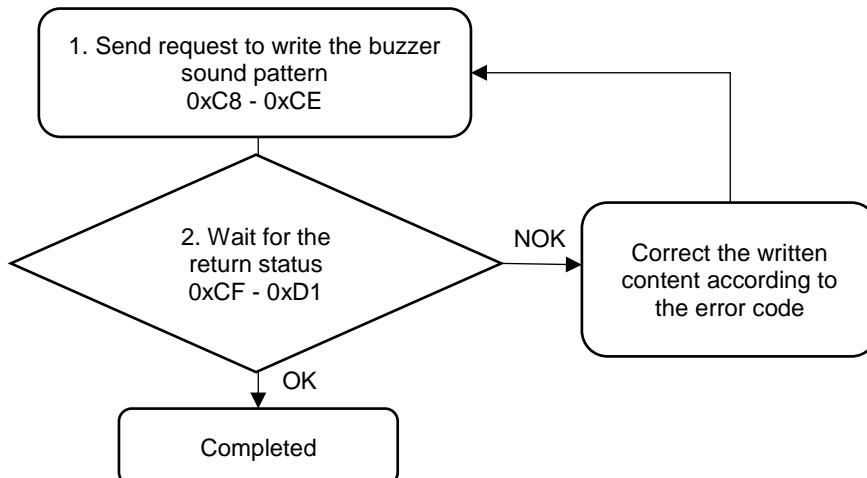
Code	Error description	Description
1	Confirm command	Must be 99

## #506 Write the buzzer sound pattern

Content description:

Use function code #506 to set the buzzer sound patterns.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	506
C9	Version number	0
CA	Sound pattern of error signal buzzer	0: mute 1: one long beep 2: one short beep 3: two short beeps
CB	Sound pattern of finished signal buzzer for a single screw	
CC	Sound pattern of finished signal buzzer for total screws	
CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	506
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

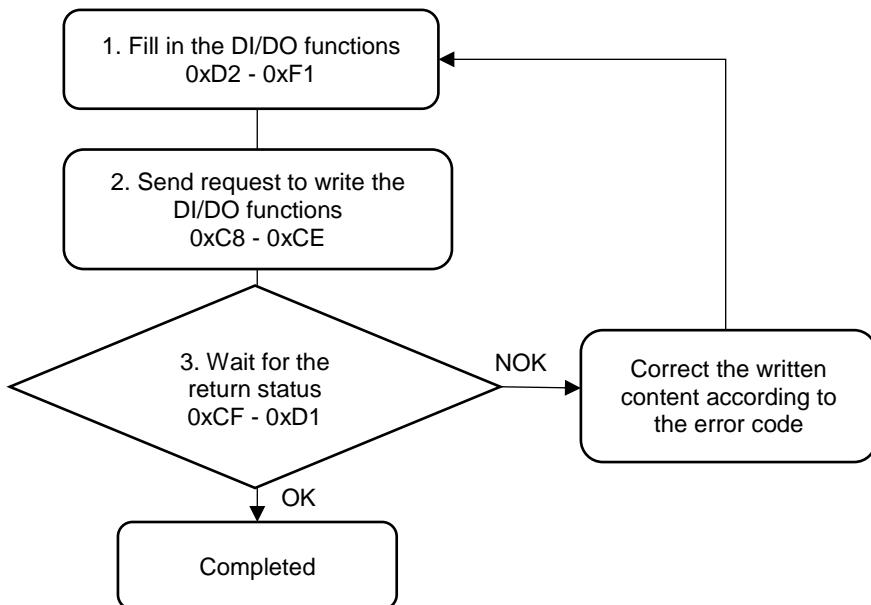
Code	Error description	Description
1	Buzzer sound pattern	Exceeds the range of 0 to 3

## #507 Write the DI/DO functions

Content description:

Use function code #507 to set the DI/DO functions.

Handshake signal description:



1. Fill in the DI/DO functions for a single tool to 0xD2 - 0xF1.

Modbus (Hex)	Function	Description
D2	DO1 NO / NC	0: NO (normally open) 1: NC (normally closed)
D3	DO2 NO / NC	
D4	DO3 NO / NC	
D5	DO4 NO / NC	
D6	DO5 NO / NC	
D7	DO6 NO / NC	
D8	DO7 NO / NC	
D9	DO8 NO / NC	
DA	DO1 function	0: not in use 1: ready 2: running 3: tightening OK 4: tightening NOK 5: loosening OK 6: loosening NOK
DB	DO2 function	7: total screw quantity reached 8: device alarms or tightening errors 9 to 12: reserved 13: status of CW / CCW switch
DC	DO3 function	14: rotation direction 15: tightening result sent to feeder
DD	DO4 function	16 to 23: parameter ID output (Bit 1 - 8) 24 to 31: screw progress output (Bit 1 - 8)
DE	DO5 function	32 to 39: sequence ID output (Bit 1 - 8)
DF	DO6 function	40 to 47: bit ID output (Bit 1 - 8)
E0	DO7 function	
E1	DO8 function	

Modbus (Hex)	Function	Description
E2	DI1 NO / NC	0: NO (normally open) 1: NC (normally closed)
E3	DI2 NO / NC	
E4	DI3 NO / NC	
E5	DI4 NO / NC	
E6	DI5 NO / NC	
E7	DI6 NO / NC	
E8	DI7 NO / NC	
E9	DI8 NO / NC	
EA	DI1 function	0: not in use 1: start tightening 2: start loosening 3: emergency stop 4: clear error
EB	DI2 function	5: reset total screw quantity 6: next step 7: previous step 8: start tightening (pulse signal) 9: start loosening (pulse signal)
EC	DI3 function	10: start tightening (dual-tool) 11: start loosening (dual-tool) 12: reset operation time 13: reset single screw tightening + loosening NOK counts
ED	DI4 function	14: prohibit tool operation 15: clear communication flag
EE	DI5 function	16 to 39: reserved
EF	DI6 function	40 to 47: bit ID input (Bit 1 - 8)
F0	DI7 function	
F1	DI8 function	

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	507
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	507
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

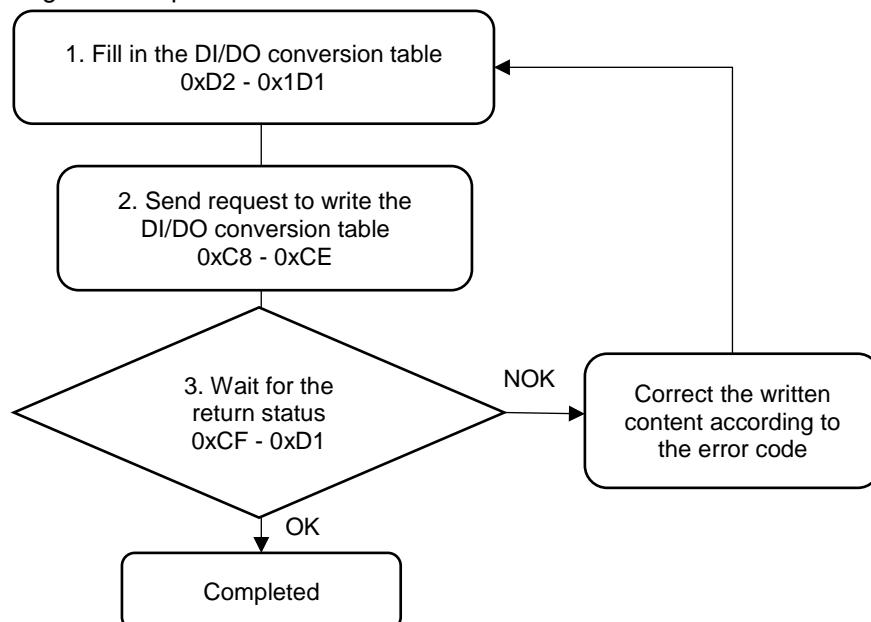
A

## #508 Write the DI/DO conversion table

Content description:

Use function code #508 to set the DI/DO conversion table.

Handshake signal description:



1. Fill in the DI/DO conversion table to 0xD2 - 0x1D1.

Modbus (Hex)	Function	Description
D2	DEC value corresponding to ID 0	0 to 255
D3	DEC value corresponding to ID 1	0 to 255
D4	DEC value corresponding to ID 2	0 to 255
D5	DEC value corresponding to ID 3	0 to 255
D6	DEC value corresponding to ID 4	0 to 255
...	DEC value corresponding to ID N	0 to 255
1CD	DEC value corresponding to ID 251	0 to 255
1CE	DEC value corresponding to ID 252	0 to 255
1CF	DEC value corresponding to ID 253	0 to 255
1D0	DEC value corresponding to ID 254	0 to 255
1D1	DEC value corresponding to ID 255	0 to 255

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	508
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Conversion table	0: bit ID output table 1: bit ID input table 2: parameter ID output table 4: screw progress output table 6: sequence ID output table
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	508
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Conversion table	Must be 0, 1, 2, 4, or 6

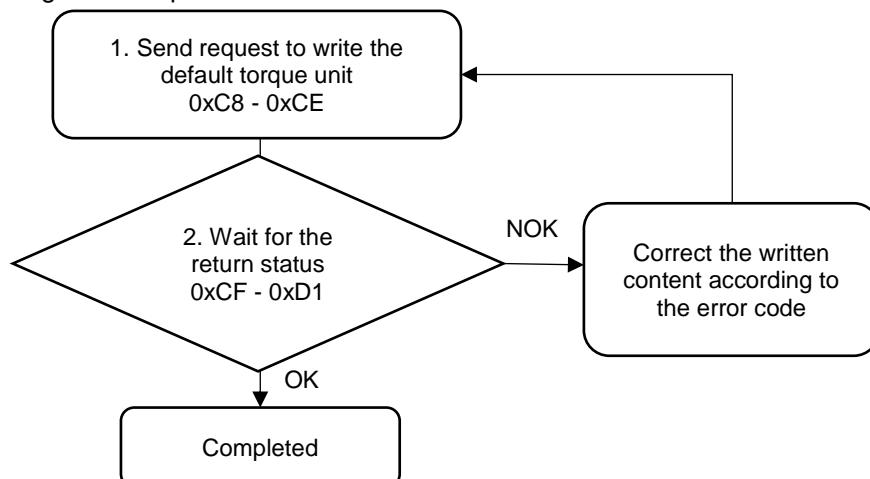
A

## #509 Write the default torque unit

Content description:

Use function code #509 to set the default torque unit of the controller.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	509
C9	Version number	0
CA	Default torque unit	0: N.m 1: kgf.cm 2: lbf.ft 3: lbf.in
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	509
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Default torque unit	Exceeds the range of 0 to 3

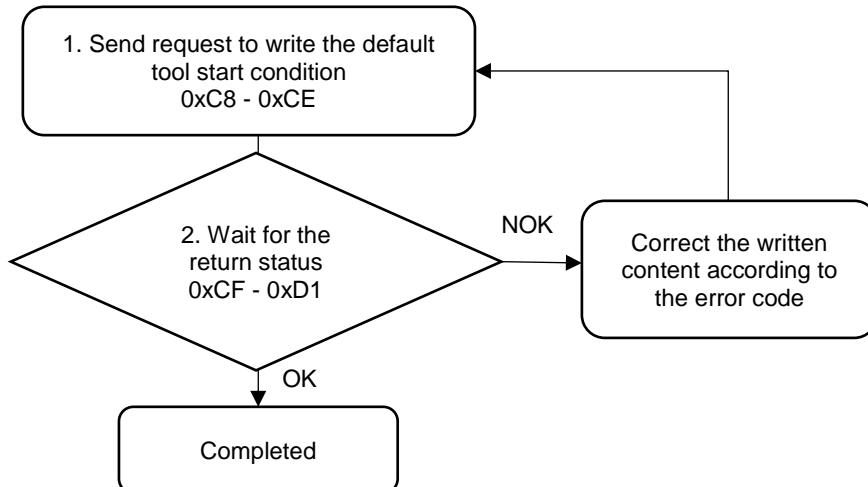
## #510 Write the default tool start condition

Content description:

Use function code #510 to set the default tool start condition.

Note: for example, first set the default tool start condition to "DI" with function code #510. Then, set the DI function to "start tightening" or "start loosening" with function code #507 or #511 to operate the tool through DI.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	510
C9	Version number	0
CA	Default tool start condition	0: push start 1: DI 2: lever start 3: push start or lever start 4: push start and lever start
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	510
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

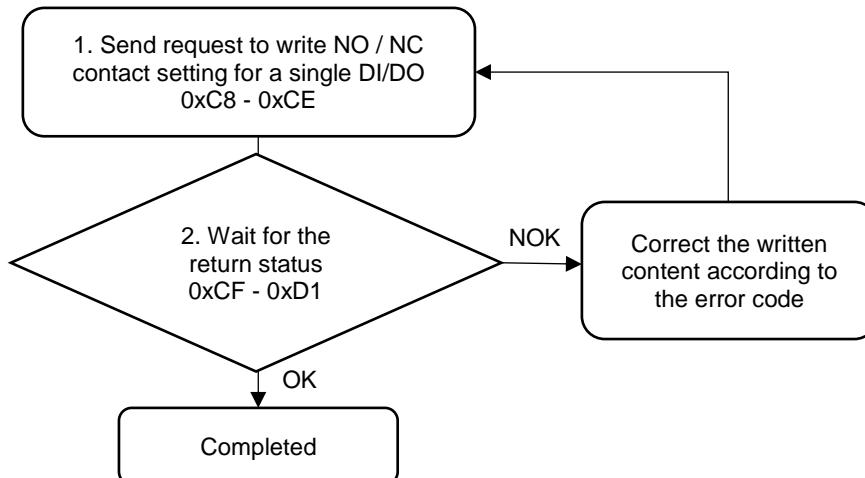
Code	Error description	Description
1	Tool start condition	Exceeds the range of 0 to 4

## #511 Write NO / NC contact setting for a single DI/DO

Content description:

Use function code #511 to set a single DI/DO as an NO / NC contact.

**A** Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	511
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	DO / DI	0: DO; 1: DI
CC	Corresponding bit of DO / DI	0 to 7
CD	NO / NC	0: NO (normally open) 1: NC (normally closed)
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	511
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	DO / DI	Must be 0 or 1
3	Corresponding bit of DO / DI	Exceeds the range of 0 to 7
4	NO / NC	Must be 0 or 1

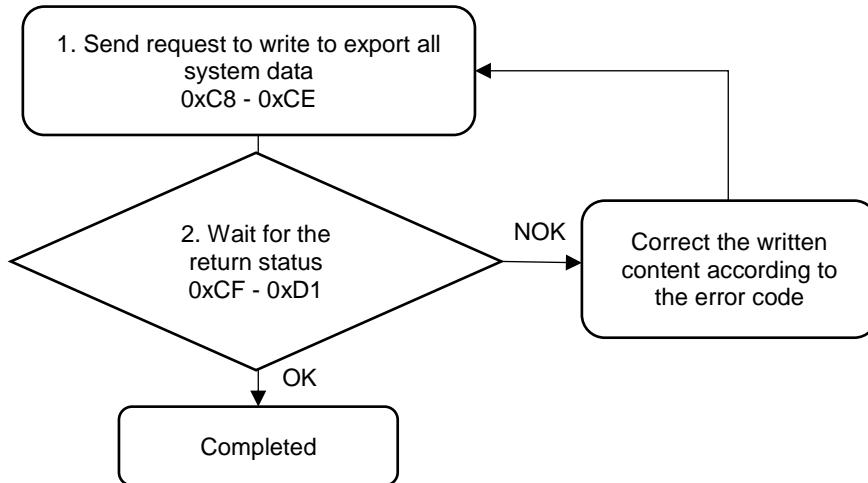
## #512 Write to export all system data

Content description:

Use function code #512 to export all system data, including contents of parameters, sequences, sources, controller, tool, and reports.

A

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	512
C9	Version number	0
CA	Data storage location	0: USB Disk 1: HMI Disk
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	512
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

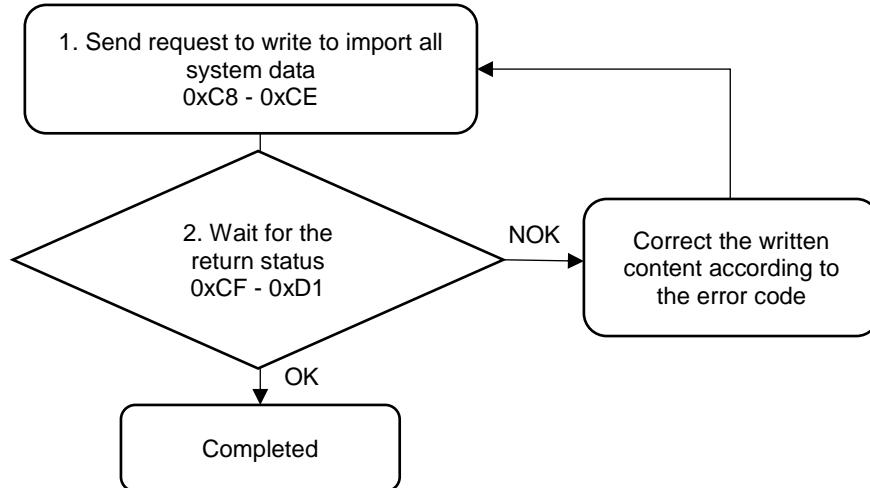
Code	Error description	Description
1	Data storage location	Must be 0 or 1

## #513 Write to import all system data

Content description:

Use function code #513 to import all system data, including contents of parameters, sequences, sources, controller, and tool.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	513
C9	Version number	0
CA	Read data from	0: USB Disk 1: HMI Disk
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	513
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Read data from	Must be 0 or 1

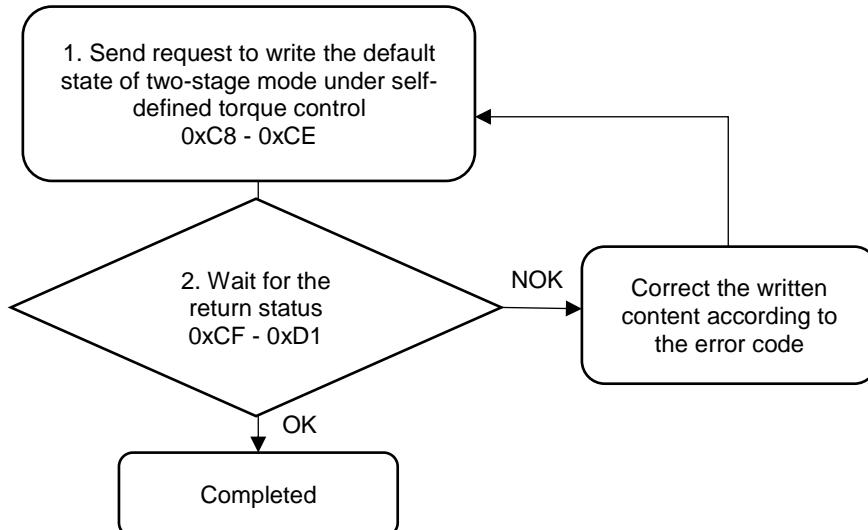
## #514 Write the default two-stage mode under self-defined torque control

Content description:

Use function code #514 to set the default state of two-stage mode under self-defined torque control.

A

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	514
C9	Version number	0
CA	Two-stage mode	0: Off 1: On
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	514
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

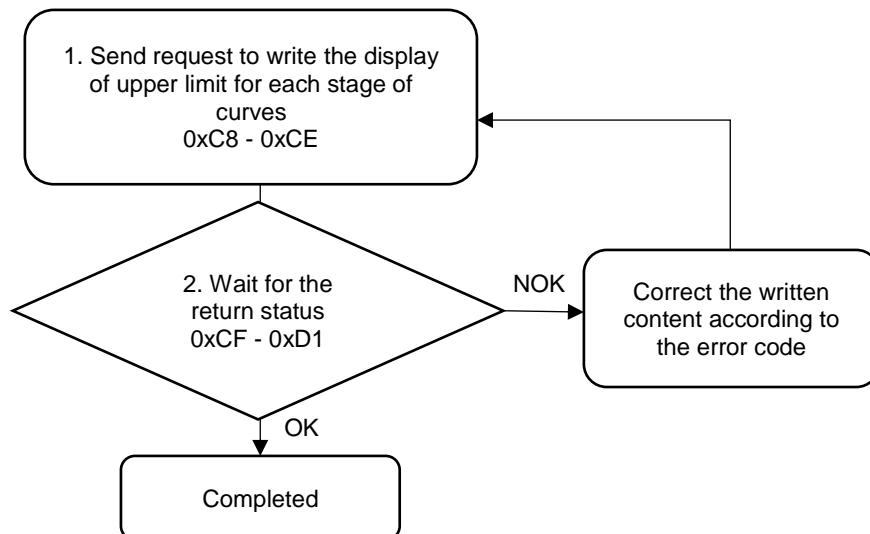
Code	Error description	Description
1	Two-stage mode	Must be 0 or 1

## #515 Write the display of upper limit for each stage of curves

Content description:

Use function code #515 to set whether to display the upper limit for each stage of the curves.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	515
C9	Version number	0
CA	Display the upper limit for each stage of curves	0: On 1: Off
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	515
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

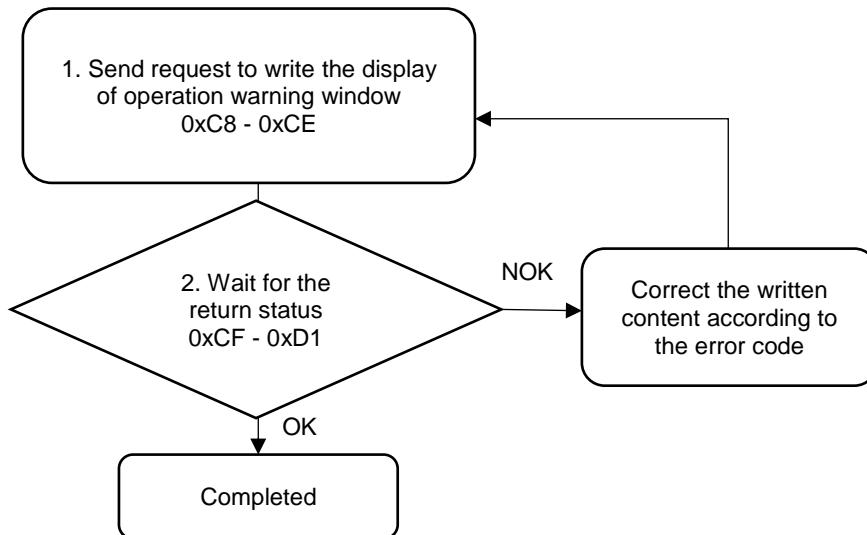
Code	Error description	Description
1	Display the upper limit for each stage of curves	Must be 0 or 1

## #516 Write the display of operation warning window

Content description:

Use function code #516 to set whether to display the operation warning window.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	516
C9	Version number	0
CA	Display the operation warning window	0: On 1: Off
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	516
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Display the operation warning window	Must be 0 or 1

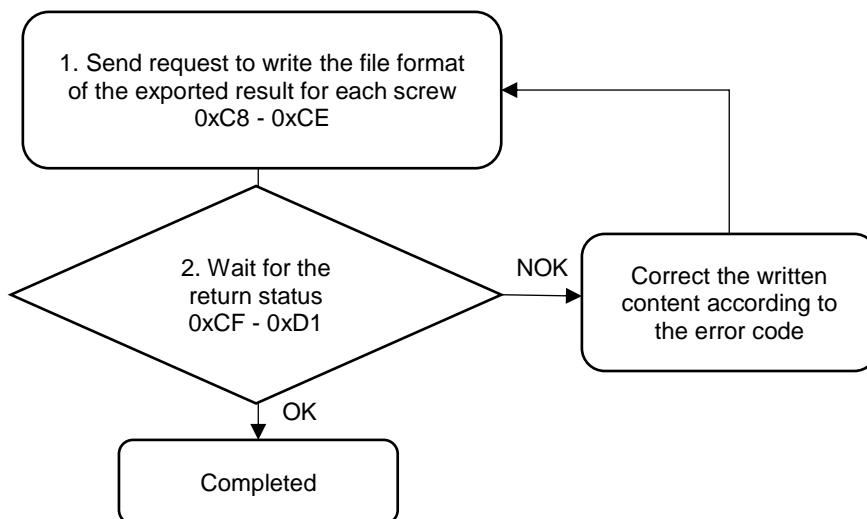
A

## #517 Write file format of the exported result for each screw

Content description:

Use function code #517 to set the file format of the exported result for each screw.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	517
C9	Version number	0
CA	File format of the exported result for each screw	0: disable 1: CSV file (HMI Disk) 2: CSV file (USB Disk) 3: BIN file (HMI Disk)
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	517
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

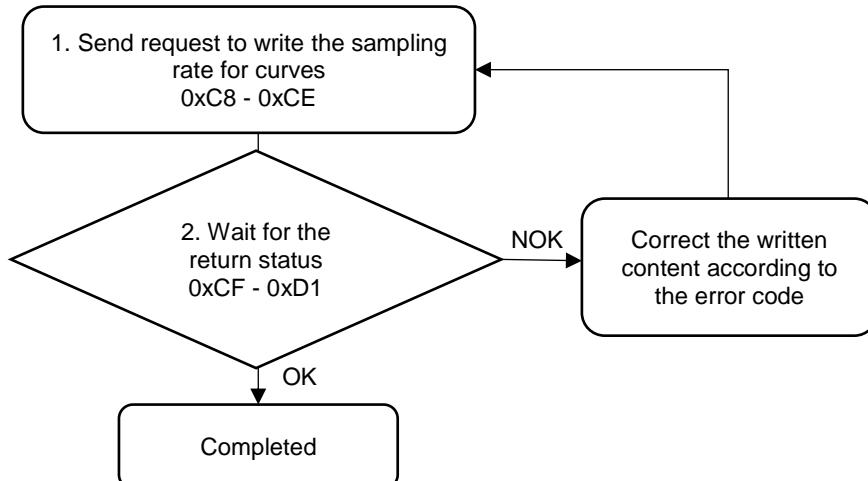
Code	Error description	Description
1	File format of the exported result for each screw	HMI kernel version 124 or later: exceeds the range of 0 to 3 HMI kernel version earlier than 124: exceeds the range of 0 to 2

## #518 Write the sampling rate for curves

Content description:

Use function code #518 to set the sampling rate for curves.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	518
C9	Version number	0
CA	Sampling rate for curves	0: 10 ms → 2 ms when start torque is reached 1: 2 ms; max. 4 seconds per production report entry 2: 2 ms; max. 8 seconds per production report entry 3: 1 ms; max. 4 seconds per production report entry 4: 1 ms; max. 8 seconds per production report entry
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	518
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

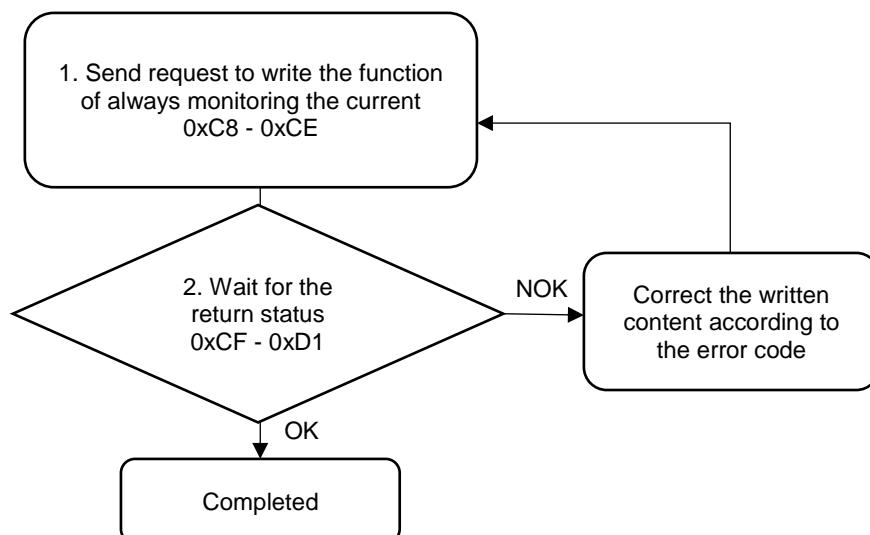
Code	Error description	Description
1	Sampling rate for curves	Exceeds the range of 0 to 4

## #519 Write the function of always monitoring the current

Content description:

Use function code #519 to set whether to enable the function of always monitoring the current.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	519
C9	Version number	0
CA	Always monitor the current	0: On 1: Off
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	519
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

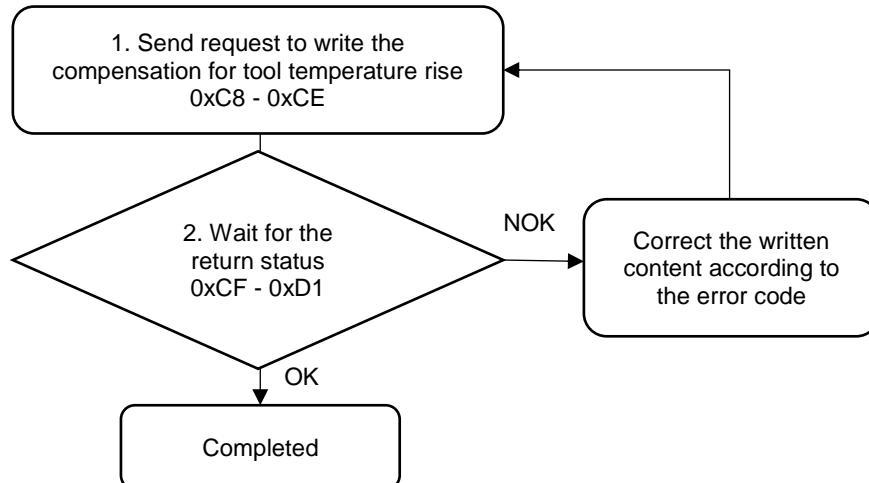
Code	Error description	Description
1	Always monitor the current	Must be 0 or 1

## #520 Write the compensation for tool temperature rise

Content description:

Use function code #520 to set the compensation for tool temperature rise.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	520
C9	Version number	0
CA	Compensation for tool temperature rise	0: On 1: Off
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	520
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Compensation for tool temperature rise	Must be 0 or 1

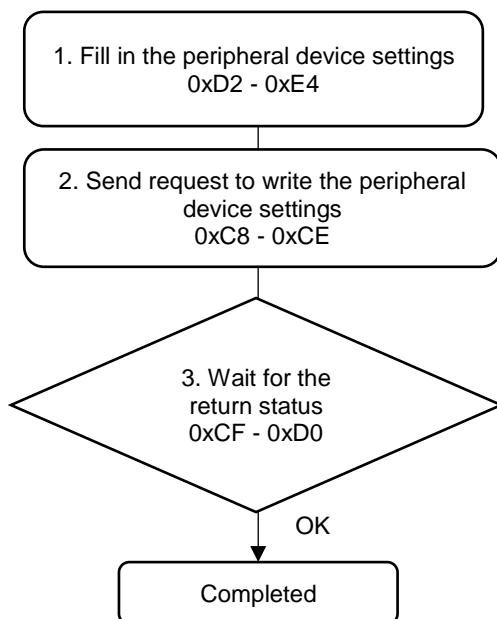
A

## #521 Write the peripheral device settings

Content description:

Use function code #521 to write the peripheral device settings.

Handshake signal description:



- Fill in the settings of peripheral device to 0xD2 - 0xE4.

Modbus (Hex)	Function	Description
D2	RS-232 connector function	0: disabled 1: Tool 1 positioning arm 2: Tool 2 positioning arm
D3	RS-485 connector function	
D4	Host connector function	
D5	Tool 1 positioning arm - target position tolerance (L)	
D6	Tool 1 positioning arm - target position tolerance (H)	Unit: mm
D7	Tool 1 - X axis position offset (L)	
D8	Tool 1 - X axis position offset (H)	Unit: mm
D9	Tool 1 - Y axis position offset (L)	
DA	Tool 1 - Y axis position offset (H)	Unit: mm
DB	Tool 1 - Z axis position offset (L)	
DC	Tool 1 - Z axis position offset (H)	Unit: mm
DD	Tool 2 positioning arm - target position tolerance (L)	
DE	Tool 2 positioning arm - target position tolerance (H)	Unit: mm
DF	Tool 2 - X axis position offset (L)	
E0	Tool 2 - X axis position offset (H)	Unit: mm
E1	Tool 2 - Y axis position offset (L)	
E2	Tool 2 - Y axis position offset (H)	Unit: mm
E3	Tool 2 - Z axis position offset (L)	
E4	Tool 2 - Z axis position offset (H)	Unit: mm

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	521
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

3. Check whether the reading is successful from the return status in 0xCF - 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	521
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

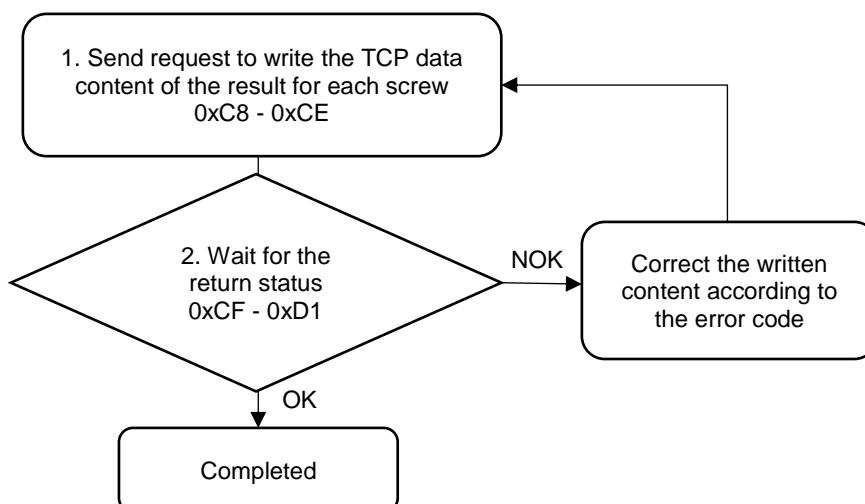
A

## #522 Write the TCP data content of the result for each screw

Content description:

Use function code #522 to set the TCP data content of the result for each screw.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	522
C9	Version number	0
CA	TCP data content of the result for each screw	0: disable 1: scale, time, torque 2: scale, angle, torque 3: scale, angle, torque rate 4: result, scale, time, torque 5: result, scale, angle, torque 6: result, scale, angle, torque rate
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	522
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	TCP data content of the result for each screw	Exceeds the range of 0 to 6

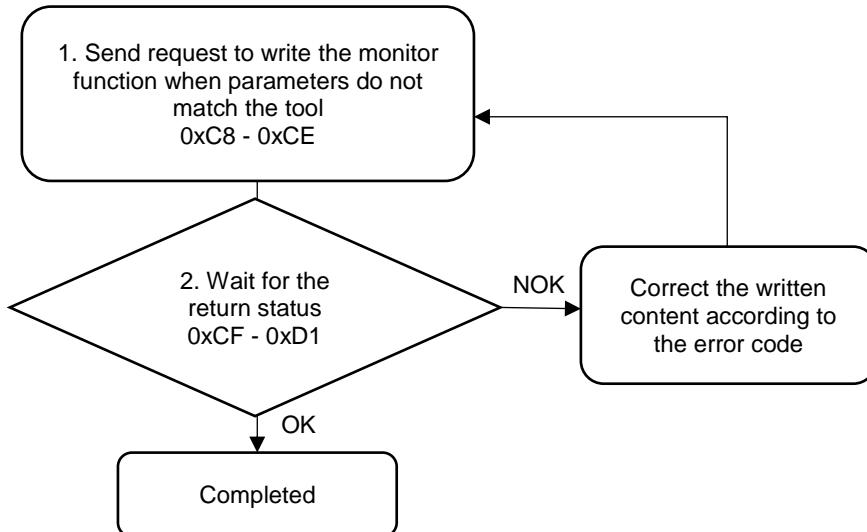
### #523 Write the monitor function when parameters do not match the tool

Content description:

Use function code #523 to set the function for monitoring if the tool torque of the operating parameter matches that of the connected tool.

A

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	523
C9	Version number	0
CA	Monitor function when parameters do not match the tool	0: On 1: Off
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	523
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

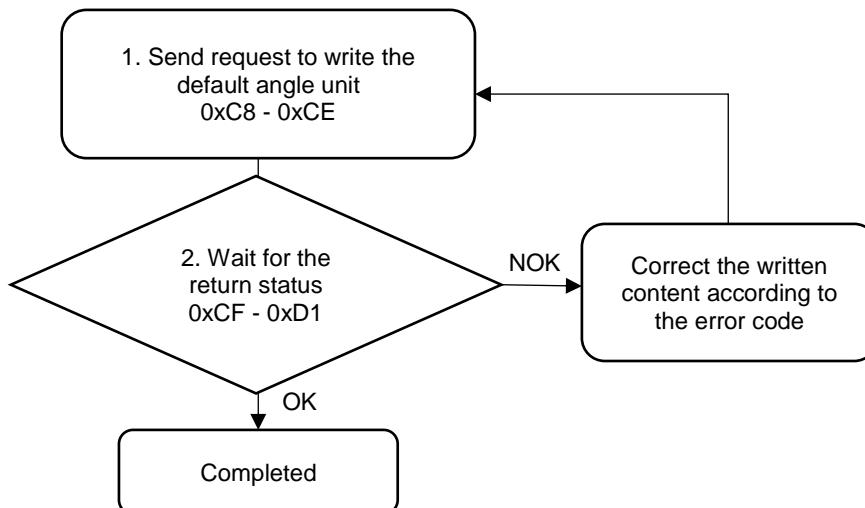
Code	Error description	Description
1	Monitor function when parameters do not match the tool	Must be 0 or 1

## #524 Write the default angle unit

Content description:

Use function code #524 to set the default angle unit of the controller.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	524
C9	Version number	0
CA	Default angle unit	0: degree 1: turn
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	524
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

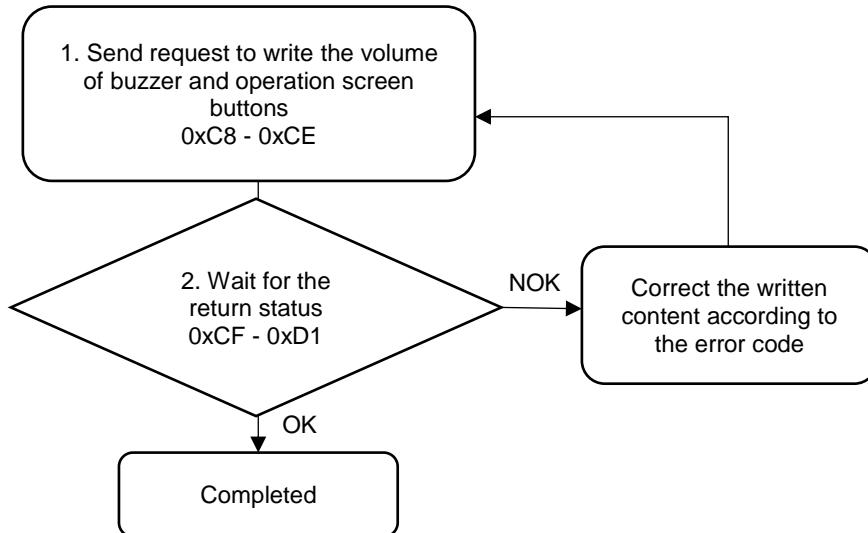
Code	Error description	Description
1	Default angle unit	Must be 0 or 1

## #525 Write the volume of buzzer and operation screen buttons

Content description:

Use function code #525 to set the volume of buzzer and operation screen buttons.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	525
C9	Version number	0
CA	Volume of buzzer	0 to 100
CB	Volume of operation screen buttons	0 to 100
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	525
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Volume of buzzer	Exceeds the range of 0 to 100
2	Volume of operation screen buttons	Exceeds the range of 0 to 100

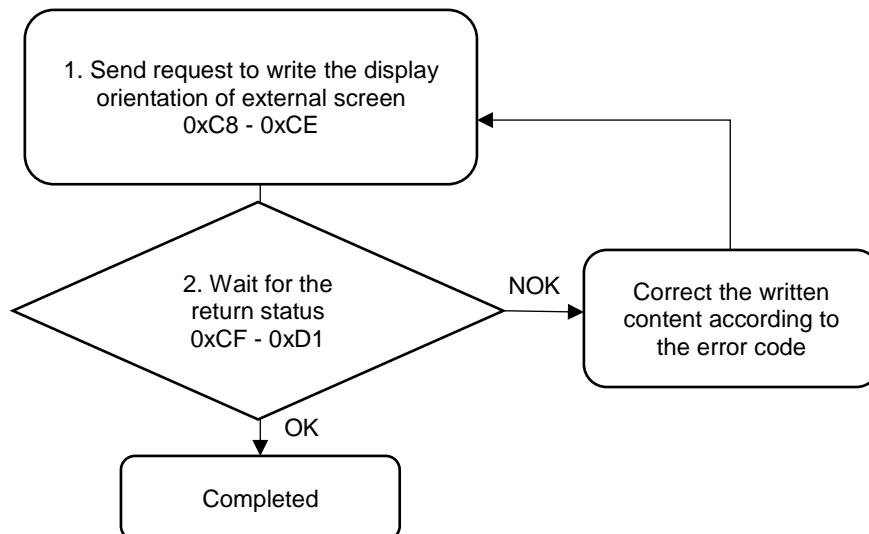
A

## #526 Write the display orientation of external screen

Content description:

Use function code #526 to set the display orientation of the external screen (HDMI).

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	526
C9	Version number	0
CA	Display orientation	0: portrait 1: landscape
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	526
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

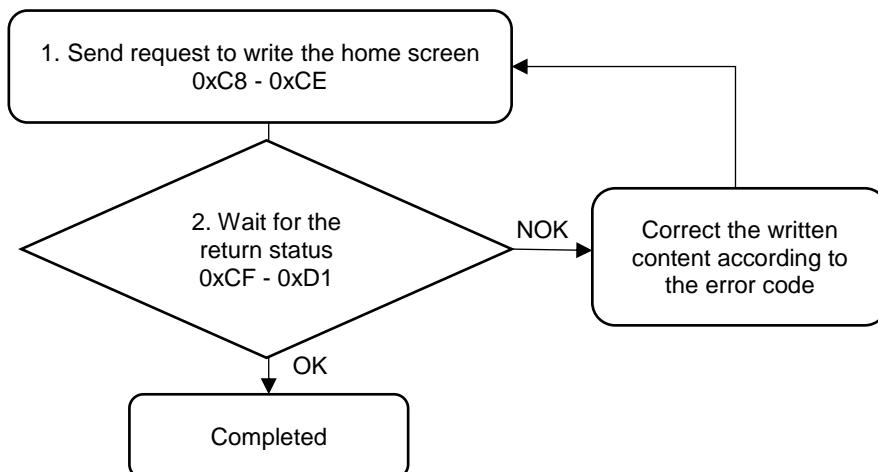
Code	Error description	Description
1	Display orientation	Must be 0 or 1

## #527 Write the home screen

Content description:

Use function code #527 to set the home screen of the controller.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	527
C9	Version number	0
CA	Home screen	0: Home 1: Results
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	527
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Home screen	Must be 0 or 1

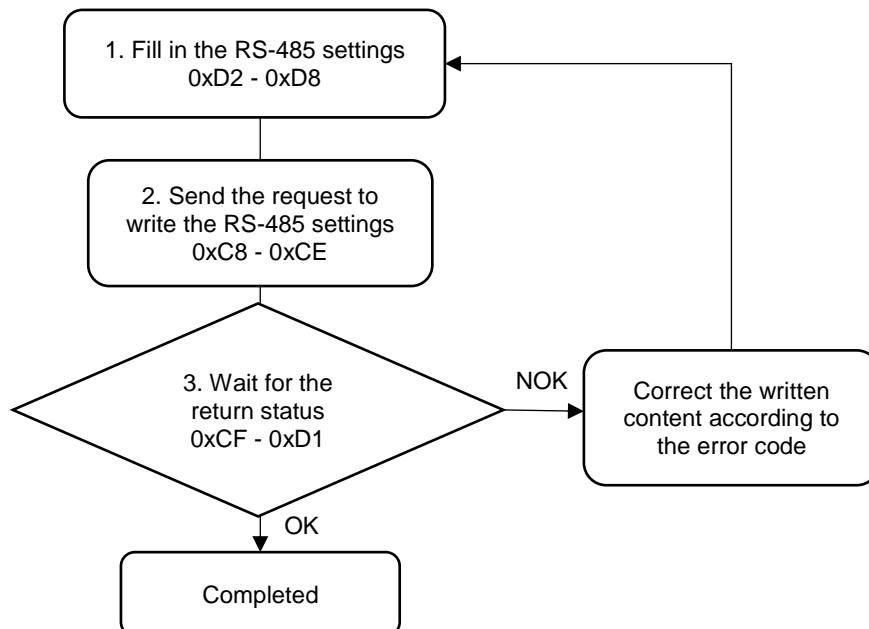
A

## #528 Write the RS-485 settings

Content description:

Use function code #528 to write the RS-485 settings.

Handshake signal description:



1. Fill in the RS-485 settings to 0xD2 - 0xD8.

Modbus (Hex)	Function	Description
D2	Function On / Off	0: Off 1: On
D3	Station	0 to 255
D4	RTU / ASCII	0: RTU 1: ASCII
D5	Baud rate	0: 9600 1: 19200 2: 38400
D6	Data bit	0: 8-bit 1: 7-bit
D7	Parity bit	0: None 1: Odd 2: Even
D8	Stop bit	0: 2-bit 1: 1-bit

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	528
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	(to be filled in last)

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	528
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Function On / Off	Must be 0 or 1
2	Station	Exceeds the range of 0 to 255
3	RTU / ASCII	Must be 0 or 1
4	Baud rate	Exceeds the range of 0 to 2
5	Data bit	Must be 0 or 1
6	Parity bit	Exceeds the range of 0 to 2
7	Stop bit	Must be 0 or 1

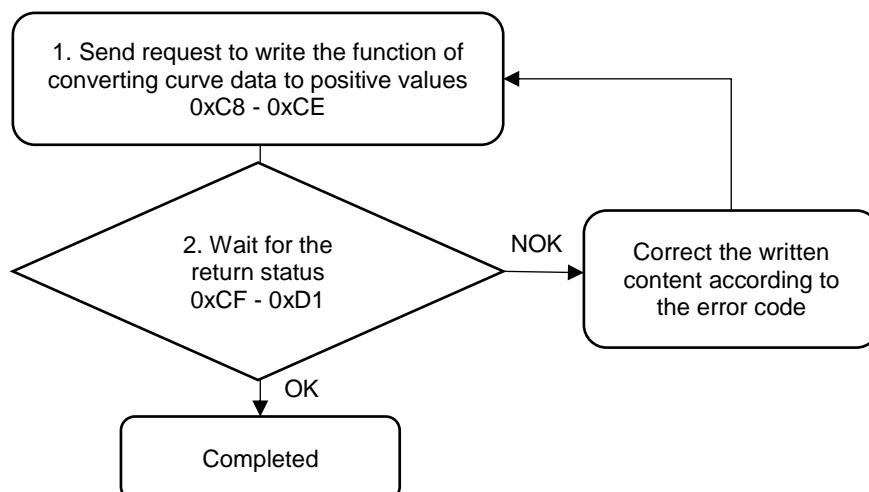
A

## #529 Write the function of converting curve data to positive values

Content description:

Use function code #529 to set the function of converting curve data to positive values.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	529
C9	Version number	0
CA	Function of converting curve data to positive values	0: On 1: Off
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	529
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

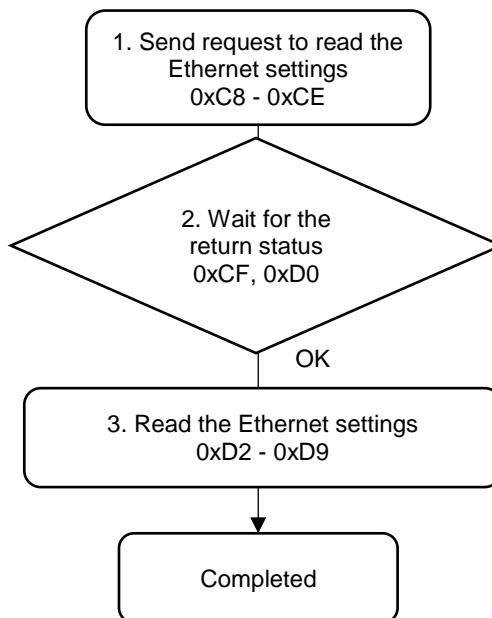
Code	Error description	Description
1	Function of converting curve data to positive values	Must be 0 or 1

## #550 Read the Ethernet settings

Content description:

Use function code #550 to read the Ethernet settings.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	550
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	550
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the Ethernet settings in 0xD2 - 0xD9.

Modbus (Hex)	Function	Description
D2	IP1 address	Default: 192
D3	IP2 address	Default: 168
D4	IP3 address	Default: 1
D5	IP4 address	Default: 11
D6	Subnet mask 1	Default: 255
D7	Subnet mask 2	Default: 255
D8	Subnet mask 3	Default: 255
D9	Subnet mask 4	Default: 0

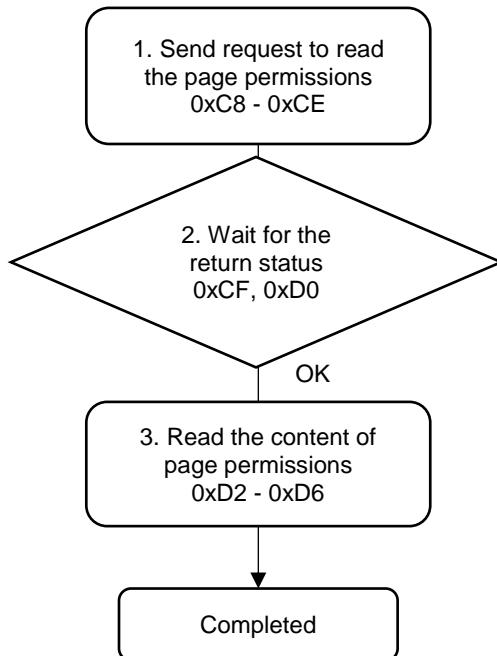
A

## #551 Read the page permissions

Content description:

Use function code #551 to read the permissions of page access and edit for different accounts.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	551
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	551
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the page permissions in 0xD2 - 0xD6.

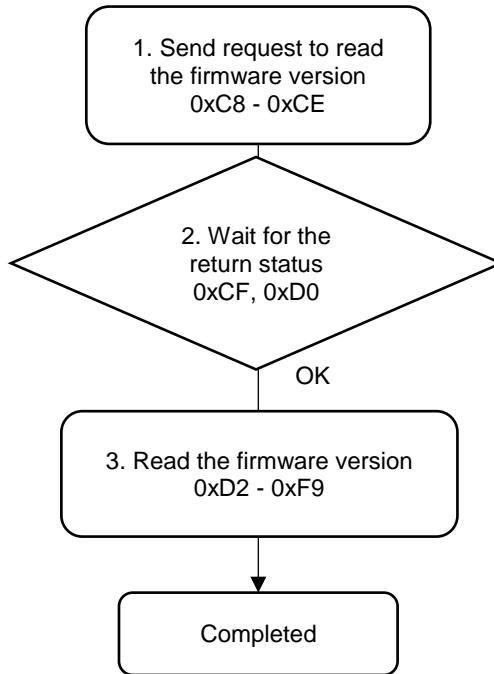
Modbus (Hex)	Function	Description
D2	User1 page permissions	Bit 0: Parameters Bit 1: Sequence
D3	User2 page permissions	Bit 2: Sources Bit 3: Controller
D4	User3 page permissions	Bit 4: Tool Bit 5: operation for screw progress
D5	User4 page permissions	Bit 6: clearing of the production report entries
D6	User5 page permissions	Bit 7: clearing of the error, warning, and button report entries

## #552 Read the firmware version

Content description:

Use function code #552 to read the firmware version of the controller.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	552
C9	Controller firmware version	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	552
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the controller firmware version in 0xD2 - 0xF9.

Modbus (Hex)	Function	Description
D2 to F9	Controller firmware version	ASCII code (40 words)

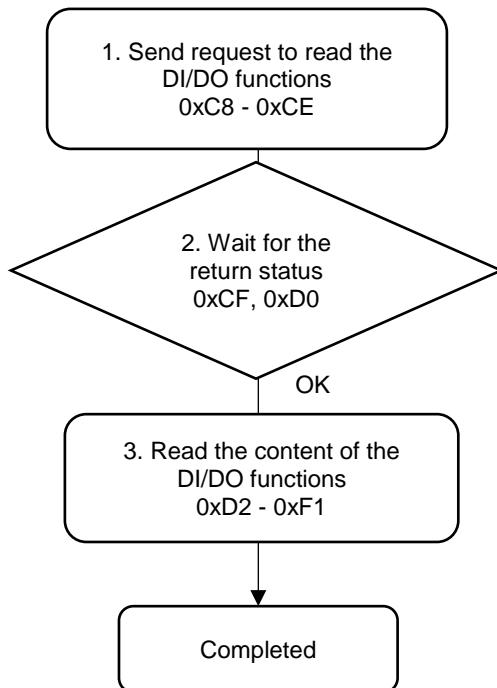
A

## #553 Read the DI/DO functions

Content description:

Use function code #553 to read the DI/DO functions.

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	553
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	553
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

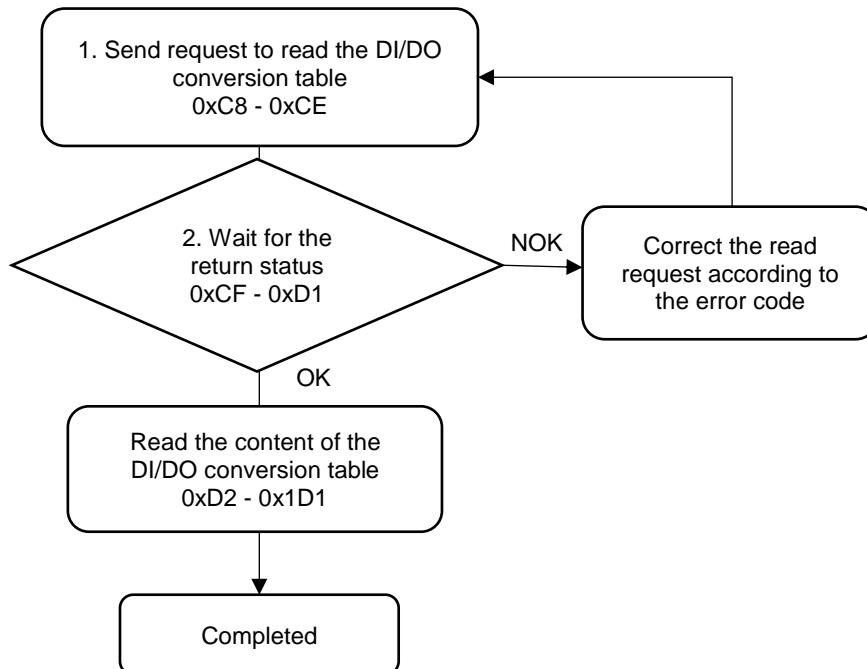
3. Read the content of the DI/DO functions in 0xD2 - 0xF1. Refer to function code #507 for the function list.

### #554 Read the DI/DO conversion table

Content description:

Use function code #554 to read information about the DI/DO conversion table.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	554
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Conversion table	0: bit ID output table 1: bit ID input table 2: parameter ID output table 4: screw progress output table 6: sequence ID output table
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

A

2. Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	554
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Conversion table	Must be 0, 1, 2, 4, or 6

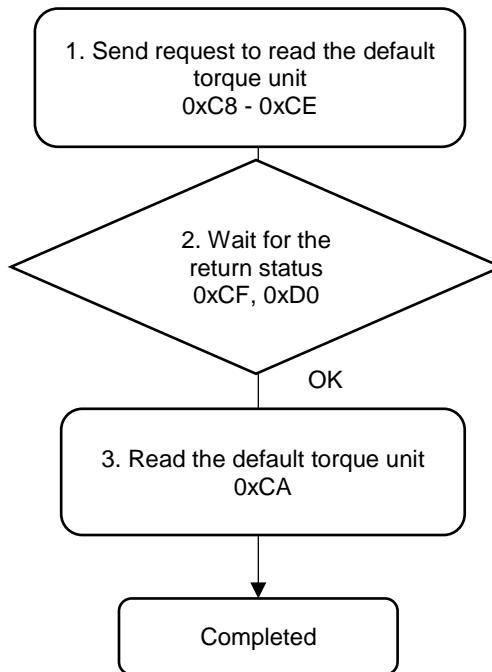
3. Read the content of the DI/DO conversion table in 0xD2 - 0x1D1. Refer to function code #508 for the function list.

## #555 Read the default torque unit

Content description:

Use function code #555 to read the default torque unit of the controller.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	555
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	555
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the default torque unit in 0xCA.

Modbus (Hex)	Write / Read request	Read
CA	Default torque unit	0: N.m 1: kgf.cm 2: lbf.ft 3: lbf.in

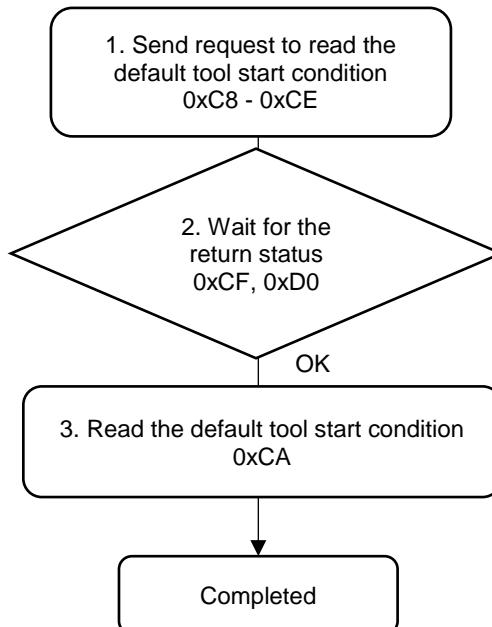
A

## #556 Read the default tool start condition

Content description:

Use function code #556 to read the default tool start condition.

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	556
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF -and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	556
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

3. Read the default tool start condition in 0xCA.

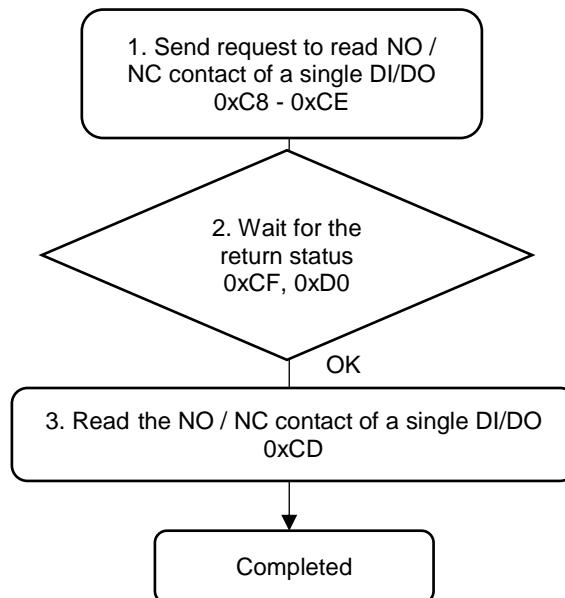
Modbus (Hex)	Write / Read request	Read
CA	Default tool start condition	0: push start 1: DI 2: lever start 3: push start or lever start 4: push start and lever start

## #557 Read NO / NC contact setting for a single DI/DO

Content description:

Use function code #557 to read the NO / NC contact of a single DI/DO.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	557
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	DO / DI	0: DO; 1: DI
CC	Corresponding bit of DO / DI	0 to 7
CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	557
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the NO / NC contact of a single DI/DO in 0xCD.

Modbus (Hex)	Write / Read request	Read
CD	NO / NC	0: NO (normally open) 1: NC (normally closed)

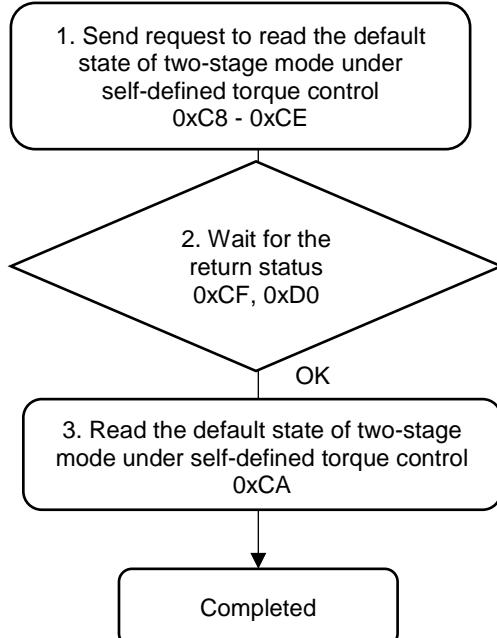
A

## #558 Read the default two-stage mode under self-defined torque control

Content description:

Use function code #558 to read the default state of two-stage mode under self-defined torque control.

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	558
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	558
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

3. Read the default state of two-stage mode under self-defined torque control in 0xCA.

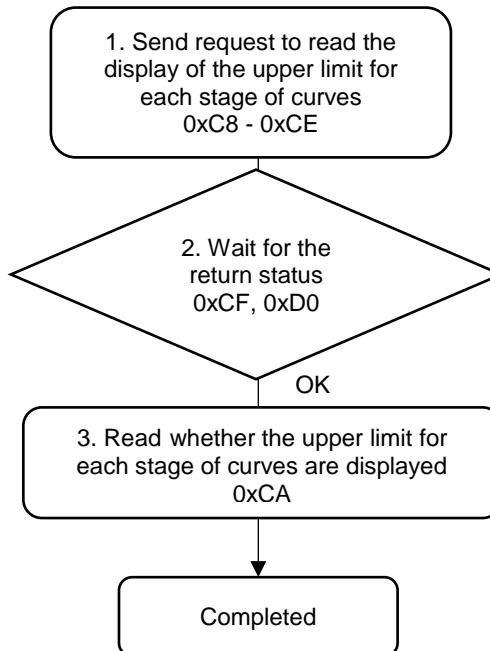
Modbus (Hex)	Write / Read request	Read
CA	Two-stage mode	0: Off 1: On

## #559 Read the display of upper limit for each stage of curves

Content description:

Use function code #559 to read whether the upper limit for each stage of curves is displayed.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	559
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	559
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read whether the upper limit for each stage of curves is displayed in 0xCA.

Modbus (Hex)	Write / Read request	Read
CA	Display the upper limit for each stage of curves	0: On 1: Off

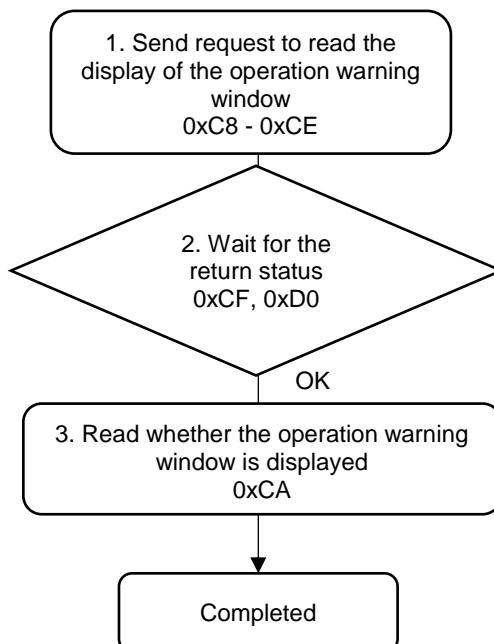
A

## #560 Read the display of operation warning window

Content description:

Use function code #560 to read whether the operation warning window is displayed.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	560
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	560
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read whether the operation warning window is displayed in 0xCA.

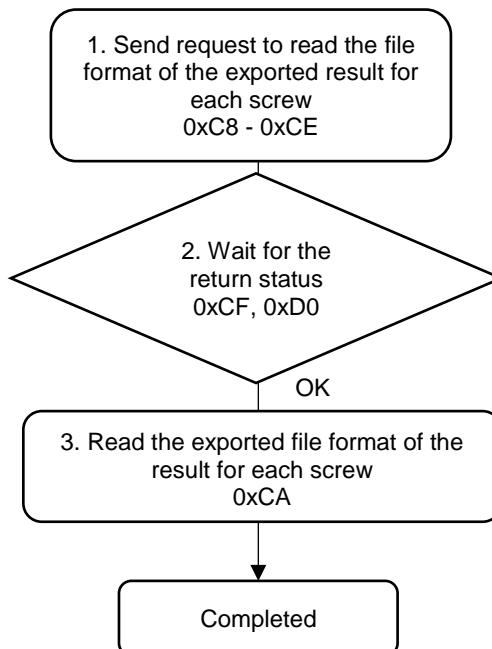
Modbus (Hex)	Write / Read request	Read
CA	Display the operation warning window	0: On 1: Off

## #561 Read file format of the exported result for each screw

Content description:

Use function code #561 to read the file format of the exported result for each screw.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	561
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	561
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the file format of the exported result for each screw in 0xCA.

Modbus (Hex)	Write / Read request	Read
CA	File format of the exported result for each screw	0: disable 1: CSV file (HMI Disk) 2: CSV file (USB Disk) 3: BIN file (HMI Disk)

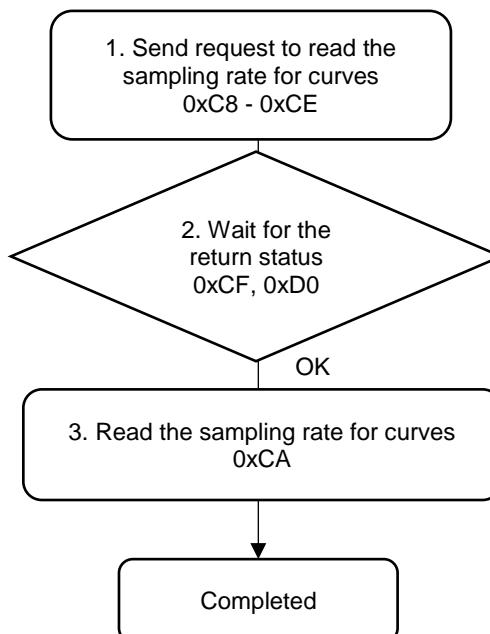
A

## #562 Read the sampling rate for curves

Content description:

Use function code #562 to read the sampling rate for curves.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	562
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	562
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the sampling rate for curves in 0xCA.

Modbus (Hex)	Write / Read request	Read
CA	Sampling rate for curves	0: 10 ms → 2 ms when start torque is reached 1: 2 ms; max. 4 seconds per production report entry 2: 2 ms; max. 8 seconds per production report entry 3: 1 ms; max. 4 seconds per production report entry 4: 1 ms; max. 8 seconds per production report entry

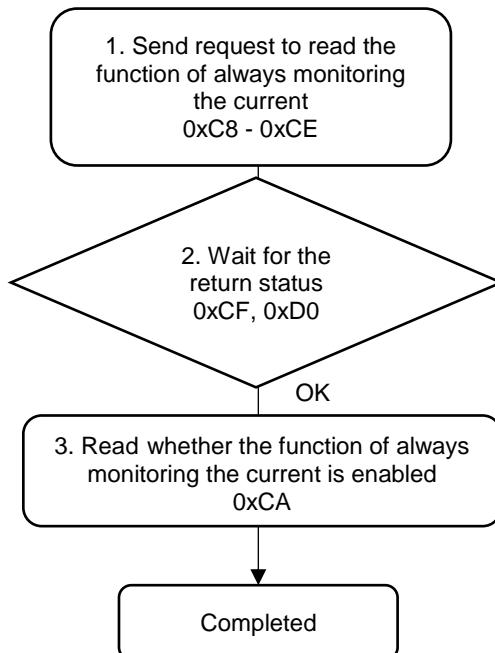
## #563 Read the function of always monitoring the current

Content description:

Use function code #563 to read whether the function of always monitoring the current is enabled.

A

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	563
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	563
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

3. Read whether the function of always monitoring the current is enabled in 0xCA.

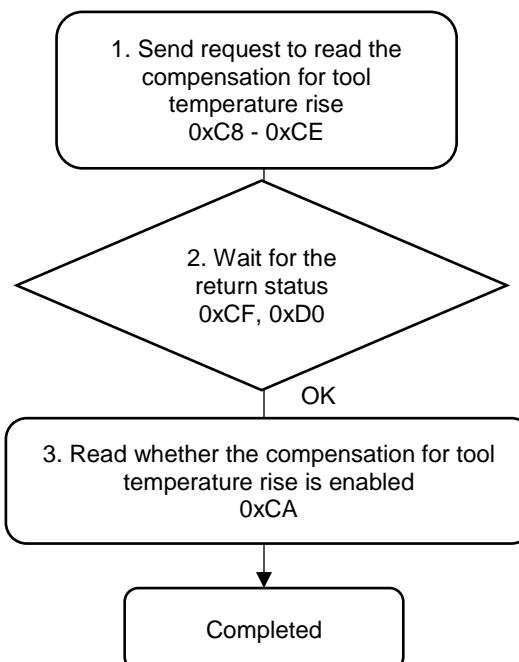
Modbus (Hex)	Write / Read request	Read
CA	Always monitor the current	0: On 1: Off

## #564 Read the compensation for tool temperature rise

Content description:

Use function code #564 to read whether the compensation for tool temperature rise is enabled.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	564
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	564
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read whether the compensation for tool temperature rise is enabled in 0xCA.

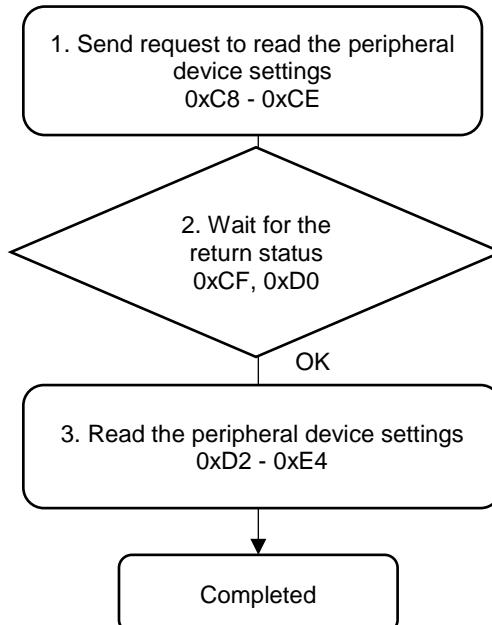
Modbus (Hex)	Write / Read request	Read
CA	Compensation for tool temperature rise	0: On 1: Off

## #565 Read the peripheral device settings

Content description:

Use function code #565 to read the peripheral device settings.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	565
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	565
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the peripheral device settings in 0xD2 - 0xE4. Refer to function code #521 for the function list.

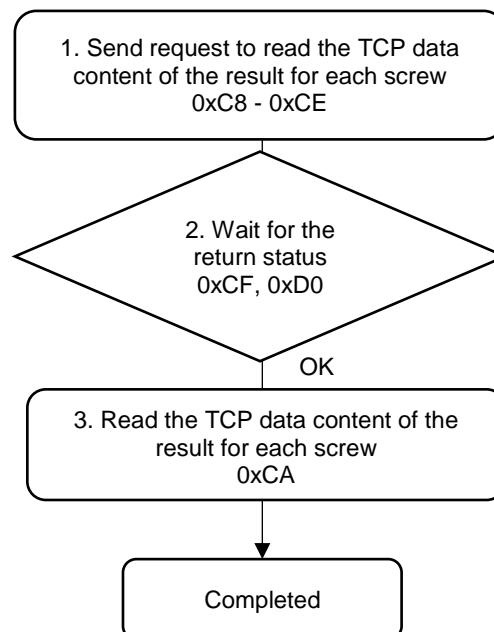
A

## #566 Read the TCP data content of the result for each screw

Content description:

Use function code #566 to read the TCP data content of the result for each screw.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	566
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	566
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the TCP data content of the result for each screw in 0xCA.

Modbus (Hex)	Write / Read request	Read
CA	TCP data content of the result for each screw	0: disable 1: scale, time, torque 2: scale, angle, torque 3: scale, angle, torque rate 4: result, scale, time, torque 5: result, scale, angle, torque 6: result, scale, angle, torque rate

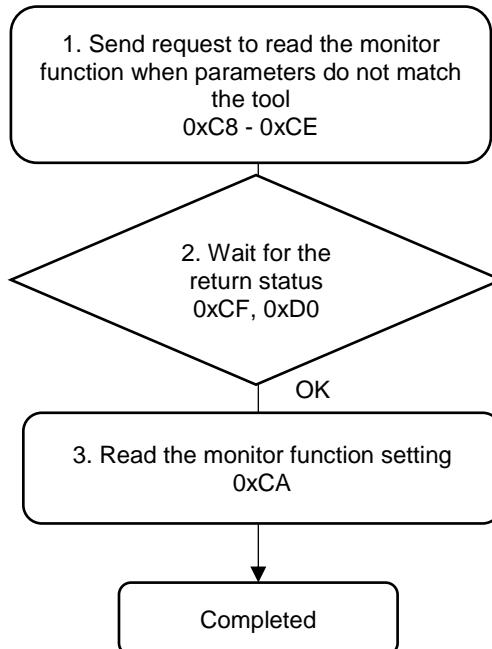
## #567 Read the monitor function when parameters do not match the tool

Content description:

Use function code #567 to read the function setting for monitoring if the tool torque of the operating parameter matches that of the connected tool.

A

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	567
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	567
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

3. Read the monitor function setting in 0xCA.

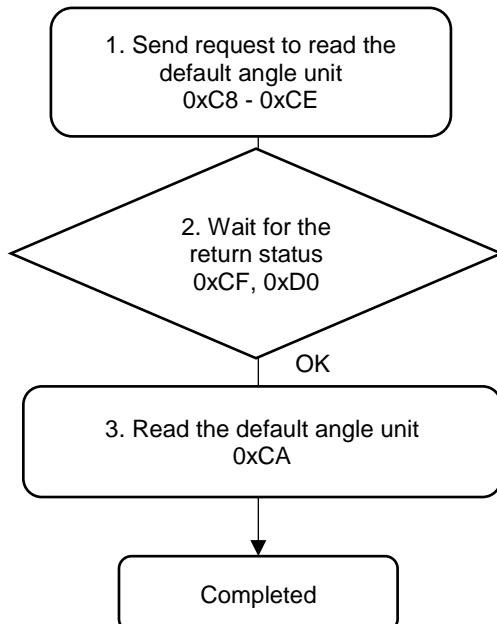
Modbus (Hex)	Write / Read request	Read
CA	Monitor function when parameters do not match the tool	0: On 1: Off

## #568 Read the default angle unit

Content description:

Use function code #568 to read the default angle unit of the controller.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	568
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	568
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the default angle unit in 0xCA.

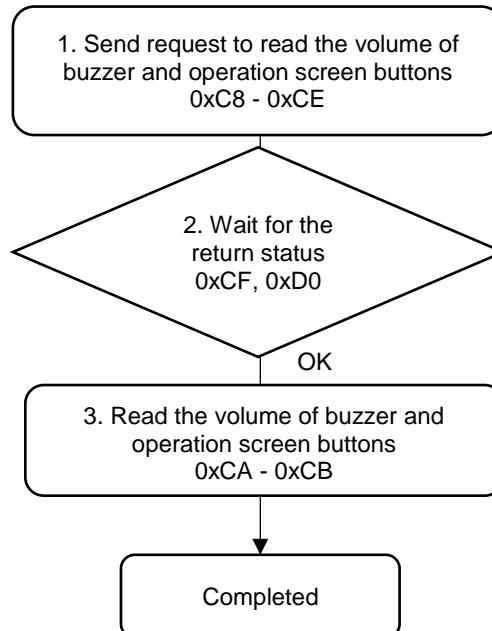
Modbus (Hex)	Write / Read request	Read
CA	Default angle unit	0: degree 1: turn

## #569 Read the volume of buzzer and operation screen buttons

Content description:

Use function code #569 to read the volume of buzzer and operation screen buttons.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	569
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	569
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the volume of buzzer and operation screen buttons in 0xCA - 0xCB.

Modbus (Hex)	Write / Read request	Read
CA	Volume of buzzer	0 to 100
CB	Volume of operation screen buttons	0 to 100

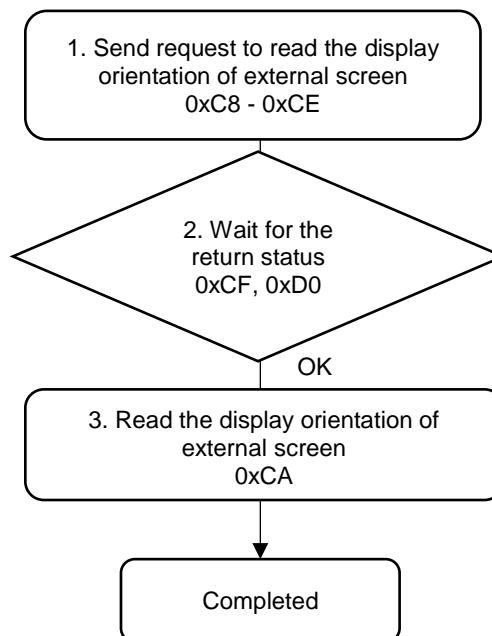
A

## #570 Read the display orientation of external screen

Content description:

Use function code #570 to read the display orientation of external screen (HDMI).

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	570
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	570
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the display orientation of external screen in 0xCA.

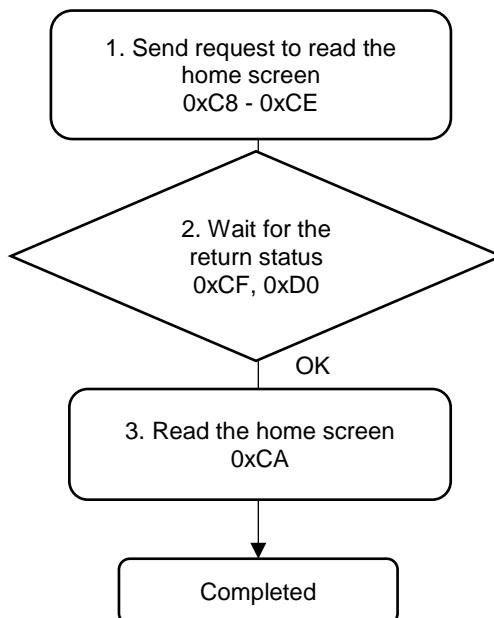
Modbus (Hex)	Write / Read request	Read
CA	Display orientation	0: portrait 1: landscape

## #571 Read the home screen

Content description:

Use function code #571 to read the home screen of the controller.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	571
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	571
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the home screen in 0xCA.

Modbus (Hex)	Write / Read request	Read
CA	Home screen	0: Home 1: Results

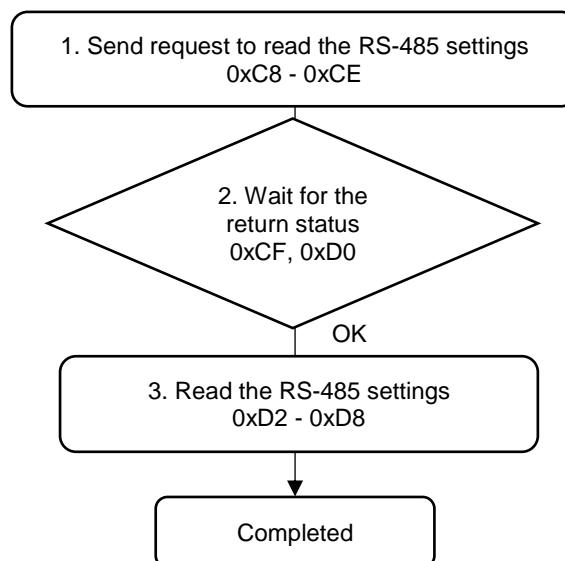
A

## #572 Read the RS-485 settings

Content description:

Use function code #572 to read the RS-485 settings.

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	572
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	572
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

3. Read the RS-485 settings in 0xD2 - 0xD8.

Modbus (Hex)	Write / Read request	Read
D2	Function On / Off	0: Off; 1: On
D3	Station	0 to 255
D4	RTU / ASCII	0: RTU; 1: ASCII
D5	Baud rate	0: 9600; 1: 19200; 2: 38400
D6	Data bit	0: 8-bit; 1: 7-bit
D7	Parity bit	0: None; 1: Odd; 2: Even
D8	Stop bit	0: 2-bit; 1: 1-bit

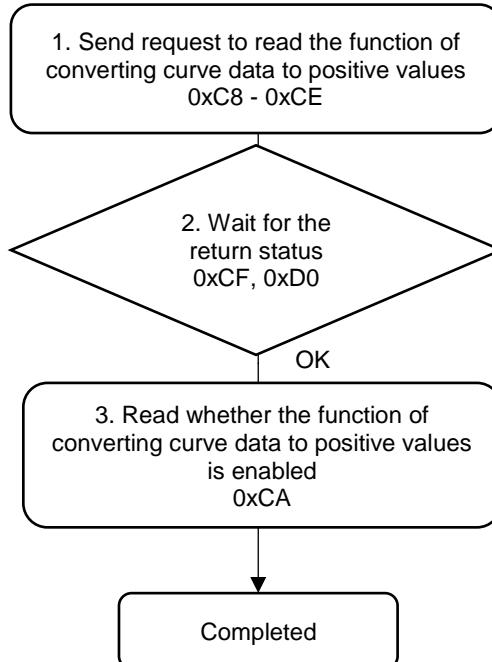
## #573 Read the function of converting curve data to positive values

Content description:

Use function code #573 to read whether the function of converting curve data to positive values is enabled.

A

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	573
C9	Version number	0
CA to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF and 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	573
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

3. Read whether the function of converting curve data to positive values is enabled in 0xCA.

Modbus (Hex)	Write / Read request	Read
CA	Function of converting curve data to positive values	0: On 1: Off

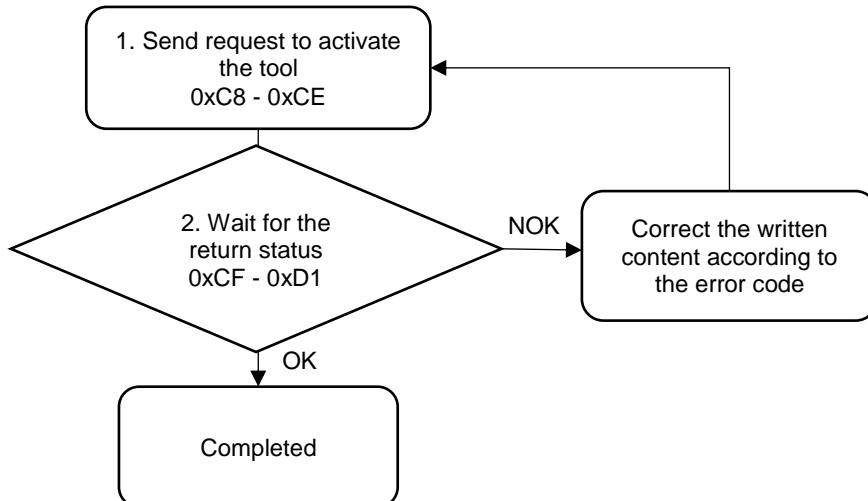
### A.3.6 Tool operations

#### #600 Write to activate the tool

Content description:

Use function code #600 to activate Tool 1 or Tool 2.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	600
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Tool activation	0: Off; 1: On
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	600
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

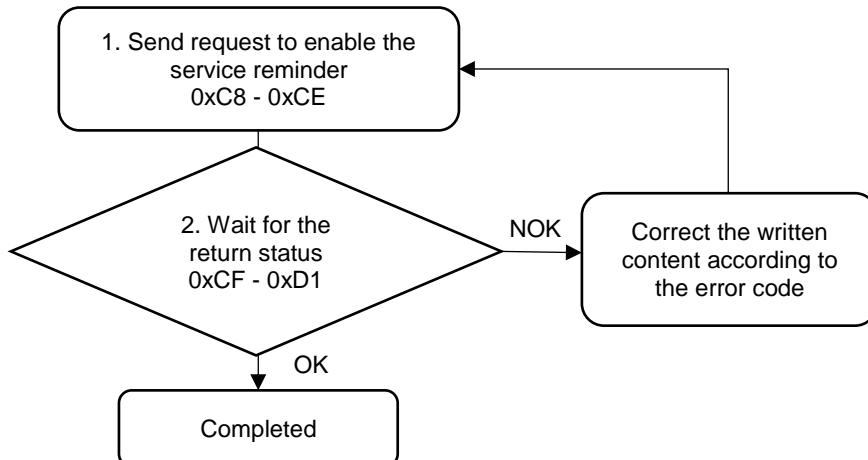
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Tool activation	Must be 0 or 1

## #601 Write to enable service reminder

Content description:

Use function code #601 to turn on or off the tool service reminder.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	601
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Service reminder	0: Off; 1: On
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	601
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Service reminder	Must be 0 or 1

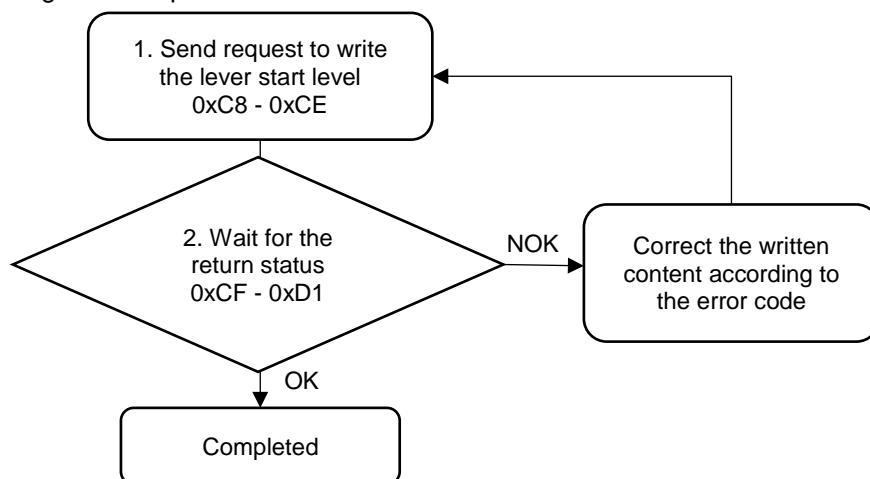
A

## #602 Write the lever start level

Content description:

Use function code #602 to set the lever start level of the tool.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	602
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Threshold for On level	0 to 4095
CC	Threshold for Off level	0 to 4095
CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	602
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

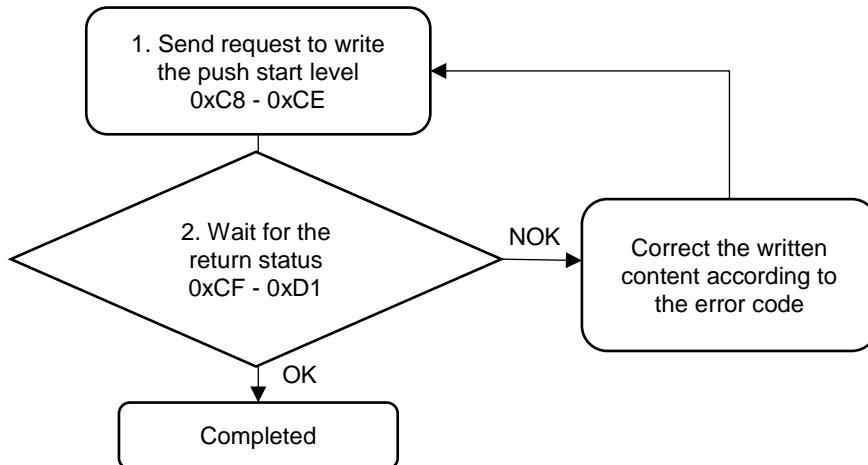
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Threshold value	Exceeds the range of 0 to 4095

## #603 Write the push start level

Content description:

Use function code #603 to set the push start level of the tool.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	603
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Threshold for On level	0 to 4095
CC	Threshold for Off level	0 to 4095
CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	603
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Threshold value	Exceeds the range of 0 to 4095

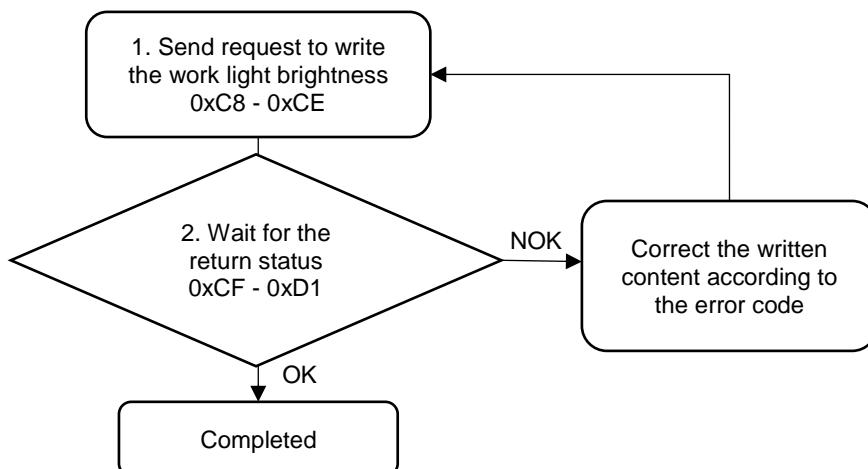
A

## #604 Write the work light brightness

Content description:

Use function code #604 to set the work light brightness of the tool.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	604
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Brightness	0 to 50 (0: Off; 50: max. brightness)
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	604
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

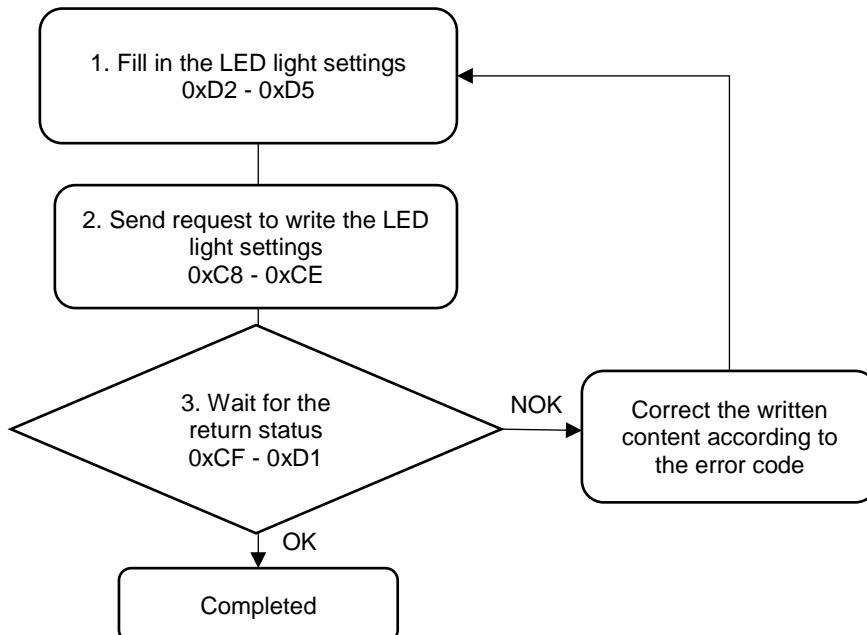
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Brightness	Exceeds the range of 0 to 50

## #606 Write the LED light settings

Content description:

Use function code #606 to set the LED light settings of the tool.

Handshake signal description:



1. Fill in the LED light settings to 0xD2 - 0xD5.

Modbus (Hex)	Function	Description
D2	NO / NC	0: NO (normally open) 1: NC (normally closed) (Bit 1 - 8: for Tool 1; Bit 9 - 16: for Tool 2)
D3	Status of red indicator	0: not in use 1: ready 2: running
D4	Status of yellow indicator	3: tightening OK 4: tightening NOK 5: loosening OK 6: loosening NOK
D5	Status of green indicator	7: total screw quantity reached

2. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	606
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

A

3. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	606
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

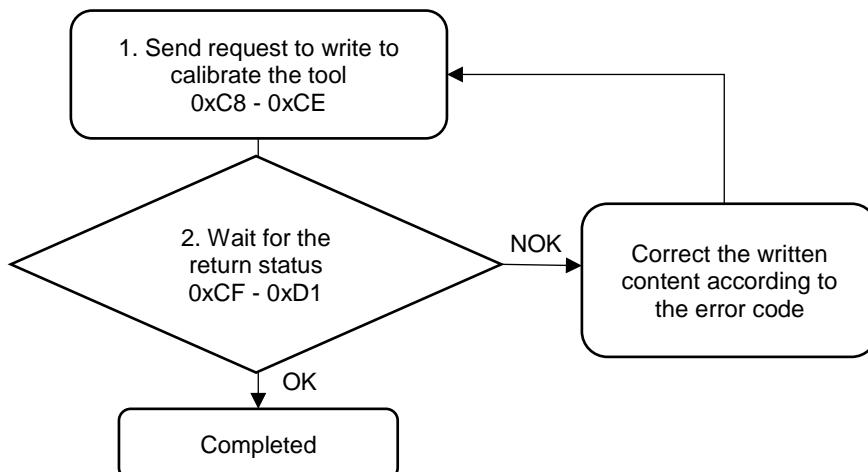
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #607 Write to calibrate the tool

Content description:

Use function code #607 to set the precision of the tool.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	607
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB	Precision	0 to 32767 (Default: 1400 for 12 kgf-cm models 3500 for 30 kgf-cm models 6000 for 50 kgf-cm models 5705 for 75 kgf-cm models)
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	607
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Precision	Exceeds the range of 0 to 32767

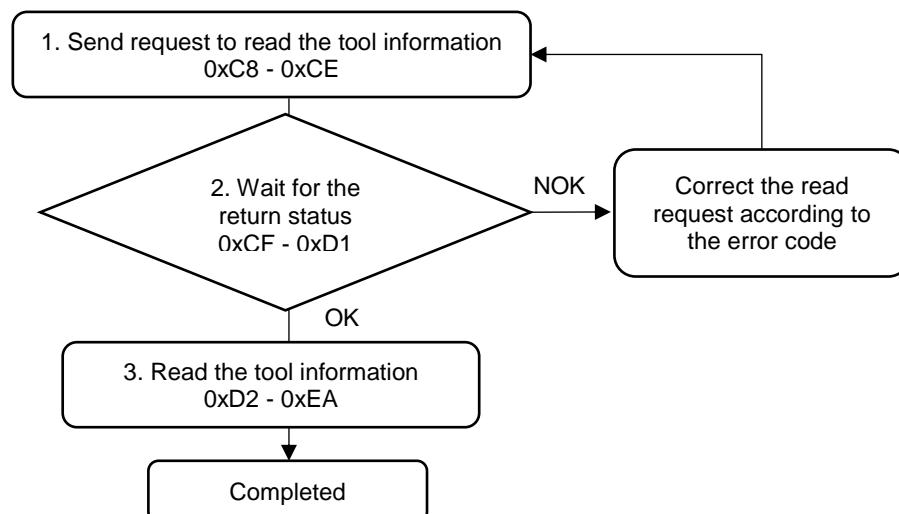
A

## #650 Read the tool information

Content description:

Use function code #650 to read the tool information.

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	650
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	650
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

3. Read the tool information in 0xD2 - 0xEA.

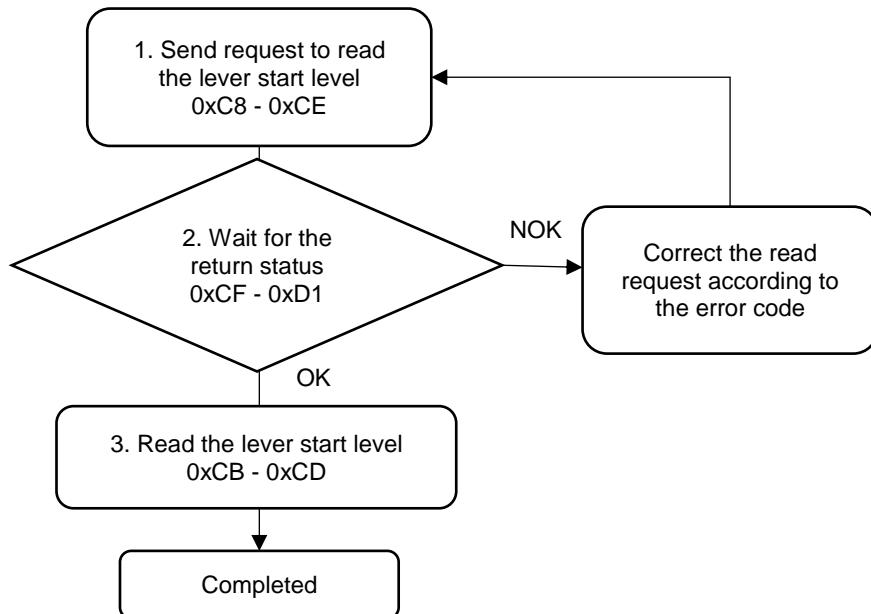
Modbus (Hex)	Function	Description
D2 to E5	Model name	ASCII code (20 words)
E6	Max. speed	Unit: rpm
E7	Max. torque	Unit: 0.001 Nm
E8	Tool temperature	Unit: °C
E9	Tightening + loosening count (L)	Tool life
EA	Tightening + loosening count (H)	

## #651 Read the lever start level

Content description:

Use function code #651 to read the lever start level of the tool.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	651
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	651
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

- Read the lever start level in 0xCB - 0xCD.

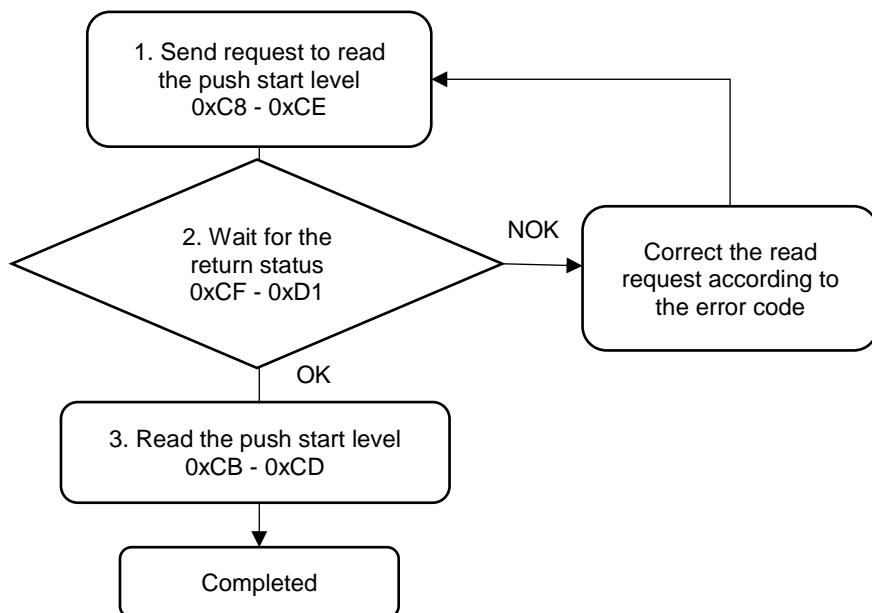
Modbus (Hex)	Write / Read request	Read
CB	Threshold of the current pressing	0 to 4095
CC	Threshold for On level	0 to 4095
CD	Threshold for Off level	0 to 4095

## #652 Read the push start level

Content description:

Use function code #652 to read the push start level of the tool.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	652
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	652
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

- Read the push start level in 0xCB - 0xCD.

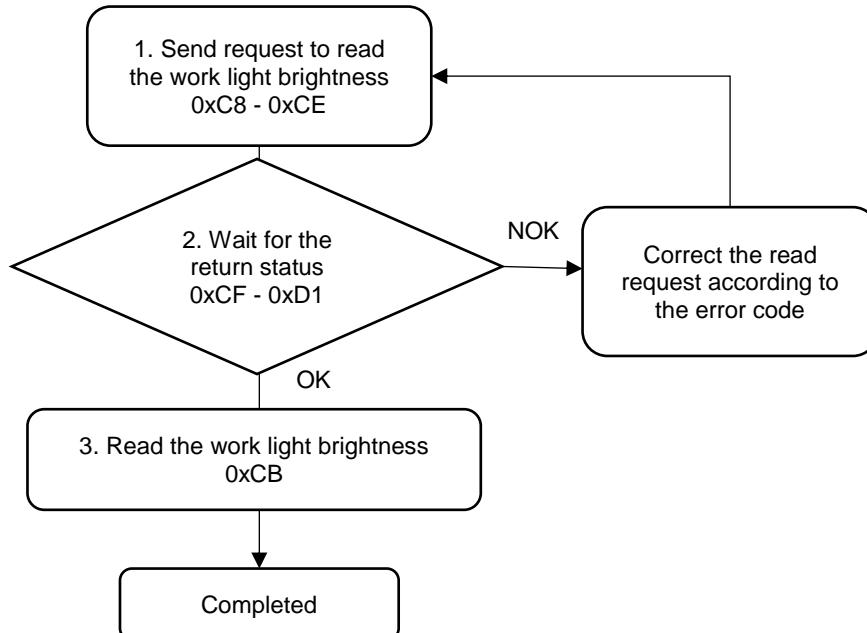
Modbus (Hex)	Write / Read request	Read
CB	Threshold of the current pressing	0 to 4095
CC	Threshold for On level	0 to 4095
CD	Threshold for Off level	0 to 4095

## #653 Read the work light brightness

Content description:

Use function code #653 to read the work light brightness of the tool.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	653
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	653
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

- Read the work light brightness in 0xCB.

Modbus (Hex)	Write / Read request	Read
CB	Brightness	0 to 50 (0: Off; 50: max. brightness)

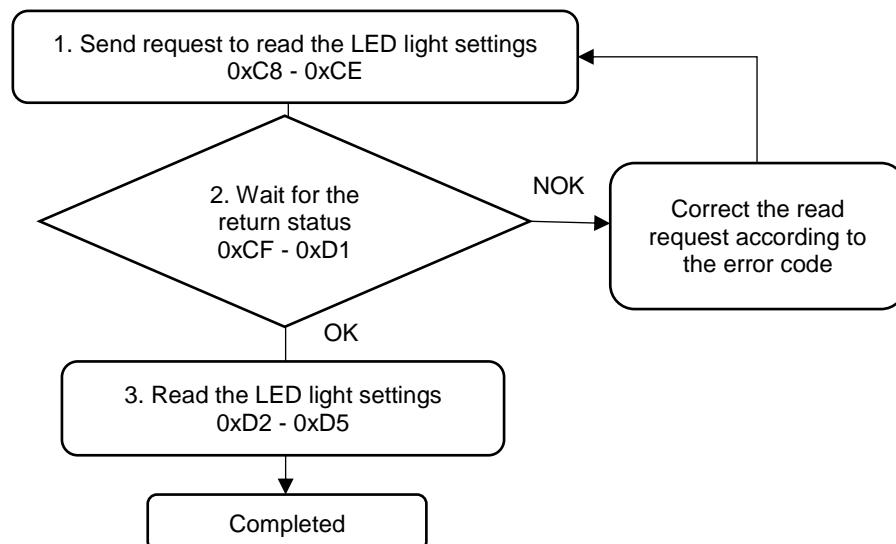
A

## #655 Read the LED light settings

Content description:

Use function code #655 to read the LED light settings of the tool.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	655
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	655
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

3. Read the LED light settings in 0xD2 - 0xD5.

Modbus (Hex)	Write / Read request	Read
D2	Reserved	-
D3	Status of red indicator	0: not in use 1: ready 2: running 3: tightening OK 4: tightening NOK 5: loosening OK 6: loosening NOK 7: total screw quantity reached
D4	Status of yellow indicator	
D5	Status of green indicator	

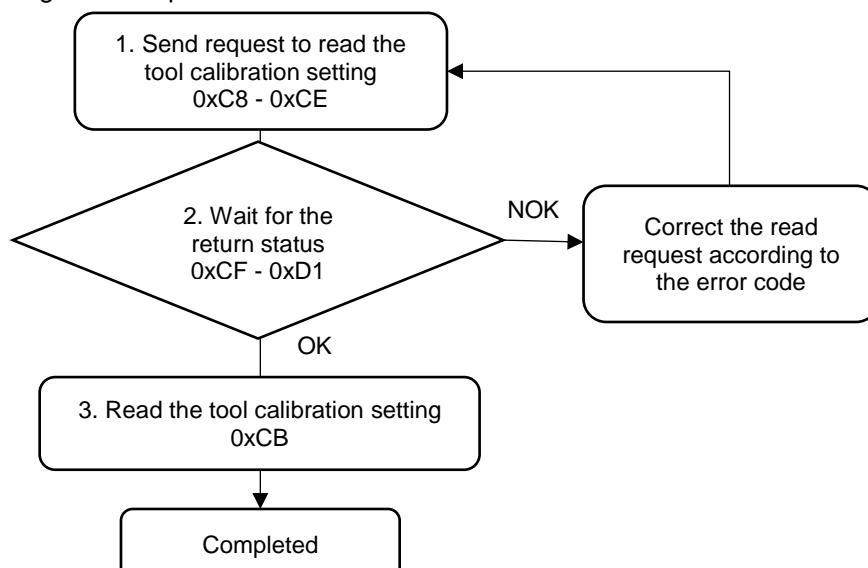
A

## #656 Read the tool calibration setting

Content description:

Use function code #656 to read the precision of the tool.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	656
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	656
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

- Read the precision of the tool in 0xCB.

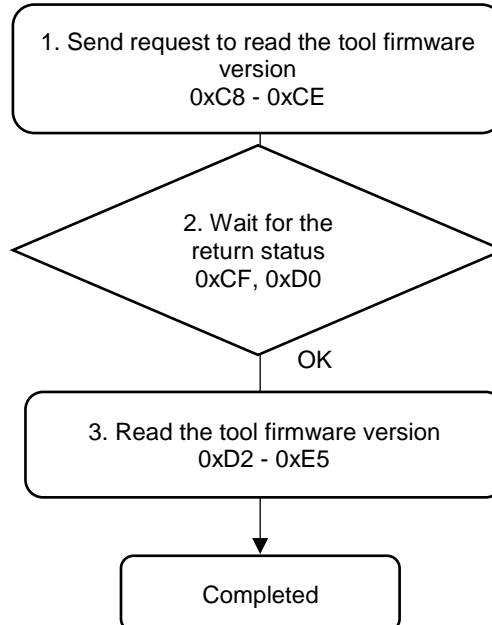
Modbus (Hex)	Write / Read request	Read
CB	Precision	0 to 32767 (Default: 1400 for 12 kgf-cm models 3500 for 30 kgf-cm models 6000 for 50 kgf-cm models 5705 for 75 kgf-cm models)

## #657 Read the tool firmware version

Content description:

Use function code #657 to read the firmware version number of the tool.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	657
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD0.

Modbus (Hex)	Return status	Description
CF	Function code	657
D0	Status	1: OK

If successful, the read status (0xD0) is 1.

- Read the firmware version number of the tool in 0xD2 to 0xE5.

Modbus (Hex)	Write / Read request	Read
D2 to E5	Tool firmware version	ASCII code (20 words)

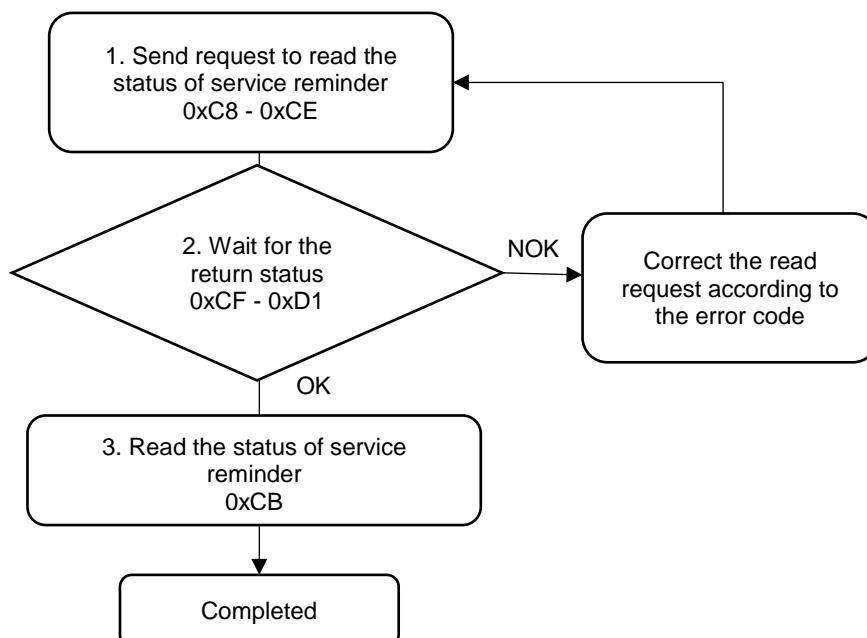
A

## #658 Read the status of service reminder

Content description:

Use function code #658 to read the status of service reminder.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	658
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	658
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

- Read the status of tool service reminder in 0xCB.

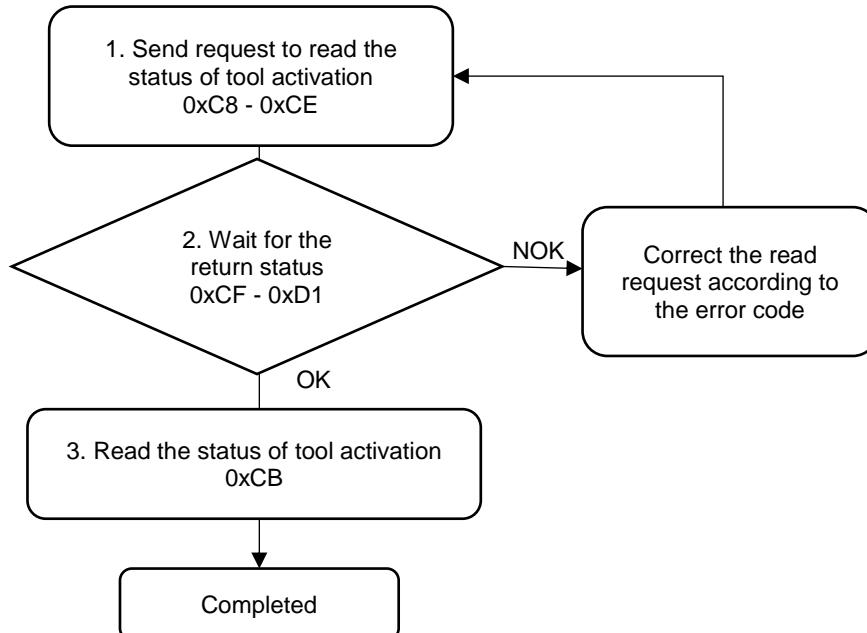
Modbus (Hex)	Write / Read request	Read
CB	Service reminder	0: Off; 1: On

## #659 Read the status of tool activation

Content description:

Use function code #659 to read the status of the tool activation.

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	659
C9	Version number	0
CA	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	659
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

- Read the status of tool activation in 0xCB.

Modbus (Hex)	Write / Read request	Read
CB	Tool activation	0: Off; 1: On

A

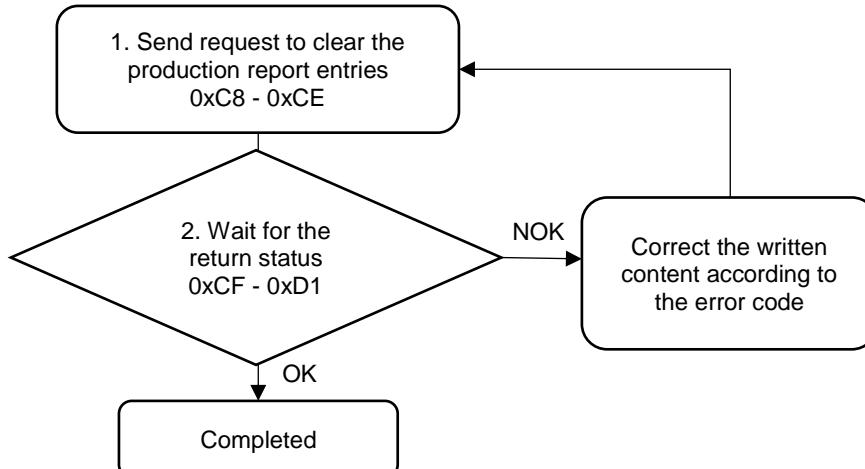
### A.3.7 Reports operations

#### #700 Clear the production report entries

Content description:

Use function code #700 to delete all the production report entries from the controller.

Handshake signal description:



1. Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	700
C9	Version number	0
CA	Confirm command	99
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	700
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

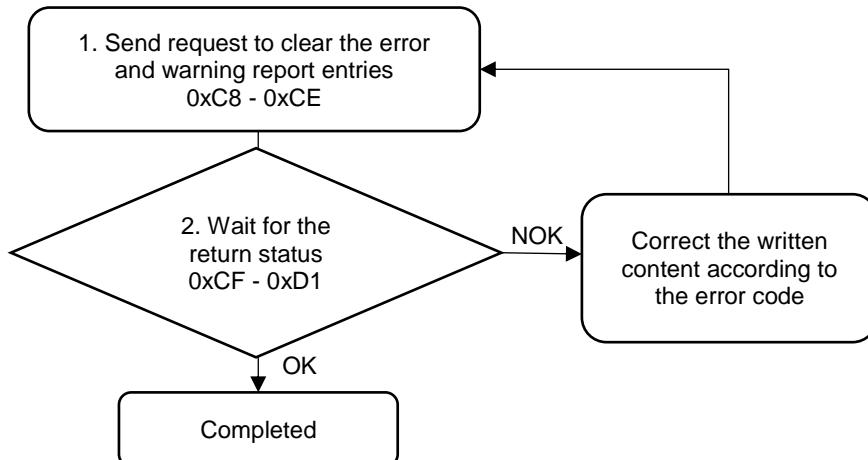
Code	Error description	Description
1	Confirm command	Must be 99

## #701 Clear the error and warning report entries

Content description:

Use function code #701 to delete all the error and warning report entries from the controller.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	701
C9	Version number	0
CA	Confirm command	99
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	701
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

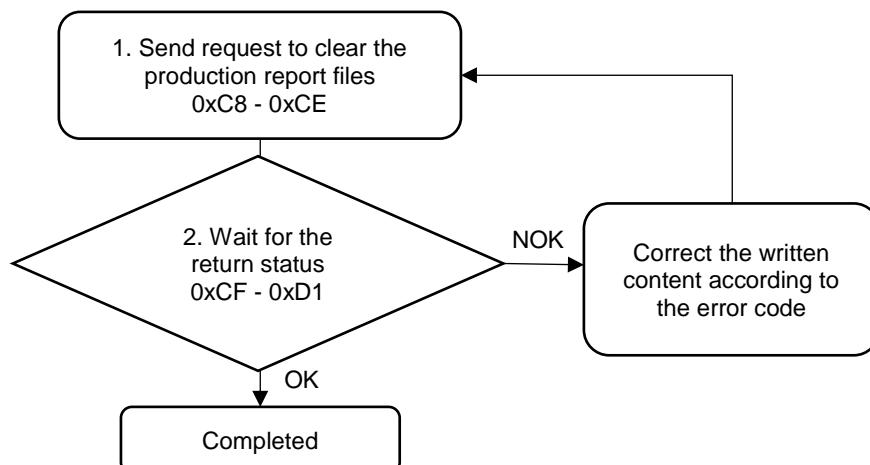
Code	Error description	Description
1	Confirm command	Must be 99

## #702 Clear the production report files

Content description:

Use function code #702 to delete all the production report files exported to the HMI.

Handshake signal description:



- Fill in the write request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	702
C9	Version number	0
CA	Confirm command	99
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the writing is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	702
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Confirm command	Must be 99

## #750 Find and read the production report entries

Content description:

Use function code #750 to read the content of the production report.

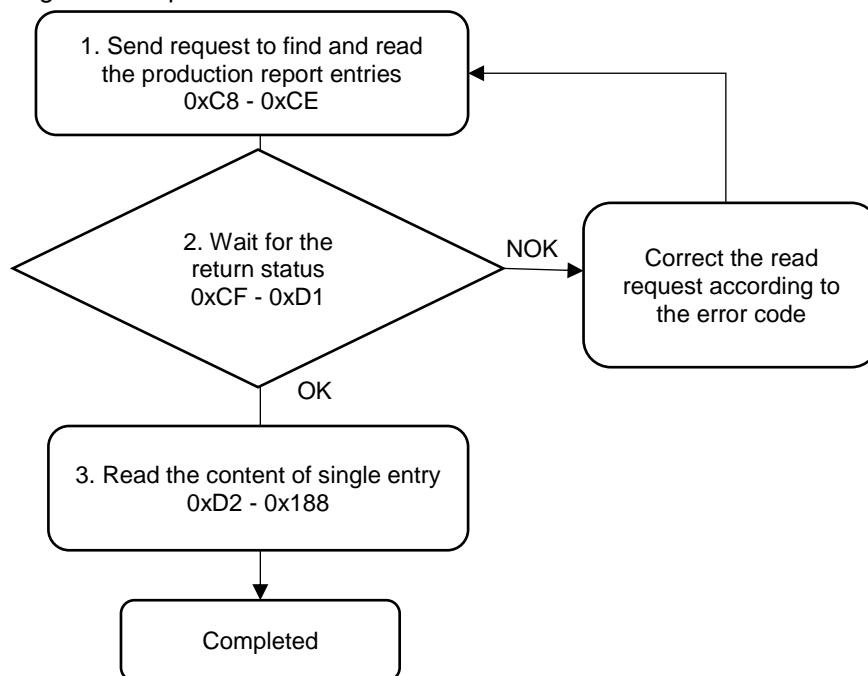
- A. Use with 0x6B and 0x6C to read the content of the latest production report.

Modbus (Hex)	Tool 1 / Tool 2 common status	R/W
6B	Current No. of production report entries (L)	R
6C	Current No. of production report entries (H)	R

- B. Read the content of history report entries.

■ When the version number is 0:

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	750
C9	Version number	0
CA	Production report ID (L)	1 to 200000
CB	Production report ID (H)	0: the latest production report
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

A

2. Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	750
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Production report ID	Exceeds the range of 0 to 200000

3. Read the content of the production report in 0xD2 - 0x188.

Modbus (Hex)	Function	Description
D2 to 135	Saved barcode string	ASCII code (100 words)
136	Year	-
137	Month	-
138	Day	-
139	Hour	-
13A	Minute	-
13B	Second	-
13C	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
13D	Screw ID (L)	-
13E	Screw ID (H)	-
13F	Sequence ID	-
140	Parameter ID	-
141	Target torque	Unit: 0.001 x torque of the current report Refer to DWORD 0x16B and 0x16C when the torque specification of the tool is 5 Nm or higher.
142	Target angle	-
143	Target torque rate	Unit: 0.0001 x torque/degree of the current report Refer to DWORD 0x16D and 0x16E when the torque specification of the tool is 5 Nm or higher.
144	Final torque	Refer to DWORD 0x16F and 0x170 when the torque specification of the tool is 5 Nm or higher.
145	Tightening angle	-
146	Rotation angle	-
147	Status	1: tightening OK; 2: tightening NOK; 3: loosening OK; 4: loosening NOK; 5: pass
148	Operation time	Unit: 0.001 second
149	AL / NG / WN code	Refer to CH12
14A	Max. angle of final stage	-
14B	Min. angle of final stage	-

Modbus (Hex)	Function	Description
14C	Max. torque of final stage	Refer to DWORD 0x171 and 0x172 when the torque specification of the tool is 5 Nm or higher.
14D	Min. torque of final stage	Refer to DWORD 0x173 and 0x174 when the torque specification of the tool is 5 Nm or higher.
14E	Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in
14F	Torque specification of the tool	Unit: 0.001 Nm
150	Max. torque of the tool	Unit: 0.001 Nm
151	Pre-tightening torque	Refer to DWORD 0x175 and 0x176 when the torque specification of the tool is 5 Nm or higher.
152	The set total operation time	Timeout setting for a single tightening parameter.
153	Max. total angle	-
154	Max. torque	Torque upper limit when the current stage finishes. Refer to DWORD 0x177 and 0x178 when the torque specification of the tool is 5 Nm or higher.
155	Min. torque	Torque lower limit when the current stage finishes. Refer to DWORD 0x179 and 0x17A when the torque specification of the tool is 5 Nm or higher.
156	Max. angle	Angle upper limit when the current stage finishes
157	Min. angle	Angle lower limit when the current stage finishes
158	Max. operation time	Time upper limit when the current stage finishes
159	Min. operation time	Time lower limit when the current stage finishes
15A	Prevail torque	Refer to DWORD 0x17B and 0x17C when the torque specification of the tool is 5 Nm or higher.
15B	Final + Prevail torque	Refer to DWORD 0x17D and 0x17E when the torque specification of the tool is 5 Nm or higher.
15C	Actual current	Unit: 0.01 Amp
15D	Clamp torque	Refer to DWORD 0x17F and 0x180 when the torque specification of the tool is 5 Nm or higher.
15E	Max. clamp torque	Clamp torque upper limit when the current stage finishes. Refer to DWORD 0x181 and 0x182 when the torque specification of the tool is 5 Nm or higher.
15F	Min. clamp torque	Clamp torque lower limit when the current stage finishes. Refer to DWORD 0x183 and 0x184 when the torque specification of the tool is 5 Nm or higher.
160	Clamp angle	-
161	Max. clamp angle	-

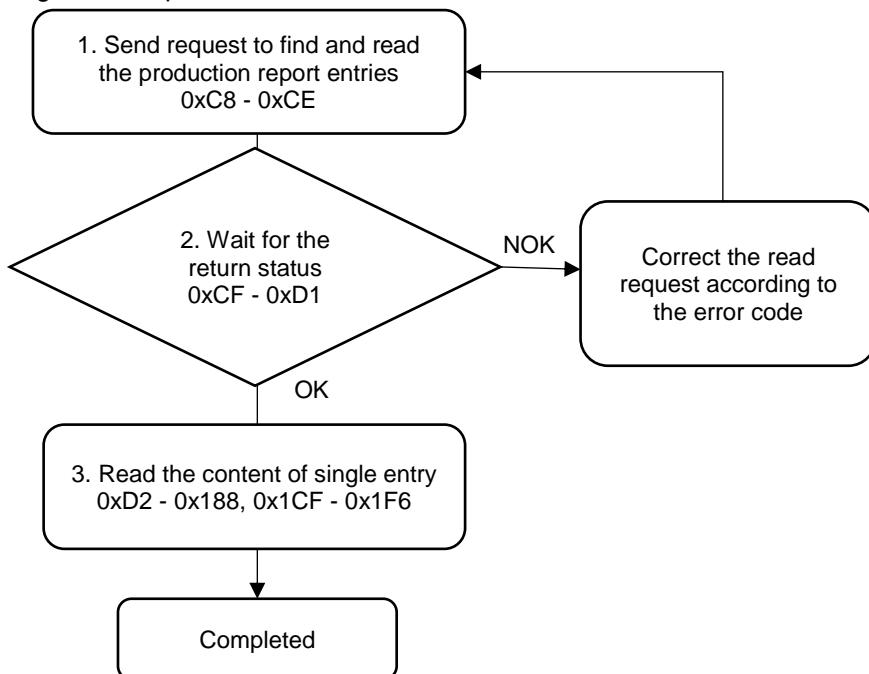
A

Modbus (Hex)	Function	Description
162	Min. clamp angle	-
163	Min. total angle	-
164	Permissions account	0: reserved 1: User1 2: User2 3: User3 4: User4 5: User5 6: Admin
165 to 16A	Reserved	-
16B	Target torque (L)	Unit: 0.001 x torque of the current report
16C	Target torque (H)	
16D	Target torque rate (L)	Unit: 0.0001 x torque/degree of the current report
16E	Target torque rate (H)	
16F	Final torque (L)	Unit: 0.001 x torque of the current report
170	Final torque (H)	
171	Final stage max. torque (L)	Unit: 0.001 x torque of the current report
172	Final stage max. torque (H)	
173	Final stage min. torque (L)	Unit: 0.001 x torque of the current report
174	Final stage min. torque (H)	
175	Pre-tightening torque (L)	Unit: 0.001 x torque of the current report
176	Pre-tightening torque (H)	
177	Max. torque (L)	Unit: 0.001 x torque of the current report
178	Max. torque (H)	Torque upper limit when the current stage finishes.
179	Min. torque (L)	Unit: 0.001 x torque of the current report
17A	Min. torque (H)	Torque lower limit when the current stage finishes.
17B	Prevail torque (L)	Unit: 0.001 x torque of the current report
17C	Prevail torque (H)	
17D	Final + Prevail torque (L)	Unit: 0.001 x torque of the current report
17E	Final + Prevail torque (H)	
17F	Clamp torque (L)	Unit: 0.001 x torque of the current report
180	Clamp torque (H)	
181	Max. clamp torque (L)	Unit: 0.001 x torque of the current report
182	Max. clamp torque (H)	Clamp torque upper limit when the current stage finishes.
183	Min. clamp torque (L)	Unit: 0.001 x torque of the current report
184	Min. clamp torque (H)	Clamp torque lower limit when the current stage finishes.
185	Tool spec. torque (L)	Unit: 0.001 x torque of the current report
186	Tool spec. torque (H)	
187	Tool max. torque (L)	Unit: 0.001 x torque of the current report
188	Tool max. torque (H)	

A

■ When the version number is 1:

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	750
C9	Version number	1
CA	Production report ID (L)	1 to 200000
CB	Production report ID (H)	0: the latest production report
CC, CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	750
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Production report ID	Exceeds the range of 0 to 200000

- Read the content of the production report in 0xD2 - 0x188 and 0x1CF - 0x1F6.

Modbus (Hex)	Function	Description
D2 to 188	Refer to the function list of version number 0	
1CF to 1E2	Sequence title	ASCII code (20 words)
1E3 to 1F6	Parameter title	ASCII code (20 words)

A

## #751 Find and read curves

Content description:

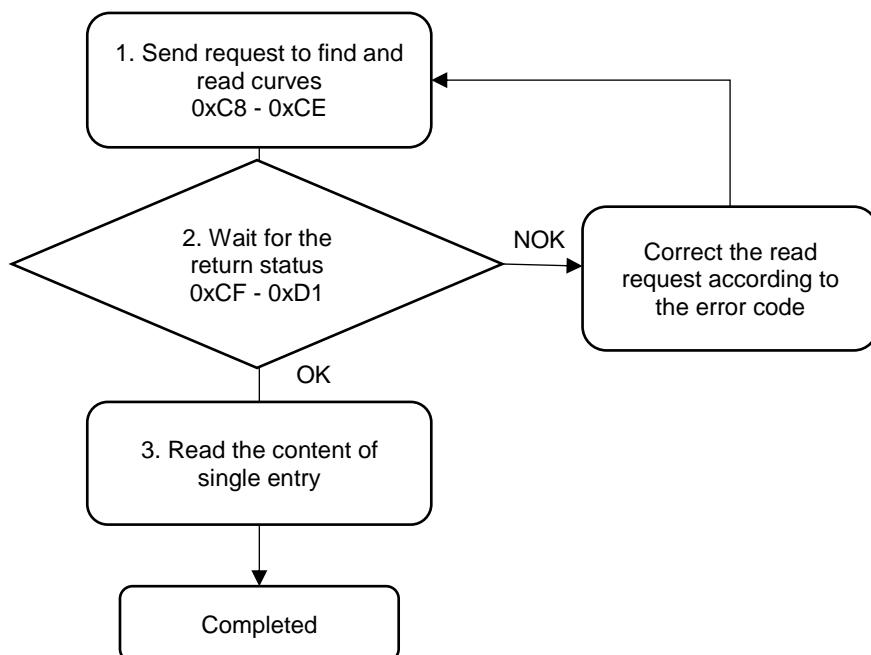
Use function code #751 to read the content of the operating curve.

- A. Use with 0x6B and 0x6C to read the content of the latest curve.

Modbus (Hex)	Tool 1 / Tool 2 common status	R/W
6B	Current No. of production report entries (L)	R
6C	Current No. of production report entries (H)	R

- B. Check the content of history curves.  
 C. Set the time as X axis and the torque as Y axis to draw a torque-time coordinate graph.  
 D. Set the angle as X axis and the torque as Y axis to draw a torque-angle coordinate graph.  
 E. Set the angle as X axis and the torque rate as Y axis to draw a torque rate-angle coordinate graph.  
 F. Read the parameters content of the curve.

Handshake signal description:



1. Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	751
C9	Version number	0 or 1
CA	Production report ID (L)	1 to 200000 0: the latest production report
CB	Production report ID (H)	

Modbus (Hex)	Write / Read request	Write
CC	Query type	0: time scale data (1 to 2000) 1: angle scale data (1 to 2000) 2: torque scale data (1 to 2000) 3: torque rate scale data (1 to 2000) 4: torque scale data DWORD (1 to 1000) 5: torque scale data DWORD (1001 to 2000) 6: torque rate scale data DWORD (1 to 1000) 7: torque rate scale data DWORD (1001 to 2000) 10: values of coordinate axis 11: parameters 20: time scale data (2001 to 4000) 21: angle scale data (2001 to 4000) 22: torque scale data (2001 to 4000) 23: torque rate scale data (2001 to 4000) 24: torque scale data DWORD (2001 to 3000) 25: torque scale data DWORD (3001 to 4000) 26: torque rate scale data DWORD (2001 to 3000) 27: torque rate scale data DWORD (3001 to 4000) 30: time scale data (4001 to 6000) 31: angle scale data (4001 to 6000) 32: torque scale data (4001 to 6000) 33: torque rate scale data (4001 to 6000) 34: torque scale data DWORD (4001 to 5000) 35: torque scale data DWORD (5001 to 6000) 36: torque rate scale data DWORD (4001 to 5000) 37: torque rate scale data DWORD (5001 to 6000) 40: time scale data (6001 to 8000) 41: angle scale data (6001 to 8000) 42: torque scale data (6001 to 8000) 43: torque rate scale data (6001 to 8000) 44: torque scale data DWORD (6001 to 7000) 45: torque scale data DWORD (7001 to 8000) 46: torque rate scale data DWORD (6001 to 7000) 47: torque rate scale data DWORD (7001 to 8000)
CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

2. Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	751
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error codes are as follows:

Code	Error description	Description
1	Production report ID	Exceeds the range of 0 to 200000
2	Query type	Must be 0 to 7, 10, 11, 20 to 27, 30 to 37, or 40 to 47

A

3. Read the content of the operating curve.

Modbus (Hex)	Query type 0	Query type 1
D2	Time scale 1 data	Angle scale 1 data
D3	Time scale 2 data	Angle scale 2 data
D4	Time scale 3 data	Angle scale 3 data
D5	Time scale 4 data	Angle scale 4 data
D6	Time scale 5 data	Angle scale 5 data
D7	Time scale 6 data	Angle scale 6 data
D8	Time scale 7 data	Angle scale 7 data
D9	Time scale 8 data	Angle scale 8 data
DA	Time scale 9 data	Angle scale 9 data
...	Time scale N data	Angle scale N data
898	Time scale 1991 data	Angle scale 1991 data
899	Time scale 1992 data	Angle scale 1992 data
89A	Time scale 1993 data	Angle scale 1993 data
89B	Time scale 1994 data	Angle scale 1994 data
89C	Time scale 1995 data	Angle scale 1995 data
89D	Time scale 1996 data	Angle scale 1996 data
89E	Time scale 1997 data	Angle scale 1997 data
89F	Time scale 1998 data	Angle scale 1998 data
8A0	Time scale 1999 data	Angle scale 1999 data
8A1	Time scale 2000 data	Angle scale 2000 data

Modbus (Hex)	Query type 2	Query type 3
D2	Torque scale 1 data	Torque rate scale 1 data
D3	Torque scale 2 data	Torque rate scale 2 data
D4	Torque scale 3 data	Torque rate scale 3 data
D5	Torque scale 4 data	Torque rate scale 4 data
D6	Torque scale 5 data	Torque rate scale 5 data
D7	Torque scale 6 data	Torque rate scale 6 data
D8	Torque scale 7 data	Torque rate scale 7 data
D9	Torque scale 8 data	Torque rate scale 8 data
DA	Torque scale 9 data	Torque rate scale 9 data
...	Torque scale N data	Torque rate scale N data
898	Torque scale 1991 data	Torque rate scale 1991 data
899	Torque scale 1992 data	Torque rate scale 1992 data
89A	Torque scale 1993 data	Torque rate scale 1993 data
89B	Torque scale 1994 data	Torque rate scale 1994 data
89C	Torque scale 1995 data	Torque rate scale 1995 data
89D	Torque scale 1996 data	Torque rate scale 1996 data
89E	Torque scale 1997 data	Torque rate scale 1997 data
89F	Torque scale 1998 data	Torque rate scale 1998 data
8A0	Torque scale 1999 data	Torque rate scale 1999 data
8A1	Torque scale 2000 data	Torque rate scale 2000 data

A

Modbus (Hex)	Query type 4	Query type 5
D2	Torque scale 1 data (L)	Torque scale 1001 data (L)
D3	Torque scale 1 data (H)	Torque scale 1001 data (H)
D4	Torque scale 2 data (L)	Torque scale 1002 data (L)
D5	Torque scale 2 data (H)	Torque scale 1002 data (H)
D6	Torque scale 3 data (L)	Torque scale 1003 data (L)
D7	Torque scale 3 data (H)	Torque scale 1003 data (H)
D8	Torque scale 4 data (L)	Torque scale 1004 data (L)
D9	Torque scale 4 data (H)	Torque scale 1004 data (H)
...	Torque scale N data (L)	Torque scale N data (L)
...	Torque scale N data (H)	Torque scale N data (H)
898	Torque scale 996 data (L)	Torque scale 1996 data (L)
899	Torque scale 996 data (H)	Torque scale 1996 data (H)
89A	Torque scale 997 data (L)	Torque scale 1997 data (L)
89B	Torque scale 997 data (H)	Torque scale 1997 data (H)
89C	Torque scale 998 data (L)	Torque scale 1998 data (L)
89D	Torque scale 998 data (H)	Torque scale 1998 data (H)
89E	Torque scale 999 data (L)	Torque scale 1999 data (L)
89F	Torque scale 999 data (H)	Torque scale 1999 data (H)
8A0	Torque scale 1000 data (L)	Torque scale 2000 data (L)
8A1	Torque scale 1000 data (H)	Torque scale 2000 data (H)

Modbus (Hex)	Query type 6	Query type 7
D2	Torque rate scale 1 data (L)	Torque rate scale 1001 data (L)
D3	Torque rate scale 1 data (H)	Torque rate scale 1001 data (H)
D4	Torque rate scale 2 data (L)	Torque rate scale 1002 data (L)
D5	Torque rate scale 2 data (H)	Torque rate scale 1002 data (H)
D6	Torque rate scale 3 data (L)	Torque rate scale 1003 data (L)
D7	Torque rate scale 3 data (H)	Torque rate scale 1003 data (H)
D8	Torque rate scale 4 data (L)	Torque rate scale 1004 data (L)
D9	Torque rate scale 4 data (H)	Torque rate scale 1004 data (H)
...	Torque rate scale N data (L)	Torque rate scale N data (L)
...	Torque rate scale N data (H)	Torque rate scale N data (H)
898	Torque rate scale 996 data (L)	Torque rate scale 1996 data (L)
899	Torque rate scale 996 data (H)	Torque rate scale 1996 data (H)
89A	Torque rate scale 997 data (L)	Torque rate scale 1997 data (L)
89B	Torque rate scale 997 data (H)	Torque rate scale 1997 data (H)
89C	Torque rate scale 998 data (L)	Torque rate scale 1998 data (L)
89D	Torque rate scale 998 data (H)	Torque rate scale 1998 data (H)
89E	Torque rate scale 999 data (L)	Torque rate scale 1999 data (L)
89F	Torque rate scale 999 data (H)	Torque rate scale 1999 data (H)
8A0	Torque rate scale 1000 data (L)	Torque rate scale 2000 data (L)
8A1	Torque rate scale 1000 data (H)	Torque rate scale 2000 data (H)

Modbus (Hex)	Query type 10	Description
D2	Running angle of stage 1	Unit: degree
D3	Running angle of stage 2	
D4	Running angle of stage 3	
D5	Running angle of stage 4	
D6	Running angle of stage 5	
D7	Running angle of stage 6	
D8	Running angle of loosening stage 1	
D9	Running angle of loosening stage 2	
DA	Max. torque of stage 1	
DB	Max. torque of stage 2	Unit: current torque unit
DC	Max. torque of stage 3	
DD	Max. torque of stage 4	
DE	Max. torque of stage 5	
DF	Max. torque of stage 6	
E0	Max. torque of loosening stage 1	
E1	Max. torque of loosening stage 2	
E2	Operation time of stage 1	
E3	Operation time of stage 2	
E4	Operation time of stage 3	Unit: ms
E5	Operation time of stage 4	
E6	Operation time of stage 5	
E7	Operation time of stage 6	
E8	Operation time of loosening stage 1	
E9	Operation time of loosening stage 2	
EA	Max. time on the scale	Unit: ms
EB	Max. angle on the scale	Unit: degree
EC	Max. torque on the scale	Unit: current torque unit
ED	Max. torque rate on the scale	Unit: current torque rate unit
EE	Total number of curve coordinates	-
EF	Max. torque	Unit: current torque unit
F0	Min. torque	Unit: current torque unit
F1	Max. torque rate	Unit: current torque rate unit
F2	Max. angle	Unit: degree
F3	Min. angle	Unit: degree
F4	Version of the curve scale	-
F5	Sampling rate for curves	0: 10 ms → 2 ms when start torque is reached 1: 2 ms; max. 4 seconds per production report entry 2: 2 ms; max. 8 seconds per production report entry 3: 1 ms; max. 4 seconds per production report entry 4: 1 ms; max. 8 seconds per production report entry
F6	Max. torque rate of curve	Unit: current torque rate unit
F7	Min. time on the scale	Unit: ms
F8	Min. angle on the scale	Unit: degree
F9	Min. torque on the scale	Unit: current torque unit

Modbus (Hex)	Query type 10	Description
FA	Min. torque rate on the scale	Unit: current torque rate unit
FB to 103	Reserved	-
104	Max. torque of stage 1 (L)	Unit: 0.001 x current torque unit
105	Max. torque of stage 1 (H)	
106	Max. torque of stage 2 (L)	Unit: 0.001 x current torque unit
107	Max. torque of stage 2 (H)	
108	Max. torque of stage 3 (L)	Unit: 0.001 x current torque unit
109	Max. torque of stage 3 (H)	
10A	Max. torque of stage 4 (L)	Unit: 0.001 x current torque unit
10B	Max. torque of stage 4 (H)	
10C	Max. torque of stage 5 (L)	Unit: 0.001 x current torque unit
10D	Max. torque of stage 5 (H)	
10E	Max. torque of stage 6 (L)	Unit: 0.001 x current torque unit
10F	Max. torque of stage 6 (H)	
110	Max. torque of loosening stage 1 (L)	Unit: 0.001 x current torque unit
111	Max. torque of loosening stage 1 (H)	
112	Max. torque of loosening stage 2 (L)	Unit: 0.001 x current torque unit
113	Max. torque of loosening stage 2 (H)	
114 to 11B	Reserved	-
11C	Max. torque on the scale (L)	Unit: 0.001 x current torque unit
11D	Max. torque on the scale (H)	
11E	Max. torque rate on the scale (L)	Unit: 0.001 x current torque rate unit
11F	Max. torque rate on the scale (H)	
120	Max. torque (L)	Unit: 0.001 x current torque unit
121	Max. torque (H)	
122	Min. torque (L)	Unit: 0.001 x current torque unit
123	Min. torque (H)	
124	Max. torque rate (L)	Unit: 0.001 x current torque rate unit
125	Max. torque rate (H)	
126	Max. torque rate of curve (L)	Unit: 0.0001 x current torque rate unit
127	Max. torque rate of curve (H)	
128	Min. torque on the scale (L)	Unit: 0.001 x current torque unit
129	Min. torque on the scale (H)	
12A	Min. torque rate on the scale (L)	Unit: 0.001 x current torque rate unit
12B	Min. torque rate on the scale (H)	

A

Modbus (Hex)								Query type 11 (version number 0)	Description
D2								Parameter ID	1 to 500
D3								Version number	0
D4								Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in
D5 to DB								Reserved	-
DC								Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
DD to E6								Reserved	-
E7								Max. current for tightening	-
E8								Max. tightening time	Unit: ms
E9								Max. tightening angle	Unit: degree
EA								Reserved	-
EB								Delay before tightening starts	Unit: ms
EC								Min. tightening angle	Unit: degree
ED to F1								Reserved	-
F2								Max. loosening time	Unit: ms
F3								Max. loosening angle	Unit: degree
F4								Reserved	-
F5								Delay before loosening starts	Unit: ms
F6 to FA								Reserved	-
FB								ID of the prevail torque to be linked	1 to 500
FC to 103								Reserved	-
104	136	168	19A	1CC	1FE	230	262	Target On / Off (L)	Bit 0 to 1 Control method type
									0: position 1: speed
									Bit 2 to 3 Operation after stage completion
									0: stop 1: execute the next stage
									Bit 4 to 5 Control method
									0: angle 1: torque 2: torque rate
105	137	169	19B	1CD	1FF	231	263	Target On / Off (H)	Bit 6 Rotation direction of the stage
									0: CW 1: CCW
									Bit 7 to 8 Hold time switch of the final stage
									0: Off 1: On
									Bit 9 Prevail torque
									0: Off 1: On
106	138	16A	19C	1CE	200	232	264	Target torque	
								Unit: 0.001 Nm (used with Target On / Off Bit 4, 1: torque)	
107	139	16B	19D	1CF	201	233	265	Rotation speed	
								Unit: rpm	

Modbus (Hex)								Query type 11 (version number 0)	Description
108	13A	16C	19E	1D0	202	234	266	Target angle	Unit: degree (used with Target On / Off Bit 4, 0: angle)
109	13B	16D	19F	1D1	203	235	267	Hold / pause time after stage completion	Unit: ms
10A	13C	16E	1A0	1D2	204	236	268	Acceleration time	Unit: ms
10B	13D	16F	1A1	1D3	205	237	269	Deceleration time	Unit: ms
10C	13E	170	1A2	1D4	206	238	26A	Start torque for torque rate calculation	-
10D	13F	171	1A3	1D5	207	239	26B	Angle interval for torque rate calculation	-
10E	140	172	1A4	1D6	208	23A	26C	Target torque rate	Unit: 0.0001 Nm/degree (used with Target On / Off Bit 4, 2: torque rate)
10F to 11D	141 to 14F	173 to 181	1A5 to 1B3	1D7 to 1E5	209 to 217	23B to 249	26D to 27B	Reserved	-
11E	150	182	1B4	1E6	218	24A	27C	Max. angle	Used with Limit On / Off (L) Bit 2
11F	151	183	1B5	1E7	219	24B	27D	Min. angle	Used with Limit On / Off (L) Bit 2
120	152	184	1B6	1E8	21A	24C	27E	Max. clamp torque	Used with Limit On / Off (L) Bit 3
121	153	185	1B7	1E9	21B	24D	27F	Min. clamp torque	Used with Limit On / Off (L) Bit 3
122	154	186	1B8	1EA	21C	24E	280	Max. torque	Used with Limit On / Off (H) Bit 0
123	155	187	1B9	1EB	21D	24F	281	Min. torque	Used with Limit On / Off (H) Bit 0
124 to 12A	156 to 15C	188 to 18E	1BA to 1C0	1EC to 1F2	21E to 224	250 to 256	282 to 288	Reserved	-
12B	15D	18F	1C1	1F3	225	257	289	Max. operation time	Unit: ms Used with Limit On / Off (H) Bit 15
12C	15E	190	1C2	1F4	226	258	28A	Min. operation time	Unit: ms Used with Limit On / Off (H) Bit 15
12D	15F	191	1C3	1F5	227	259	28B	Reserved	-
12E	160	192	1C4	1F6	228	25A	28C	Reserved	-
12F	161	193	1C5	1F7	229	25B	28D	Angle range for prevail torque calculation	Set the angle range (%) of the stage to calculate the average torque
130	162	194	1C6	1F8	22A	25C	28E	Reserved	-
131	163	195	1C7	1F9	22B	25D	28F	Reserved	-
132	164	196	1C8	1FA	22C	25E	290	Limit On / Off (L)	Bit 2: limit the angle
133	165	197	1C9	1FB	22D	25F	291	Limit On / Off (H)	Bit 0: limit the torque Bit 15: limit the operation time
134	166	198	1CA	1FC	22E	260	292	Reserved	-
135	167	199	1CB	1FD	22F	261	293	Stage code	10: start stage 20: rundown stage (angle / torque mode) 29: rundown stage (torque rate mode) 30: pre-tightening stage 40: tightening stage 90: first stage of loosening 91: second stage of loosening

A

Modbus (Hex)	Query type 11 (version number 1)	Description
D2	Parameter ID	1 to 500
D3	Version number	1
D4	Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in
D5 to D7	Reserved	-
D8	1st stage loosening angle	-
D9	2nd stage loosening angle	-
DA	Switch for monitoring the min. loosening torque	-
DB	Reserved	-
DC	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
DD to E6	Reserved	-
E7	Max. current for tightening	-
E8	Max. tightening time	Unit: ms
E9	Max. tightening angle	Unit: degree
EA	Reserved	-
EB	Delay before tightening starts	Unit: ms
EC	Min. tightening angle	Unit: degree
ED to EF	Reserved	-
F0	Rotation direction of loosening	-
F1	Reserved	-
F2	Max. loosening time	Unit: ms
F3	Max. loosening angle	Unit: degree
F4	Reserved	-
F5	Delay before loosening starts	Unit: ms
F6	Min. loosening angle	Unit: degree
F7 to F8	Reserved	-
F9	Min. loosening torque (L)	Unit: 0.001 Nm
FA	Min. loosening torque (H)	
FB	ID of the prevail torque to be linked	1 to 500
FC to 101	Reserved	-
102	1st stage loosening speed	-
103	2nd stage loosening speed	-

A

Modbus (Hex)								Query type 11 (version number 1)	Description	
104	136	168	19A	1CC	1FE	230	262	Target On / Off (L)	Bit 0 to 1 Control method type	0: position 1: speed
									Bit 2 to 3 Operation after stage completion	0: stop 1: execute the next stage
									Bit 4 to 5 Control method	0: angle 1: torque 2: torque rate
									Bit 6 Rotation direction of the stage	0: CW 1: CCW
									Bit 7 to 8 Hold time switch of the final stage	0: Off 1: On
									Bit 9 Prevail torque	0: Off 1: On
									Bit 10 Reserved	-
									Bit 11 Relative / absolute torque command	0: absolute 1: relative
									Bit 12 Timing to add the relative torque	0: beginning of a stage 1: snug point
105	137	169	19B	1CD	1FF	231	263	Target On / Off (H)	-	
106	138	16A	19C	1CE	200	232	264	Final target speed	-	
107	139	16B	19D	1CF	201	233	265	Rotation speed	Unit: rpm	
108	13A	16C	19E	1D0	202	234	266	Target angle	Unit: degree (used with Target On / Off Bit 4, 0: angle)	
109	13B	16D	19F	1D1	203	235	267	Hold / pause time after stage completion	Unit: ms	
10A	13C	16E	1A0	1D2	204	236	268	Acceleration time	Unit: ms	
10B	13D	16F	1A1	1D3	205	237	269	Deceleration time	Unit: ms	
10C	13E	170	1A2	1D4	206	238	26A	Acceleration time of 2nd stage	-	
10D	13F	171	1A3	1D5	207	239	26B	Angle interval for torque rate calculation	-	
10E	140	172	1A4	1D6	208	23A	26C	Final pause time	Unit: ms	
10F	141	173	1A5	1D7	209	23B	26D	Reserved	-	
110	142	174	1A6	1D8	20A	23C	26E	Target torque (L)	Unit: 0.001 Nm (used with Target On / Off Bit 4, 1: torque)	
111	143	175	1A7	1D9	20B	23D	26F	Target torque (H)		
112	144	176	1A8	1DA	20C	23E	270	Reserved	-	
113	145	177	1A9	1DB	20D	23F	271	Reserved	-	
114	146	178	1AA	1DC	20E	240	272	Target torque rate (L)	Unit: 0.0001 Nm/degree (used with Target On / Off Bit 4, 2: torque rate)	
115	147	179	1AB	1DD	20F	241	273	Target torque rate (H)		

A

Modbus (Hex)									Query type 11 (version number 1)	Description
116	148	17A	1AC	1DE	210	242	274	Torque of 1st stage (L)		
117	149	17B	1AD	1DF	211	243	275	Torque of 1st stage (H)	Unit: 0.001 Nm	
118	14A	17C	1AE	1E0	212	244	276	Reserved	-	
119	14B	17D	1AF	1E1	213	245	277	Reserved	-	
11A	14C	17E	1B0	1E2	214	246	278	Max. clamp torque (L)	Unit: 0.001 Nm	
11B	14D	17F	1B1	1E3	215	247	279	Max. clamp torque (H)	Used with Limit On / Off (L) Bit 3	
11C	14E	180	1B2	1E4	216	248	27A	Min. clamp torque (L)	Unit: 0.001 Nm	
11D	14F	181	1B3	1E5	217	249	27B	Min. clamp torque (H)	Used with Limit On / Off (L) Bit 3	
11E	150	182	1B4	1E6	218	24A	27C	Max. angle	Used with Limit On / Off (L) Bit 2	
11F	151	183	1B5	1E7	219	24B	27D	Min. angle	Used with Limit On / Off (L) Bit 2	
120	152	184	1B6	1E8	21A	24C	27E	Max. torque (L)	Unit: 0.001 Nm	
121	153	185	1B7	1E9	21B	24D	27F	Max. torque (H)	Used with Limit On / Off (H) Bit 0	
122	154	186	1B8	1EA	21C	24E	280	Min. torque (L)	Unit: 0.001 Nm	
123	155	187	1B9	1EB	21D	24F	281	Min. torque (H)	Used with Limit On / Off (H) Bit 0	
124 to 12A	156 to 15C	188 to 18E	1BA to 1C0	1EC to 1F2	21E to 224	250 to 256	282 to 288	Reserved	-	
12B	15D	18F	1C1	1F3	225	257	289	Max. operation time	Unit: ms Used with Limit On / Off (H) Bit 15	
12C	15E	190	1C2	1F4	226	258	28A	Min. operation time	Unit: ms Used with Limit On / Off (H) Bit 15	
12D	15F	191	1C3	1F5	227	259	28B	Reserved	-	
12E	160	192	1C4	1F6	228	25A	28C	Reserved	-	
12F	161	193	1C5	1F7	229	25B	28D	Angle range for prevail torque calculation	Set the angle range (%) of the stage to calculate the average torque	
130	162	194	1C6	1F8	22A	25C	28E	Reserved	-	
131	163	195	1C7	1F9	22B	25D	28F	Reserved	-	
132	164	196	1C8	1FA	22C	25E	290	Limit On / Off (L)	Bit 2: limit the angle	
133	165	197	1C9	1FB	22D	25F	291	Limit On / Off (H)	Bit 0: limit the torque Bit 15: limit the operation time	
134	166	198	1CA	1FC	22E	260	292	Reserved	-	
135	167	199	1CB	1FD	22F	261	293	Stage code	10: start stage 20: rundown stage (angle / torque mode) 29: rundown stage (torque rate mode) 30: pre-tightening stage 40: tightening stage 90: 1st stage of loosening 91: 2nd stage of loosening	

A

A

Modbus (Hex)	Query type 20	Query type 21
D2	Time scale 2001 data	Angle scale 2001 data
D3	Time scale 2002 data	Angle scale 2002 data
D4	Time scale 2003 data	Angle scale 2003 data
D5	Time scale 2004 data	Angle scale 2004 data
D6	Time scale 2005 data	Angle scale 2005 data
D7	Time scale 2006 data	Angle scale 2006 data
D8	Time scale 2007 data	Angle scale 2007 data
D9	Time scale 2008 data	Angle scale 2008 data
DA	Time scale 2009 data	Angle scale 2009 data
...	Time scale N data	Angle scale N data
898	Time scale 3991 data	Angle scale 3991 data
899	Time scale 3992 data	Angle scale 3992 data
89A	Time scale 3993 data	Angle scale 3993 data
89B	Time scale 3994 data	Angle scale 3994 data
89C	Time scale 3995 data	Angle scale 3995 data
89D	Time scale 3996 data	Angle scale 3996 data
89E	Time scale 3997 data	Angle scale 3997 data
89F	Time scale 3998 data	Angle scale 3998 data
8A0	Time scale 3999 data	Angle scale 3999 data
8A1	Time scale 4000 data	Angle scale 4000 data

Modbus (Hex)	Query type 22	Query type 23
D2	Torque scale 2001 data	Torque rate scale 2001 data
D3	Torque scale 2002 data	Torque rate scale 2002 data
D4	Torque scale 2003 data	Torque rate scale 2003 data
D5	Torque scale 2004 data	Torque rate scale 2004 data
D6	Torque scale 2005 data	Torque rate scale 2005 data
D7	Torque scale 2006 data	Torque rate scale 2006 data
D8	Torque scale 2007 data	Torque rate scale 2007 data
D9	Torque scale 2008 data	Torque rate scale 2008 data
DA	Torque scale 2009 data	Torque rate scale 2009 data
...	Torque scale N data	Torque rate scale N data
898	Torque scale 3991 data	Torque rate scale 3991 data
899	Torque scale 3992 data	Torque rate scale 3992 data
89A	Torque scale 3993 data	Torque rate scale 3993 data
89B	Torque scale 3994 data	Torque rate scale 3994 data
89C	Torque scale 3995 data	Torque rate scale 3995 data
89D	Torque scale 3996 data	Torque rate scale 3996 data
89E	Torque scale 3997 data	Torque rate scale 3997 data
89F	Torque scale 3998 data	Torque rate scale 3998 data
8A0	Torque scale 3999 data	Torque rate scale 3999 data
8A1	Torque scale 4000 data	Torque rate scale 4000 data

Modbus (Hex)	Query type 24	Query type 25
D2	Torque scale 2001 data (L)	Torque scale 3001 data (L)
D3	Torque scale 2001 data (H)	Torque scale 3001 data (H)
D4	Torque scale 2002 data (L)	Torque scale 3002 data (L)
D5	Torque scale 2002 data (H)	Torque scale 3002 data (H)
D6	Torque scale 2003 data (L)	Torque scale 33003 data (L)
D7	Torque scale 2003 data (H)	Torque scale 3003 data (H)
D8	Torque scale 2004 data (L)	Torque scale 3004 data (L)
D9	Torque scale 2004 data (H)	Torque scale 3004 data (H)
...	Torque scale N data (L)	Torque scale N data (L)
...	Torque scale N data (H)	Torque scale N data (H)
898	Torque scale 2996 data (L)	Torque scale 3996 data (L)
899	Torque scale 2996 data (H)	Torque scale 3996 data (H)
89A	Torque scale 2997 data (L)	Torque scale 3997 data (L)
89B	Torque scale 2997 data (H)	Torque scale 3997 data (H)
89C	Torque scale 2998 data (L)	Torque scale 3998 data (L)
89D	Torque scale 2998 data (H)	Torque scale 3998 data (H)
89E	Torque scale 2999 data (L)	Torque scale 3999 data (L)
89F	Torque scale 2999 data (H)	Torque scale 3999 data (H)
8A0	Torque scale 3000 data (L)	Torque scale 4000 data (L)
8A1	Torque scale 3000 data (H)	Torque scale 4000 data (H)

Modbus (Hex)	Query type 26	Query type 27
D2	Torque rate scale 2001 data (L)	Torque rate scale 3001 data (L)
D3	Torque rate scale 2001 data (H)	Torque rate scale 3001 data (H)
D4	Torque rate scale 2002 data (L)	Torque rate scale 3002 data (L)
D5	Torque rate scale 2002 data (H)	Torque rate scale 3002 data (H)
D6	Torque rate scale 2003 data (L)	Torque rate scale 3003 data (L)
D7	Torque rate scale 2003 data (H)	Torque rate scale 3003 data (H)
D8	Torque rate scale 2004 data (L)	Torque rate scale 3004 data (L)
D9	Torque rate scale 2004 data (H)	Torque rate scale 3004 data (H)
...	Torque rate scale N data (L)	Torque rate scale N data (L)
...	Torque rate scale N data (H)	Torque rate scale N data (H)
898	Torque rate scale 2996 data (L)	Torque rate scale 3996 data (L)
899	Torque rate scale 2996 data (H)	Torque rate scale 3996 data (H)
89A	Torque rate scale 2997 data (L)	Torque rate scale 3997 data (L)
89B	Torque rate scale 2997 data (H)	Torque rate scale 3997 data (H)
89C	Torque rate scale 2998 data (L)	Torque rate scale 3998 data (L)
89D	Torque rate scale 2998 data (H)	Torque rate scale 3998 data (H)
89E	Torque rate scale 2999 data (L)	Torque rate scale 3999 data (L)
89F	Torque rate scale 2999 data (H)	Torque rate scale 3999 data (H)
8A0	Torque rate scale 3000 data (L)	Torque rate scale 4000 data (L)
8A1	Torque rate scale 3000 data (H)	Torque rate scale 4000 data (H)

A

Modbus (Hex)	Query type 30	Query type 31
D2	Time scale 4001 data	Angle scale 4001 data
D3	Time scale 4002 data	Angle scale 4002 data
D4	Time scale 4003 data	Angle scale 4003 data
D5	Time scale 4004 data	Angle scale 4004 data
D6	Time scale 4005 data	Angle scale 4005 data
D7	Time scale 4006 data	Angle scale 4006 data
D8	Time scale 4007 data	Angle scale 4007 data
D9	Time scale 4008 data	Angle scale 4008 data
DA	Time scale 4009 data	Angle scale 4009 data
...	Time scale N data	Angle scale N data
898	Time scale 5991 data	Angle scale 5991 data
899	Time scale 5992 data	Angle scale 5992 data
89A	Time scale 5993 data	Angle scale 5993 data
89B	Time scale 5994 data	Angle scale 5994 data
89C	Time scale 5995 data	Angle scale 5995 data
89D	Time scale 5996 data	Angle scale 5996 data
89E	Time scale 5997 data	Angle scale 5997 data
89F	Time scale 5998 data	Angle scale 5998 data
8A0	Time scale 5999 data	Angle scale 5999 data
8A1	Time scale 6000 data	Angle scale 6000 data

Modbus (Hex)	Query type 32	Query type 33
D2	Torque scale 4001 data	Torque rate scale 4001 data
D3	Torque scale 4002 data	Torque rate scale 4002 data
D4	Torque scale 4003 data	Torque rate scale 4003 data
D5	Torque scale 4004 data	Torque rate scale 4004 data
D6	Torque scale 4005 data	Torque rate scale 4005 data
D7	Torque scale 4006 data	Torque rate scale 4006 data
D8	Torque scale 4007 data	Torque rate scale 4007 data
D9	Torque scale 4008 data	Torque rate scale 4008 data
DA	Torque scale 4009 data	Torque rate scale 4009 data
...	Torque scale N data	Torque rate scale N data
898	Torque scale 5991 data	Torque rate scale 5991 data
899	Torque scale 5992 data	Torque rate scale 5992 data
89A	Torque scale 5993 data	Torque rate scale 5993 data
89B	Torque scale 5994 data	Torque rate scale 5994 data
89C	Torque scale 5995 data	Torque rate scale 5995 data
89D	Torque scale 5996 data	Torque rate scale 5996 data
89E	Torque scale 5997 data	Torque rate scale 5997 data
89F	Torque scale 5998 data	Torque rate scale 5998 data
8A0	Torque scale 5999 data	Torque rate scale 5999 data
8A1	Torque scale 6000 data	Torque rate scale 6000 data

Modbus (Hex)	Query type 34	Query type 35
D2	Torque scale 4001 data (L)	Torque scale 5001 data (L)
D3	Torque scale 4001 data (H)	Torque scale 5001 data (H)
D4	Torque scale 4002 data (L)	Torque scale 5002 data (L)
D5	Torque scale 4002 data (H)	Torque scale 5002 data (H)
D6	Torque scale 4003 data (L)	Torque scale 5003 data (L)
D7	Torque scale 4003 data (H)	Torque scale 5003 data (H)
D8	Torque scale 4004 data (L)	Torque scale 5004 data (L)
D9	Torque scale 4004 data (H)	Torque scale 5004 data (H)
...	Torque scale N data (L)	Torque scale N data (L)
...	Torque scale N data (H)	Torque scale N data (H)
898	Torque scale 4996 data (L)	Torque scale 5996 data (L)
899	Torque scale 4996 data (H)	Torque scale 5996 data (H)
89A	Torque scale 4997 data (L)	Torque scale 5997 data (L)
89B	Torque scale 4997 data (H)	Torque scale 5997 data (H)
89C	Torque scale 4998 data (L)	Torque scale 5998 data (L)
89D	Torque scale 4998 data (H)	Torque scale 5998 data (H)
89E	Torque scale 4999 data (L)	Torque scale 5999 data (L)
89F	Torque scale 4999 data (H)	Torque scale 5999 data (H)
8A0	Torque scale 5000 data (L)	Torque scale 6000 data (L)
8A1	Torque scale 5000 data (H)	Torque scale 6000 data (H)

Modbus (Hex)	Query type 36	Query type 37
D2	Torque rate scale 4001 data (L)	Torque rate scale 5001 data (L)
D3	Torque rate scale 4001 data (H)	Torque rate scale 5001 data (H)
D4	Torque rate scale 4002 data (L)	Torque rate scale 5002 data (L)
D5	Torque rate scale 4002 data (H)	Torque rate scale 5002 data (H)
D6	Torque rate scale 4003 data (L)	Torque rate scale 5003 data (L)
D7	Torque rate scale 4003 data (H)	Torque rate scale 5003 data (H)
D8	Torque rate scale 4004 data (L)	Torque rate scale 5004 data (L)
D9	Torque rate scale 4004 data (H)	Torque rate scale 5004 data (H)
...	Torque rate scale N data (L)	Torque rate scale N data (L)
...	Torque rate scale N data (H)	Torque rate scale N data (H)
898	Torque rate scale 4996 data (L)	Torque rate scale 5996 data (L)
899	Torque rate scale 4996 data (H)	Torque rate scale 5996 data (H)
89A	Torque rate scale 4997 data (L)	Torque rate scale 5997 data (L)
89B	Torque rate scale 4997 data (H)	Torque rate scale 5997 data (H)
89C	Torque rate scale 4998 data (L)	Torque rate scale 5998 data (L)
89D	Torque rate scale 4998 data (H)	Torque rate scale 5998 data (H)
89E	Torque rate scale 4999 data (L)	Torque rate scale 5999 data (L)
89F	Torque rate scale 4999 data (H)	Torque rate scale 5999 data (H)
8A0	Torque rate scale 5000 data (L)	Torque rate scale 6000 data (L)
8A1	Torque rate scale 5000 data (H)	Torque rate scale 6000 data (H)

Modbus (Hex)	Query type 40	Query type 41
D2	Time scale 6001 data	Angle scale 6001 data
D3	Time scale 6002 data	Angle scale 6002 data
D4	Time scale 6003 data	Angle scale 6003 data
D5	Time scale 6004 data	Angle scale 6004 data
D6	Time scale 6005 data	Angle scale 6005 data
D7	Time scale 6006 data	Angle scale 6006 data
D8	Time scale 6007 data	Angle scale 6007 data
D9	Time scale 6008 data	Angle scale 6008 data
DA	Time scale 6009 data	Angle scale 6009 data
...	Time scale N data	Angle scale N data
898	Time scale 7991 data	Angle scale 7991 data
899	Time scale 7992 data	Angle scale 7992 data
89A	Time scale 7993 data	Angle scale 7993 data
89B	Time scale 7994 data	Angle scale 7994 data
89C	Time scale 7995 data	Angle scale 7995 data
89D	Time scale 7996 data	Angle scale 7996 data
89E	Time scale 7997 data	Angle scale 7997 data
89F	Time scale 7998 data	Angle scale 7998 data
8A0	Time scale 7999 data	Angle scale 7999 data
8A1	Time scale 8000 data	Angle scale 8000 data

Modbus (Hex)	Query type 42	Query type 43
D2	Torque scale 6001 data	Torque rate scale 6001 data
D3	Torque scale 6002 data	Torque rate scale 6002 data
D4	Torque scale 6003 data	Torque rate scale 6003 data
D5	Torque scale 6004 data	Torque rate scale 6004 data
D6	Torque scale 6005 data	Torque rate scale 6005 data
D7	Torque scale 6006 data	Torque rate scale 6006 data
D8	Torque scale 6007 data	Torque rate scale 6007 data
D9	Torque scale 6008 data	Torque rate scale 6008 data
DA	Torque scale 6009 data	Torque rate scale 6009 data
...	Torque scale N data	Torque rate scale N data
898	Torque scale 7991 data	Torque rate scale 7991 data
899	Torque scale 7992 data	Torque rate scale 7992 data
89A	Torque scale 7993 data	Torque rate scale 7993 data
89B	Torque scale 7994 data	Torque rate scale 7994 data
89C	Torque scale 7995 data	Torque rate scale 7995 data
89D	Torque scale 7996 data	Torque rate scale 7996 data
89E	Torque scale 7997 data	Torque rate scale 7997 data
89F	Torque scale 7998 data	Torque rate scale 7998 data
8A0	Torque scale 7999 data	Torque rate scale 7999 data
8A1	Torque scale 8000 data	Torque rate scale 8000 data

A

Modbus (Hex)	Query type 44	Query type 45
D2	Torque scale 6001 data (L)	Torque scale 7001 data (L)
D3	Torque scale 6001 data (H)	Torque scale 7001 data (H)
D4	Torque scale 6002 data (L)	Torque scale 7002 data (L)
D5	Torque scale 6002 data (H)	Torque scale 7002 data (H)
D6	Torque scale 6003 data (L)	Torque scale 7003 data (L)
D7	Torque scale 6003 data (H)	Torque scale 7003 data (H)
D8	Torque scale 6004 data (L)	Torque scale 7004 data (L)
D9	Torque scale 6004 data (H)	Torque scale 7004 data (H)
...	Torque scale N data (L)	Torque scale N data (L)
...	Torque scale N data (H)	Torque scale N data (H)
898	Torque scale 6996 data (L)	Torque scale 7996 data (L)
899	Torque scale 6996 data (H)	Torque scale 7996 data (H)
89A	Torque scale 6997 data (L)	Torque scale 7997 data (L)
89B	Torque scale 6997 data (H)	Torque scale 7997 data (H)
89C	Torque scale 6998 data (L)	Torque scale 7998 data (L)
89D	Torque scale 6998 data (H)	Torque scale 7998 data (H)
89E	Torque scale 6999 data (L)	Torque scale 7999 data (L)
89F	Torque scale 6999 data (H)	Torque scale 7999 data (H)
8A0	Torque scale 7000 data (L)	Torque scale 8000 data (L)
8A1	Torque scale 7000 data (H)	Torque scale 8000 data (H)

Modbus (Hex)	Query type 46	Query type 47
D2	Torque rate scale 6001 data (L)	Torque rate scale 7001 data (L)
D3	Torque rate scale 6001 data (H)	Torque rate scale 7001 data (H)
D4	Torque rate scale 6002 data (L)	Torque rate scale 7002 data (L)
D5	Torque rate scale 6002 data (H)	Torque rate scale 7002 data (H)
D6	Torque rate scale 6003 data (L)	Torque rate scale 7003 data (L)
D7	Torque rate scale 6003 data (H)	Torque rate scale 7003 data (H)
D8	Torque rate scale 6004 data (L)	Torque rate scale 7004 data (L)
D9	Torque rate scale 6004 data (H)	Torque rate scale 7004 data (H)
...	Torque rate scale N data (L)	Torque rate scale N data (L)
...	Torque rate scale N data (H)	Torque rate scale N data (H)
898	Torque rate scale 6996 data (L)	Torque rate scale 7996 data (L)
899	Torque rate scale 6996 data (H)	Torque rate scale 7996 data (H)
89A	Torque rate scale 6997 data (L)	Torque rate scale 7997 data (L)
89B	Torque rate scale 6997 data (H)	Torque rate scale 7997 data (H)
89C	Torque rate scale 6998 data (L)	Torque rate scale 7998 data (L)
89D	Torque rate scale 6998 data (H)	Torque rate scale 7998 data (H)
89E	Torque rate scale 6999 data (L)	Torque rate scale 7999 data (L)
89F	Torque rate scale 6999 data (H)	Torque rate scale 7999 data (H)
8A0	Torque rate scale 7000 data (L)	Torque rate scale 8000 data (L)
8A1	Torque rate scale 7000 data (H)	Torque rate scale 8000 data (H)

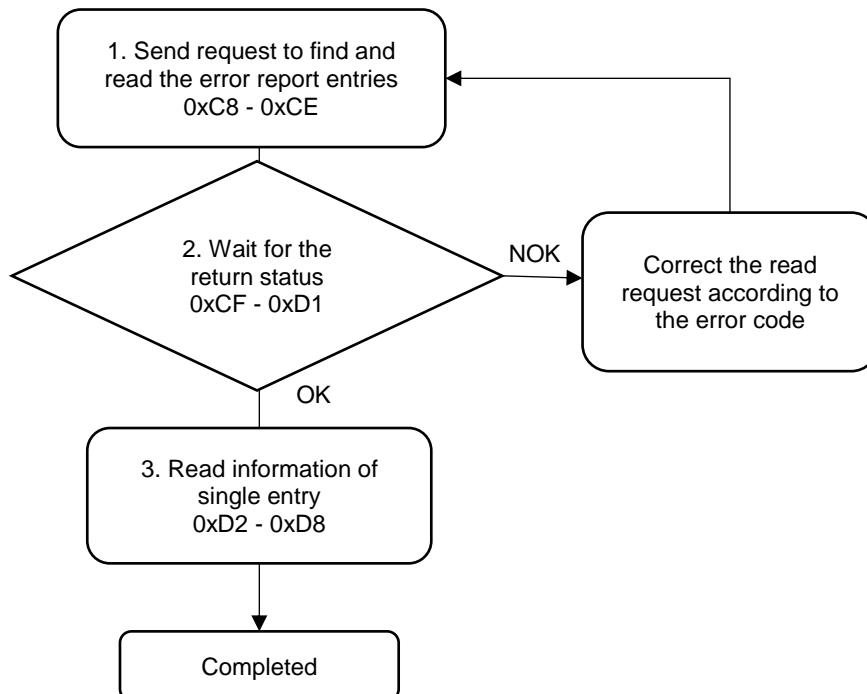
## #752 Find and read the error report entries

Content description:

Use function code #752 with 0x69 to read the content of the error report.

Modbus (Hex)	Tool 1 / Tool 2 common status	R/W
69	Current No. of error report entries	R

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	752
C9	Version number	0
CA	Error report ID	1 to 60000 0: the latest error report
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	752
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Error report ID	Exceeds the range of 0 to 60000

A

3. Read the content of the error report in 0xD2 - 0xD8.

Modbus (Hex)	Function	Description
D2	Date / Time	Year
D3	Date / Time	Month
D4	Date / Time	Day
D5	Date / Time	Hour
D6	Date / Time	Minute
D7	Date / Time	Second
D8	AL / NG code	Refer to CH12*

Note: 0x1001 - 0x1999: Tool 1 device alarm (AL); 0x2000 - 0x2999: Tool 2 device alarm (AL).  
0x3001 - 0x3999: Tool 1 tightening error (NG); 0x4000 - 0x4999: Tool 2 tightening error (NG).

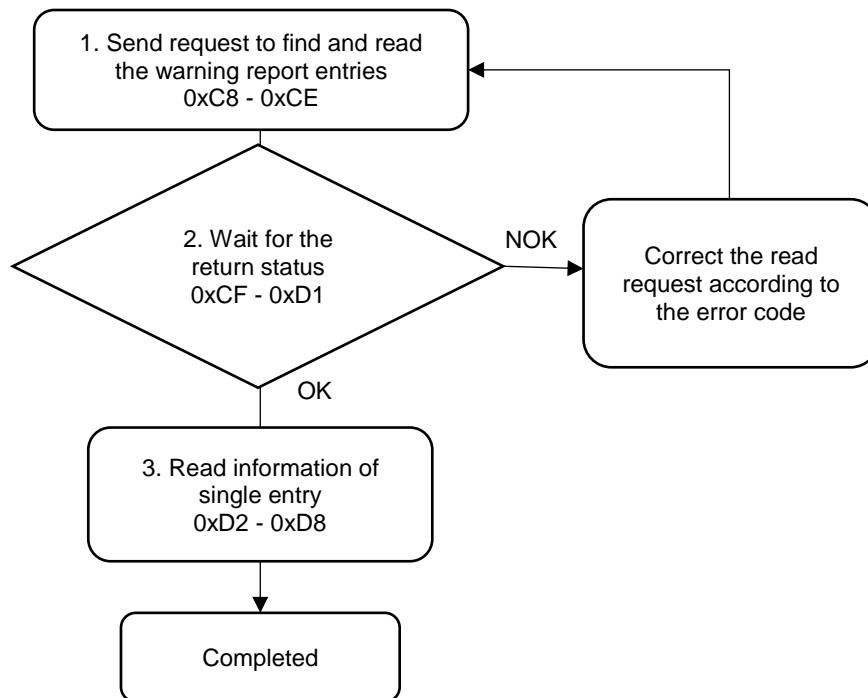
### #753 Find and read the warning report entries

Content description:

Use function code #753 with 0x6A to read the content of the warning report.

Modbus (Hex)	Tool 1 / Tool 2 common status	R/W
6A	Current No. of warning report entries	R

Handshake signal description:



A

- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	753
C9	Version number	0
CA	Warning report ID	1 to 60000 0: the latest warning report
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	753
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Warning report ID	Exceeds the range of 0 to 60000

- Read the content of the warning report in 0xD2 - 0xD8.

Modbus (Hex)	Function	Description
D2	Date / Time	Year
D3	Date / Time	Month
D4	Date / Time	Day
D5	Date / Time	Hour
D6	Date / Time	Minute
D7	Date / Time	Second
D8	WN code	Refer to CH12*

Note: 0x5001 - 0x5999: Tool 1 operation warning (WN); 0x6000 - 0x6999: Tool 2 operation warning (WN)

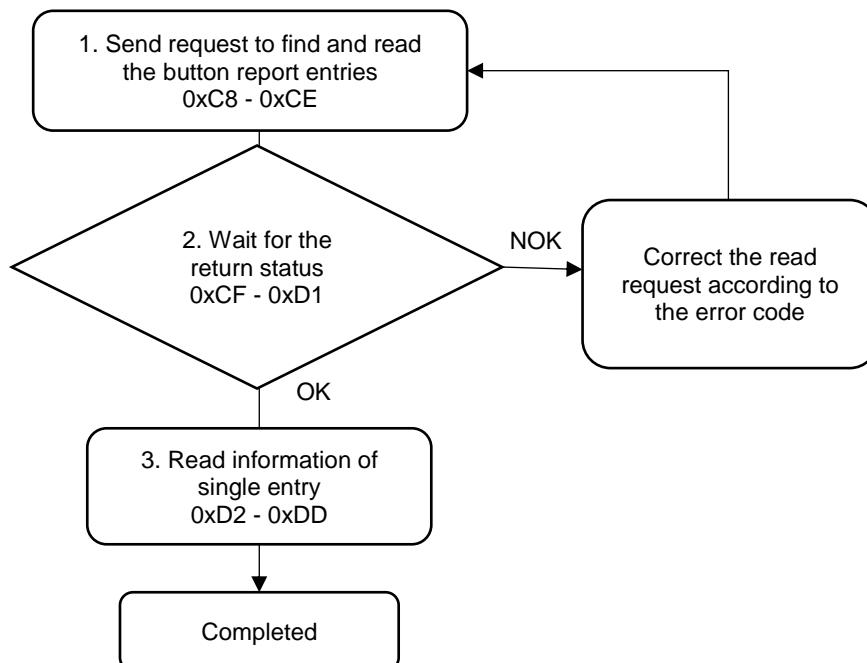
## #754 Find and read the button report entries

Content description:

Use function code #754 with 0x6D and 0x6E to read the content of the button report.

Modbus (Hex)	Tool 1 / Tool 2 common status	R/W
6D	Current No. of button report entries (L)	R
6E	Current No. of button report entries (H)	R

Handshake signal description:



- Fill in the read request to 0xC8 - 0xCE.

Modbus (Hex)	Write / Read request	Write
C8	Function code	753
C9	Version number	0
CA	Button report ID	1 to 60000 0: the latest button report
CB to CD	Reserved	-
CE	Request to send command	1 (to be filled in last)

- Check whether the reading is successful from the return status in 0xCF - 0xD1.

Modbus (Hex)	Return status	Description
CF	Function code	753
D0	Status	1: OK; 2: NOK
D1	Error code	-

If successful, the read status (0xD0) is 1.

If failed, the read status (0xD0) is 2. The error code is as follows:

Code	Error description	Description
1	Button report ID	Exceeds the range of 0 to 60000

3. Read the content of the button report in 0xD2 - 0xDD.

Modbus (Hex)	Function	Description
D2	Date / Time	Year
D3	Date / Time	Month
D4	Date / Time	Day
D5	Date / Time	Hour
D6	Date / Time	Minute
D7	Date / Time	Second
D8	Button ID	Refer to Section 11.4 Button Report.
D9	Value before change (L)	0 to 4294967295
DA	Value before change (H)	
DB	Value after change (L)	0 to 4294967295
DC	Value after change (H)	
DD	Permissions account	0: reserved 1: User1 2: User2 3: User3 4: User4 5: User5 6: Admin

A

(This page is intentionally left blank.)

A

# TCP/IP Communication - Function Codes



This chapter introduces the handshake method and information of the TCP/IP communication interface provided by the smart screwdriving controller. You can operate the controller remotely through this interface.

B.1	System structure .....	B-5
B.2	Operational status of the smart screwdriving system .....	B-6
	#10 Write to enable the subscription .....	B-6
	#11 Write to disable the subscription .....	B-6
	#20 Write the operational status value .....	B-7
	#30 Write the function of automatically sending the TCP data content of the result for each screw.....	B-8
	#50 Read the operational status value .....	B-9
	#60 Write the setting of automatically sending the TCP data content of the result for each screw.....	B-14
	#80 Read the setting of automatically sending the TCP data content of the result for each screw.....	B-18
B.3	Handshake data of the smart screwdriving system .....	B-19
B.3.1	Parameters operations .....	B-22
	#100 Write the parameter .....	B-22
	#110 Write to delete the parameter .....	B-27
	#150 Read the parameter .....	B-28
B.3.2	Sequence operations .....	B-29
	#200 Write the sequence .....	B-29
	#201 Write the navigator coordinates.....	B-31
	#202 Write the navigator image codes .....	B-33
	#203 Write the coordinates of positioning arm .....	B-34
	#210 Write to delete the sequence .....	B-37
	#250 Read the sequence .....	B-38
	#251 Read the navigator coordinates .....	B-39
	#252 Read the navigator image codes .....	B-40
	#253 Read the coordinates of positioning arm .....	B-41

**B**

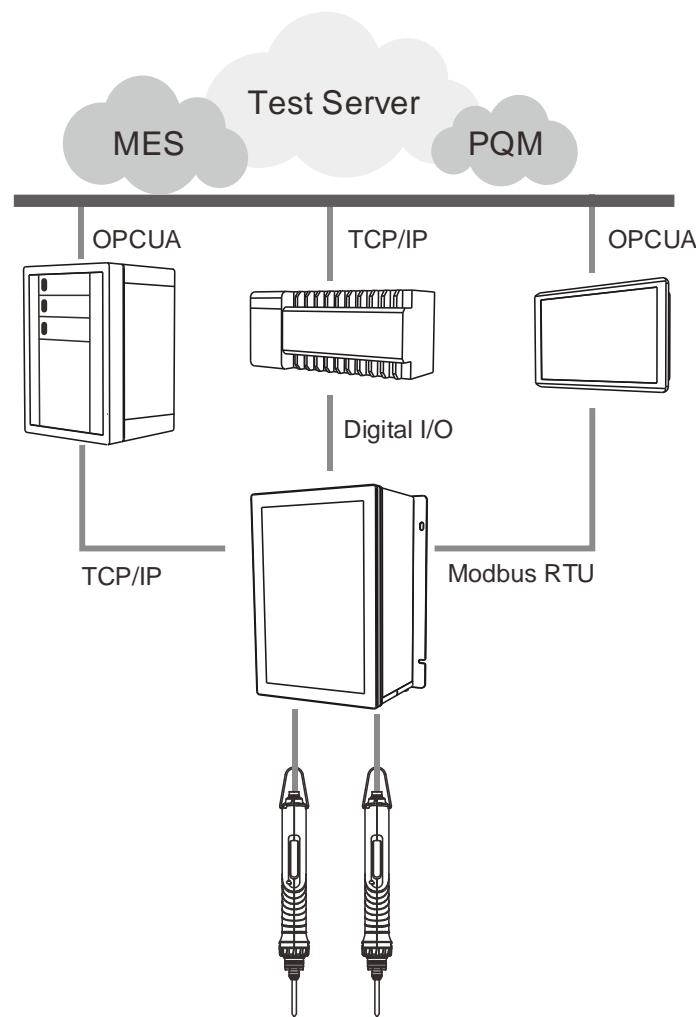
B.3.3 Sources operations .....	B-42
#300 Write the operating mode and switching method of source.....	B-42
#301 Write the contents of a single source.....	B-44
#302 Write to switch parameter under manual setting .....	B-47
#303 Write to switch sequence under manual setting .....	B-49
#310 Write to delete the source.....	B-50
#350 Read the operating mode and switching method of source .....	B-52
#351 Read the contents of a single source .....	B-53
B.3.4 Results operations .....	B-54
#400 Write the switching method of source .....	B-54
#401 Write the barcode string .....	B-55
#402 Write to clear all errors .....	B-56
#403 Write to reset the operation progress .....	B-57
#404 Write to force execute the previous step .....	B-58
#405 Write to force execute the next step .....	B-59
#406 Write to restrict tightening operation.....	B-60
#407 Write to restrict loosening operation.....	B-61
#408 Write the scanner advanced settings.....	B-62
#409 Write to clear the single screw tightening NOK count.....	B-63
#410 Write to clear the single screw loosening NOK count .....	B-64
#411 Write to reset the operation time.....	B-65
#412 Write to reset the operation status .....	B-66
#450 Read the switching method of source.....	B-67
#451 Read the barcode string .....	B-68
#452 Read the scanner advanced settings .....	B-69
#453 Read the tightening status indicator .....	B-70
B.3.5 Controller operations .....	B-71
#500 Write the request for permissions login .....	B-71
#501 Write the request for password change.....	B-72
#502 Write the request for permissions logout .....	B-74
#503 Write the page permissions.....	B-75
#504 Write the Ethernet settings.....	B-76
#505 Write the request for factory reset.....	B-77
#506 Write the buzzer sound pattern .....	B-78
#507 Write the DI/DO functions .....	B-79
#508 Write the DI/DO conversion table .....	B-81
#509 Write the default torque unit .....	B-83
#510 Write the default tool start condition .....	B-84
#511 Write NO / NC contact setting for a single DI/DO.....	B-85
#512 Write to export all system data.....	B-86

#513 Write to import all system data.....	B-87
#514 Write the default two-stage mode under self-defined torque control .....	B-88
#515 Write the display of upper limit for each stage of curves .....	B-89
#516 Write the display of operation warning window .....	B-90
#517 Write file format of the exported result for each screw .....	B-91
#518 Write the sampling rate for curves .....	B-92
#519 Write the function of always monitoring the current.....	B-93
#520 Write the compensation for tool temperature rise .....	B-94
#521 Write the peripheral device settings .....	B-95
#522 Write the TCP data content of the result for each screw .....	B-96
#523 Write the monitor function when parameters do not match the tool .....	B-98
#524 Write the default angle unit .....	B-99
#525 Write the volume of buzzer and operation screen buttons .....	B-100
#526 Write the display orientation of external screen.....	B-101
#527 Write the home screen.....	B-102
#528 Write the RS-485 settings.....	B-103
#529 Write the function of converting curve data to positive values .....	B-105
#550 Read the Ethernet settings.....	B-106
#551 Read the page permissions.....	B-107
#552 Read the firmware version .....	B-108
#553 Read the DI/DO functions.....	B-109
#554 Read the DI/DO conversion table .....	B-110
#555 Read the default torque unit .....	B-112
#556 Read the default tool start condition .....	B-113
#557 Read NO / NC contact setting for a single DI/DO .....	B-114
#558 Read the default two-stage mode under self-defined torque control .....	B-115
#559 Read the display of upper limit for each stage of curves .....	B-116
#560 Read the display of operation warning window .....	B-117
#561 Read file format of the exported result for each screw .....	B-118
#562 Read the sampling rate for curves .....	B-119
#563 Read the function of always monitoring the current .....	B-120
#564 Read the compensation for tool temperature rise .....	B-121
#565 Read the peripheral device settings .....	B-122
#566 Read the TCP data content of the result for each screw .....	B-123
#567 Read the monitor function when parameters do not match the tool .....	B-124
#568 Read the default angle unit .....	B-125
#569 Read the volume of buzzer and operation screen buttons.....	B-126
#570 Read the display orientation of external screen .....	B-127
#571 Read the home screen.....	B-128
#572 Read the RS-485 settings.....	B-129

B

#573 Read the function of converting curve data to positive values .....	B-130
B.3.6 Tool operations .....	B-131
#600 Write to activate the tool.....	B-131
#601 Write to enable service reminder.....	B-132
#602 Write the lever start level.....	B-133
#603 Write the push start level .....	B-134
#604 Write the work light brightness.....	B-135
#606 Write the LED light settings.....	B-136
#607 Write to calibrate the tool.....	B-137
#650 Read the tool information .....	B-138
#651 Read the lever start level.....	B-139
#652 Read the push start level.....	B-140
#653 Read the work light brightness.....	B-141
#655 Read the LED light settings.....	B-142
#656 Read the tool calibration setting .....	B-143
#657 Read the tool firmware version .....	B-144
#658 Read the status of service reminder.....	B-145
#659 Read the status of tool activation.....	B-146
B.3.7 Reports operations .....	B-147
#700 Clear the production report entries.....	B-147
#701 Clear the error and warning report entries .....	B-148
#702 Clear the production report files .....	B-149
#750 Find and read the production report entries .....	B-150
#751 Find and read curves.....	B-155
#752 Find and read the error report entries .....	B-174
#753 Find and read the warning report entries .....	B-175
#754 Find and read the button report entries .....	B-177

## B.1 System structure



B

The Delta smart screwdriving system provides multiple communication protocols: Modbus TCP (Ethernet), Modbus RTU (RS-485) and TCP/IP. It allows peripheral IIoT equipment to obtain the controller information, and then collect data to construct host computer systems, such as MES and PQM. The connection between the IIoT equipment and the smart screwdriving system is not limited by the hardware platform. Therefore, any equipment that supports the protocol (such as PC, PLC, or HMI) is able to control the smart screwdriving system and obtain tightening data.

The TCP/IP handshake information in this chapter consists of:

1. Operational status of the smart screwdriving system.
2. Handshake data of the smart screwdriving system.

### TCP server

The smart screwdriving system supports TCP communication. The default IP is 192.168.1.11, and the default port is 1001. The host requires the keepalive feature to ensure it can actively re-connect to the smart screwdriving controller and obtain the correct data.

**Important:** to use the TCP communication, the controller firmware version must be 0.41.0112.0069(118) or later. The numbers in parentheses indicate the HMI kernel version, which must be 118 or later to support TCP communication.

## B.2 Operational status of the smart screwdriving system

There are two ways of obtaining the operational status of the smart screwdriving system:

1. Use function code #10 to send the request for starting the subscription. Then, the system returns a real-time operational status (see the table of operational status in function code #50) every 0.3 seconds. To stop receiving the data, use function code #11 to send the request for canceling the subscription.
2. Use function code #50 to read the operational status value. Each time you send a request, the system returns a real-time operational status.

To obtain the result for each screw, use function codes #30, #60, and #80.

Function code table for the operational status:

Function code	Function name	Function code	Function name
#10	Write to start the subscription	#50	Read the operational status value
#11	Write to cancel the subscription	#80	Read the setting of automatically sending the TCP data content of the result for each screw
#20	Write the operational status value	-	-
#30	Write the function of automatically sending the TCP data content of the result for each screw	-	-
#60	Write the setting of automatically sending the TCP data content of the result for each screw	-	-

### #10 Write to start the subscription

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	10	0A00
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

### #11 Write to cancel the subscription

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	11	0B00
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

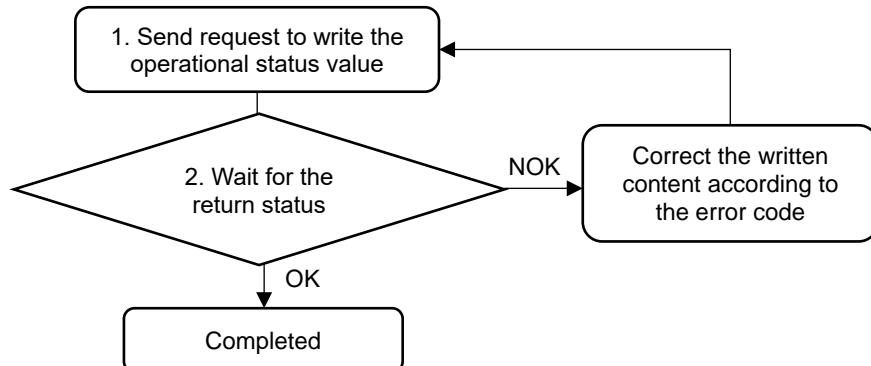
## #20 Write the operational status value

Content description:

Use function code #20 to set the operational status value with the host controller. This function is often used to clear the flag.

B

Handshake signal description:



- Send the request to write the operational status value.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	20	1400
3 - 4	Version number	-	0000
5 - 6	Data format	1: Word 2: Double Word	0100
7 - 8	Operational status	11 - 610 Refer to function code #50 for the table of operational status.	2400
9 - 10	Operational status value (L)	-	0000
11 - 12	Operational status value (H)	-	0000
13 - 14	Request to send command	-	0100

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	20	1400
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Data format	1: Word 2: Double Word	0100
7 - 8	Operational status	11 - 610 Refer to function code #50 for the table of operational status.	2400
9 - 10	Operational status value (L)	-	0000
11 - 12	Operational status value (H)	-	0000
13 - 14	Reserved	-	0000
15 - 16	Return function code	20	1400
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

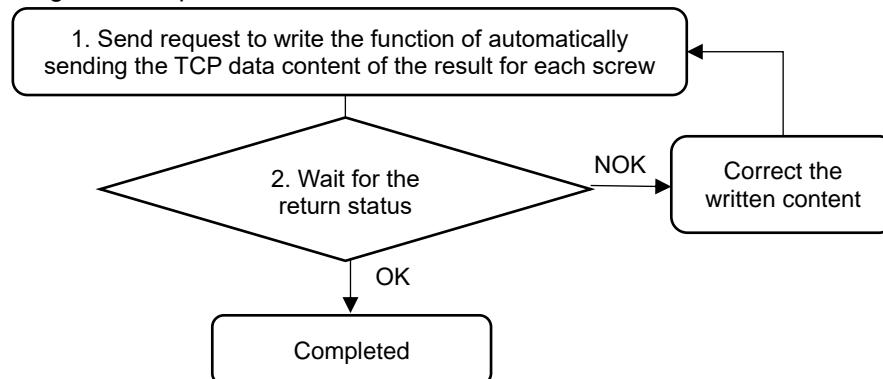
Code	Error description	Description
1	Data format	Must be 1 or 2
2	Operational status	Exceeds 11 - 610

### #30 Write the function of automatically sending the TCP data content of the result for each screw

Content description:

Use function code #30 to enable or disable the function of automatically sending the TCP data content of the result for each screw.

Handshake signal description:



- Send the request to write the function of automatically sending the TCP data content of the result for each screw.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	30	1E00
3 - 4	Version number	-	0000
5 - 6	TCP data content of the result for each screw	0: disable 1: scale, time, torque 2: scale, angle, torque 3: scale, angle, torque rate 4: result, scale, time, torque 5: result, scale, angle, torque 6: result, scale, angle, torque rate	0002
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	30	1E00
3 - 4	Return data length	Unit: Word	0A00
5 - 6	TCP data content of the result for each screw	0: disable 1: scale, time, torque 2: scale, angle, torque 3: scale, angle, torque rate 4: result, scale, time, torque 5: result, scale, angle, torque 6: result, scale, angle, torque rate	0002
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	30	1E00
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

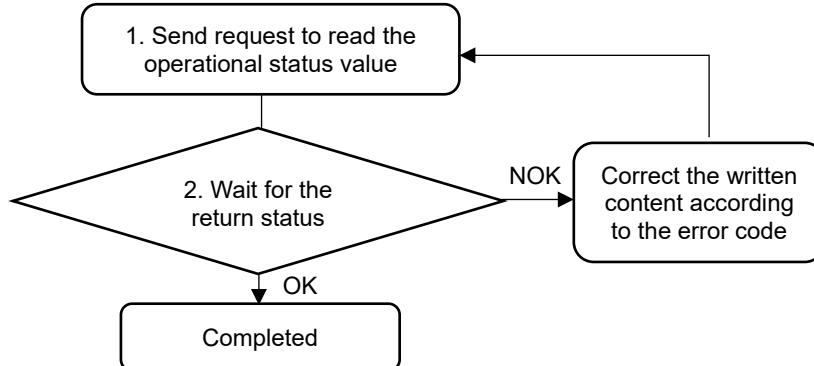
If successful, the read status is 1.

## #50 Read the operational status value

Content description:

Use function code #50 to read the operational status value with the host controller.

Handshake signal description:



1. Send the request to read the operational status value.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	50	3200
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	50	3200
3 - 4	Return data length	Unit: Word	0A00
5 - 14	Reserved	10 bytes	...
15 - 16	Return function code	50	3200
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 1220	Operational status	Refer to the following table.	-

Table of operational status:

Byte		Tool 1 status / Tool 2 status
Tool 1	Tool 2	
21 - 22	121 - 122	Tightening ID set for cur. switch method
23 - 24	123 - 124	PAR/SEQ set for cur. switch method
25 - 26	125 - 126	SEQ ID of current switching method
27 - 28	127 - 128	PAR ID of current switching method
29 - 30	129 - 130	Current target torque
31 - 32	131 - 132	Current target angle
33 - 34	133 - 134	Current parameter progress
35 - 36	135 - 136	Screw progress of current parameter (L)
37 - 38	137 - 138	Screw progress of current parameter (H)
39 - 40	139 - 140	Screw progress of current sequence (L)
41 - 42	141 - 142	Screw progress of current sequence (H)
43 - 44	143 - 144	Tightening OK count (L)
45 - 46	145 - 146	Tightening OK count (H)
47 - 48	147 - 148	Single screw tightening NOK count (L)

B

**B**

Byte		Tool 1 status / Tool 2 status
Tool 1	Tool 2	
49 - 50	149 - 150	Single screw tightening NOK count (H)
51 - 52	151 - 152	Loosening OK count (L)
53 - 54	153 - 154	Loosening OK count (H)
55 - 56	155 - 156	Single screw loosening NOK count (L)
57 - 58	157 - 158	Single screw loosening NOK count (H)
59 - 60	159 - 160	Final stage max. torque
61 - 62	161 - 162	Final stage min. torque
63 - 64	163 - 164	Current torque unit <sup>*1</sup>
65 - 66	165 - 166	Tightening / Loosening in operation <sup>*2</sup>
67 - 68	167 - 168	Bit ID of current switching method
69 - 70	169 - 170	Version of operational status <sup>*3</sup>
71 - 72	171 - 172	Clear the flag <sup>*4</sup>
73 - 74	173 - 174	Total screw Qty. of current sequence (L)
75 - 76	175 - 176	Total screw Qty. of current sequence (H)
77 - 78	177 - 178	Parameter Qty. of current sequence
79 - 80	179 - 180	Screw Qty. of current parameter (L)
81 - 82	181 - 182	Screw Qty. of current parameter (H)
83 - 84	183 - 184	All screws of current parameter finished
85 - 86	185 - 186	Current parameter finished
87 - 88	187 - 188	Current screw finished
89 - 90	189 - 190	Setting parameters (Waiting...)
91 - 92	191 - 192	Final + Prevail torque
93 - 94	193 - 194	Total angle
95 - 96	195 - 196	Tightening angle
97 - 98	197 - 198	Tightening result (1: OK; 2: NOK; 5: Pass)
99 - 100	199 - 200	Loosening result (1: OK; 2: NOK)
101 - 102	201 - 202	Curve creation finished
103 - 104	203 - 204	Restrict tightening status
105 - 106	205 - 206	Parameter settings OK / NOK
107 - 108	207 - 208	Final torque
109 - 110	209 - 210	Prevail torque
111 - 112	211 - 212	Final current
113 - 114	213 - 214	Cause to restrict tightening operation <sup>*5</sup>
115 - 116	215 - 216	Cause to restrict loosening operation <sup>*6</sup>
117 - 118	217 - 218	Remaining operation time (L)
119 - 120	219 - 220	Remaining operation time (H)
421 - 422	821 - 822	Current target torque (L)
423 - 424	823 - 824	Current target torque (H)
425 - 426	825 - 826	Final stage max. torque (L)
427 - 428	827 - 828	Final stage max. torque (H)
429 - 430	829 - 830	Final stage min. torque (L)
431 - 432	831 - 832	Final stage min. torque (H)
433 - 434	833 - 834	Final + Prevail torque (L)
435 - 436	835 - 836	Final + Prevail torque (H)
437 - 438	837 - 838	Final torque (L)
439 - 440	839 - 840	Final torque (H)
441 - 442	841 - 842	Prevail torque (L)

Byte		Tool 1 status / Tool 2 status
Tool 1	Tool 2	
443 - 444	843 - 844	Prevail torque (H)
445 - 446	845 - 846	Tightening OK count (L)
447 - 448	847 - 848	Tightening OK count (H)
449 - 450	849 - 850	Tightening NOK count (L)
451 - 452	851 - 852	Tightening NOK count (H)
453 - 454	853 - 854	Tightening OK + NOK count (L)
455 - 456	855 - 856	Tightening OK + NOK count (H)
457 - 458	857 - 858	Ready
459 - 460	859 - 860	Max. angle of final stage
461 - 462	861 - 862	Min. angle of final stage
463 - 464	863 - 864	Max. total angle
465 - 466	865 - 866	Min. total angle
467 - 468	867 - 868	Current position of positioning arm X axis (L)
469 - 470	869 - 870	Current position of positioning arm X axis (H)
471 - 472	871 - 872	Current position of positioning arm Y axis (L)
473 - 474	873 - 874	Current position of positioning arm Y axis (H)
475 - 476	875 - 876	Current position of positioning arm Z axis (L)
477 - 478	877 - 878	Current position of positioning arm Z axis (H)
479 - 480	879 - 880	Target position of positioning arm X axis (L)
481 - 482	881 - 882	Target position of positioning arm X axis (H)
483 - 484	883 - 884	Target position of positioning arm Y axis (L)
485 - 486	885 - 886	Target position of positioning arm Y axis (H)
487 - 488	887 - 888	Target position of positioning arm Z axis (L)
489 - 490	889 - 890	Target position of positioning arm Z axis (H)
491 - 492	891 - 892	Clamp torque (L)
493 - 494	893 - 894	Clamp torque (H)
495 - 496	895 - 896	Clamp angle
497 - 498	897 - 898	Snug torque (L)
499 - 500	899 - 900	Snug torque (H)
501 - 502	901 - 902	Tool operation prohibited <sup>†7</sup>
503 - 620	903 - 1020	Reserved
621 - 820	1021 - 1220	Barcode string (ASCII code; 100 words)

B

Byte	Tool 1 / Tool 2 common status	Byte	Tool 1 / Tool 2 common status
221 - 222	Tool 1 AL / NG / WN code* <sup>8</sup>	247 - 248	Reserved
223 - 224	Tool 2 AL / NG / WN code* <sup>8</sup>	249 - 250	All production report entries cleared
225 - 226	DO status (Bit 1 - 8: Tool 1; Bit 9 - 16: Tool 2)	251 - 252	Start overwriting from production report ID 1
227 - 228	DI status (Bit 1 - 8: Tool 1; Bit 9 - 16: Tool 2)	253 - 254	Start overwriting from error report ID 1
229 - 230	DI control (Bit 1 - 8: Tool 1; Bit 9 - 16: Tool 2)	255 - 256	Start overwriting from warning report ID 1
231 - 232	Current No. of error report entries	257 - 258	Start overwriting from button report ID 1
233 - 234	Current No. of warning report entries	259 - 260	Keepalive
235 - 236	Current No. of production report entries (L)	261 - 262	Single-tool / Dual-tool alternation / Dual-tool synchronization
237 - 238	Current No. of production report entries (H)	263 - 264	Switching method of Tool 1
239 - 240	Current No. of button report entries (L)	265 - 266	Switching method of Tool 2
241 - 242	Current No. of button report entries (H)	267 - 268	Operating curve count
243 - 244	Production report entry creation finished	269 - 420	Reserved
245 - 246	Clear the common flag* <sup>9</sup>	-	-

Note:

1. 0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in
2. Bit 0: tightening in progress; Bit 1: loosening in progress
3. 0: does not support operational statuses bytes 211 - 410 and bytes 411 - 610  
1: supports operational statuses bytes 211 - 410 and bytes 411 - 610
4. Bit 0: clear the "All screws of current parameter finished" flag (bytes 42 and 92)  
Bit 1: clear the "Current parameter finished" flag (bytes 43 and 93)  
Bit 2: clear the "Current screw finished" flag (bytes 44 and 94)  
Bit 3: clear the "Curve creation finished" flag (bytes 51 and 101)  
Bit 4: clear the "Tightening result" flag (bytes 49 and 99) and "Loosening result" flag (bytes 50 and 100)
5. Bit 0: max. count for single screw NOK tightening  
Bit 1: prohibit tool operation when scanner string is null  
Bit 2: prohibit tool operation when screw Qty. reached  
Bit 3: max. operation time  
Bit 4: incorrect parameter sequence  
Bit 5: tightening operation restricted  
Bit 6: parameter check protection  
Bit 7: parameters do not match the tool
6. Bit 0: loosening prohibited after tightening OK  
Bit 1: loosening prohibited after tightening NOK  
Bit 2: max. count for single screw NOK loosening  
Bit 3: incorrect parameter sequence  
Bit 4: loosening operation restricted  
Bit 5: parameter range error

7. 0: remove restriction for tightening; remove restriction for loosening  
1001: restrict tightening operation; remove restriction for loosening  
1002: remove restriction for tightening; restrict loosening operation  
1003: restrict tightening operation; restrict loosening operation
8. 0x1001 - 0x1999: Tool 1 device alarm (AL); 0x2000 - 0x2999: Tool 2 device alarm (AL)  
0x3001 - 0x3999: Tool 1 tightening error (NG); 0x4000 - 0x4999: Tool 2 tightening error (NG)  
0x5001 - 0x5999: Tool 1 operation warning (WN); 0x6000 - 0x6999: Tool 2 operation warning (WN)
9. Bit 0: clear the "Production report entry creation finished" flag (byte 122)  
Bit 1: clear the "All production report entries cleared" flag (byte 125)  
Bit 2: clear the "Start overwriting from production report ID 1" flag (byte 126)  
Bit 3: clear the "Start overwriting from error report ID 1" flag (byte 127)  
Bit 4: clear the "Start overwriting from warning report ID 1" flag (byte 128)  
Bit 5: clear the "Start overwriting from button report ID 1" flag (byte 129)

B

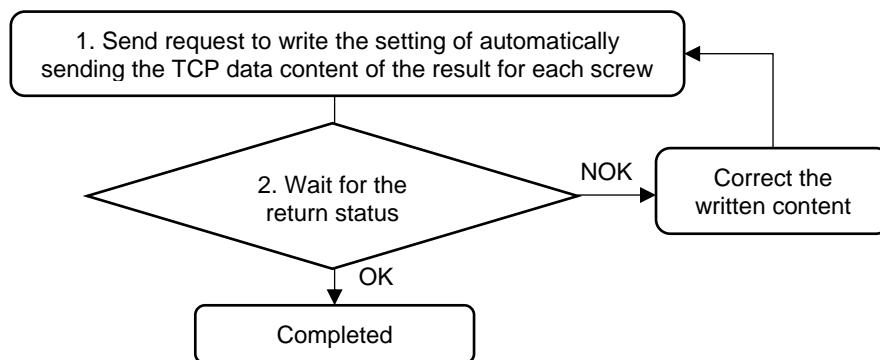
## #60 Write the setting of automatically sending the TCP data content of the result for each screw

Content description:

B

Use function code #60 to write the setting of automatically sending the TCP data content of the result for each screw.

Handshake signal description:



- Send the request to write the setting of automatically sending the TCP data content of the result for each screw.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	60	3C00
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	TCP data content of the result for each screw	11: scale, time, torque 12: scale, angle, torque 13: scale, angle, torque rate 21: result, scale, time, torque 22: result, scale, angle, torque 23: result, scale, angle, torque rate	0B00
9 - 10	Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in	0000
11 - 12	Reserved	-	0000
13 - 14	Request to send command	-	0100

- Check whether the writing is successful from the return status.

Bytes	Return status	Description	Example (Hex)
1 - 2	Function code	60	3C00
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	TCP data content of the result for each screw	11: scale, time, torque 12: scale, angle, torque 13: scale, angle, torque rate 21: result, scale, time, torque 22: result, scale, angle, torque 23: result, scale, angle, torque rate	0B00
9 - 10	Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in	0000
11 - 14	Reserved	4 bytes	...

Bytes	Return status	Description	Example (Hex)
15 - 16	Return function code	60	3C00
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

B

The following are the TCP data content of the result for each screw stored in the system.

Byte	Time data	Angle data
1 - 2	Time point 1 data	Angle point 1 data
3 - 4	Time point 2 data	Angle point 2 data
5 - 6	Time point 3 data	Angle point 3 data
...	Time point N data	Angle point N data
3995 - 3996	Time point 1998 data	Angle point 1998 data
3997 - 3998	Time point 1999 data	Angle point 1999 data
3999 - 4000	Time point 2000 data	Angle point 2000 data

Byte	Torque data	Torque rate data	
1 - 2	Torque point 1 data	Unit: 0.001 Nm	Torque rate point 1 data
3 - 4	Torque point 2 data		Torque rate point 2 data
5 - 6	Torque point 3 data		Torque rate point 3 data
...	Torque point N data		Torque rate point N data
3995 - 3996	Torque point 1998 data		Torque rate point 1998 data
3997 - 3998	Torque point 1999 data		Torque rate point 1999 data
3999 - 4000	Torque point 2000 data		Torque rate point 2000 data

Byte	Report data	Description
1 - 2	Year, month, day	-
3 - 4	Hour, minute, second (L)	-
5 - 6	Hour, minute, second (H)	-
7 - 8	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2
9 - 10	Screw ID (L)	-
11 - 12	Screw ID (H)	-
13 - 14	Sequence ID	-
15 - 16	Parameter ID	-
17 - 18	Target torque	Unit: 0.001 Nm
19 - 20	Target angle	Unit: degree
21 - 22	Target torque rate	Unit: 0.0001 Nm/degree
23 - 24	Final torque	Unit: 0.001 Nm
25 - 26	Tightening angle	Unit: degree
27 - 28	Rotation angle	Unit: degree

Byte	Report data	Description
29 - 30	Status	1: tightening OK; 2: tightening NOK; 3: loosening OK; 4: loosening NOK; 5: pass
31 - 32	Operation time	Unit: 0.001 second
33 - 34	AL / NG / WN code	Refer to CH12
35 - 36	Max. angle of final stage	Unit: degree
37 - 38	Min. angle of final stage	Unit: degree
39 - 40	Max. torque of final stage	Unit: 0.001 Nm
41 - 42	Min. torque of final stage	Unit: 0.001 Nm
43 - 44	Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in
45 - 46	Torque specification of the tool	Unit: 0.001 Nm
47 - 48	Max. torque of the tool	Unit: 0.001 Nm
49 - 50	Pre-tightening torque	Unit: 0.001 Nm
51 - 52	The set total operation time	Timeout setting for a single tightening parameter.
53 - 54	Max. total angle	-
55 - 56	Max. torque	Unit: 0.001 Nm
57 - 58	Min. torque	Unit: 0.001 Nm
59 - 60	Max. angle	Angle upper limit when the current stage finishes.
61 - 62	Min. angle	Angle lower limit when the current stage finishes.
63 - 64	Max. operation time	Time upper limit when the current stage finishes. Unit: 0.01 second
65 - 66	Min. operation time	Time lower limit when the current stage finishes. Unit: 0.01 second
67 - 68	Prevail torque	Unit: 0.001 Nm
69 - 70	Final + Prevail torque	Unit: 0.001 Nm
71 - 72	Actual current	Unit: 0.01 Amp
73 - 74	Clamp torque	Unit: 0.001 Nm
75 - 76	Max. clamp torque	Unit: 0.001 Nm
77 - 78	Min. clamp torque	Unit: 0.001 Nm
79 - 80	Clamp angle	Unit: degree
81 - 82	Max. clamp angle	Unit: degree
83 - 84	Min. clamp angle	Unit: degree
85 - 86	Min. total angle	Unit: degree
87 - 100	Reserved	-

B

Byte	Scale data	Description
1 - 2	Running angle of stage 1	Unit: degree
3 - 4	Running angle of stage 2	
5 - 6	Running angle of stage 3	
7 - 8	Running angle of stage 4	
9 - 10	Running angle of stage 5	
11 - 12	Running angle of stage 6	
13 - 14	Running angle of loosening stage 1	
15 - 16	Running angle of loosening stage 2	
17 - 18	Max. torque of stage 1	
19 - 20	Max. torque of stage 2	
21 - 22	Max. torque of stage 3	Unit: 0.001 Nm
23 - 24	Max. torque of stage 4	
25 - 26	Max. torque of stage 5	
27 - 28	Max. torque of stage 6	
29 - 30	Max. torque of loosening stage 1	
31 - 32	Max. torque of loosening stage 2	
33 - 34	Operation time of stage 1	
35 - 36	Operation time of stage 2	
37 - 38	Operation time of stage 3	
39 - 40	Operation time of stage 4	
41 - 42	Operation time of stage 5	Unit: 0.001 second
43 - 44	Operation time of stage 6	
45 - 46	Operation time of loosening stage 1	
47 - 48	Operation time of loosening stage 2	
49 - 50	Max. time on the scale	
51 - 52	Max. angle on the scale	
53 - 54	Max. torque on the scale	
55 - 56	Max. torque rate on the scale	
57 - 58	Total number of curve coordinates	-
59 - 60	Max. torque	Unit: 0.001 Nm
61 - 62	Min. torque	Unit: 0.001 Nm
63 - 64	Max. torque rate	Unit: 0.0001 Nm/degree
65 - 66	Max. angle	Unit: degree
67 - 68	Min. angle	Unit: degree
69 - 70	Version of the curve scale	-
71 - 100	Reserved	-

B

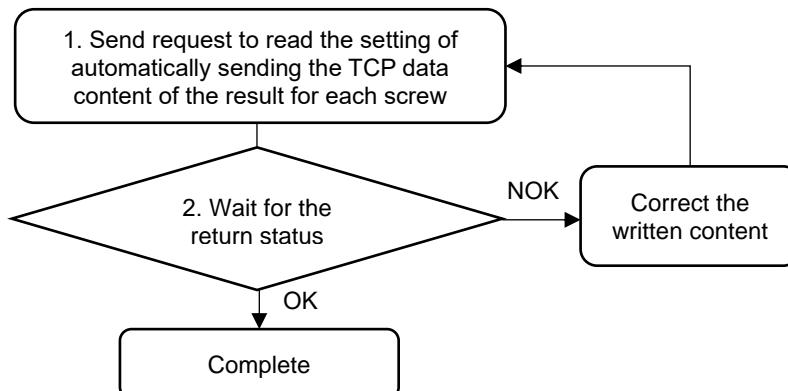
## #80 Read the setting of automatically sending the TCP data content of the result for each screw

Content description:

B

Use function code #80 to read the setting of automatically sending the TCP data content of the result for each screw.

Handshake signal description:



- Send the request to read the setting of automatically sending the TCP data content of the result for each screw.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	80	5000
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	80	5000
3 - 4	Return data length	Unit: Word	0A00
5 - 6	TCP data content of the result for each screw	11: scale, time, torque 12: scale, angle, torque 13: scale, angle, torque rate 21: result, scale, time, torque 22: result, scale, angle, torque 23: result, scale, angle, torque rate	0002
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	80	5000
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

B

## B.3 Handshake data of the smart screwdriving system

You can operate all functions of the smart screwdriving controller with the function code table through handshaking. All function codes are listed as follows:

Parameters			
Function code	Function name	Function code	Function name
#100	Write the parameter	#150	Read the parameter
#110	Write to delete the parameter	-	-
Sequence			
Function code	Function name	Function code	Function name
#200	Write the sequence	#250	Read the sequence
#201	Write the navigator coordinates	#251	Read the navigator coordinates
#202	Write the navigator image codes	#252	Read the navigator image codes
#203	Write the coordinates of positioning arm	#253	Read the coordinates of positioning arm
#210	Write to delete the sequence	-	-
Sources			
Function code	Function name	Function code	Function name
#300	Write the operating mode and switching method of source	#350	Read the operating mode and switching method of source
#301	Write the contents of a single source	#351	Read the contents of a single source
#302	Write to switch parameter under manual setting	-	-
#303	Write to switch sequence under manual setting	-	-
#310	Write to delete the source	-	-
Results			
Function code	Function name	Function code	Function name
#400	Write the switching method of source	#450	Read the switching method of source
#401	Write the barcode string	#451	Read the barcode string
#402	Write to clear all errors	#452	Read the scanner advanced settings
#403	Write to reset the operation progress	#453	Read the tightening status indicator
#404	Write to force execute the previous step	-	-
#405	Write to force execute the next step	-	-
#406	Write to restrict tightening operation	-	-
#407	Write to restrict loosening operation	-	-
#408	Write the scanner advanced settings	-	-
#409	Write to clear the single screw tightening NOK count	-	-
#410	Write to clear the single screw loosening NOK count	-	-
#411	Write to reset the operation time	-	-
#412	Write to reset the operational status	-	-

Controller			
Function code	Function name	Function code	Function name
#500	Write the request for permissions login	#550	Read the Ethernet settings
#501	Write the request for password change	#551	Read the page permissions
#502	Write the request for permissions logout	#552	Read the firmware version
#503	Write the page permissions	#553	Read the DI/DO functions
#504	Write the Ethernet settings	#554	Read the DI/DO conversion table
#505	Write the request for factory reset	#555	Read the default torque unit
#506	Write the buzzer sound pattern	#556	Read the default tool start condition
#507	Write the DI/DO functions	#557	Read NO / NC contact setting for a single DI/DO
#508	Write the DI/DO conversion table	#558	Read the default two-stage mode under self-defined torque control
#509	Write the default torque unit	#559	Read the display of upper limit for each stage of curves
#510	Write the default tool start condition	#560	Read the display of operation warning window
#511	Write NO / NC contact setting for a single DI/DO	#561	Read the file format of the exported result for each screw
#512	Write to export all system data	#562	Read the sampling rate for curves
#513	Write to import all system data	#563	Read the function of always monitoring the current
#514	Write the default two-stage mode under self-defined torque control	#564	Read the compensation for tool temperature rise
#515	Write the display of upper limit for each stage of curves	#565	Read the peripheral device settings
#516	Write the display of operation warning window	#566	Read the TCP data content of the result for each screw
#517	Write the file format of the exported result for each screw	#567	Read the monitor function when parameters do not match the tool
#518	Write the sampling rate for curves	#568	Read the default angle unit
#519	Write the function of always monitoring the current	#569	Read the volume of buzzer and operation screen buttons
#520	Write the compensation for tool temperature rise	#570	Read the display orientation of external screen
#521	Write the peripheral device settings	#571	Read the home screen
#522	Write the TCP data content of the result for each screw	#572	Read the RS-485 settings
#523	Write the monitor function when parameters do not match the tool	#573	Read the function of converting curve data to positive values
#524	Write the default angle unit	-	-
#525	Write the volume of buzzer and operation screen buttons	-	-
#526	Write the display orientation of external screen	-	-
#527	Write the home screen	-	-
#528	Write the RS-485 settings	-	-
#529	Write the function of converting curve data to positive values	-	-

B

Tool			
Function code	Function name	Function code	Function name
#600	Write to activate the tool	#650	Read the tool information
#601	Write to enable service reminder	#651	Read the lever start level
#602	Write the lever start level	#652	Read the push start level
#603	Write the push start level	#653	Read the work light brightness
#604	Write the work light brightness	#655	Read the LED light settings
#606	Write the LED light settings	#656	Read the tool calibration setting
#607	Write to calibrate the tool	#657	Read the tool firmware version
-	-	#658	Read the status of service reminder
-	-	#659	Read the status of tool activation

## Reports

Function code	Function name	Function code	Function name
#700	Clear the production report entries	#750	Find and read the production report entries
#701	Clear the error and warning report entries	#751	Find and read curves
#702	Clear the production report files	#752	Find and read the error report entries
-	-	#753	Find and read the warning report entries
-	-	#754	Find and read the button report entries

### B.3.1 Parameters operations

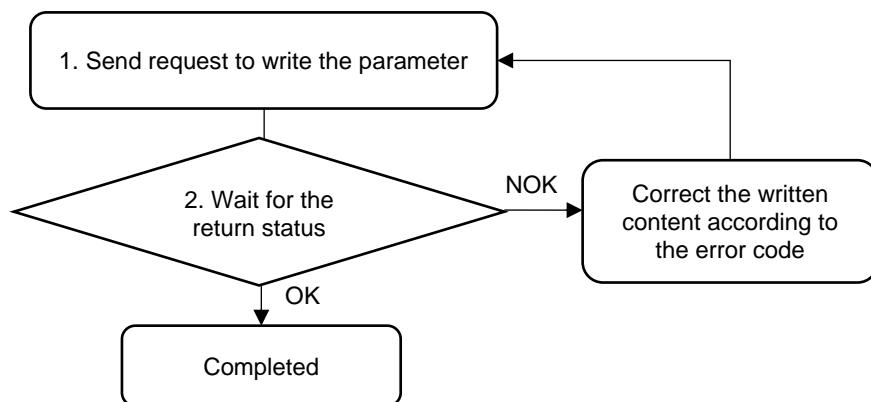
#### #100 Write the parameter

Content description:

Use function code #100 to set the tightening parameter.

- Add a tightening parameter.
- Modify an existing tightening parameter. First, read the parameter with function code #150. Then, modify and write the parameter with function code #100.

Handshake signal description:



- Send the request to write the parameter.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	100	6400
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Parameter ID	1 to 500	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 60	Parameter title	ASCII code (20 words)	...
61 - 62	Min. tightening angle	Unit: degree (< 32767 degrees)	0000
63 - 64	Hold time switch of the final stage	Whether to stay in the Servo On state during the final stage (used with the Pause time setting)	0000
65 - 66	The prevail torque to be linked	The parameter ID to be linked	0000
67 - 68	Max. tightening time	Unit: 0.1 second (< 3276.7 seconds)	6400
69 - 70	Max. loosening time	Unit: 0.1 second (< 3276.7 seconds)	6400
71 - 72	Max. tightening angle	Unit: degree (< 32767 degrees)	FF7F

Byte						Write / Read request	Description	Example (Hex)
73 - 74						Max. loosening angle	Unit: degree (< 32767 degrees)	FF7F
75 - 76						Delay before tightening starts	Unit: 0.01 second (< 327.67 seconds)	0000
77 - 78						Delay before loosening starts	Unit: 0.01 second (< 327.67 seconds)	0000
79 - 80						Start torque for switching the curve sampling rate	Unit: 0.001 Nm	F500
81 - 82						Start torque rate for snug angle calculation	Unit: 0.0001 Nm/degree	6400
83 - 84						Snug point angle correction	Unit: 0.1 degree	6400
85 - 86						Final current detection	0: Off; 1: On	0000
87 - 88						Delay before outputting the tightening result to feeder	Unit: 0.1 second	0000
89 - 90						Tool precision compensation	-10.0% to +10.0% Unit: 0.1%	0000
91 - 92						Angle delay for torque rate reached	Unit: 0.1 degree	0000
93 - 100						Reserved	8 bytes	...
101 102	201 202	301 302	401 402	501 502	601 602	Control method	0: angle 1: torque 2: torque rate 3: clamp torque 4: clamp angle	0100
103 104	203 204	303 304	403 404	503 504	603 604	Tightening direction	0: CW; 1: CCW	0000
105 106	205 206	305 306	405 406	505 506	605 606	Rotation speed	Unit: rpm	6400
107 108	207 208	307 308	407 408	507 508	607 608	Target torque	Unit: 0.001 Nm	E803
109 110	209 210	309 310	409 410	509 510	609 610	Target angle	Unit: degree	0A00
111 112	211 212	311 312	411 412	511 512	611 612	Target torque rate	Unit: 0.0001 Nm/degree	0000
113 114	213 214	313 314	413 414	513 514	613 614	Angle interval for torque rate calculation	Unit: 0.1 degree	6400
115 116	215 216	315 316	415 416	515 516	615 616	Acceleration time	Unit: ms	E803
117 118	217 218	317 318	417 418	517 518	617 618	Max. angle	Unit: degree	0000
119 120	219 220	319 320	419 420	519 520	619 620	Min. angle	Unit: degree	0000
121 122	221 222	321 322	421 422	521 522	621 622	Max. torque	Unit: 0.001 Nm	F203
123 124	223 224	323 324	423 424	523 524	623 624	Min. torque	Unit: 0.001 Nm	2003
125 126	225 226	325 326	425 426	525 526	625 626	Max. operation time	Unit: 0.01 second	0000
127 128	227 228	327 328	427 428	527 528	627 628	Min. operation time	Unit: 0.01 second	0000
129 130	229 230	329 330	429 430	529 530	629 630	Prevail torque On / Off	0: Off; 1: On	0000

B

**B**

Byte							Write / Read request	Description	Example (Hex)
131 - 132	231 - 232	331 - 332	431 - 432	531 - 532	631 - 632	Angle range for prevail torque calculation		0 to 100%	0000
133 - 134	233 - 234	333 - 334	433 - 434	533 - 534	633 - 634	Pause time		Unit: ms	0000
135 - 136	235 - 236	335 - 336	435 - 436	535 - 536	635 - 636	Max. clamp torque		Unit: 0.001 Nm	0000
137 - 138	237 - 238	337 - 338	437 - 438	537 - 538	637 - 638	Min. clamp torque		Unit: 0.001 Nm	0000
139 - 140	239 - 240	339 - 340	439 - 440	539 - 540	639 - 640	Max. clamp angle		Unit: degree	0000
141 - 142	241 - 242	341 - 342	441 - 442	541 - 542	641 - 642	Min. clamp angle		Unit: degree	0000
143 - 144	243 - 244	343 - 344	443 - 444	543 - 544	643 - 644	Torque of 1st stage		Unit: 0.001 Nm	0000
145 - 146	245 - 246	345 - 346	445 - 446	545 - 546	645 - 646	Pause time after 1st stage		Unit: ms	0000
147 - 148	247 - 248	347 - 348	447 - 448	547 - 548	647 - 648	Acc. time of 2nd stage		Unit: ms	0000
149 - 150	249 - 250	349 - 350	449 - 450	549 - 550	649 - 650	Speed of final stage		Unit: rpm	0000
151 - 152	251 - 252	351 - 352	451 - 452	551 - 552	651 - 652	Deceleration time		Unit: ms	0000
153 - 200	253 - 300	353 - 400	453 - 500	553 - 600	653 - 700	Reserved		48 bytes	...
701 - 702						1st stage loosening angle		Unit: degree	6400
703 - 704						1st stage loosening speed		Unit: rpm	6400
705 - 706						2nd stage loosening angle		Unit: degree	100E
707 - 708						2nd stage loosening speed		Unit: rpm	F401
709 - 710						Loosening direction		0: CW; 1: CCW	0100
711 - 712						Detect loosening torque		Unit: 0.001 Nm	0000
713 - 714						Production report saving		0: Off; 1: On	0100
715 - 716						1st stage loosening acceleration time		Unit: ms	6400
717 - 718						2nd stage loosening acceleration time		Unit: ms	6400

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	100	6400
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Parameter ID	1 to 500	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	100	6400
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description
1	Start: Max. torque < Min. torque
2	Start: Max. angle < Min. angle
3	Rundown: Max. torque < Min. torque
4	Rundown: Max. angle < Min. angle
5	Pre-tightening: Max. torque < Min. torque
6	Pre-tightening: Max. angle < Min. angle
7	Tightening: Max. torque < Min. torque
8	Tightening: Max. angle < Min. angle
9	Check if the stage sequence of the tightening settings is correct
10	No parameters set for this stage
11	Rundown: The set torque < Min. torque
12	Rundown: The set torque > Max. torque
13	Pre-tightening: The set torque < Min. torque
14	Pre-tightening: The set torque > Max. torque
15	Tightening: The set torque < Min. torque
16	Tightening: The set torque > Max. torque
17	The set angle > 32767
18	The set torque > Tool spec. torque The set min. torque > Tool spec. torque
19	The set torque > Tool max. torque
20	The set speed > Tool max. speed
21	Rundown: Torque cannot be 0
22	Pre-tightening: Torque cannot be 0
23	Tightening: Torque cannot be 0
24	The set rundown torque > The set pre-tightening torque
25	The set rundown torque > The set tightening torque
26	The set pre-tightening torque > The set tightening torque
27	The set clamp torque > Max. clamp torque
28	Max. clamp torque < Min. clamp torque
29	Max. clamp torque > Tool max. torque
30	Tightening: The set speed < Min. speed

B

**B**

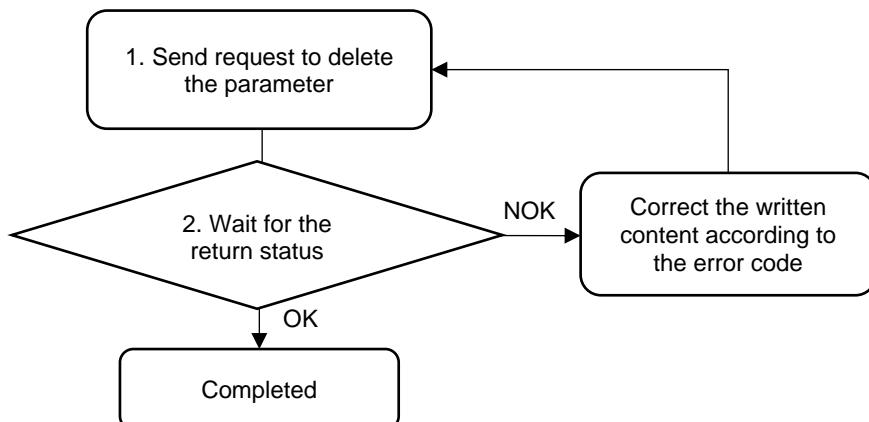
Code	Error description
32	General: The set timeout > 32767
33	General: The set max. total angle > 32767
34	Start: Min. operation time > Max. operation time
35	Rundown: Min. operation time > Max. operation time
36	Pre-tightening: Min. operation time > Max. operation time
37	Tightening: Min. operation time > Max. operation time
38	General: The set tightening timeout > Max. operation time of the stage
39	Linked prevail torque cannot be 0
40	Cannot set multiple torque rates
41	Max. clamp angle < Min. clamp angle
42	Cannot set multiple clamp torques or angles
47	Tightening speed > Pre-tightening speed
48	Start speed > Rundown speed
49	Pre-tightening speed > Rundown speed
50	Tightening speed > Rundown speed
51	Start: Max. torque > Tightening torque
52	Start: Min. torque > Tightening torque
53	Rundown: Max. torque > Tightening torque
54	Rundown: Min. torque > Tightening torque
55	Rundown: Max. torque > Tightening torque
56	Rundown: Min. torque > Tightening torque
57	Pre-tightening: Max. torque > Tightening torque
58	Pre-tightening: Min. torque > Tightening torque
59	Parameter not applicable to this model
61	The set torque < Min. torque
62	The set torque > Max. torque
63	Max. torque < Min. torque
64	Max. angle < Min. angle
65	Min. operation time > Max. operation time
100	Parameter ID exceeds the range of 1 to 500
101	Tool 1 / Tool 2 must be 0 or 1
102	Title string is null
103	Title already exists

## #110 Write to delete the parameter

Content description:

Use function code #110 to delete the tightening parameter.

Handshake signal description:



### 1. Send the request to delete the parameter.

Byte	Write / Read request	Description	Example (HEX)
1 - 2	Function code	110	6E00
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	The ID to be deleted	0: all the parameters 1 to 500: a single parameter	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

### 2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (HEX)
1 - 2	Function code	110	6E00
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	The ID to be deleted	0: all the parameters 1 to 500: a single parameter	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	110	6E00
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	The ID to be deleted	Exceeds the range of 0 to 500

B

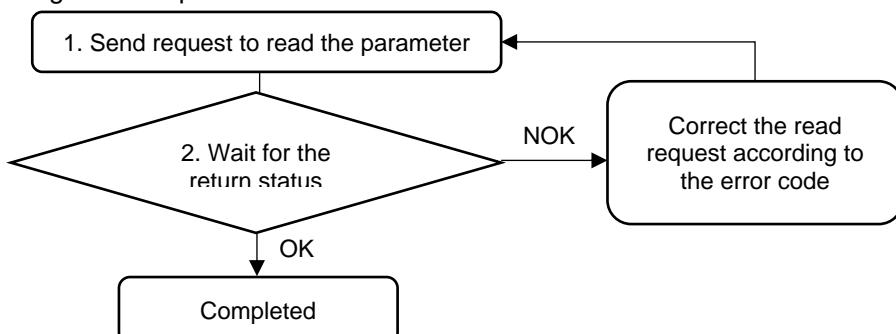
## #150 Read the parameter

Content description:

Use function code #150 to read the tightening parameter.

- Obtain the content of an existing tightening parameter.
- Check whether the tightening parameter has been set.

Handshake signal description:



- Send the request to read the tightening parameter.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	150	9600
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Parameter ID	1 to 500	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the reading is successful from the return status and read the parameter content.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	150	9600
3 - 4	Return data length	Unit: Word	3602
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Parameter ID	1 to 500	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	150	9600
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 718	Refer to function code #100 for the Write / Read request table.		

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Parameter ID	Exceeds the range of 1 to 500
2	Tool 1 / Tool 2	Must be 0 or 1
3	Parameter content	Not set

### B.3.2 Sequence operations

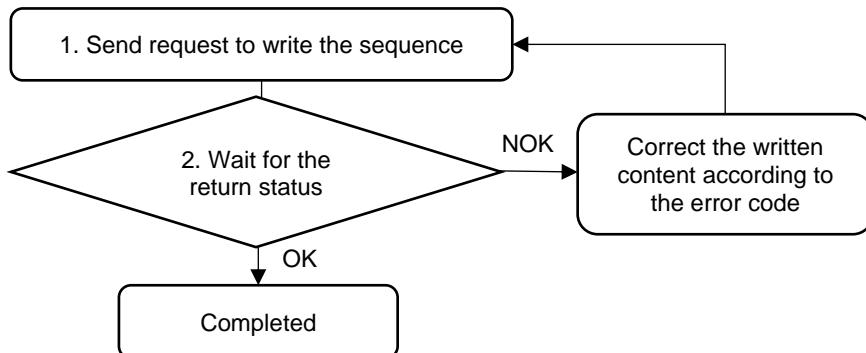
#### #200 Write the sequence

Content description:

Use function code #200 to set the tightening sequence.

- Add a tightening sequence.
  - Modify an existing tightening sequence. First, read the sequence with function code #250.
- Then, modify and write the sequence with function code #200.

Handshake signal description:



- Send the request to write the sequence.

In each sequence, you can configure up to 100 sets of parameters.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	200	C800
3 - 4	Version number	-	0000
5 - 6	Sequence ID	1 to 500	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 60	Sequence title	ASCII code (20 words)	...
61 - 62	General / Navigator mode	0: General mode 1: Navigator mode	0000
63 - 64	Positioning arm function	0: Off 1: On	0000
65 - 80	Reserved	16 bytes	...
81 - 82	Tool ID for Set 1	0: Tool 1 1: Tool 2	0000
83 - 84	Tool ID for Set 2		0000
85 - 86	Tool ID for Set 3		0000
...	Tool ID for Set N		...
275 - 276	Tool ID for Set 98		0000
277 - 278	Tool ID for Set 99		0000
279 - 280	Tool ID for Set 100		0000
281 - 282	Parameter ID for Set 1	1 to 500	0100
283 - 284	Parameter ID for Set 2	1 to 500	0200
285 - 286	Parameter ID for Set 3	1 to 500	0000

**B**

Byte	Write / Read request	Description	Example (Hex)
...	Parameter ID for Set N	1 to 500	...
475 - 476	Parameter ID for Set 98	1 to 500	0000
477 - 478	Parameter ID for Set 99	1 to 500	0000
479 - 480	Parameter ID for Set 100	1 to 500	0000
481 - 482	Screw quantity for Set 1 (L)	1 to 999999	0200
483 - 484	Screw quantity for Set 1 (H)		0000
485 - 486	Screw quantity for Set 2 (L)	1 to 999999	0300
487 - 488	Screw quantity for Set 2 (H)		0000
489 - 490	Screw quantity for Set 3 (L)	1 to 999999	0000
491 - 492	Screw quantity for Set 3 (H)		0000
...	Screw quantity for Set N (L)	1 to 999999	...
...	Screw quantity for Set N (H)		...
869 - 870	Screw quantity for Set 98 (L)	1 to 999999	0000
871 - 872	Screw quantity for Set 98 (H)		0000
873 - 874	Screw quantity for Set 99 (L)	1 to 999999	0000
875 - 876	Screw quantity for Set 99 (H)		0000
877 - 878	Screw quantity for Set 100 (L)	1 to 999999	0000
879 - 880	Screw quantity for Set 100 (H)		0000
881 - 882	Bit ID for Set 1	0 to 255	0000
883 - 884	Bit ID for Set 2	0 to 255	0000
885 - 886	Bit ID for Set 3	0 to 255	0000
...	Bit ID for Set N	0 to 255	...
1075 - 1076	Bit ID for Set 98	0 to 255	0000
1077 - 1078	Bit ID for Set 99	0 to 255	0000
1079 - 1080	Bit ID for Set 100	0 to 255	0000

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	200	C800
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Sequence ID	1 to 500	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	200	C800
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500
2	The quantity is 0	Cannot be set as 0
3	Total screw quantity > 999999	Must not exceed 999999
100	Title string is null	-
101	Title already exists	-

## #201 Write the navigator coordinates

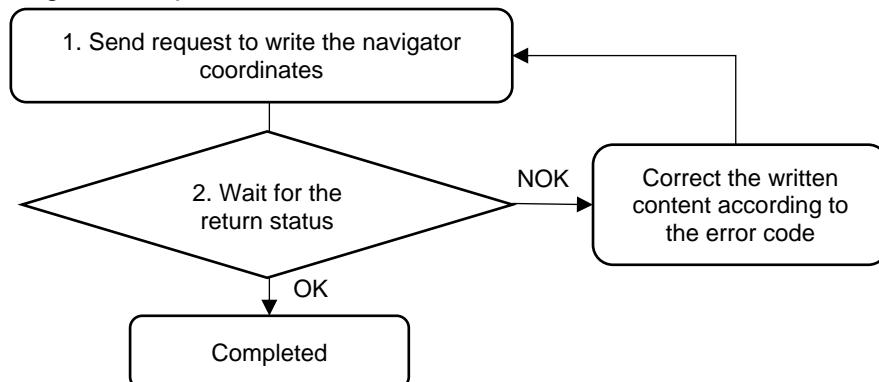
Content description:

Use function code #201 to set the navigator coordinates of screws.

Note: first, set the coordinates of screws with function code #201. Then, set the navigator image codes corresponding to screws with function code #202.

B

Handshake signal description:



- Send the request to set the navigator coordinates of up to 100 screws.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	201	C900
3 - 4	Version number	-	0000
5 - 6	Sequence ID	1 to 500	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	Screw ID 1 - X axis position	0 to 740	6400
23 - 24	Screw ID 1 - Y axis position	0 to 460	6400
25 - 26	Screw ID 2 - X axis position	0 to 740	C800
27 - 28	Screw ID 2 - Y axis position	0 to 460	6400
29 - 30	Screw ID 3 - X axis position	0 to 740	2C10
31 - 32	Screw ID 3 - Y axis position	0 to 460	6400
33 - 34	Screw ID 4 - X axis position	0 to 740	6400
35 - 36	Screw ID 4 - Y axis position	0 to 460	C800
37 - 38	Screw ID 5 - X axis position	0 to 740	6400
39 - 40	Screw ID 5 - Y axis position	0 to 460	2C10
...	Screw ID N - X axis position	0 to 740	0000
...	Screw ID N - Y axis position	0 to 460	0000
401 - 402	Screw ID 96 - X axis position	0 to 740	0000
403 - 404	Screw ID 96 - Y axis position	0 to 460	0000
405 - 406	Screw ID 97 - X axis position	0 to 740	0000
407 - 408	Screw ID 97 - Y axis position	0 to 460	0000
409 - 410	Screw ID 98 - X axis position	0 to 740	0000
411 - 412	Screw ID 98 - Y axis position	0 to 460	0000

Byte	Write / Read request	Description	Example (Hex)
413 - 414	Screw ID 99 - X axis position	0 to 740	0000
415 - 416	Screw ID 99 - Y axis position	0 to 460	0000
417 - 418	Screw ID 100 - X axis position	0 to 740	0000
419 - 420	Screw ID 100 - Y axis position	0 to 460	0000

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	201	C900
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Sequence ID	1 to 500	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	201	C900
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500
2	Axis position exceeds the range	X axis: exceeds the range of 0 to 740 Y axis: exceeds the range of 0 to 460

## #202 Write the navigator image codes

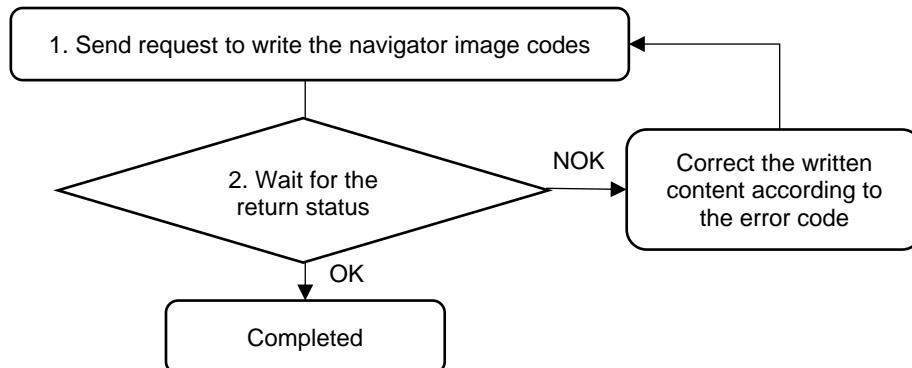
Content description:

Use function code #202 to set the navigator image codes corresponding to the screws.

Note: first, set the coordinates of screws with function code #201. Then, set the navigator image codes corresponding to the screws with function code #202.

B

Handshake signal description:



- Send the request to write the navigator image codes of up to 100 screws.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	202	CA00
3 - 4	Version number	-	0000
5 - 6	Sequence ID	1 to 500	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	Screw ID 1 - displayed image		0100
23 - 24	Screw ID 2 - displayed image		0100
25 - 26	Screw ID 3 - displayed image		0100
27 - 28	Screw ID 4 - displayed image		0100
29 - 30	Screw ID 5 - displayed image		0100
...	Screw ID N - displayed image		0000
211 - 212	Screw ID 96 - displayed image	0: no display 1: image A 2: image B 3: image C	0000
213 - 214	Screw ID 97 - displayed image		0000
215 - 216	Screw ID 98 - displayed image		0000
217 - 218	Screw ID 99 - displayed image		0000
219 - 220	Screw ID 100 - displayed image		0000

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	202	CA00
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Sequence ID	1 to 500	0100
7 - 14	Reserved	8 bytes	...

Byte	Return status	Description	Example (Hex)
15 - 16	Return function code	202	CA00
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500
2	Image code exceeds the range	Exceeds the range of 0 to 3

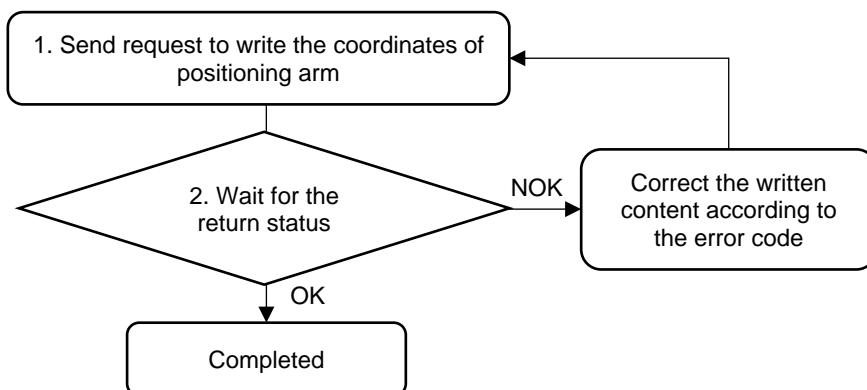
## #203 Write the coordinates of positioning arm

Content description:

Use function code #203 to set the coordinates of positioning arm.

Note: first, set the tightening sequence with function code #200. Then, set the coordinates of positioning arm with function code #203.

Handshake signal description:



- Send the request to write the coordinates of positioning arm for up to 100 screws.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	203	CB00
3 - 4	Version number	-	0000
5 - 6	Sequence ID	1 to 500	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	Screw ID 1 - positioning arm X axis position (L)	Unit: mm	E803
23 - 24	Screw ID 1 - positioning arm X axis position (H)		0000
25 - 26	Screw ID 1 - positioning arm Y axis position (L)	Unit: mm	0000
27 - 28	Screw ID 1 - positioning arm Y axis position (H)		0000

Byte	Write / Read request	Description	Example (Hex)
29 - 30	Screw ID 1 - positioning arm Z axis position (L)		E803
31 - 32	Screw ID 1 - positioning arm Z axis position (H)	Unit: mm	0000
33 - 34	Screw ID 2 - positioning arm X axis position (L)		0000
35 - 36	Screw ID 2 - positioning arm X axis position (H)	Unit: mm	0000
37 - 38	Screw ID 2 - positioning arm Y axis position (L)		0000
39 - 40	Screw ID 2 - positioning arm Y axis position (H)	Unit: mm	0000
41 - 42	Screw ID 2 - positioning arm Z axis position (L)		0000
43 - 44	Screw ID 2 - positioning arm Z axis position (H)	Unit: mm	0000
45 - 46	Screw ID 3 - positioning arm X axis position (L)		0000
47 - 48	Screw ID 3 - positioning arm X axis position (H)	Unit: mm	0000
49 - 50	Screw ID 3 - positioning arm Y axis position (L)		0000
51 - 52	Screw ID 3 - positioning arm Y axis position (H)	Unit: mm	0000
53 - 54	Screw ID 3 - positioning arm Z axis position (L)		0000
55 - 56	Screw ID 3 - positioning arm Z axis position (H)	Unit: mm	0000
...	Screw ID N - positioning arm X axis position (L)		0000
...	Screw ID N - positioning arm X axis position (H)	Unit: mm	0000
...	Screw ID N - positioning arm Y axis position (L)		0000
...	Screw ID N - positioning arm Y axis position (H)	Unit: mm	0000
...	Screw ID N - positioning arm Z axis position (L)		0000
...	Screw ID N - positioning arm Z axis position (H)	Unit: mm	0000
1185 - 1186	Screw ID 98 - positioning arm X axis position (L)		0000
1187 - 1188	Screw ID 98 - positioning arm X axis position (H)	Unit: mm	0000
1189 - 1190	Screw ID 98 - positioning arm Y axis position (L)		0000
1191 - 1192	Screw ID 98 - positioning arm Y axis position (H)	Unit: mm	0000
1193 - 1194	Screw ID 98 - positioning arm Z axis position (L)		0000
1195 - 1196	Screw ID 98 - positioning arm Z axis position (H)	Unit: mm	0000
1197 - 1198	Screw ID 99 - positioning arm X axis position (L)		0000
1199 - 1200	Screw ID 99 - positioning arm X axis position (H)	Unit: mm	0000
1201 - 1202	Screw ID 99 - positioning arm Y axis position (L)		0000
1203 - 1204	Screw ID 99 - positioning arm Y axis position (H)	Unit: mm	0000
1205 - 1206	Screw ID 99 - positioning arm Z axis position (L)		0000
1207 - 1208	Screw ID 99 - positioning arm Z axis position (H)	Unit: mm	0000
1209 - 1210	Screw ID 100 - positioning arm X axis position (L)		0000
1211 - 1212	Screw ID 100 - positioning arm X axis position (H)	Unit: mm	0000
1213 - 1214	Screw ID 100 - positioning arm Y axis position (L)		0000
1215 - 1216	Screw ID 100 - positioning arm Y axis position (H)	Unit: mm	0000
1217 - 1218	Screw ID 100 - positioning arm Z axis position (L)		0000
1219 - 1220	Screw ID 100 - positioning arm Z axis position (H)	Unit: mm	0000

B

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	203	CB00
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Sequence ID	1 to 500	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	203	CB00
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

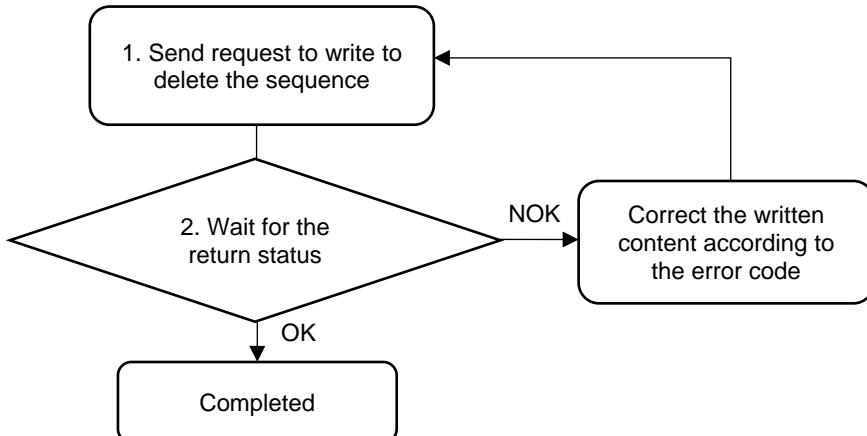
Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500

## #210 Write to delete the sequence

Content description:

Use function code #210 to delete the tightening sequence.

Handshake signal description:



1. Send the request to write to delete the sequence.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	210	D200
3 - 4	Version number	-	0000
5 - 6	The ID to be deleted	0: all the sequences 1 to 500: a single sequence	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	210	D200
3 - 4	Return data length	Unit: Word	0A00
5 - 6	The ID to be deleted	0: all the sequences 1 to 500: a single sequence	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	210	D200
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	The ID to be deleted	Exceeds the range of 0 to 500

B

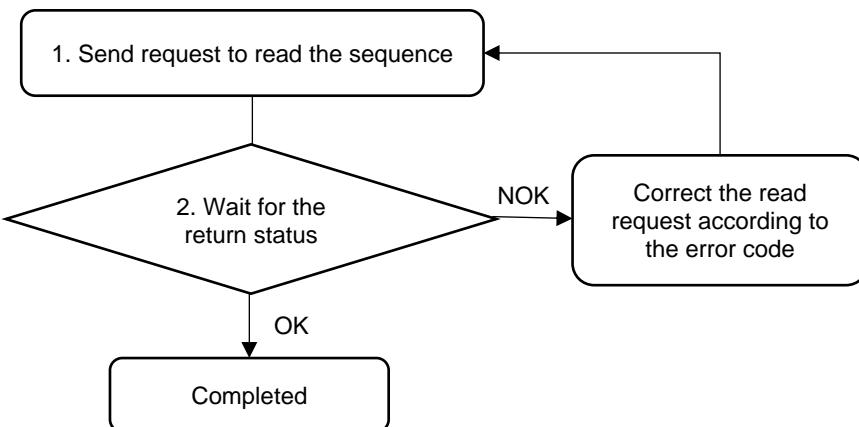
## #250 Read the sequence

Content description:

Use function code #250 to read the tightening sequence.

- Obtain the content of an existing tightening sequence.
- Check whether the tightening sequence has been set.

Handshake signal description:



- Send the request to read the sequence.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	250	FA00
3 - 4	Version number	-	0000
5 - 6	Sequence ID	1 to 500	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the reading is successful from the return status and read the sequence content.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	250	FA00
3 - 4	Return data length	Unit: Word	2602
5 - 6	Sequence ID	1 to 500	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	250	FA00
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 1080	Refer to function code #200 for the Write / Read request table.		

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

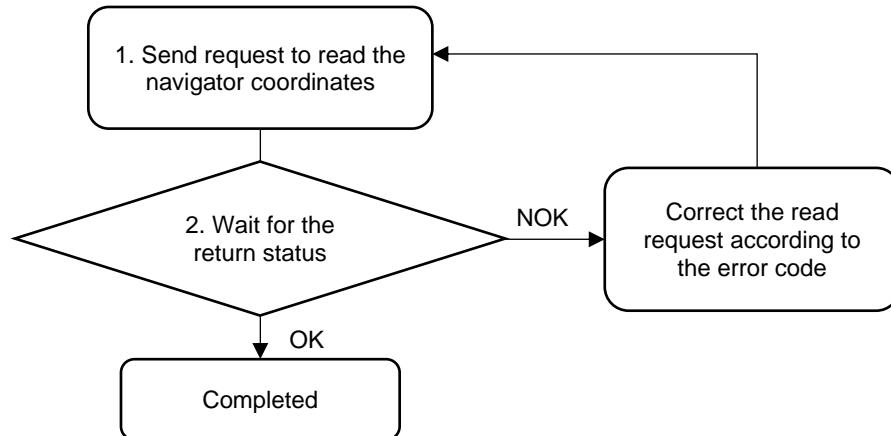
Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500

## #251 Read the navigator coordinates

Content description:

Use function code #251 to read the navigator coordinates of screws.

Handshake signal description:



1. Send the request to read the navigator coordinates.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	251	FB00
3 - 4	Version number	-	0000
5 - 6	Sequence ID	1 to 500	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the content of navigator coordinates.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	251	FB00
3 - 4	Return data length	Unit: Word	2602
5 - 6	Sequence ID	1 to 500	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	251	FB00
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 420	Refer to function code #201 for the Write / Read request table.		

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500

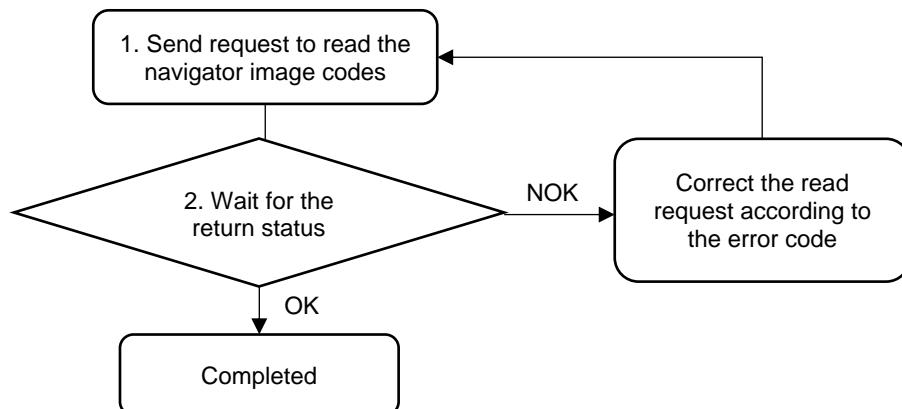
B

## #252 Read the navigator image codes

Content description:

Use function code #252 to read the navigator image codes corresponding to the screws.

Handshake signal description:



1. Send the request to read the navigator image codes.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	252	FC00
3 - 4	Version number	-	0000
5 - 6	Sequence ID	1 to 500	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the navigator image codes.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	252	FC00
3 - 4	Return data length	Unit: Word	6E00
5 - 6	Sequence ID	1 to 500	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	252	FC00
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 220	Refer to function code #202 for the Write / Read request table.		

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

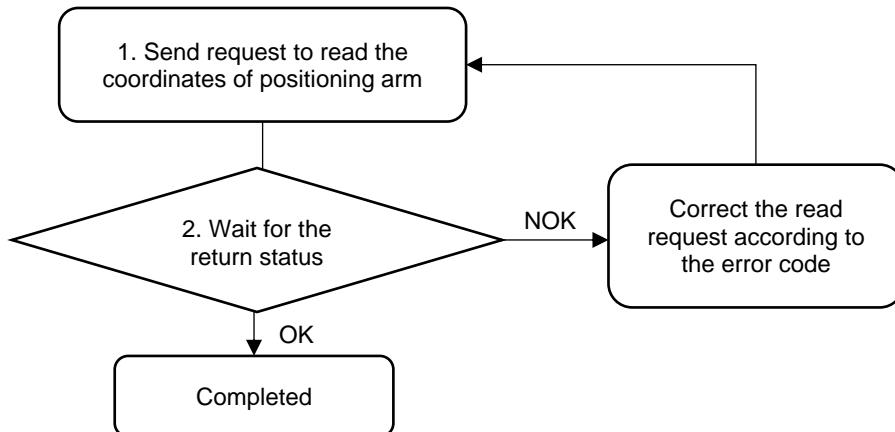
Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500

## #253 Read the coordinates of positioning arm

Content description:

Use function code #253 to read the coordinates of positioning arm.

Handshake signal description:



- Send the request to read the coordinates of the positioning arm.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	253	FD00
3 - 4	Version number	-	0000
5 - 6	Sequence ID	1 to 500	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the reading is successful from the return status and read the coordinates of the positioning arm.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	253	FD00
3 - 4	Return data length	Unit: Word	6E00
5 - 6	Sequence ID	1 to 500	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	253	FD00
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 1220	Refer to function code #203 for the Write / Read request table.		

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Sequence ID	Exceeds the range of 1 to 500

B

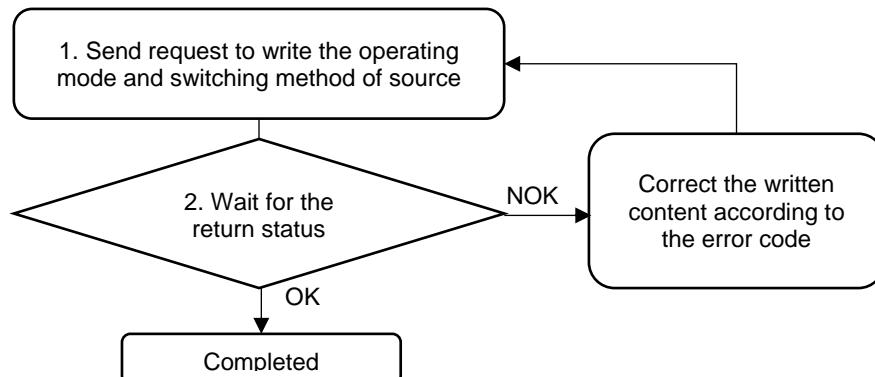
### B.3.3 Sources operations

#### #300 Write the operating mode and switching method of source

Content description:

Use function code #300 to switch the operating mode and switching method of the controller.

Handshake signal description:



1. Send the request to write the operating mode and switching method of source.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	300	2C01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Operating mode	0: single-tool 1: dual-tool alternation 2: dual-tool synchronization	0000
9 - 10	Switching method	0: manual 1: screw bit selector 2: barcode scanner	0000
11 - 12	Reserved	-	0000
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	300	2C01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Operating mode	0: single-tool 1: dual-tool alternation 2: dual-tool synchronization	0000
9 - 10	Switching method	0: manual 1: screw bit selector 2: barcode scanner	0000
11 - 14	Reserved	4 bytes	...
15 - 16	Return function code	300	2C01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Operating mode	Exceeds the range of 0 to 2
2	Switching method	Exceeds the range of 0 to 2
3	Tool 1 / Tool 2	Must be 0 or 1
4	Cannot set to dual-tool alternation or dual-tool synchronization when only one tool is activated	-
5	Cannot use the screw bit selector mode under dual-tool alternation	-

B

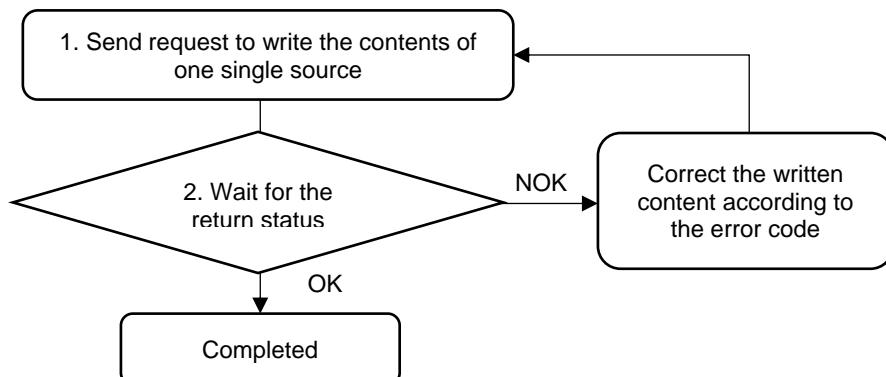
### #301 Write the contents of a single source

Content description:

Use function code #301 to set the tightening source.

- A. Add a single tightening source for each tool.
- B. Modify the settings for an existing tightening source. First, read the settings of a single source with function code #351. Then, modify and write the settings with function code #301.

Handshake signal description:



1. Send the request to write the contents of one single source.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	301	2D01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 220	Corresponding barcode string	ASCII code (100 words); only applicable when the switching method is Barcode Scanner	...
221 - 222	Source for the switching method	0: parameter 1: sequence	0000
223 - 224	Parameter / Sequence ID	1 to 500	0100
225 - 226	Total screw quantity (L)	1 to 999999	0300
227 - 228	Total screw quantity (H)		0000
229 - 230	Bit ID	0 to 255	0000

Byte	Write / Read request	Description	Example (Hex)
231 - 232	Advanced settings (L)	Bit 0: loosening prohibited after tightening OK Bit 1: loosening prohibited after tightening NOK Bit 2: max. count for single screw NOK tightening Bit 3: max. count for single screw NOK loosening Bit 4: go to next step after tightening NOK Bit 5: go to previous step after loosening OK Bit 6: prohibit tool operation when scanner string is null Bit 7: clear scanner string when screw Qty. reached Bit 8: prohibit scanning when screw Qty. not reached Bit 9: max. operation time Bit 10: reset Qty. when screw Qty. reached Bit 11: enable reminder when tightening signal ends too early	0004
233 - 234	Advanced settings (H)	Bit 6: prohibit tool operation when scanner string is null Bit 7: clear scanner string when screw Qty. reached Bit 8: prohibit scanning when screw Qty. not reached Bit 9: max. operation time Bit 10: reset Qty. when screw Qty. reached Bit 11: enable reminder when tightening signal ends too early	0000
235 - 236	Single screw tightening NOK count (L)	1 to 999999	3F42
237 - 238	Single screw tightening NOK count (H)		0F00
239 - 240	Single screw loosening NOK count (L)	1 to 999999	3F42
241 - 242	Single screw loosening NOK count (H)		0F00
243 - 250	Reserved	8 bytes	...
251 - 252	Max. operation time (L)	1 to 9999999	7F96
253 - 254	Max. operation time (H)		9800
255 - 256	The parameters to be used under dual-tool alternation mode	0: use parameters of Tool 1 1: use parameters of Tool 2	0000
257 - 258	Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in	0100
259 - 260	Start condition for Tool 1	0: push start 1: DI 2: lever start 3: push start or lever start 4: push start and lever start	0300
261 - 262	Start condition for Tool 2	0: push start or lever start 1: DI 2: lever start 3: push start and lever start	0300

B

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	301	2D01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	301	2D01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

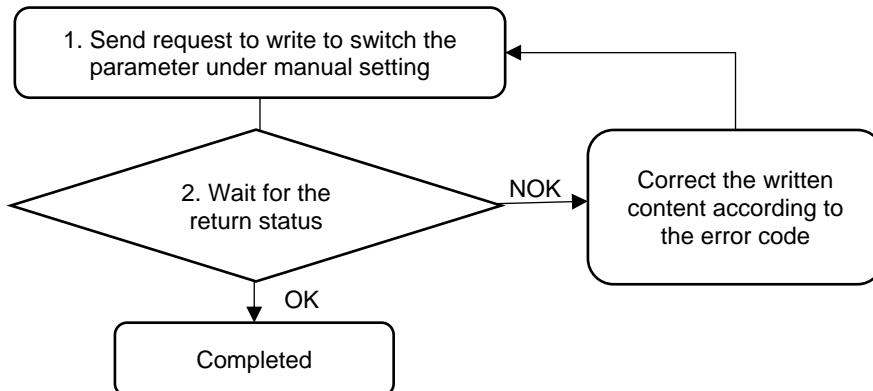
Code	Error description	Description
1	Switching method ID	Exceeds the range of 1 to 500
2	Tool 1 / Tool 2	Must be 0 or 1
10	Source for the switching method	Must be 0 or 1
11	Sequence / Parameter ID	Exceeds the range of 1 to 500
12	Total screw quantity	Exceeds the range of 1 to 999999
13	Bit ID	Exceeds the range of 0 to 255
20	Single screw tightening NOK count	Exceeds the range of 1 to 999999
21	Single screw loosening NOK count	Exceeds the range of 1 to 999999
40	Max. operation time	Exceeds the range of 1 to 9999999
50	Cannot specify the tightening parameter	Cannot select the tightening parameter under dual-tool alternation
51	Sequence error	Must select the sequence which includes tightening parameters of both Tool 1 and Tool 2 under dual-tool alternation
100	Title string is null	-
101	Title already exists	-

## #302 Write to switch parameter under manual setting

Content description:

Use function code #302 to switch the parameter ID and screw quantity when the switching method is set to manual setting.

Handshake signal description:



- Send the request to write to switch the parameter under manual setting.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	302	2E01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0100
7 - 8	Parameter ID	1 to 500	0100
9 - 10	Total screw quantity (L)	1 to 999999	0300
11 - 12	Total screw quantity (H)		0000
13 - 14	Request to send command	-	0100

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	302	2E01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Parameter ID	1 to 500	0100
9 - 10	Total screw quantity (L)	1 to 999999	0300
11 - 12	Total screw quantity (H)		0000
13 - 14	Reserved	-	0000
15 - 16	Return function code	302	2E01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Switching method error	Must be manual setting
2	Tool 1 / Tool 2	Must be 0 or 1
11	Parameter ID	Exceeds the range of 1 to 500
12	Total screw quantity	Exceeds the range of 1 to 999999
50	Cannot specify the tightening parameter	Cannot select the tightening parameter under dual-tool alternation

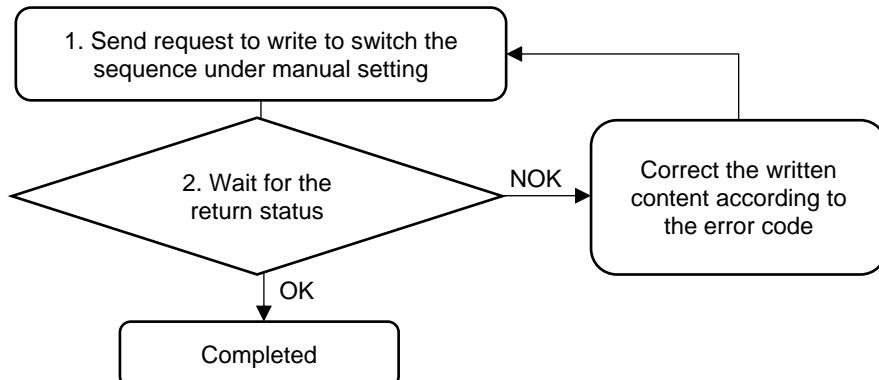
### #303 Write to switch sequence under manual setting

Content description:

Use function code #303 to switch the sequence ID when the switching method is set to manual setting.

B

Handshake signal description:



1. Send the request to write to switch the sequence under manual setting.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	303	2F01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0100
7 - 8	Sequence ID	1 to 500	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	303	2F01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0100
7 - 8	Sequence ID	1 to 500	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	303	2F01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

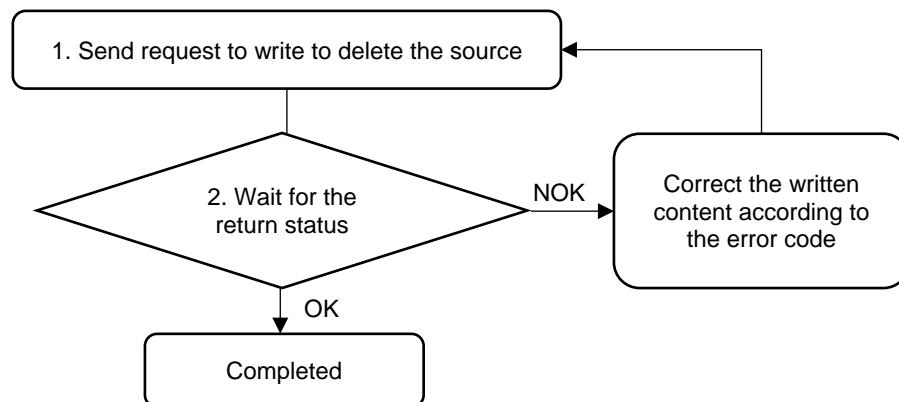
Code	Error description	Description
1	Switching method error	Must be manual setting
2	Tool 1 / Tool 2	Must be 0 or 1
11	Sequence ID	Exceeds the range of 1 to 500
50	Sequence error	Must select the sequence which includes tightening parameters of both Tool 1 and Tool 2 under dual-tool alternation

## #310 Write to delete the source

Content description:

Use function code #310 to delete the tightening source.

Handshake signal description:



1. Send the request to write to delete the source.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	310	3601
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Operating mode	0: single-tool 1: dual-tool alternation 2: dual-tool synchronization	0000
9 - 10	Switching method	0: manual 1: screw bit selector 2: barcode scanner	0000
11 - 12	Switching method ID to be deleted	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500 Delete all: 0	0100
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	310	3601
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Operating mode	0: single-tool 1: dual-tool alternation 2: dual-tool synchronization	0000
9 - 10	Switching method	0: manual 1: screw bit selector 2: barcode scanner	0000
11 - 12	Switching method ID to be deleted	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500 Delete all: 0	0100
13 - 14	Reserved	-	0000
15 - 16	Return function code	310	3601
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Operating mode	Exceeds the range of 0 to 2
2	Switching method	Exceeds the range of 0 to 2
3	Tool 1 / Tool 2	Must be 0 or 1
4	Cannot set to dual-tool alternation or dual-tool synchronization when only one tool is activated	-
5	Cannot use the screw bit selector mode under dual-tool alternation	-
6	Switching method ID to be deleted	Exceeds the range of 0 to 500

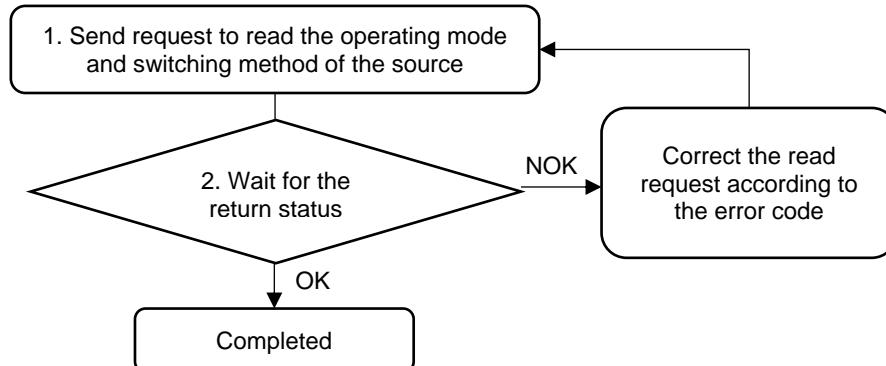
B

## #350 Read the operating mode and switching method of source

Content description:

Use function code #350 to read the current operating mode and switching method of the smart screwdriving controller.

Handshake signal description:



1. Send the request to read the operating mode and switching method of the source.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	350	5E01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the operating mode and switching method of the source.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	350	5E01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Operating mode	0: single-tool 1: dual-tool alternation 2: dual-tool synchronization	0000
9 - 10	Switching method	0: manual 1: screw bit selector 2: barcode scanner	0000
11 - 14	Reserved	4 bytes	...
15 - 16	Return function code	350	5E01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

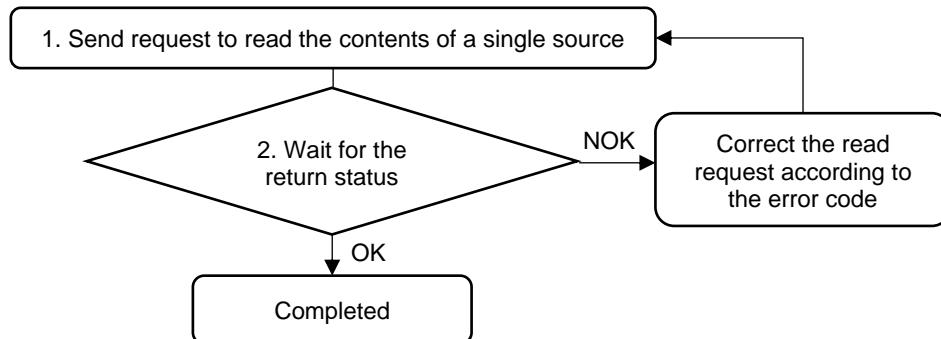
### #351 Read the contents of a single source

Content description:

Use function code #351 to read the settings of a single tightening source.

- Obtain the contents of an existing tightening source.
- Check whether the tightening source has been set.

Handshake signal description:



- Send the request to read the contents of a single source.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	351	5F01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the reading is successful from the return status and read the contents of a single source.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	351	5F01
3 - 4	Return data length	Unit: Word	8D00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	351	5F01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 262	Refer to function code #301 for the Write / Read request table.		

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Switching method ID	Exceeds the range of 1 to 500
2	Tool 1 / Tool 2	Must be 0 or 1

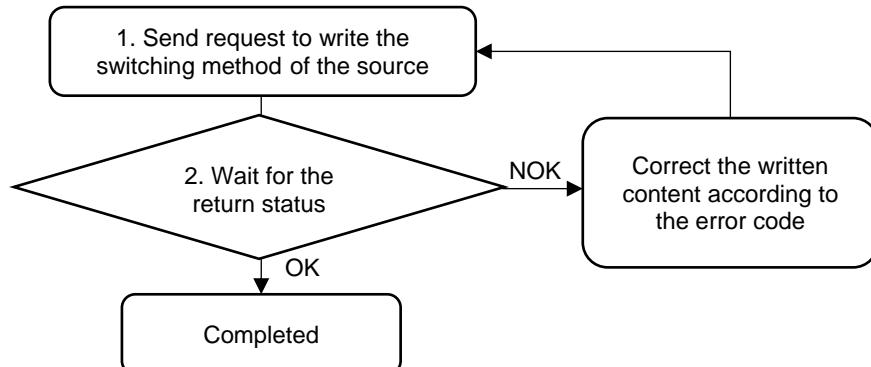
### B.3.4 Results operations

#### #400 Write the switching method of source

Content description:

Use function code #400 to switch the switching method of the tightening source in operation.

Handshake signal description:



1. Send the request to write the switching method of the source.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	400	9001
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	400	9001
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	400	9001
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Switching method ID	Manual: exceeds 1 Screw bit selector: exceeds the range of 1 to 255 Barcode scanner: exceeds the range of 1 to 500

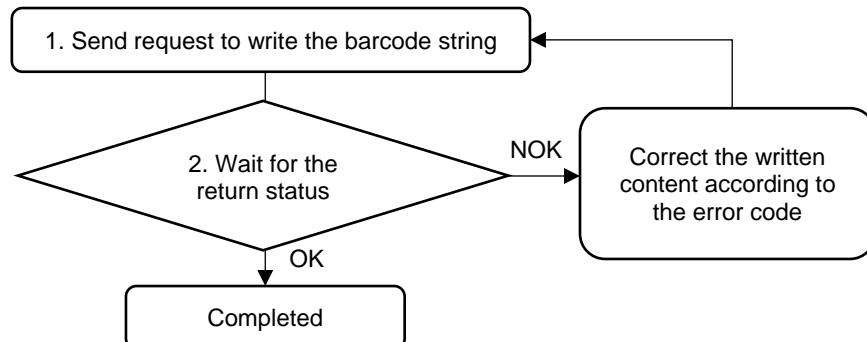
## #401 Write the barcode string

Content description:

Use function code #401 to input the barcode string.

- A. Input the barcode string to the controller.
- B. If the switching method is Barcode Scanner, when you scan the barcode, the content of the string is immediately matched and switched to the corresponding parameter or sequence.

Handshake signal description:



1. Send the request to write the barcode string.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	401	9101
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 220	Barcode string	ASCII code (100 words)	...

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	401	9101
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	401	9101
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Matching failed	Failed to match the strings in Barcode Scanner mode

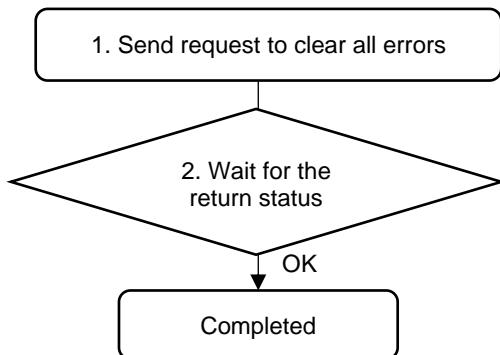
## #402 Write to clear all errors

Content description:

Use function code #402 to clear all the AL, NG, and WN alarms.

B

Handshake signal description:



1. Send the request to clear all errors.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	402	9201
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	402	9201
3 - 4	Return data length	Unit: Word	0A00
5 - 14	Reserved	10 bytes	...
15 - 16	Return function code	402	9201
17 - 18	Status	1: OK	0100

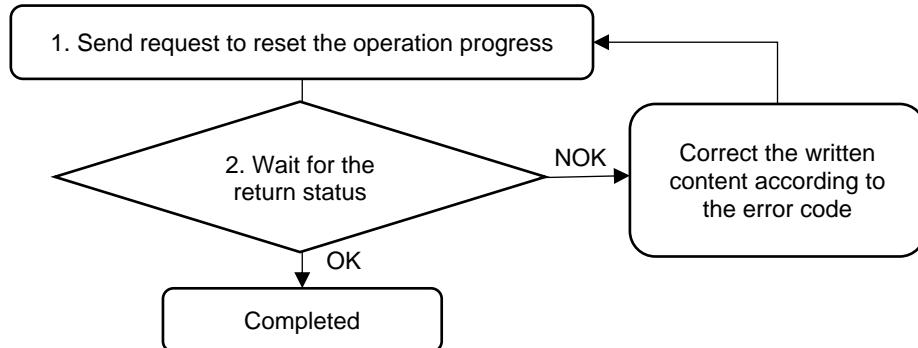
If successful, the read status is 1.

## #403 Write to reset the operation progress

Content description:

Use function code #403 to reset the operation progress (total screw quantity, parameter quantity, and screw quantity of the parameter).

Handshake signal description:



1. Send the request to reset the operation progress.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	403	9301
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	403	9301
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	403	9301
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

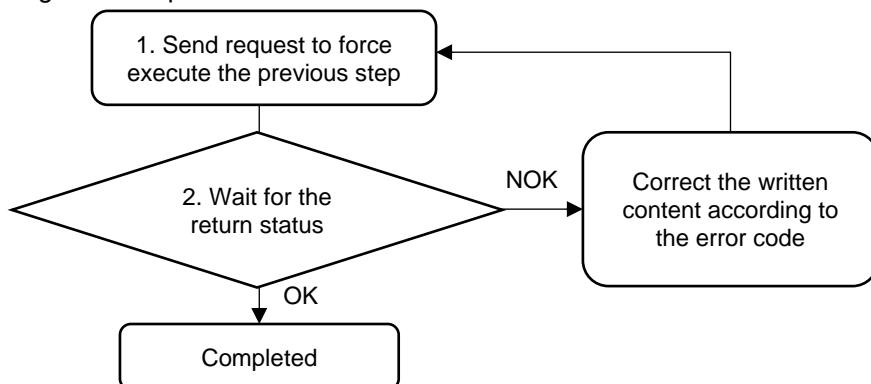
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #404 Write to force execute the previous step

Content description:

Use function code #404 to execute the parameter of the previous screw.

Handshake signal description:



1. Send the request to force execute the previous step.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	404	9401
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	404	9401
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	404	9401
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

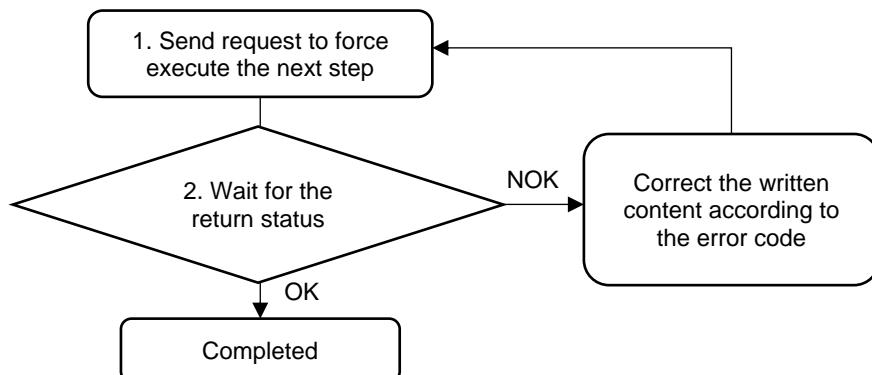
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #405 Write to force execute the next step

Content description:

Use function code #405 to execute the parameter of the next screw.

Handshake signal description:



1. Send the request to force execute the next step.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	405	9501
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	405	9501
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	405	9501
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

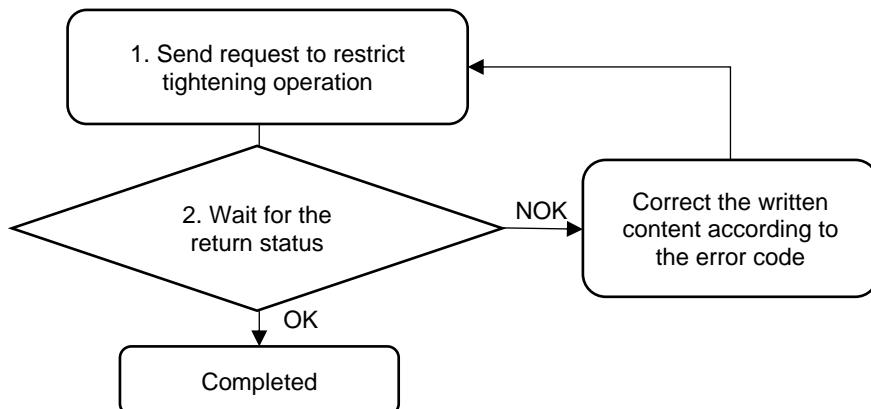
B

## #406 Write to restrict tightening operation

Content description:

Use function code #406 to restrict the transducerized smart screwdriver from performing tightening operations until you use function code #406 again to remove the restriction.

Handshake signal description:



1. Send the request to restrict the tightening operation.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	406	9601
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Restrict operation / Remove restriction	0: remove restriction 1: restrict operation	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	406	9601
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Restrict operation / Remove restriction	0: remove restriction 1: restrict operation	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	406	9601
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

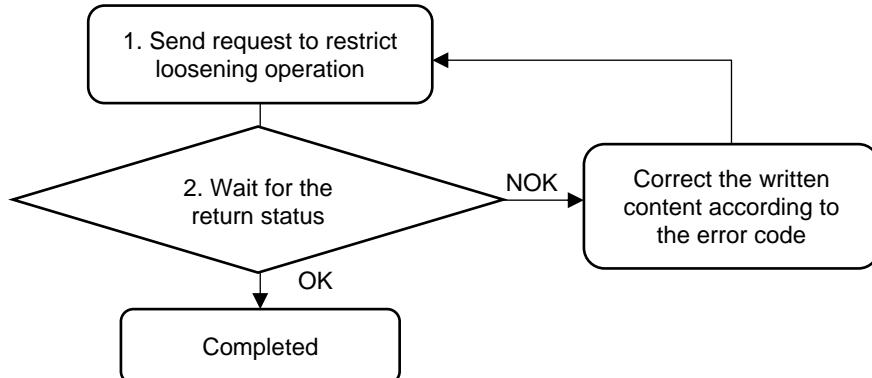
## #407 Write to restrict loosening operation

Content description:

Use function code #407 to restrict the transducerized smart screwdriver from performing loosening operations until you use function code #407 again to remove the restriction.

B

Handshake signal description:



1. Send the request to restrict the loosening operation.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	407	9701
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Restrict operation / Remove restriction	0: remove restriction 1: restrict operation	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	407	9701
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Restrict operation / Remove restriction	0: remove restriction 1: restrict operation	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	407	9701
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

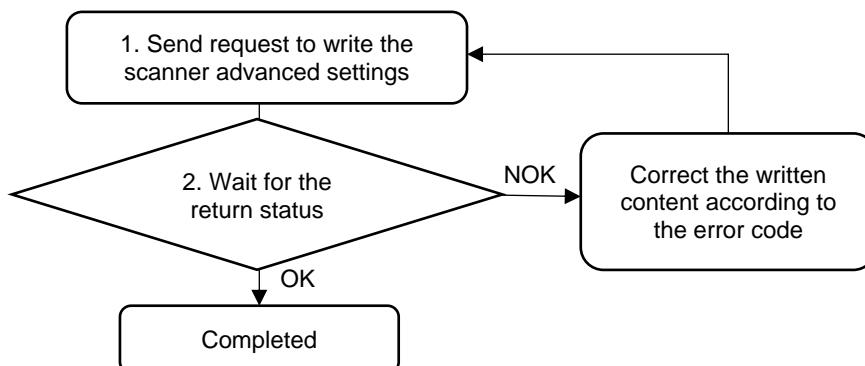
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #408 Write the scanner advanced settings

Content description:

Use function code #408 to set the scanner advanced settings.

Handshake signal description:



1. Send the request to write the scanner advanced settings.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	408	9801
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	Start position (char.) for saving scanner string	1 to 200	0100
23 - 24	End position (char.) for saving scanner string		C800
25 - 26	Start position (char.) for matching scanner string		0100
27 - 28	End position (char.) for matching scanner string		C800

Example 1: when the barcode string is "ABCDE", if you set 2 to bytes 21 - 22 and 4 to bytes 23 - 24, the system then saves the 3-character string "BCD" to the Results screen.

Example 2: when the barcode string is "ABCDE" and the switching method is Barcode Scanner, if you set 2 to bytes 25 - 26 and 4 to bytes 27 - 28, the system then matches the 3-character string "BCD" against the corresponding strings of the 500 sets of parameters or sequences.

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	408	9801
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	408	9801
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Scanner advanced setting value out of range	Exceeds the range of 1 to 200

B

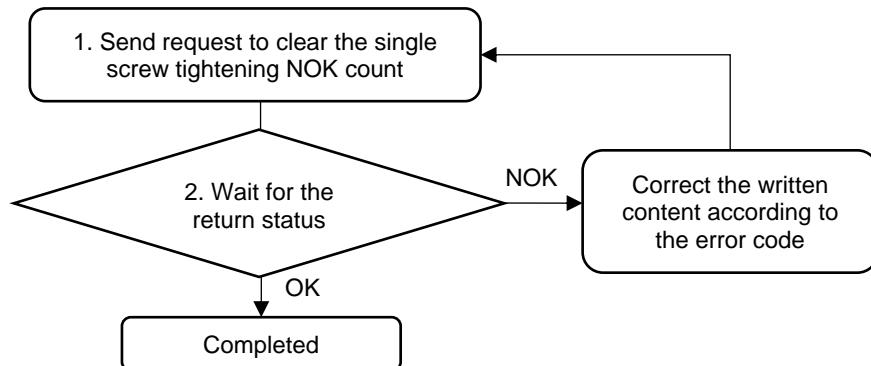
### #409 Write to clear the single screw tightening NOK count

Content description:

Use function code #409 to clear the single screw tightening NOK count.

Byte		Tool 1 status / Tool 2 status
Tool 1	Tool 2	
47 - 48	147 - 148	Single screw tightening NOK count (L)
49 - 50	149 - 150	Single screw tightening NOK count (H)

Handshake signal description:



- Send the request to clear the single screw tightening NOK count.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	409	9901
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	409	9901
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	409	9901
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

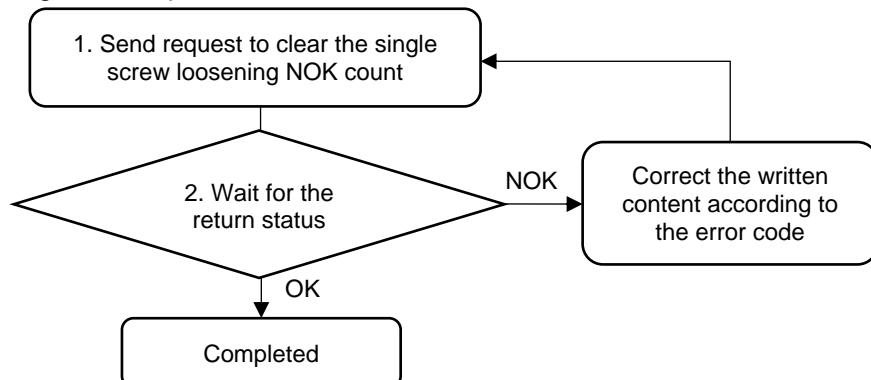
## #410 Write to clear the single screw loosening NOK count

Content description:

Use function code #410 to clear the single screw loosening NOK count.

Byte		Tool 1 status / Tool 2 status
Tool 1	Tool 2	
55 - 56	155 - 156	Single screw loosening NOK count (L)
57 - 58	157 - 158	Single screw loosening NOK count (H)

Handshake signal description:



### 1. Send the request to clear the single screw loosening NOK count.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	410	9A01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

### 2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	410	9A01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	410	9A01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

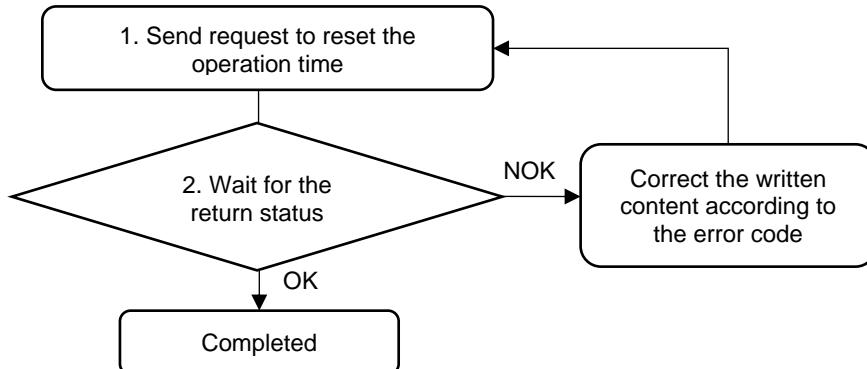
## #411 Write to reset the operation time

Content description:

Use function code #411 to restart the timer for counting the remaining operation time.

Byte		Tool 1 status / Tool 2 status
Tool 1	Tool 2	
117 - 118	217 - 218	Remaining operation time (L)
119 - 120	219 - 220	Remaining operation time (H)

Handshake signal description:



### 1. Send the request to reset the operation time.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	411	9B01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

### 2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	411	9B01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	411	9B01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

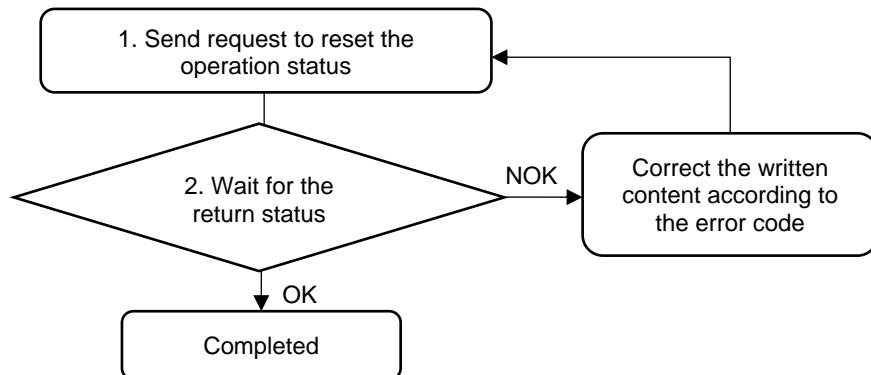
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #412 Write to reset the operation status

Content description:

Use function code #412 to reset the operation status, including the operation progress and other tightening information.

Handshake signal description:



1. Send the request to reset the operation status.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	412	9C01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	412	9C01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	412	9C01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

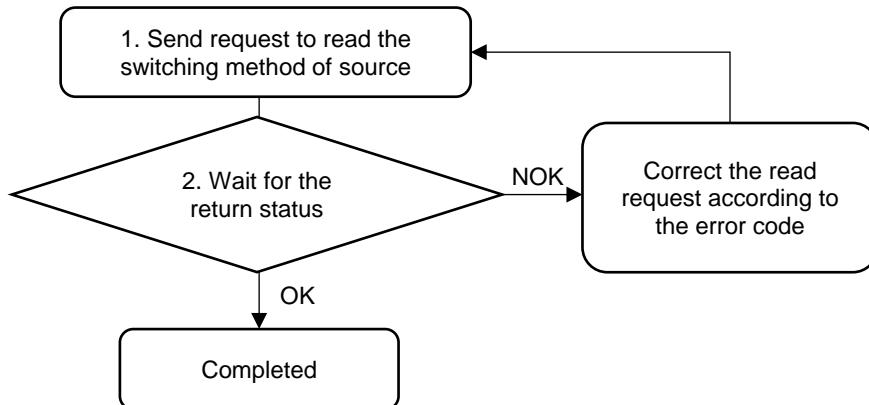
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #450 Read the switching method of source

Content description:

Use function code #450 to read the switching method of the tightening source in operation.

Handshake signal description:



1. Send the request to read the switching method of the tightening source.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	450	C201
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the switching method of the tightening source in operation.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	450	C201
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Switching method ID	Manual: 1 Screw bit selector: 1 to 255 Barcode scanner: 1 to 500 (0: the controller is not running)	0000
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	450	C201
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

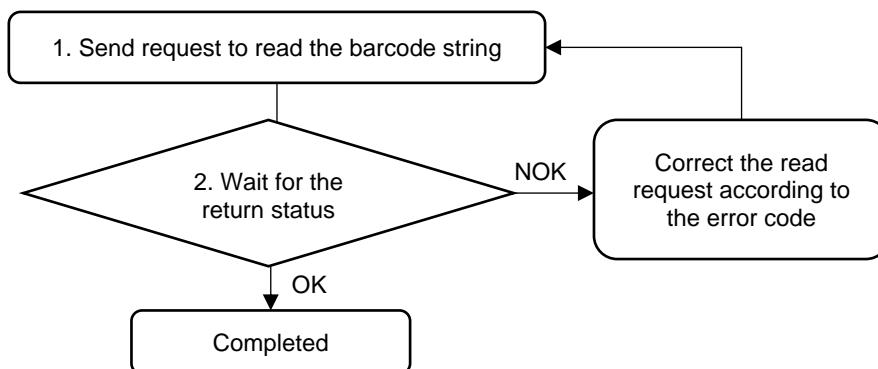
B

## #451 Read the barcode string

Content description:

Use function code #451 to read the content of the barcode string.

Handshake signal description:



1. Send the request to read the barcode string.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	451	C301
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the barcode string.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	451	C301
3 - 4	Return data length	Unit: Word	6E00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	451	C301
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 220	Barcode string	ASCII code (100 words)	...

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

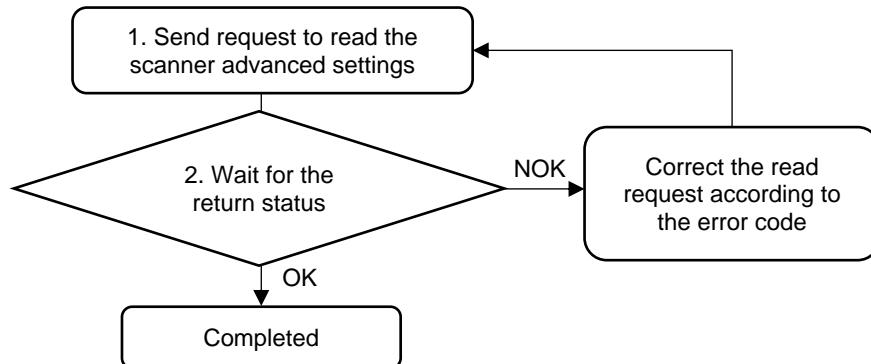
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #452 Read the scanner advanced settings

Content description:

Use function code #452 to read the Scanner Advanced Settings.

Handshake signal description:



1. Send the request to read the scanner advanced settings.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	452	C401
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the scanner advanced settings.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	452	C401
3 - 4	Return data length	Unit: Word	0E00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	452	C401
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 22	Start position (char.) for saving scanner string	1 to 200	0100
23 - 24	End position (char.) for saving scanner string		C800
25 - 26	Start position (char.) for matching scanner string		0100
27 - 28	End position (char.) for matching scanner string		C800

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

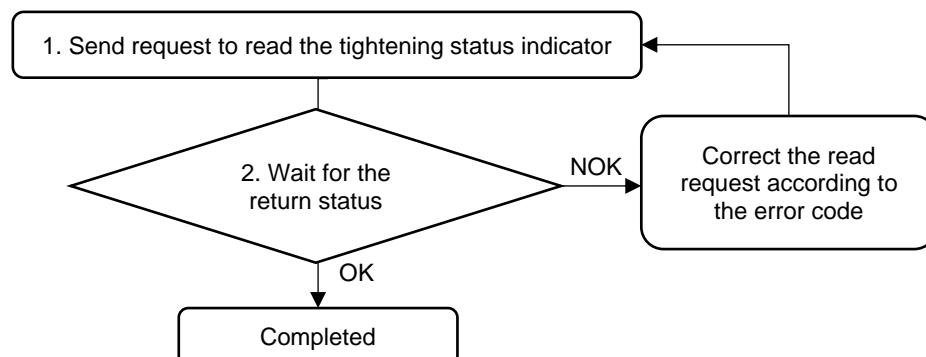
B

## #453 Read the tightening status indicator

Content description:

Use function code #453 to read the tightening status indicator for up to 1000 screws.

Handshake signal description:



1. Send the request to read the tightening status indicator.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	453	C501
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the tightening status indicator.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	453	C501
3 - 4	Return data length	Unit: Word	3F02
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	453	C501
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 22	Tightening status indicator for screw ID 1		0200
23 - 24	Tightening status indicator for screw ID 2		0200
25 - 26	Tightening status indicator for screw ID 3		0200
...	Tightening status indicator for screw ID N	2: green 8: red	...
2015 - 2016	Tightening status indicator for screw ID 998		0200
2017 - 2018	Tightening status indicator for screw ID 999		0200
2019 - 2020	Tightening status indicator for screw ID 1000		0200

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

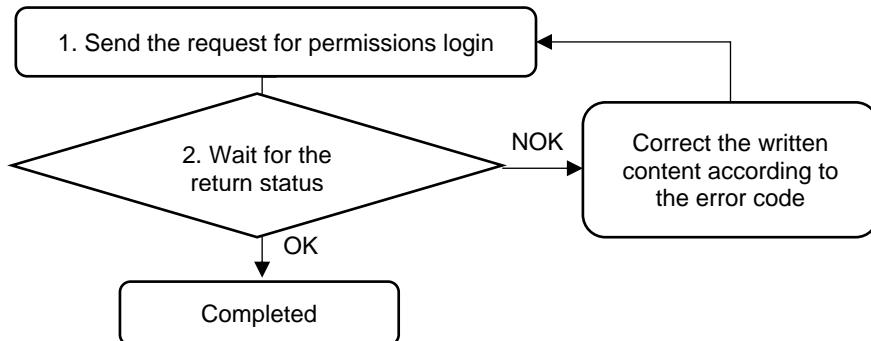
### B.3.5 Controller operations

#### #500 Write the request for permissions login

Content description:

Use function code #500 to switch the controller permissions account through the host controller.

Handshake signal description:



1. Send the request for permissions login.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	500	F401
3 - 4	Version number	-	0000
5 - 6	Permissions account	1: User1 2: User2 3: User3 4: User4 5: User5 6: Admin (highest level)	0200
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 40	Permissions password	Numbers converted to ASCII code (10 words)	...

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	500	F401
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Permissions account	1: User1 2: User2 3: User3 4: User4 5: User5 6: Admin (highest level)	0200
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	500	F401
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

B

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Permissions account	Exceeds the range of 1 to 6
2	Login failed	-

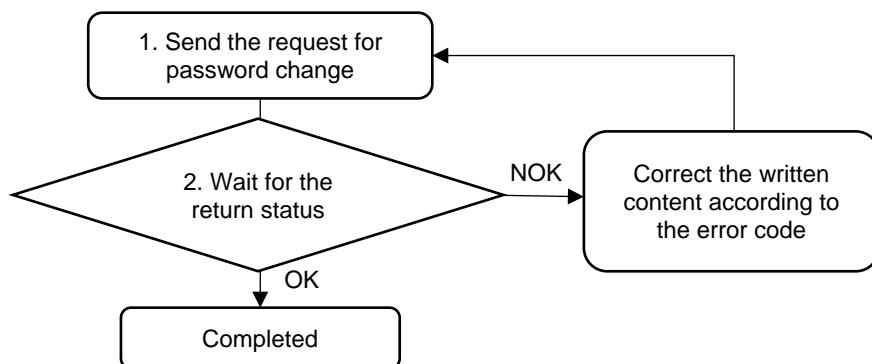
B

## #501 Write the request for password change

Content description:

Use function code #501 to change the permissions password of controller through the host controller.

Handshake signal description:



### 1. Send the request for password change.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	501	F501
3 - 4	Version number	-	0000
5 - 6	Permissions account	1: User1 2: User2 3: User3 4: User4 5: User5 6: Admin (highest level)	0200
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 40	Old password	Numbers converted to ASCII code (10 words)	...
41 - 60	New password	Numbers converted to ASCII code (10 words)	...

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	501	F501
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Permissions account	1: User1 2: User2 3: User3 4: User4 5: User5 6: Admin (highest level)	0200
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	501	F501
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Permissions account	Exceeds the range of 1 to 6
2	Password change failed	-

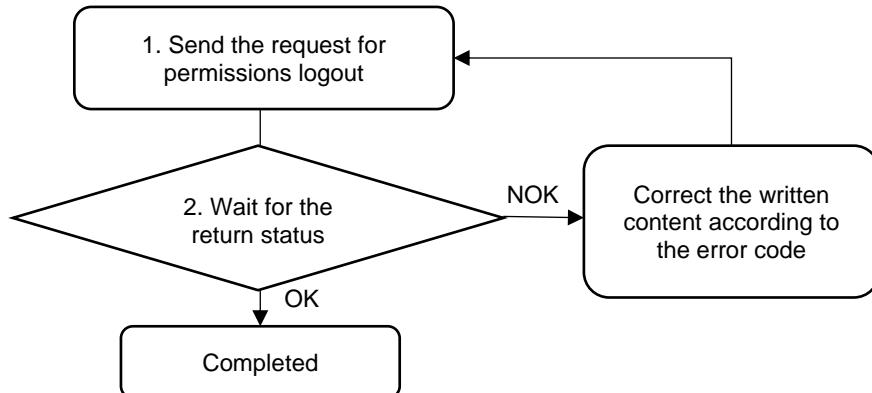
B

## #502 Write the request for permissions logout

Content description:

Use function code #502 to log out of the controller permissions account through the host controller. The default permissions account after logout is User1.

Handshake signal description:



### 1. Send the request for permissions logout.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	502	F601
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

### 2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	502	F601
3 - 4	Return data length	Unit: Word	0A00
5 - 14	Reserved	8 bytes	...
15 - 16	Return function code	502	F601
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Logout failed	-

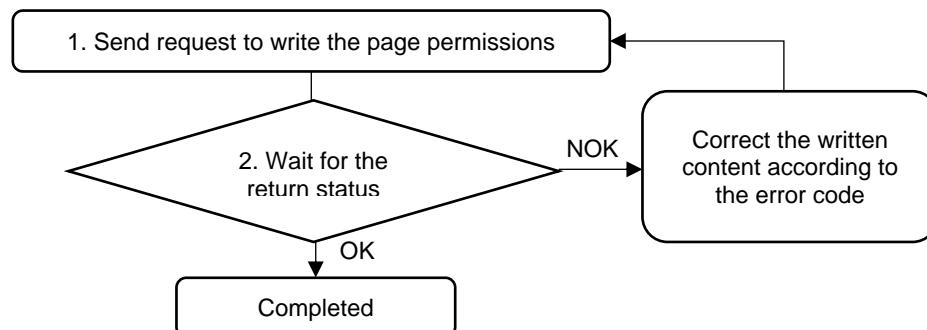
## #503 Write the page permissions

Content description:

Use function code #503 to set the permissions of page access and edit for different accounts.

B

Handshake signal description:



1. Send the request to write the page permissions.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	503	F701
3 - 4	Version number	-	0000
5 - 6	Confirm command	99	6300
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	User1 page permissions	Bit 0: Parameters Bit 1: Sequence Bit 2: Sources Bit 3: Controller Bit 4: Tool	00C0
23 - 24	User2 page permissions	Bit 5: operation for screw progress	00C0
25 - 26	User3 page permissions	Bit 6: clearing of the production report entries	00C0
27 - 28	User4 page permissions	Bit 7: clearing of the error, warning, and button report entries	00C0
29 - 30	User5 page permissions		00C0

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	503	F701
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Confirm command	99	6300
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	503	F701
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

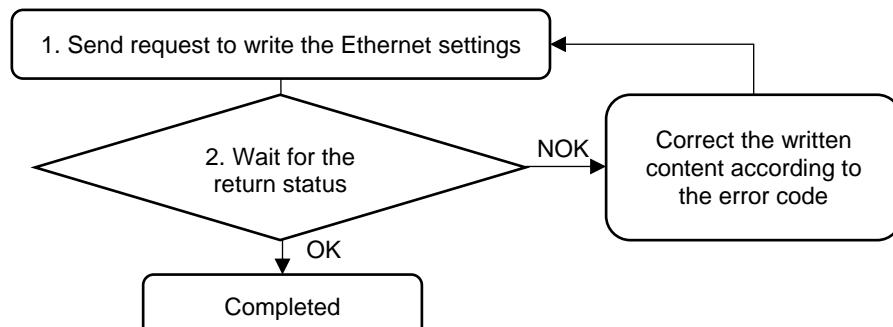
Code	Error description	Description
1	Confirm command	Must be 99

## #504 Write the Ethernet settings

Content description:

Use function code #504 to write the Ethernet settings.

Handshake signal description:



1. Send the request to write the Ethernet settings.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	504	F801
3 - 4	Version number	-	0000
5 - 6	Confirm command	99	6300
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	IP1 address	Default: 192	C000
23 - 24	IP2 address	Default: 168	A800
25 - 26	IP3 address	Default: 1	0100
27 - 28	IP4 address	Default: 11	0B00
29 - 30	Subnet mask 1	Default: 255	FF00
31 - 32	Subnet mask 2	Default: 255	FF00
33 - 34	Subnet mask 3	Default: 255	FF00
35 - 36	Subnet mask 4	Default: 0	0000

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	504	F801
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Confirm command	99	6300
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	504	F801
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

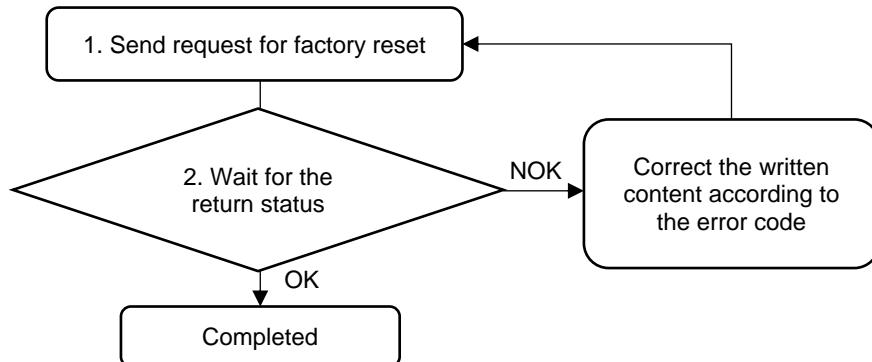
Code	Error description	Description
1	Confirm command	Must be 99

## #505 Write the request for factory reset

Content description:

Use function code #505 to write the request for factory reset.

Handshake signal description:



1. Send the request for factory reset.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	505	F901
3 - 4	Version number	-	0000
5 - 6	Confirm command	99	6300
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

Note:

1. After factory reset, all data will be deleted and all settings will be restored to default.
2. If you use the account of the highest permissions (Admin) for factory reset, the Ethernet settings will be restored to default, and the error reports and warning reports will be cleared.

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	505	F901
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Confirm command	99	6300
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	505	F901
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Confirm command	Must be 99

B

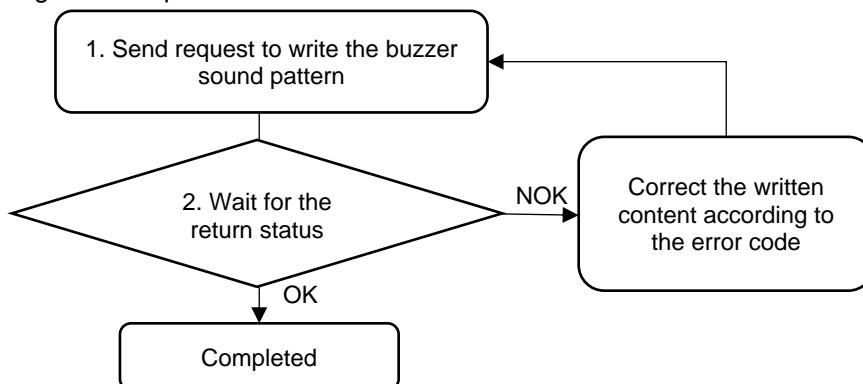
## #506 Write the buzzer sound pattern

Content description:

Use function code #506 to set the buzzer sound patterns.

B

Handshake signal description:



1. Send the request to write the buzzer sound pattern.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	506	FA01
3 - 4	Version number	-	0000
5 - 6	Sound pattern of error signal buzzer	0: mute 1: one long beep 2: one short beep 3: two short beeps	0000
7 - 8	Sound pattern of finished signal buzzer for a single screw	0: mute 1: one long beep 2: one short beep 3: two short beeps	0000
9 - 10	Sound pattern of finished signal buzzer for total screws	0: mute 1: one long beep 2: one short beep 3: two short beeps	0000
11 - 12	Reserved	-	0000
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	506	FA01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Sound pattern of error signal buzzer	0: mute 1: one long beep 2: one short beep 3: two short beeps	0000
7 - 8	Sound pattern of finished signal buzzer for a single screw	0: mute 1: one long beep 2: one short beep 3: two short beeps	0000
9 - 10	Sound pattern of finished signal buzzer for total screws	0: mute 1: one long beep 2: one short beep 3: two short beeps	0000
11 - 14	Reserved	4 bytes	...
15 - 16	Return function code	506	FA01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

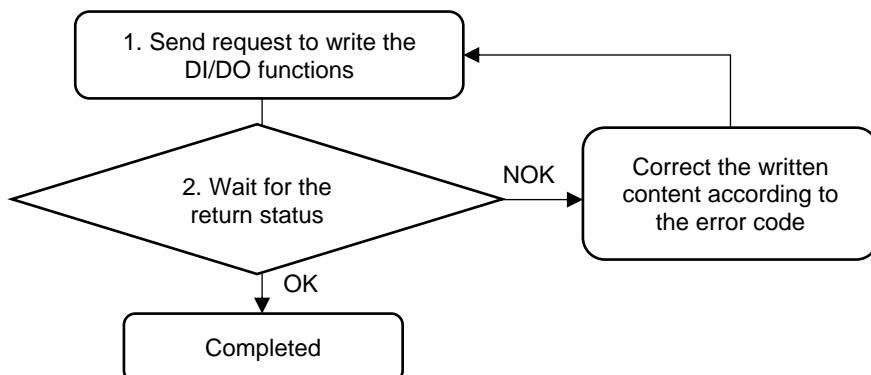
Code	Error description	Description
1	Buzzer sound pattern	Exceeds the range of 0 to 3

## #507 Write the DI/DO functions

Content description:

Use function code #507 to set the DI/DO functions.

Handshake signal description:



1. Send the request to write the DI/DO functions.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	507	FB01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	DO1 NO / NC		0000
23 - 24	DO2 NO / NC		0000
25 - 26	DO3 NO / NC		0000
27 - 28	DO4 NO / NC	0: NO (normally open) 1: NC (normally closed)	0000
29 - 30	DO5 NO / NC		0000
31 - 32	DO6 NO / NC		0000
33 - 34	DO7 NO / NC		0000
35 - 36	DO8 NO / NC		0000
37 - 38	DO1 function	0: not in use 1: ready	0100
39 - 40	DO2 function	2: running 3: tightening OK	0200
41 - 42	DO3 function	4: tightening NOK 5: loosening OK	0300
43 - 44	DO4 function	6: loosening NOK 7: total screw quantity reached 8: device alarms or tightening errors	0400
45 - 46	DO5 function	9 to 12: reserved 13: status of CW / CCW switch	0500
47 - 48	DO6 function	14: rotation direction 15: tightening result sent to feeder	0600
49 - 50	DO7 function	16 to 23: parameter ID output (Bit 1 - 8) 24 to 31: screw progress output (Bit 1 - 8)	0000
51 - 52	DO8 function	32 to 39: sequence ID output (Bit 1 - 8) 40 to 47: bit ID output (Bit 1 - 8)	0000

B

Byte	Write / Read request	Description	Example (Hex)
53 - 54	DI1 NO / NC	0: NO (normally open) 1: NC (normally closed)	0000
55 - 56	DI2 NO / NC		0000
57 - 58	DI3 NO / NC		0000
59 - 60	DI4 NO / NC		0000
61 - 62	DI5 NO / NC		0000
63 - 64	DI6 NO / NC		0000
65 - 66	DI7 NO / NC		0000
67 - 68	DI8 NO / NC		0000
69 - 70	DI1 function	0: not in use 1: start tightening	0100
		2: start loosening	
71 - 72	DI2 function	3: emergency stop 4: clear error	0200
		5: reset total screw quantity	
73 - 74	DI3 function	6: next step	0000
		7: previous step	
75 - 76	DI4 function	8: start tightening (pulse signal) 9: start loosening (pulse signal)	0000
		10: start tightening (dual-tool) 11: start loosening (dual-tool)	
77 - 78	DI5 function	12: reset operation time	0000
		13: reset single screw tightening + loosening NOK counts	
79 - 80	DI6 function	14: prohibit tool operation 15: clear communication flag	0000
		16 to 39: reserved	
81 - 82	DI7 function	40 to 47: bit ID input (Bit 1 - 8)	0000
83 - 84	DI8 function		

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	507	FB01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	507	FB01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

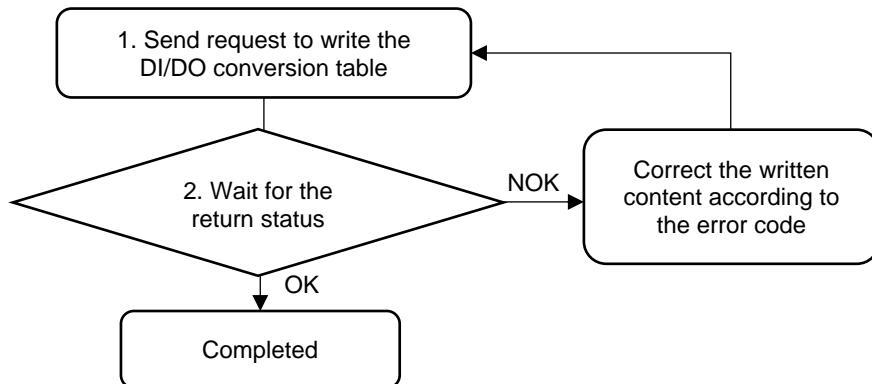
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #508 Write the DI/DO conversion table

Content description:

Use function code #508 to set the DI/DO conversion table.

Handshake signal description:



1. Send the request to write the DI/DO conversion table.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	508	FC01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Conversion table	0: bit ID output table 1: bit ID input table 2: parameter ID output table 4: screw progress output table 6: sequence ID output table	0100
9 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	DEC value corresponding to ID 0	0 to 255	0000
23 - 24	DEC value corresponding to ID 1		0100
25 - 26	DEC value corresponding to ID 2		0200
27 - 28	DEC value corresponding to ID 3		0300
29 - 30	DEC value corresponding to ID 4		0400
...	DEC value corresponding to ID N		...
523 - 524	DEC value corresponding to ID 251		FB00
525 - 526	DEC value corresponding to ID 252		FC00
527 - 528	DEC value corresponding to ID 253		FD00
529 - 530	DEC value corresponding to ID 254		FE00
531 - 532	DEC value corresponding to ID 255		FF00

B

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	508	FC01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Conversion table	0: bit ID output table 1: bit ID input table 2: parameter ID output table 4: screw progress output table 6: sequence ID output table	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	508	FC01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

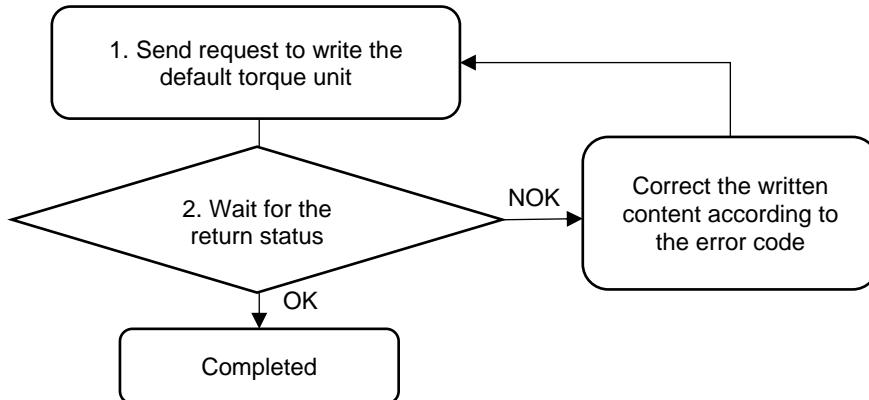
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Conversion table	Must be 0, 1, 2, 4, or 6

## #509 Write the default torque unit

Content description:

Use function code #509 to set the default torque unit of the controller.

Handshake signal description:



1. Send the request to write the default torque unit.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	509	FD01
3 - 4	Version number	-	0000
5 - 6	Default torque unit	0: N.m 1: kgf.cm 2: lbf.ft 3: lbf.in	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	509	FD01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Default torque unit	0: N.m 1: kgf.cm 2: lbf.ft 3: lbf.in	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	509	FD01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Default torque unit	Exceeds the range of 0 to 3

B

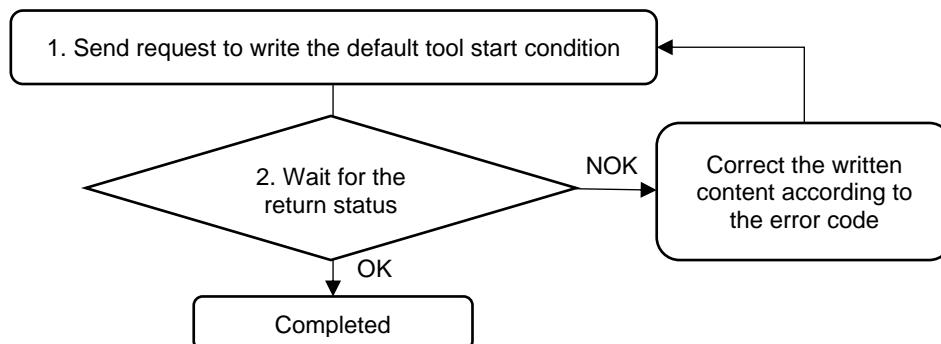
## #510 Write the default tool start condition

Content description:

Use function code #510 to set the default tool start condition.

Note: for example, first set the default tool start condition to "DI" with function code #510. Then, set the DI function to "start tightening" or "start loosening" with function code #507 or #511 to operate the tool through DI.

Handshake signal description:



1. Send the request to write the default tool start condition.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	510	FE01
3 - 4	Version number	-	0000
5 - 6	Default tool start condition	0: push start 1: DI 2: lever start 3: push start or lever start 4: push start and lever start	0300
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	510	FE01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Default tool start condition	0: push start 1: DI 2: lever start 3: push start or lever start 4: push start and lever start	0300
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	510	FE01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

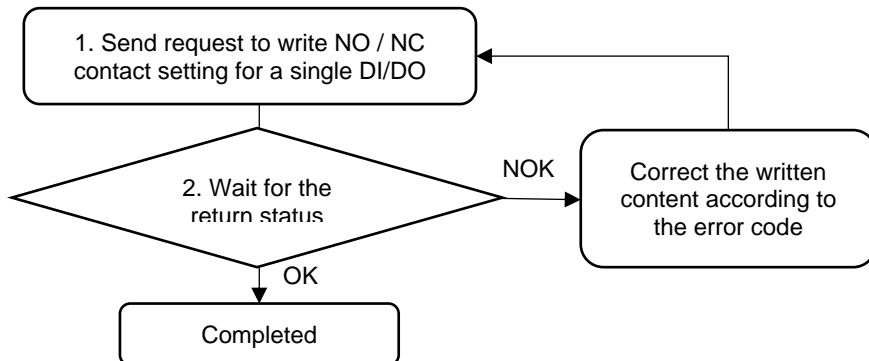
Code	Error description	Description
1	Tool start condition	Exceeds the range of 0 to 4

## #511 Write NO / NC contact setting for a single DI/DO

Content description:

Use function code #511 to set a single DI/DO as an NO / NC contact.

Handshake signal description:



1. Send the request to write the NO / NC contact setting for a single DI/DO.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	511	FF01
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	DO / DI	0: DO; 1: DI	0100
9 - 10	Corresponding bit of DO / DI	0 to 7	0000
11 - 12	NO / NC	0: NO (normally open) 1: NC (normally closed)	0100
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	511	FF01
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	DO / DI	0: DO; 1: DI	0100
9 - 10	Corresponding bit of DO / DI	0 to 7	0000
11 - 12	NO / NC	0: NO (normally open) 1: NC (normally closed)	0100
13 - 14	Reserved	-	0000
15 - 16	Return function code	511	FF01
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	DO / DI	Must be 0 or 1
3	Corresponding bit of DO / DI	Exceeds the range of 0 to 7
4	NO / NC	Must be 0 or 1

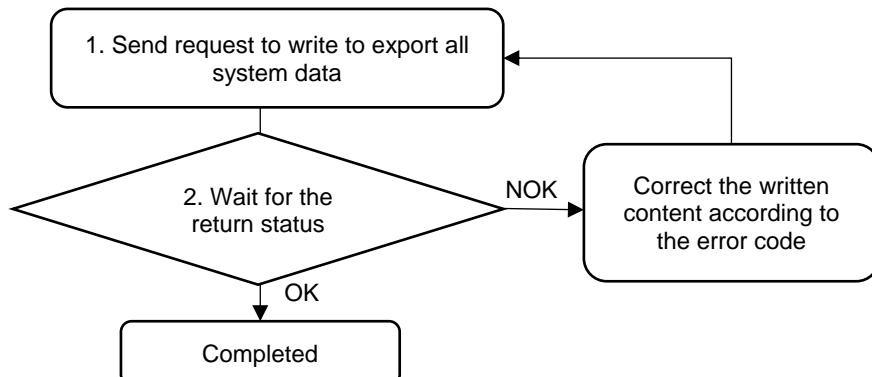
B

## #512 Write to export all system data

Content description:

Use function code #512 to export all system data, including contents of parameters, sequences, sources, controller, tool, and reports.

Handshake signal description:



1. Send the request to export all system data.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	512	0002
3 - 4	Version number	-	0000
5 - 6	Data storage location	0: USB Disk 1: HMI Disk	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	512	0002
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Data storage location	0: USB Disk 1: HMI Disk	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	512	0002
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

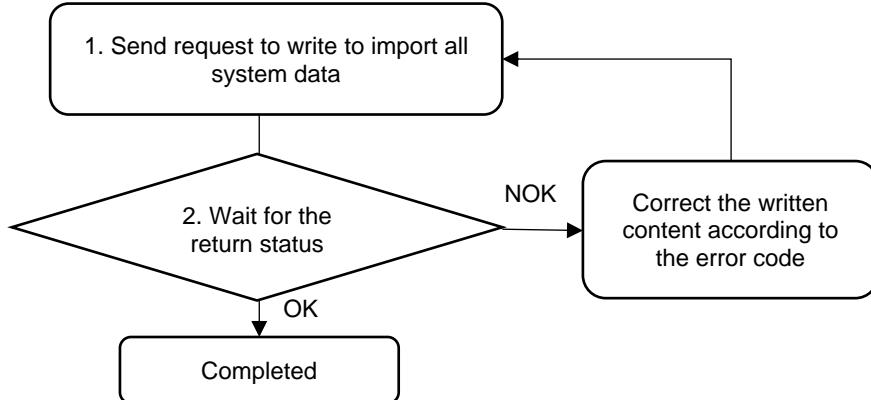
Code	Error description	Description
1	Data storage location	Must be 0 or 1

## #513 Write to import all system data

Content description:

Use function code #513 to import all system data, including contents of parameters, sequences, sources, controller, and tool.

Handshake signal description:



1. Send the request to write to import all system data.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	513	0102
3 - 4	Version number	-	0000
5 - 6	Read data from	0: USB Disk 1: HMI Disk	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	513	0102
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Read data from	0: USB Disk 1: HMI Disk	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	513	0102
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

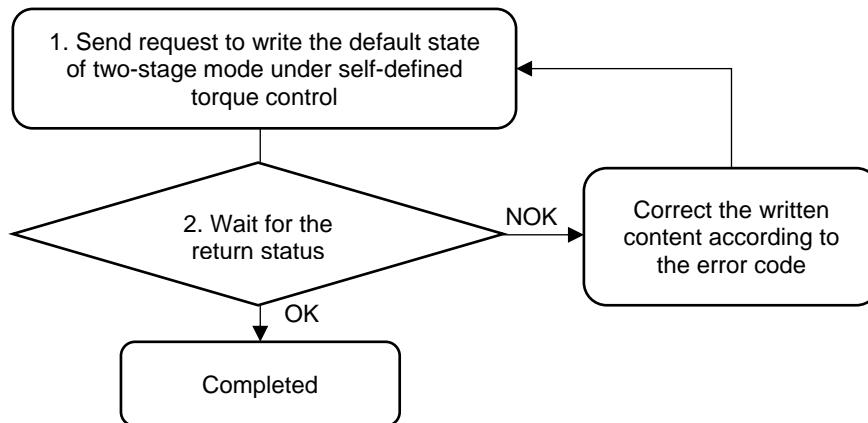
Code	Error description	Description
1	Read data from	Must be 0 or 1

## #514 Write the default two-stage mode under self-defined torque control

Content description:

Use function code #514 to set the default state of two-stage mode under self-defined torque control.

Handshake signal description:



- Send the request to write the default state of two-stage mode under self-defined torque control.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	514	0202
3 - 4	Version number	-	0000
5 - 6	Two-stage mode	0: Off 1: On	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	514	0202
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Two-stage mode	0: Off 1: On	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	514	0202
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

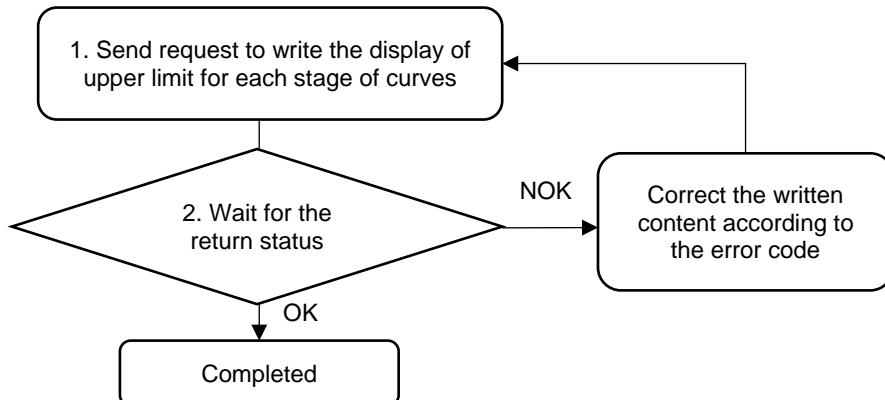
Code	Error description	Description
1	Two-stage mode	Must be 0 or 1

## #515 Write the display of upper limit for each stage of curves

Content description:

Use function code #515 to set whether to display the upper limit for each stage of the curves.

Handshake signal description:



1. Send the request to write the display of upper limit for each stage of curves.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	515	0302
3 - 4	Version number	-	0000
5 - 6	Display the upper limit for each stage of curves	0: On 1: Off	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	515	0302
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Display the upper limit for each stage of curves	0: On 1: Off	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	515	0302
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Display the upper limit for each stage of curves	Must be 0 or 1

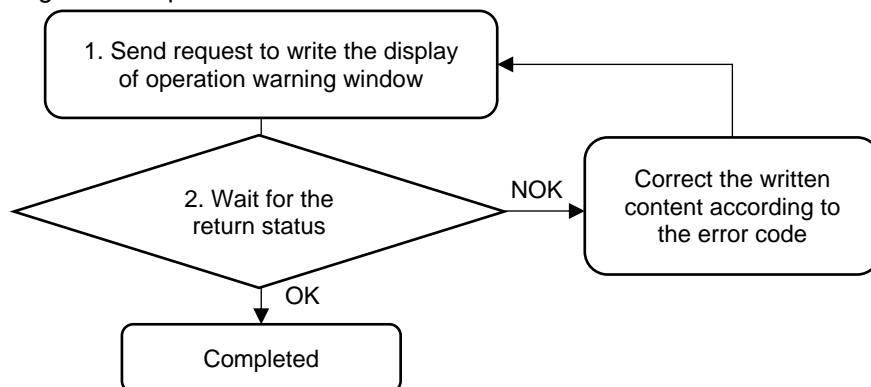
B

## #516 Write the display of operation warning window

Content description:

Use function code #516 to set whether to display the operation warning window.

Handshake signal description:



1. Send the request to write the display of operation warning window.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	516	0402
3 - 4	Version number	-	0000
5 - 6	Display the operation warning window	0: On 1: Off	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	516	0402
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Display the operation warning window	0: On 1: Off	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	516	0402
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

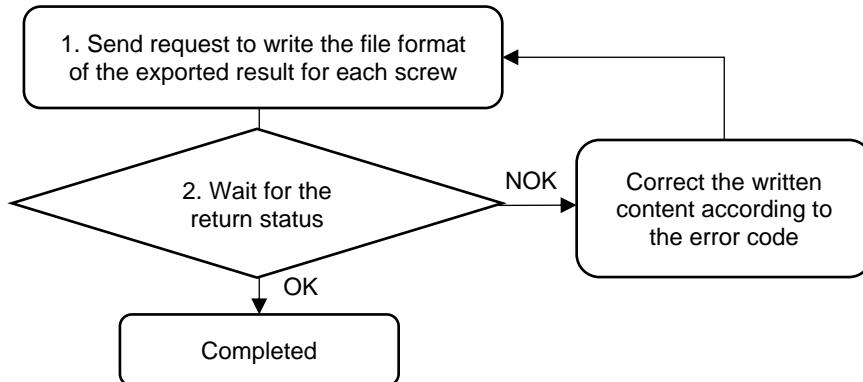
Code	Error description	Description
1	Display the operation warning window	Must be 0 or 1

## #517 Write file format of the exported result for each screw

Content description:

Use function code #517 to set the file format of the exported result for each screw.

Handshake signal description:



1. Send the request to write the file format of the exported result for each screw.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	517	0502
3 - 4	Version number	-	0000
5 - 6	File format of the exported result for each screw	0: disable 1: CSV file (HMI Disk) 2: CSV file (USB Disk) 3: BIN file (HMI Disk)	0300
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	517	0502
3 - 4	Return data length	Unit: Word	0A00
5 - 6	File format of the exported result for each screw	0: disable 1: CSV file (HMI Disk) 2: CSV file (USB Disk) 3: BIN file (HMI Disk)	0300
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	517	0502
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	File format of the exported result for each screw	HMI kernel version 124 or later: exceeds the range of 0 to 3 HMI kernel version earlier than 124: exceeds the range of 0 to 2

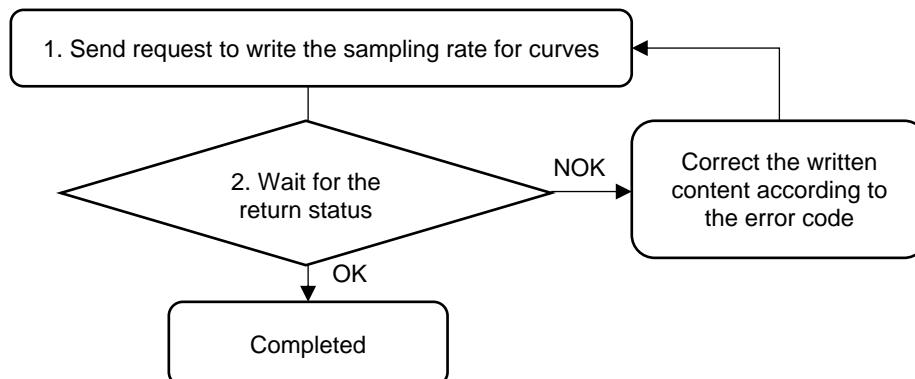
B

## #518 Write the sampling rate for curves

Content description:

Use function code #518 to set the sampling rate for curves.

Handshake signal description:



- Send the request to write the sampling rate for curves.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	518	0602
3 - 4	Version number	-	0000
5 - 6	Sampling rate for curves	0: 10 ms → 2 ms when start torque is reached 1: 2 ms; max. 4 seconds per production report entry 2: 2 ms; max. 8 seconds per production report entry 3: 1 ms; max. 4 seconds per production report entry 4: 1 ms; max. 8 seconds per production report entry	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	518	0602
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Sampling rate for curves	0: 10 ms → 2 ms when start torque is reached 1: 2 ms; max. 4 seconds per production report entry 2: 2 ms; max. 8 seconds per production report entry 3: 1 ms; max. 4 seconds per production report entry 4: 1 ms; max. 8 seconds per production report entry	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	518	0602
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

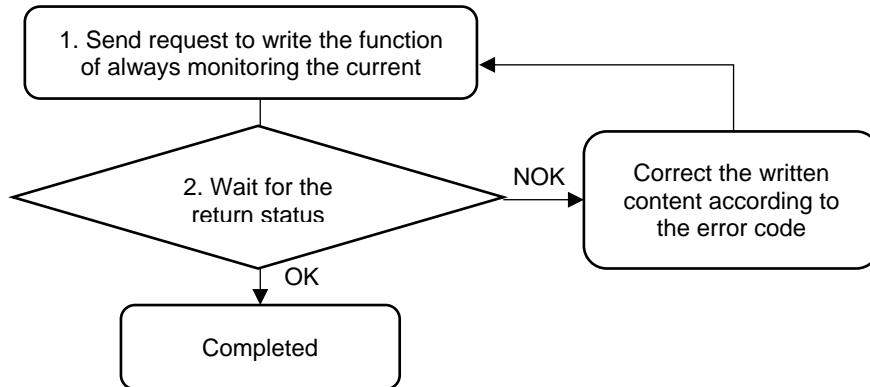
Code	Error description	Description
1	Sampling rate for curves	Exceeds the range of 0 to 4

## #519 Write the function of always monitoring the current

Content description:

Use function code #519 to set whether to enable the function of always monitoring the current.

Handshake signal description:



1. Send the request to write the function of always monitoring the current.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	519	0702
3 - 4	Version number	-	0000
5 - 6	Always monitor the current	0: On 1: Off	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	519	0702
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Always monitor the current	0: On 1: Off	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	519	0702
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Always monitor the current	Must be 0 or 1

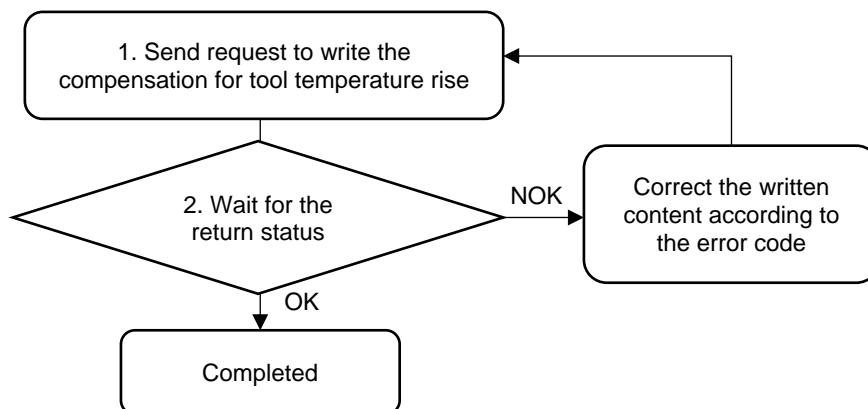
B

## #520 Write the compensation for tool temperature rise

Content description:

Use function code #520 to set the compensation for tool temperature rise.

Handshake signal description:



1. Send the request to write the compensation for tool temperature rise.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	520	0802
3 - 4	Version number	-	0000
5 - 6	Compensation for tool temperature rise	0: On 1: Off	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	520	0802
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Compensation for tool temperature rise	0: On 1: Off	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	520	0802
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Compensation for tool temperature rise	Must be 0 or 1

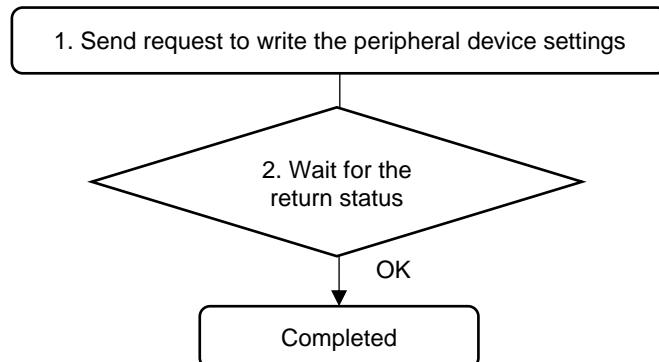
## #521 Write the peripheral device settings

Content description:

Use function code #521 to write the peripheral device settings.

Handshake signal description:

B



1. Send the request to write the peripheral device settings.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	521	0902
3 - 4	Version number	-	0000
5 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	RS-232 connector function	0: disabled 1: Tool 1 positioning arm 2: Tool 2 positioning arm	C000 A800 0100
23 - 24	RS-485 connector function		
25 - 26	Host connector function		
27 - 28	Tool 1 positioning arm - target position tolerance (L)	Unit: mm	0800
29 - 30	Tool 1 positioning arm - target position tolerance (H)		0000
31 - 32	Tool 1 - X axis position offset (L)	Unit: mm	0000
33 - 34	Tool 1 - X axis position offset (H)		0000
35 - 36	Tool 1 - Y axis position offset (L)	Unit: mm	0000
37 - 38	Tool 1 - Y axis position offset (H)		0000
39 - 40	Tool 1 - Z axis position offset (L)	Unit: mm	0000
41 - 42	Tool 1 - Z axis position offset (H)		0000
43 - 44	Tool 2 positioning arm - target position tolerance (L)	Unit: mm	0800
45 - 46	Tool 2 positioning arm - target position tolerance (H)		0000
47 - 48	Tool 2 - X axis position offset (L)	Unit: mm	0000
49 - 50	Tool 2 - X axis position offset (H)		0000
51 - 52	Tool 2 - Y axis position offset (L)	Unit: mm	0000
53 - 54	Tool 2 - Y axis position offset (H)		0000
55 - 56	Tool 2 - Z axis position offset (L)	Unit: mm	0000
57 - 58	Tool 2 - Z axis position offset (H)		0000

2. Check whether the reading is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	521	0902
3 - 4	Return data length	Unit: Word	0A00
5 - 14	Reserved	10 bytes	...
15 - 16	Return function code	521	0902
17 - 18	Status	1: OK	0100

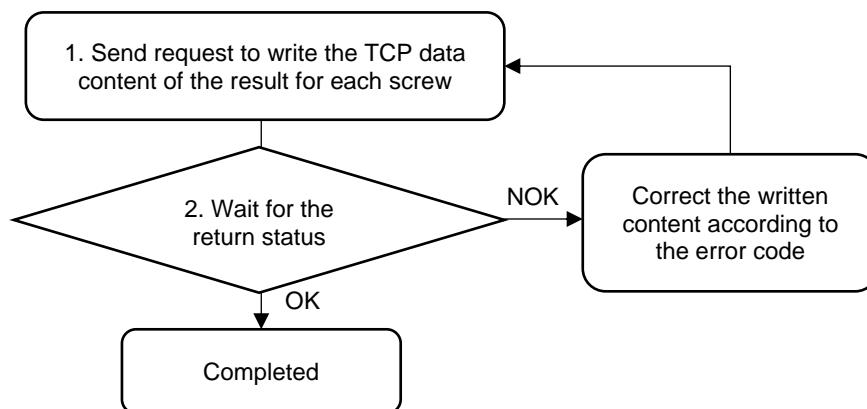
If successful, the read status is 1.

### #522 Write the TCP data content of the result for each screw

Content description:

Use function code #522 to set the TCP data content of the result for each screw.

Handshake signal description:



1. Send the request to write the TCP data content of the result for each screw.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	522	0A02
3 - 4	Version number	-	0000
5 - 6	TCP data content of the result for each screw	0: disable 1: scale, time, torque 2: scale, angle, torque 3: scale, angle, torque rate 4: result, scale, time, torque 5: result, scale, angle, torque 6: result, scale, angle, torque rate	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Bytes	Return status	Description	Example (Hex)
1 - 2	Function code	522	0A02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	TCP data content of the result for each screw	0: disable 1: scale, time, torque 2: scale, angle, torque 3: scale, angle, torque rate 4: result, scale, time, torque 5: result, scale, angle, torque 6: result, scale, angle, torque rate	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	522	0A02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	TCP data content of the result for each screw	Exceeds the range of 0 to 6

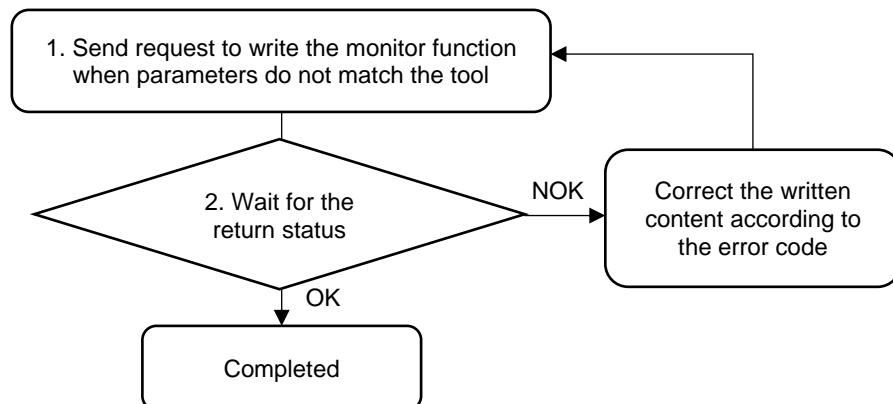
B

## #523 Write the monitor function when parameters do not match the tool

Content description:

Use function code #523 to set the function for monitoring if the tool torque of the operating parameter matches that of the connected tool.

Handshake signal description:



- Send the request to write the monitor function when parameters do not match the tool.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	523	0B02
3 - 4	Version number	-	0000
5 - 6	Monitor function when parameters do not match the tool	0: On 1: Off	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	523	0B02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Monitor function when parameters do not match the tool	0: On 1: Off	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	523	0B02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

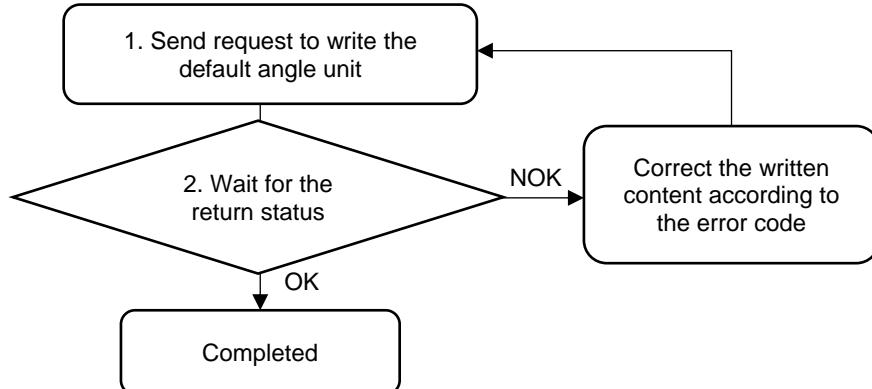
Code	Error description	Description
1	Monitor function when parameters do not match the tool	Must be 0 or 1

## #524 Write the default angle unit

Content description:

Use function code #524 to set the default angle unit of the controller.

Handshake signal description:



1. Send the request to write the default angle unit.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	524	0C02
3 - 4	Version number	-	0000
5 - 6	Default angle unit	0: degree 1: turn	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	524	0C02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Default angle unit	0: degree 1: turn	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	524	0C02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Default angle unit	Must be 0 or 1

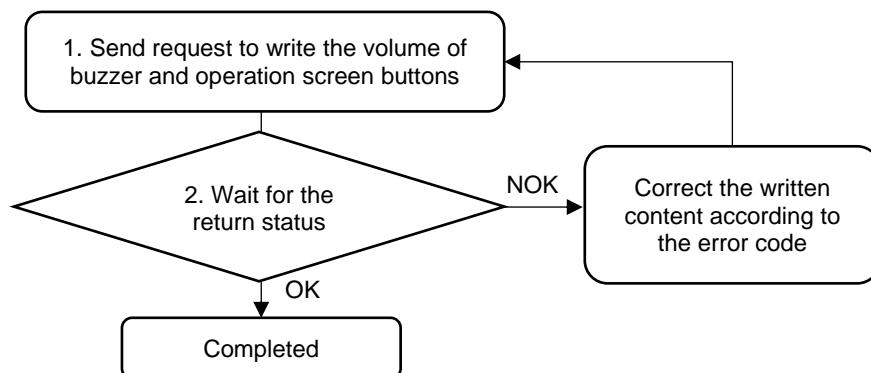
B

## #525 Write the volume of buzzer and operation screen buttons

Content description:

Use function code #525 to set the volume of buzzer and operation screen buttons.

Handshake signal description:



- Send the request to write the volume of buzzer and operation screen buttons.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	525	0D02
3 - 4	Version number	-	0000
5 - 6	Volume of buzzer	0 to 100	0000
7 - 8	Volume of operation screen buttons	0 to 100	0000
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	525	0D02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Volume of buzzer	0 to 100	0000
7 - 8	Volume of operation screen buttons	0 to 100	0000
9 - 12	Reserved	4 bytes	...
15 - 16	Return function code	525	0D02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

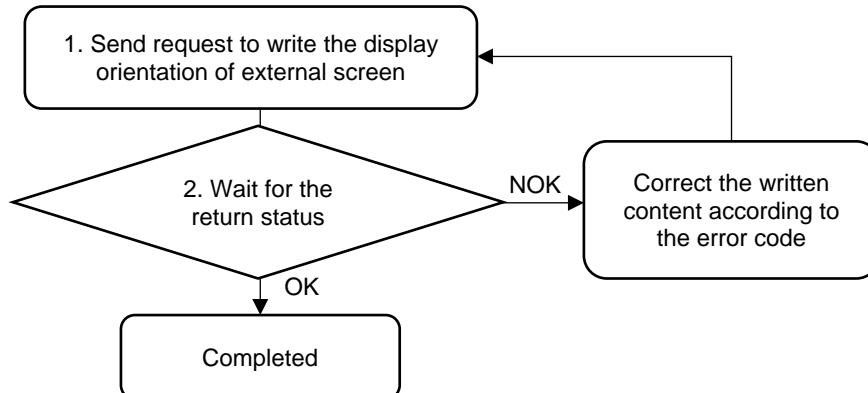
Code	Error description	Description
1	Volume of buzzer	Exceeds the range of 0 to 100
2	Volume of operation screen buttons	Exceeds the range of 0 to 100

## #526 Write the display orientation of external screen

Content description:

Use function code #526 to set the display orientation of the external screen (HDMI).

Handshake signal description:



1. Send the request to write the display orientation of external screen.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	526	0E02
3 - 4	Version number	-	0000
5 - 6	Display orientation	0: portrait 1: landscape	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	526	0E02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Display orientation	0: portrait 1: landscape	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	526	0E02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Display orientation	Must be 0 or 1

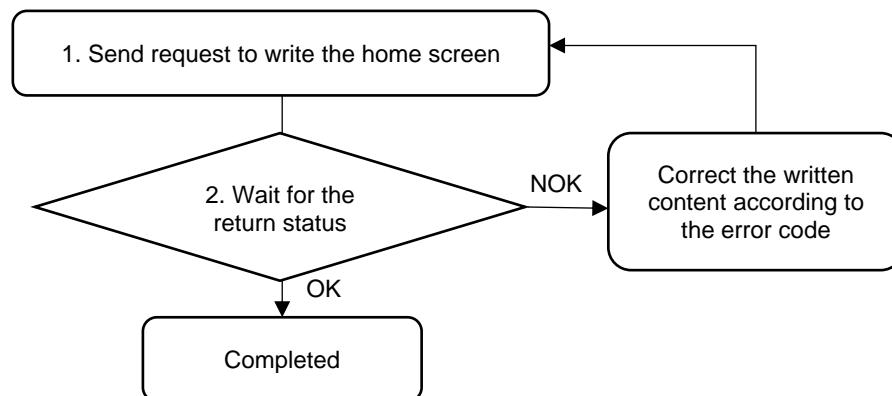
B

## #527 Write the home screen

Content description:

Use function code #527 to set the home screen of the controller.

Handshake signal description:



1. Send the request to write the home screen.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	527	0F02
3 - 4	Version number	-	0000
5 - 6	Home screen	0: Home 1: Results	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	527	0F02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Home screen	0: Home 1: Results	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	527	0F02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

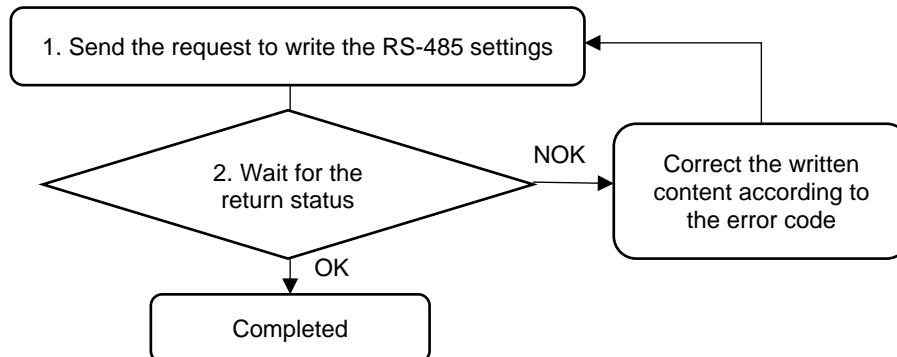
Code	Error description	Description
1	Home screen	Must be 0 or 1

## #528 Write the RS-485 settings

Content description:

Use function code #528 to write the RS-485 settings.

Handshake signal description:



1. Send the request to write the RS-485 settings.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	528	1002
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	Function On / Off	0: Off 1: On	0100
23 - 24	Station	0 to 255	0100
25 - 26	RTU / ASCII	0: RTU 1: ASCII	0000
27 - 28	Baud rate	0: 9600 1: 19200 2: 38400	0000
29 - 30	Data bit	0: 8-bit 1: 7-bit	0000
31 - 32	Parity bit	0: None 1: Odd 2: Even	0000
33 - 34	Stop bit	0: 2-bit 1: 1-bit	0000

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	528	1002
3 - 4	Return data length	Unit: Word	0A00
5 - 14	Reserved	10 bytes	...
15 - 16	Return function code	528	1002
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

B

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Function On / Off	Must be 0 or 1
2	Station	Exceeds the range of 0 to 255
3	RTU / ASCII	Must be 0 or 1
4	Baud rate	Exceeds the range of 0 to 2
5	Data bit	Must be 0 or 1
6	Parity bit	Exceeds the range of 0 to 2
7	Stop bit	Must be 0 or 1

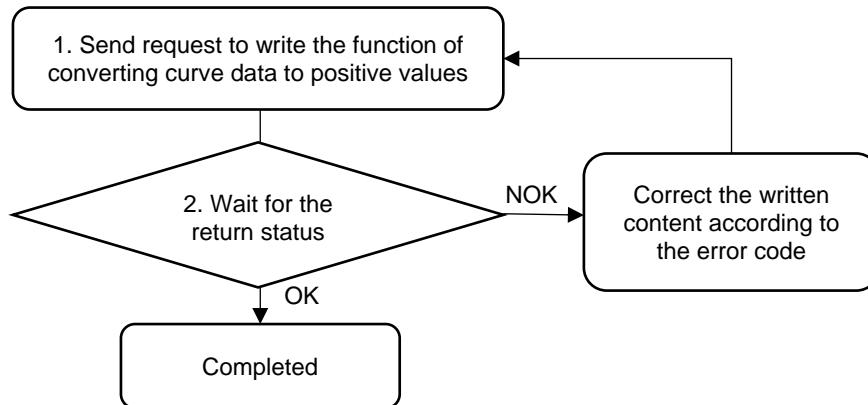
B

## #529 Write the function of converting curve data to positive values

Content description:

Use function code #529 to set the function of converting curve data to positive values.

Handshake signal description:



1. Send the request to write the function of converting curve data to positive values.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	529	1102
3 - 4	Version number	-	0000
5 - 6	Function of converting curve data to positive values	0: On 1: Off	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	529	1102
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Function of converting curve data to positive values	0: On 1: Off	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	529	1102
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Function of converting curve data to positive values	Must be 0 or 1

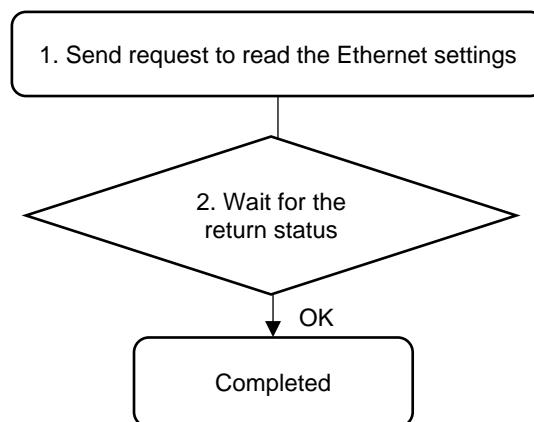
B

## #550 Read the Ethernet settings

Content description:

Use function code #550 to read the Ethernet settings.

Handshake signal description:



1. Send the request to read the Ethernet settings.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	550	2602
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the Ethernet settings.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	550	2602
3 - 4	Return data length	Unit: Word	1200
5 - 14	Reserved	10 bytes	...
15 - 16	Return function code	550	2602
17 - 18	Status	1: OK	0100
21 - 22	IP1 address	Default: 192	C000
23 - 24	IP2 address	Default: 168	A800
25 - 26	IP3 address	Default: 1	0100
27 - 28	IP4 address	Default: 11	0B00
29 - 30	Subnet mask 1	Default: 255	FF00
31 - 32	Subnet mask 2	Default: 255	FF00
33 - 34	Subnet mask 3	Default: 255	FF00
35 - 36	Subnet mask 4	Default: 0	0000

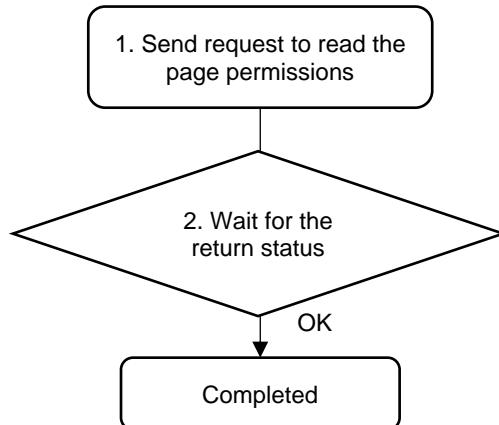
If successful, the read status is 1.

## #551 Read the page permissions

Content description:

Use function code #551 to read the permissions of page access and edit for different accounts.

Handshake signal description:



1. Send the request to read the page permissions.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	551	2702
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the page permissions.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	551	2702
3 - 4	Return data length	Unit: Word	0F00
5 - 14	Reserved	10 bytes	...
15 - 16	Return function code	551	2702
17 - 18	Status	1: OK	0100
21 - 22	User1 page permissions	Bit 0: Parameters Bit 1: Sequence Bit 2: Sources Bit 3: Controller Bit 4: Tool Bit 5: operation for screw progress Bit 6: clearing of the production report entries Bit 7: clearing of the error, warning, and button report entries	00C0
23 - 24	User2 page permissions		00C0
25 - 26	User3 page permissions		00C0
27 - 28	User4 page permissions		00C0
29 - 30	User5 page permissions		00C0

If successful, the read status is 1.

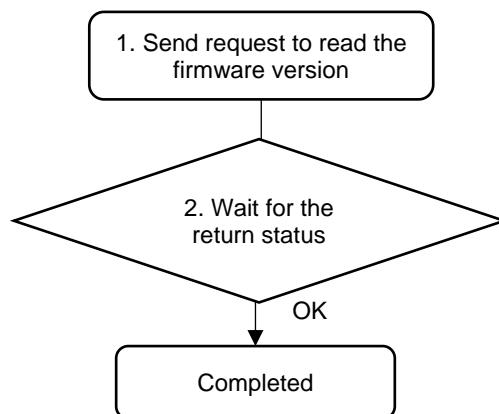
B

## #552 Read the firmware version

Content description:

Use function code #552 to read the firmware version of the controller.

Handshake signal description:



1. Send the request to read the firmware version.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	552	2802
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the controller firmware version.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	552	2802
3 - 4	Return data length	Unit: Word	1400
5 - 14	Reserved	10 bytes	...
15 - 16	Return function code	552	2802
17 - 18	Status	1: OK	0100
21 - 60	Controller firmware version	ASCII code (40 words)	...

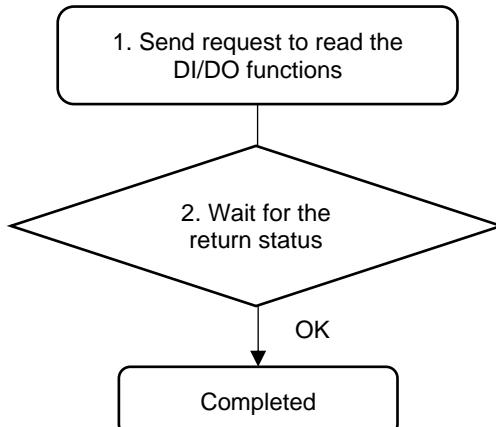
If successful, the read status is 1.

## #553 Read the DI/DO functions

Content description:

Use function code #553 to read the DI/DO functions.

Handshake signal description:



1. Send the request to read the DI/DO functions.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	553	2902
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the content of the DI/DO functions.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	553	2902
3 - 4	Return data length	Unit: Word	2A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	553	2902
17 - 18	Status	1: OK	0100
21 - 84	See function code #507 for the Write / Read request table.		

If successful, the read status is 1.

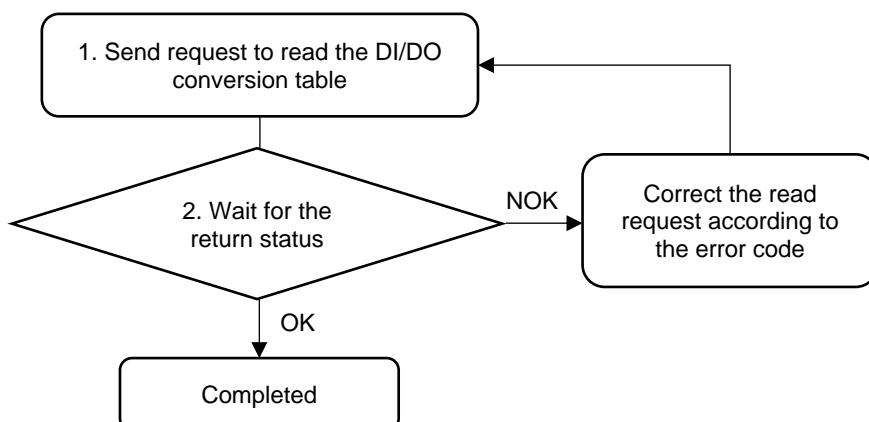
B

## #554 Read the DI/DO conversion table

Content description:

Use function code #554 to read information about the DI/DO conversion table.

Handshake signal description:



- Send the request to read the DI/DO conversion table.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	554	2A02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Conversion table	0: bit ID output table 1: bit ID input table 2: parameter ID output table 4: screw progress output table 6: sequence ID output table	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the reading is successful from the return status and read the content of the DI/DO conversion table.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	554	2A02
3 - 4	Return data length	Unit: Word	0A01
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Conversion table	0: bit ID output table 1: bit ID input table 2: parameter ID output table 4: screw progress output table 6: sequence ID output table	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	554	2A02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 22	DEC value corresponding to ID 0	0 to 255	0000

Byte	Return status	Description	Example (Hex)
23 - 24	DEC value corresponding to ID 1	0 to 255	0100
25 - 26	DEC value corresponding to ID 2	0 to 255	0200
27 - 28	DEC value corresponding to ID 3	0 to 255	0300
29 - 30	DEC value corresponding to ID 4	0 to 255	0400
...	DEC value corresponding to ID N	0 to 255	...
523 - 524	DEC value corresponding to ID 251	0 to 255	FB00
525 - 526	DEC value corresponding to ID 252	0 to 255	FC00
527 - 528	DEC value corresponding to ID 253	0 to 255	FD00
529 - 530	DEC value corresponding to ID 254	0 to 255	FE00
531 - 532	DEC value corresponding to ID 255	0 to 255	FF00

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Conversion table	Must be 0, 1, 2, 4, or 6

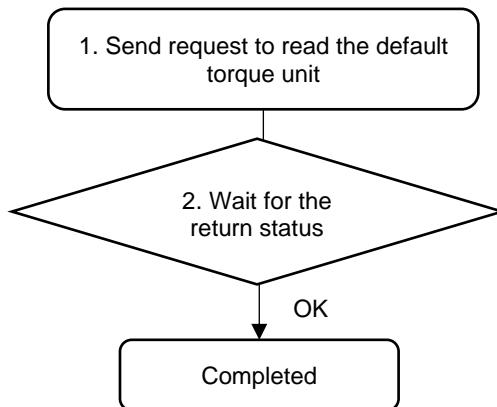
B

## #555 Read the default torque unit

Content description:

Use function code #555 to read the default torque unit of the controller.

Handshake signal description:



1. Send the request to read the default torque unit.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	555	2B02
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the default torque unit.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	555	2B02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Default torque unit	0: N.m 1: kgf.cm 2: lbf.ft 3: lbf.in	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	555	2B02
17 - 18	Status	1: OK	0100

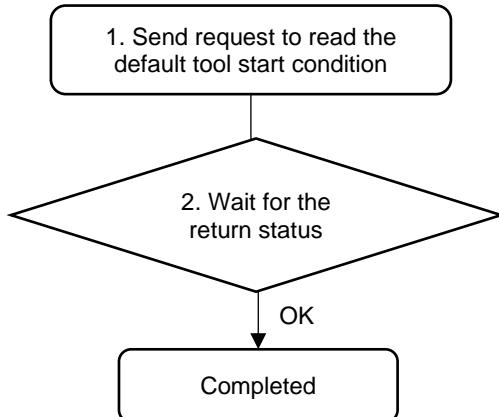
If successful, the read status is 1.

## #556 Read the default tool start condition

Content description:

Use function code #556 to read the default tool start condition.

Handshake signal description:



1. Send the request to read the default tool start condition.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	556	2C02
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the default tool start condition.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	556	2C02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Default tool start condition	0: push start 1: DI 2: lever start 3: push start or lever start 4: push start and lever start	0300
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	556	2C02
17 - 18	Status	1: OK	0100

If successful, the read status is 1.

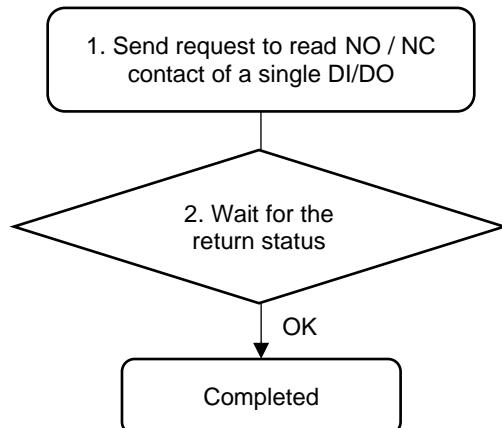
B

## #557 Read NO / NC contact setting for a single DI/DO

Content description:

Use function code #557 to read the NO / NC contact of a single DI/DO.

Handshake signal description:



1. Send the request to read the NO / NC contact of a single DI/DO.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	557	2D02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	DO / DI	0: DO; 1: DI	0100
9 - 10	Corresponding bit of DO / DI	0 to 7	0000
11 - 12	Reserved	-	0000
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the NO / NC contact of a single DI/DO.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	557	2D02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	DO / DI	0: DO; 1: DI	0100
9 - 10	Corresponding bit of DO / DI	0 to 7	0000
11 - 12	NO / NC	0: NO (normally open) 1: NC (normally closed)	0100
13 - 14	Reserved	-	0000
15 - 16	Return function code	557	2D02
17 - 18	Status	1: OK	0100

If successful, the read status is 1.

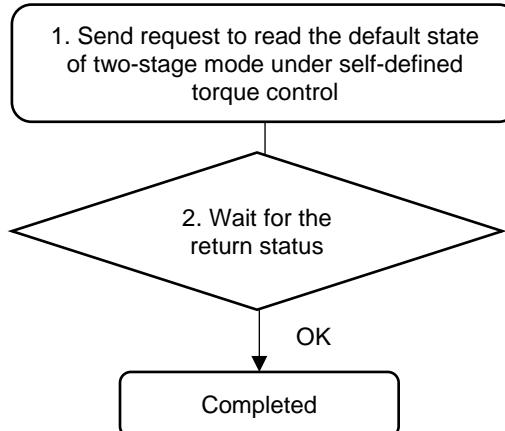
## #558 Read the default two-stage mode under self-defined torque control

Content description:

Use function code #558 to read the default state of two-stage mode under self-defined torque control.

B

Handshake signal description:



1. Send the request to read the default state of tw-stage mode under self-defined torque control.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	558	2E02
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the default state of two-stage mode under self-defined torque control.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	558	2E02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Two-stage mode	0: Off 1: On	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	558	2E02
17 - 18	Status	1: OK	0100

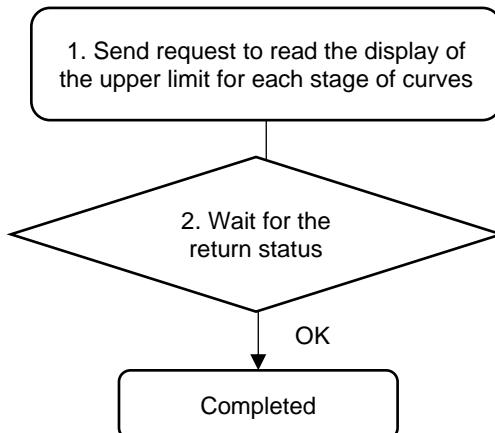
If successful, the read status is 1.

## #559 Read the display of upper limit for each stage of curves

Content description:

Use function code #559 to read whether the upper limit for each stage of curves is displayed.

Handshake signal description:



- Send the request to read the display of the upper limit for each stage of curves.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	559	2F02
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the reading is successful from the return status and read whether the upper limit for each stage of curves is displayed.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	559	2F02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Display the upper limit for each stage of curves	0: On 1: Off	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	559	2F02
17 - 18	Status	1: OK	0100

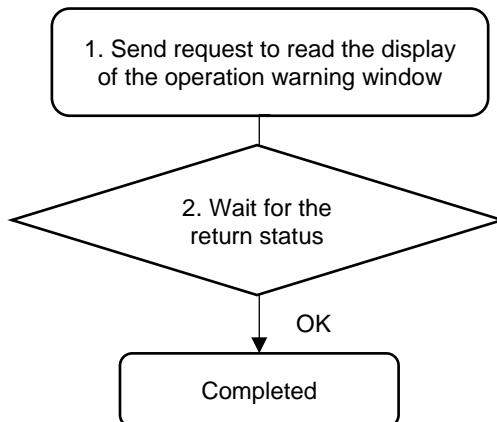
If successful, the read status is 1.

## #560 Read the display of operation warning window

Content description:

Use function code #560 to read whether the operation warning window is displayed.

Handshake signal description:



1. Send the request to read the display of the operation warning window.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	560	3002
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read whether the operation warning window is displayed.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	560	3002
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Display the operation warning window	0: On 1: Off	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	560	3002
17 - 18	Status	1: OK	0100

If successful, the read status is 1.

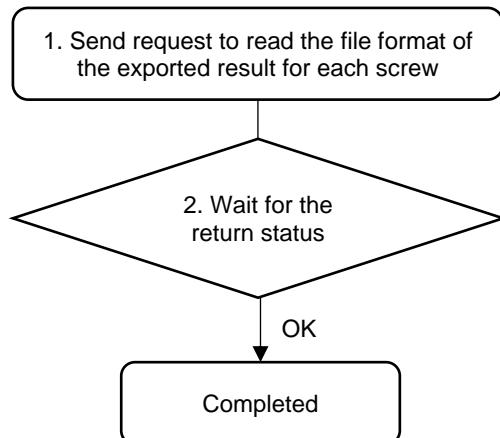
B

## #561 Read file format of the exported result for each screw

Content description:

Use function code #561 to read the file format of the exported result for each screw.

Handshake signal description:



1. Send the request to read the file format of the exported result for each screw.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	561	3102
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the file format of the exported result for each screw.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	561	3102
3 - 4	Return data length	Unit: Word	0A00
5 - 6	File format of the exported result for each screw	0: disable 1: CSV file (HMI Disk) 2: CSV file (USB Disk) 3: BIN file (HMI Disk)	0300
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	561	3102
17 - 18	Status	1: OK	0100

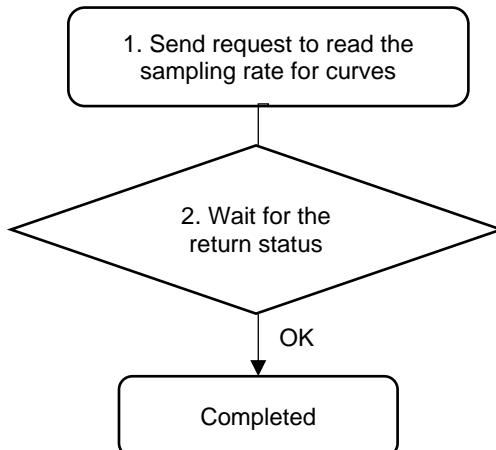
If successful, the read status is 1.

## #562 Read the sampling rate for curves

Content description:

Use function code #562 to read the sampling rate for curves.

Handshake signal description:



1. Send the request to read the sampling rate for curves.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	562	3202
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the sampling rate for curves.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	562	3202
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Sampling rate for curves	0: 10 ms → 2 ms when start torque is reached 1: 2 ms; max. 4 seconds per production report entry 2: 2 ms; max. 8 seconds per production report entry 3: 1 ms; max. 4 seconds per production report entry 4: 1 ms; max. 8 seconds per production report entry	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	562	3202
17 - 18	Status	1: OK	0100

If successful, the read status is 1.

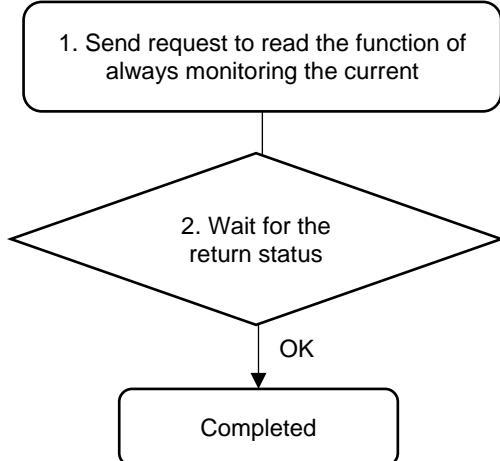
B

## #563 Read the function of always monitoring the current

Content description:

Use function code #563 to read whether the function of always monitoring the current is enabled.

Handshake signal description:



1. Send the request to read the function of always monitoring the current.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	563	3302
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read whether the function of always monitoring the current is enabled.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	563	3302
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Always monitor the current	0: On 1: Off	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	563	3302
17 - 18	Status	1: OK	0100

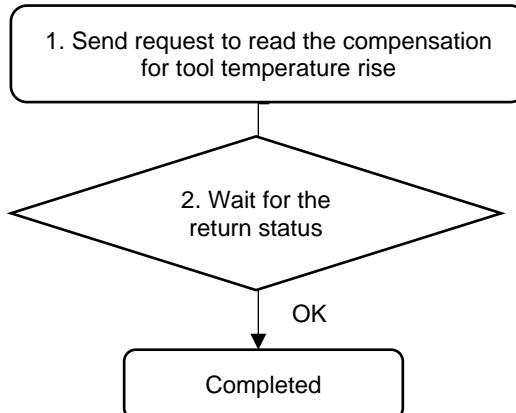
If successful, the read status is 1.

## #564 Read the compensation for tool temperature rise

Content description:

Use function code #564 to read whether the compensation for tool temperature rise is enabled.

Handshake signal description:



1. Send the request to read the compensation for tool temperature rise.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	564	3402
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read whether the compensation for tool temperature rise is enabled.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	564	3402
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Compensation for tool temperature rise	0: On 1: Off	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	564	3402
17 - 18	Status	1: OK	0100

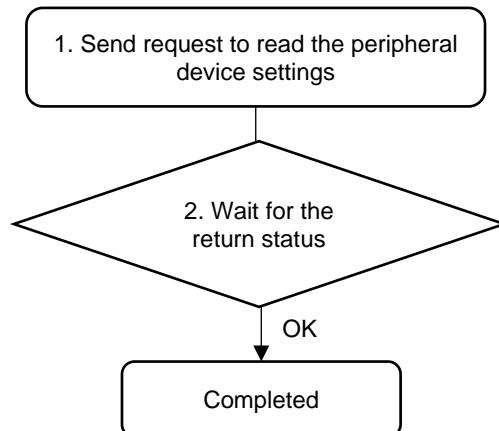
If successful, the read status is 1.

## #565 Read the peripheral device settings

Content description:

Use function code #565 to read the peripheral device settings.

Handshake signal description:



1. Send the request to read the peripheral device settings.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	565	3502
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the peripheral device settings.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	565	3502
3 - 4	Return data length	Unit: Word	1D00
5 - 14	Reserved	10 bytes	...
15 - 16	Return function code	565	3502
17 - 18	Status	1: OK	0100
21 - 58	Refer to function code #521 for the Write / Read request table.		

If successful, the read status is 1.

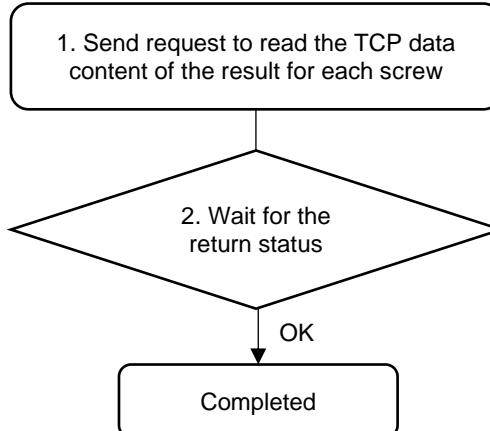
## #566 Read the TCP data content of the result for each screw

Content description:

Use function code #566 to read the TCP data content of the result for each screw.

Handshake signal description:

B



1. Send the request to read the TCP data content of the result for each screw.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	566	3602
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the TCP data content of the result for each screw.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	566	3602
3 - 4	Return data length	Unit: Word	0A00
5 - 6	TCP data content of the result for each screw	0: disable 1: scale, time, torque 2: scale, angle, torque 3: scale, angle, torque rate 4: result, scale, time, torque 5: result, scale, angle, torque 6: result, scale, angle, torque rate	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	566	3602
17 - 18	Status	1: OK	0100

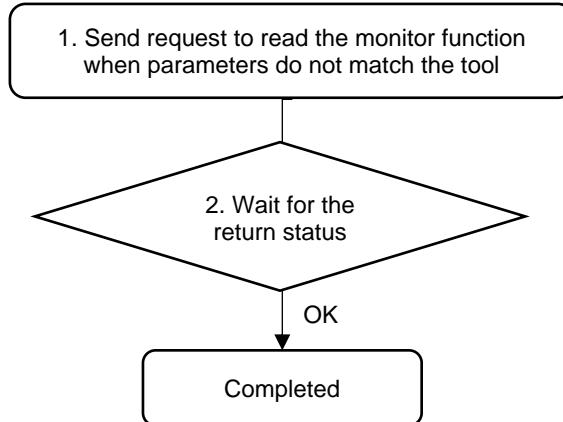
If successful, the read status is 1.

## #567 Read the monitor function when parameters do not match the tool

Content description:

Use function code #567 to read the function setting for monitoring if the tool torque of the operating parameter matches that of the connected tool.

Handshake signal description:



- Send the request to read the monitor function when parameters do not match the tool.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	567	3702
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the reading is successful from the return status and read the monitor function setting.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	567	3702
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Monitor function when parameters do not match the tool	0: On 1: Off	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	567	3702
17 - 18	Status	1: OK	0100

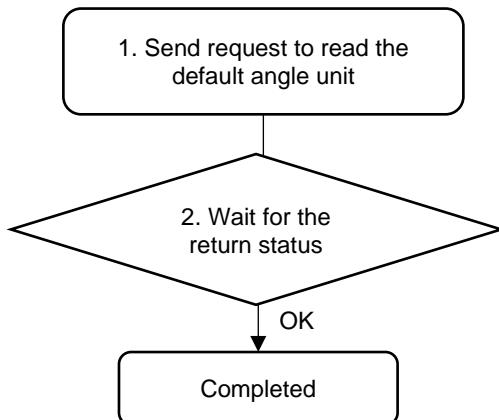
If successful, the read status is 1.

## #568 Read the default angle unit

Content description:

Use function code #568 to read the default angle unit of the controller.

Handshake signal description:



1. Send the request to read the default angle unit.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	568	3802
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the default angle unit.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	568	3802
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Default angle unit	0: degree 1: turn	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	568	3802
17 - 18	Status	1: OK	0100

If successful, the read status is 1.

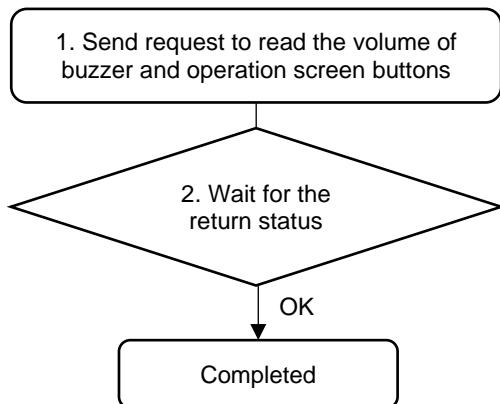
B

## #569 Read the volume of buzzer and operation screen buttons

Content description:

Use function code #569 to read the volume of buzzer and operation screen buttons.

Handshake signal description:



1. Send the request to read the volume of buzzer and operation screen buttons.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	569	3902
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the volume of buzzer and operation screen buttons.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	569	3902
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Volume of buzzer	0 to 100	0000
7 - 8	Volume of operation screen buttons	0 to 100	0000
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	569	3902
17 - 18	Status	1: OK	0100

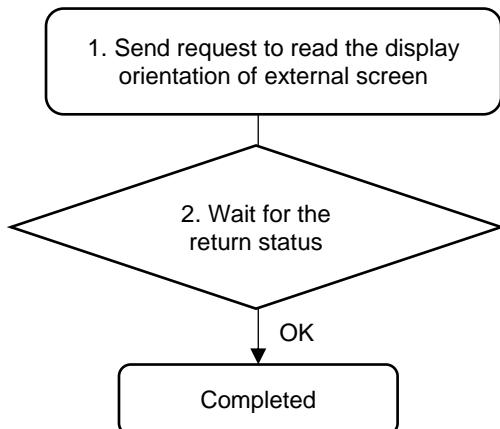
If successful, the read status is 1.

## #570 Read the display orientation of external screen

Content description:

Use function code #570 to read the display orientation of external screen (HDMI).

Handshake signal description:



1. Send the request to read the display orientation of external screen.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	570	3A02
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the display orientation of external screen.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	570	3A02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Display orientation	0: portrait 1: landscape	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	570	3A02
17 - 18	Status	1: OK	0100

If successful, the read status is 1.

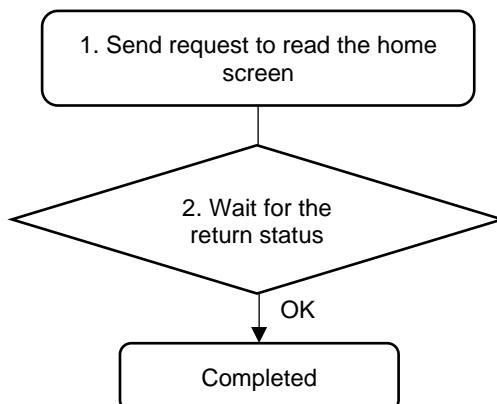
B

## #571 Read the home screen

Content description:

Use function code #571 to read the home screen of the controller.

Handshake signal description:



1. Send the request to read the home screen.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	571	3B02
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the home screen.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	571	3B02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Home screen	0: Home 1: Results	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	571	3B02
17 - 18	Status	1: OK	0100

If successful, the read status is 1.

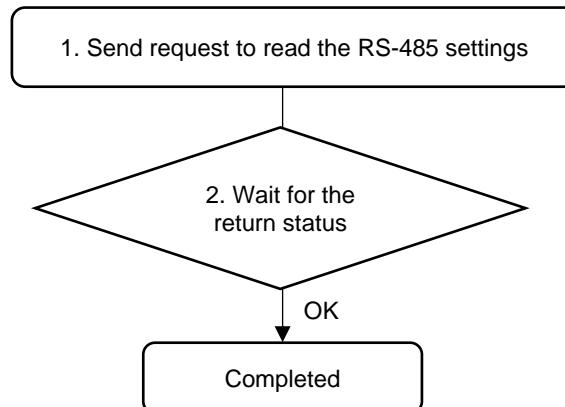
## #572 Read the RS-485 settings

Content description:

Use function code #572 to read the RS-485 settings.

Handshake signal description:

B



1. Send the request to read the RS-485 settings.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	572	3C02
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the RS-485 settings.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	572	3C02
3 - 4	Return data length	Unit: Word	0A00
5 - 14	Reserved	10 bytes	...
15 - 16	Return function code	572	3C02
17 - 18	Status	1: OK 0: Error	0100
21 - 22	Function On / Off	0: Off; 1: On	0100
23 - 24	Station	0 to 255	0100
25 - 26	RTU / ASCII	0: RTU 1: ASCII	0000
27 - 28	Baud rate	0: 9600 1: 19200 2: 38400	0000
29 - 30	Data bit	0: 8-bit 1: 7-bit	0000
31 - 32	Parity bit	0: None 1: Odd 2: Even	0000
33 - 34	Stop bit	0: 2-bit 1: 1-bit	0000

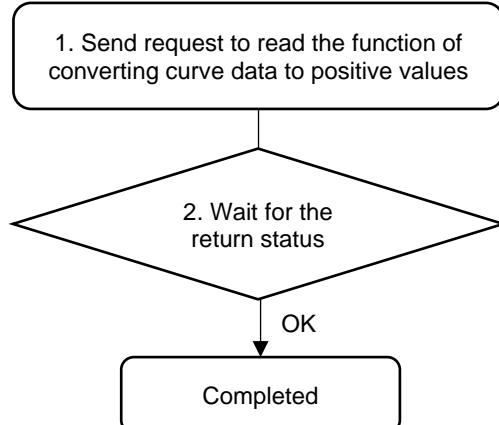
If successful, the read status is 1.

## #573 Read the function of converting curve data to positive values

Content description:

Use function code #573 to read whether the function of converting curve data to positive values is enabled.

Handshake signal description:



1. Send the request to read the function of converting curve data to positive values.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	573	3D02
3 - 4	Version number	-	0000
5 - 12	Reserved	8 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read whether the function of converting curve data to positive values is enabled.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	573	3D02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Function of converting curve data to positive values	0: On 1: Off	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	573	3D02
17 - 18	Status	1: OK	0100

If successful, the read status is 1.

### B.3.6 Tool operations

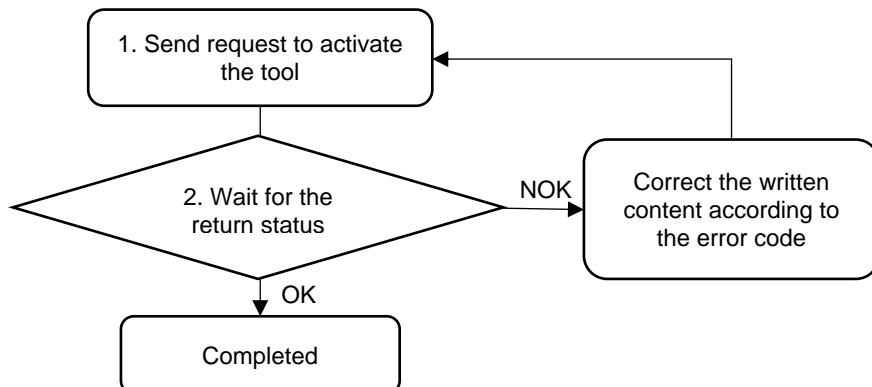
#### #600 Write to activate the tool

Content description:

Use function code #600 to activate Tool 1 or Tool 2.

B

Handshake signal description:



1. Send the request to activate the tool.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	600	5802
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Tool activation	0: Off; 1: On	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	600	5802
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Tool activation	0: Off; 1: On	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	600	5802
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

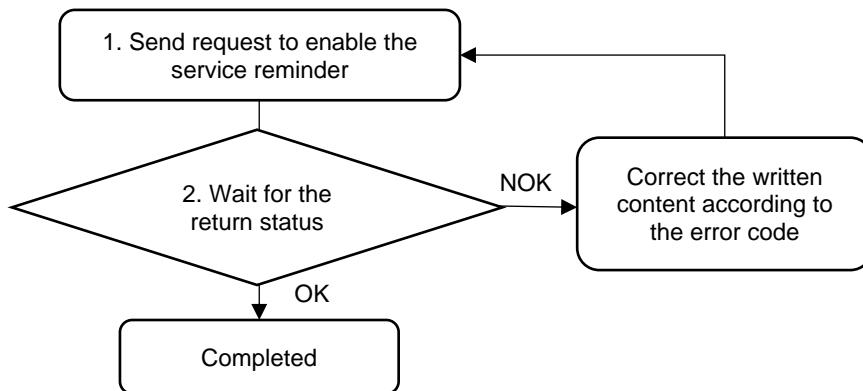
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Tool activation	Must be 0 or 1

## #601 Write to enable service reminder

Content description:

Use function code #601 to turn on or off the tool service reminder.

Handshake signal description:



1. Send the request to enable the service reminder.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	601	5902
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Service reminder	0: Off; 1: On	0100
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	601	5902
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Service reminder	0: Off; 1: On	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	601	5902
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

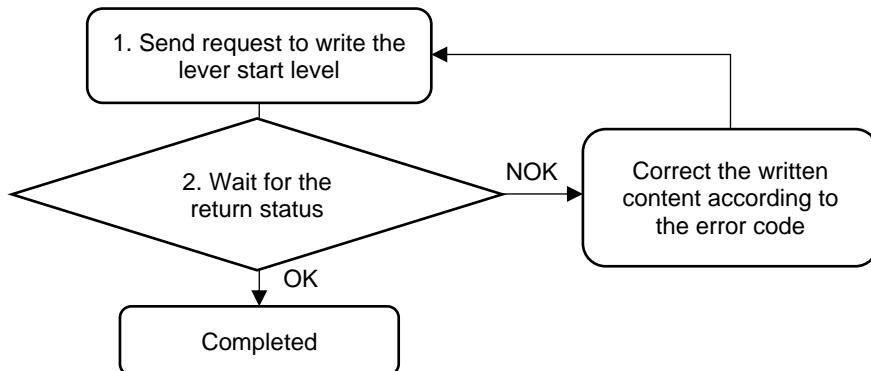
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Service reminder	Must be 0 or 1

## #602 Write the lever start level

Content description:

Use function code #602 to set the lever start level of the tool.

Handshake signal description:



1. Send the request to write the lever start level.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	602	5A02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Threshold for On level	0 to 4095	DC05
9 - 10	Threshold for Off level	0 to 4095	4006
11 - 12	Reserved	-	0000
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	602	5A02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Threshold for On level	0 to 4095	DC05
9 - 10	Threshold for Off level	0 to 4095	4006
11 - 14	Reserved	4 bytes	...
15 - 16	Return function code	602	5A02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Threshold value	Exceeds the range of 0 to 4095

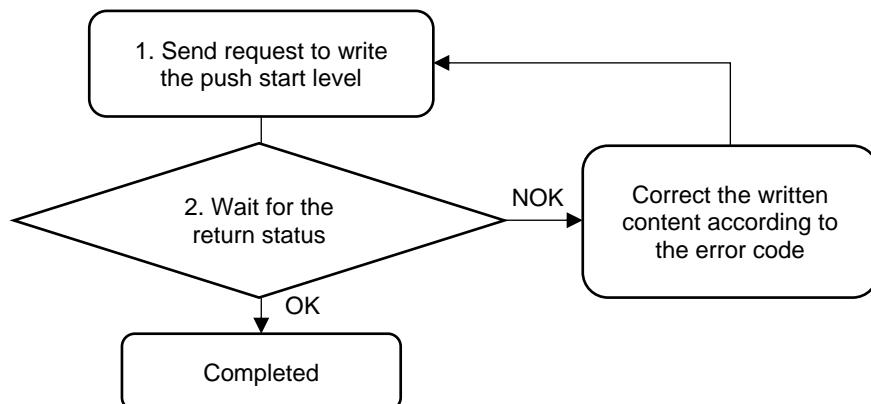
B

## #603 Write the push start level

Content description:

Use function code #603 to set the push start level of the tool.

Handshake signal description:



1. Send the request to write the push start level.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	603	5B02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Threshold for On level	0 to 4095	4C04
9 - 10	Threshold for Off level	0 to 4095	B004
11 - 12	Reserved	-	0000
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	603	5B02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Threshold for On level	0 to 4095	4C04
9 - 10	Threshold for Off level	0 to 4095	B004
11 - 14	Reserved	4 bytes	...
15 - 16	Return function code	603	5B02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

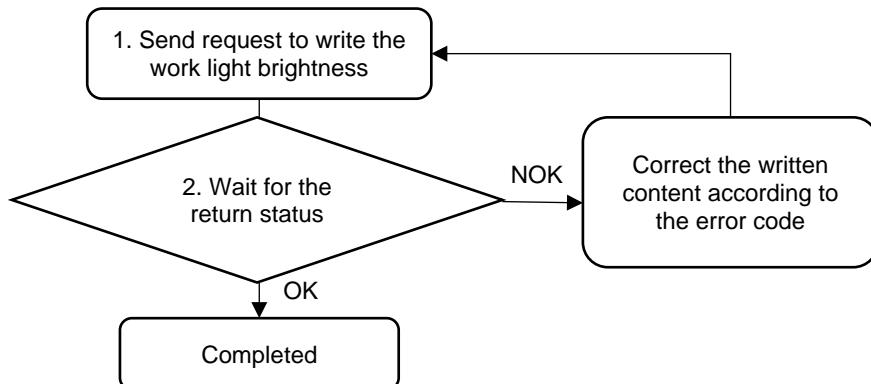
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Threshold value	Exceeds the range of 0 to 4095

## #604 Write the work light brightness

Content description:

Use function code #604 to set the work light brightness of the tool.

Handshake signal description:



1. Send the request to write the work light brightness.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	604	5C02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Brightness	0 to 50 (0: Off; 50: max. brightness)	3200
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	604	5C02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Brightness	0 to 50 (0: Off; 50: max. brightness)	3200
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	604	5C02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Brightness	Exceeds the range of 0 to 50

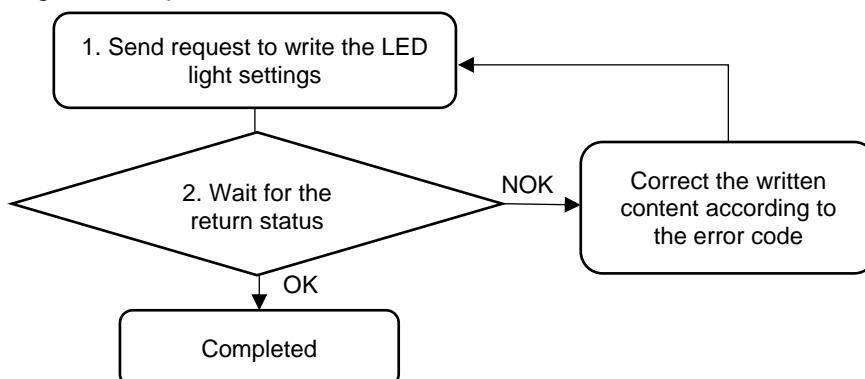
B

## #606 Write the LED light settings

Content description:

Use function code #606 to set the LED light settings of the tool.

Handshake signal description:



- Send the request to write the LED light settings.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	606	5E02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100
15 - 20	Reserved	6 bytes	...
21 - 22	NO / NC	0: NO (normally open) 1: NC (normally closed) (Bit 1 - 8: for Tool 1; Bit 9 - 16: for Tool 2)	0000
23 - 24	Status of red indicator	0: not in use 1: ready 2: running	0400
25 - 26	Status of yellow indicator	3: tightening OK 4: tightening NOK 5: loosening OK 6: loosening NOK	0100
27 - 28	Status of green indicator	7: total screw quantity reached	0300

- Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	606	5E02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	606	5E02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

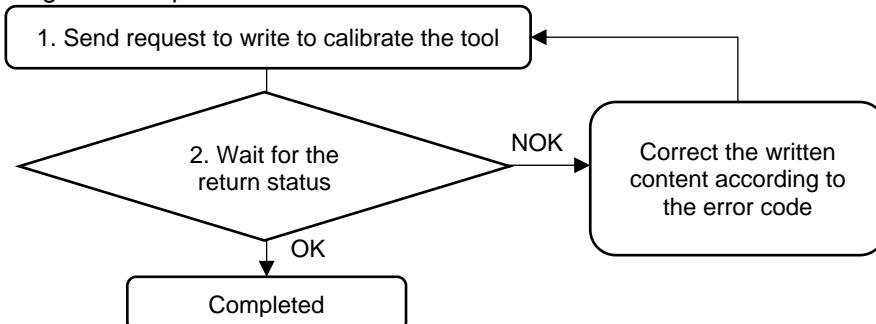
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #607 Write to calibrate the tool

Content description:

Use function code #607 to set the precision of the tool.

Handshake signal description:



B

1. Send the request to write to calibrate the tool.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	607	5F02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Precision	0 to 32767 (Default: 1400 for 12 kgf-cm models 3500 for 30 kgf-cm models 6000 for 50 kgf-cm models 5705 for 75 kgf-cm models)	0578
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	607	5F02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Precision	0 to 32767 (Default: 1400 for 12 kgf-cm models 3500 for 30 kgf-cm models 6000 for 50 kgf-cm models 5705 for 75 kgf-cm models)	0578
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	607	5F02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

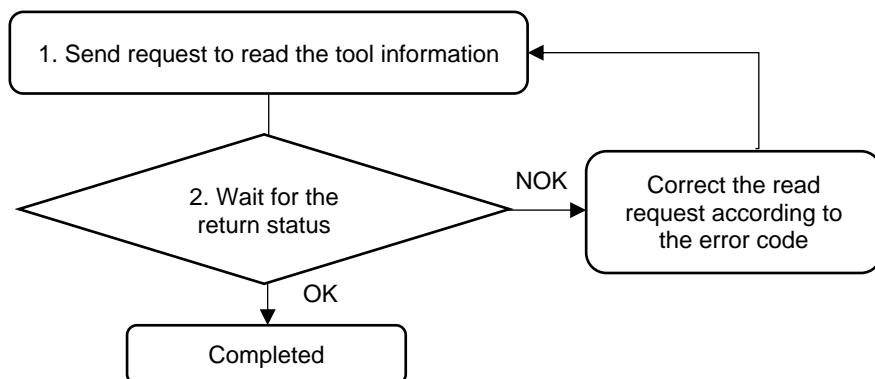
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1
2	Precision	Exceeds the range of 0 to 32767

## #650 Read the tool information

Content description:

Use function code #650 to read the tool information.

Handshake signal description:



1. Send the request to read the tool information.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	650	8A02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the tool information.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	650	8A02
3 - 4	Return data length	Unit: Word	2300
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	650	8A02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 60	Model name	ASCII code (20 words)	...
61 - 62	Max. speed	Unit: rpm	D007
63 - 64	Max. torque	Unit: 0.001 Nm	B004
65 - 66	Tool temperature	Unit: °C	2100
67 - 68	Tightening + loosening count (L)	Tool life	0100
69 - 70	Tightening + loosening count (H)		0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

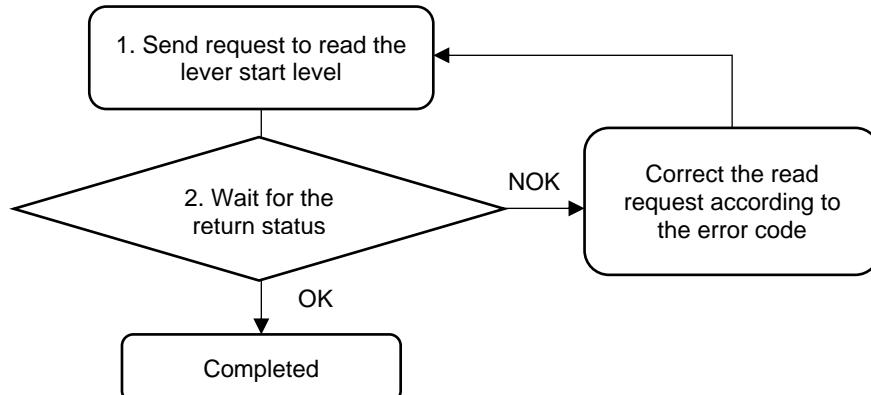
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #651 Read the lever start level

Content description:

Use function code #651 to read the lever start level of the tool.

Handshake signal description:



1. Send the request to read the lever start level.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	651	8B02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the contents of lever start level.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	651	8B02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Threshold of the current pressing	0 to 4095	5E06
9 - 10	Threshold for On level	0 to 4095	DC05
11 - 12	Threshold for Off level	0 to 4095	4006
13 - 14	Reserved	-	0000
15 - 16	Return function code	651	8B02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

B

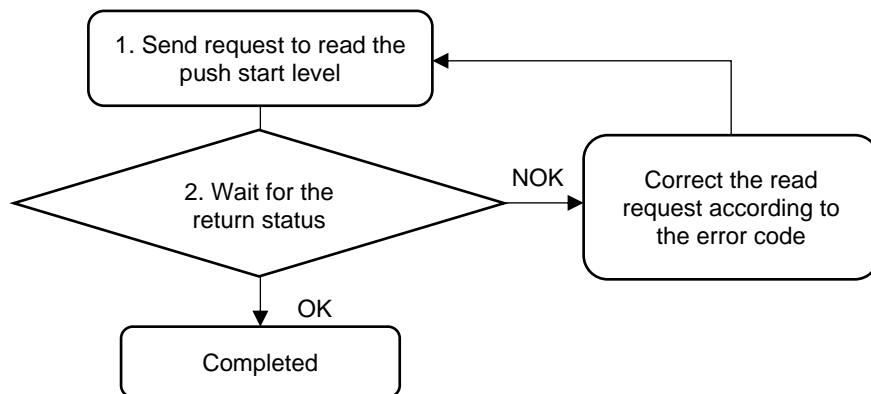
## #652 Read the push start level

Content description:

Use function code #652 to read the push start level of the tool.

B

Handshake signal description:



1. Send the request to read the push start level.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	652	8C02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the contents of push start level.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	652	8C02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Threshold of the current pressing	0 to 4095	5E06
9 - 10	Threshold for On level	0 to 4095	4C04
11 - 12	Threshold for Off level	0 to 4095	B004
13 - 14	Reserved	-	0000
15 - 16	Return function code	652	8C02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

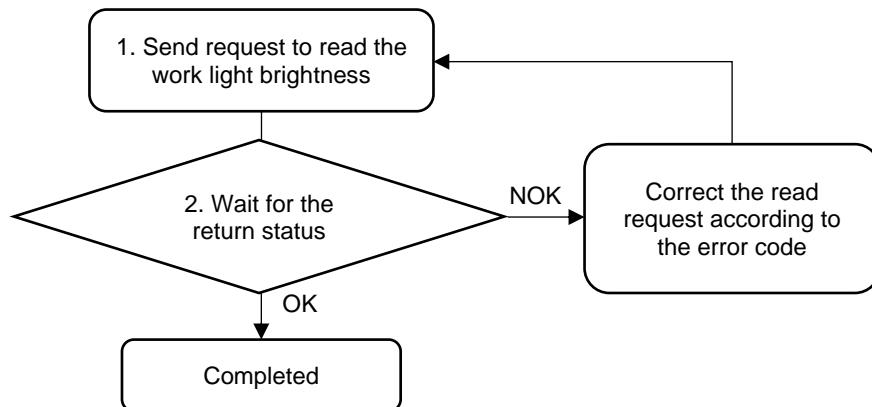
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #653 Read the work light brightness

Content description:

Use function code #653 to read the work light brightness of the tool.

Handshake signal description:



1. Send the request to read the work light brightness.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	653	8D02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the work light brightness.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	653	8D02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Brightness	0 to 50 (0: Off; 50: max. brightness)	3200
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	653	8D02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

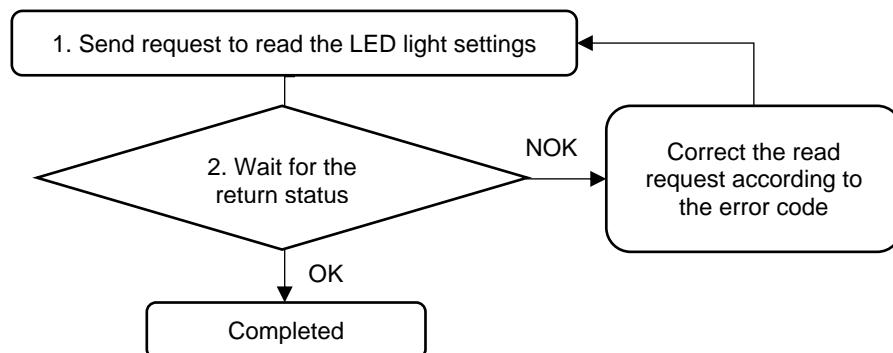
B

## #655 Read the LED light settings

Content description:

Use function code #655 to read the LED light settings of the tool.

Handshake signal description:



1. Send the request to read the LED light settings.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	655	8F02
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the LED light settings.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	655	8F02
3 - 4	Return data length	Unit: Word	0E00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	6 bytes	...
15 - 16	Return function code	655	8F02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 22	Reserved	-	0000
23 - 24	Status of red indicator	0: not in use 1: ready 2: running 3: tightening OK 4: tightening NOK	0400
25 - 26	Status of yellow indicator	5: loosening OK 6: loosening NOK	0100
27 - 28	Status of green indicator	7: total screw quantity reached	0300

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

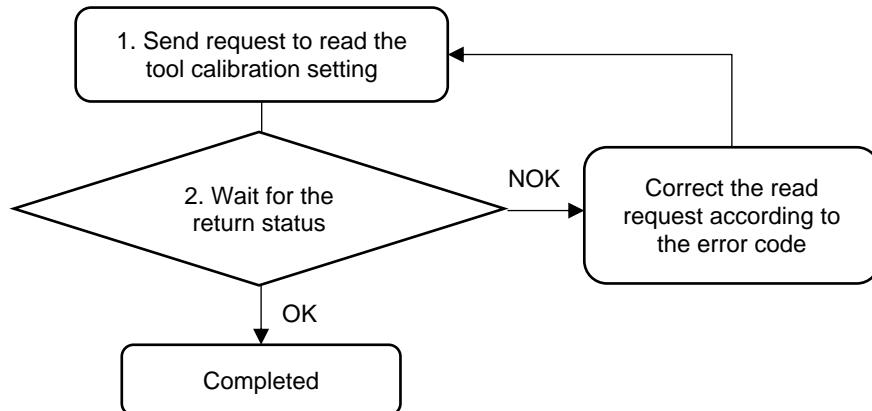
Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

## #656 Read the tool calibration setting

Content description:

Use function code #656 to read the precision of the tool.

Handshake signal description:



1. Send the request to read the tool calibration setting.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	656	9002
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the precision of the tool.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	656	9002
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Precision	0 to 32767 (Default: 1400 for 12 kgf-cm models 3500 for 30 kgf-cm models 6000 for 50 kgf-cm models 5705 for 75 kgf-cm models)	7805
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	656	9002
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

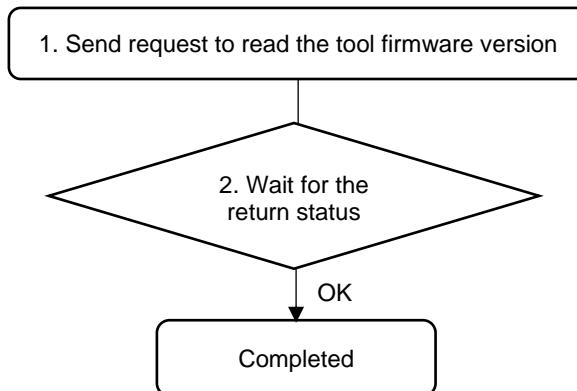
B

## #657 Read the tool firmware version

Content description:

Use function code #657 to read the firmware version number of the tool.

Handshake signal description:



1. Send the request to read the tool firmware version.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	657	9102
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the firmware version number of the tool.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	657	9102
3 - 4	Return data length	Unit: Word	1400
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 14	Reserved	6 bytes	...
15 - 16	Return function code	657	9102
17 - 18	Status	1: OK	0100
21 - 60	Tool firmware version	ASCII code (20 words)	...

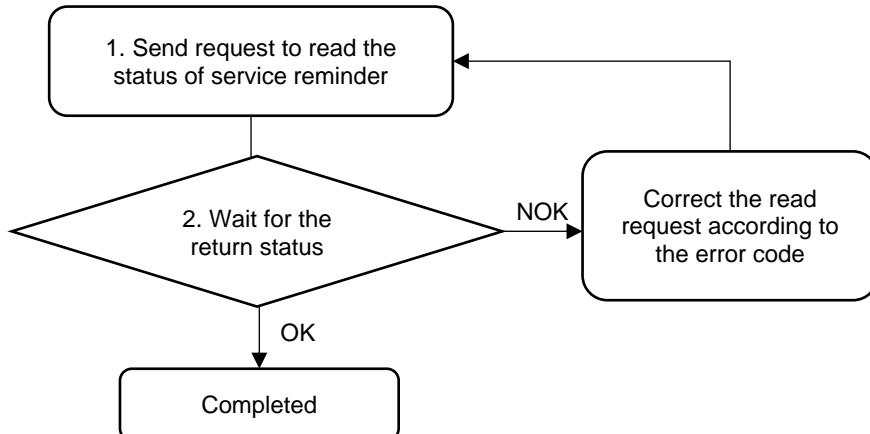
If successful, the read status is 1.

## #658 Read the status of service reminder

Content description:

Use function code #658 to read the status of service reminder.

Handshake signal description:



1. Send the request to read the status of service reminder.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	658	9202
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the status of tool service reminder.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	658	9202
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Service reminder	0: Off; 1: On	0000
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	658	9202
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

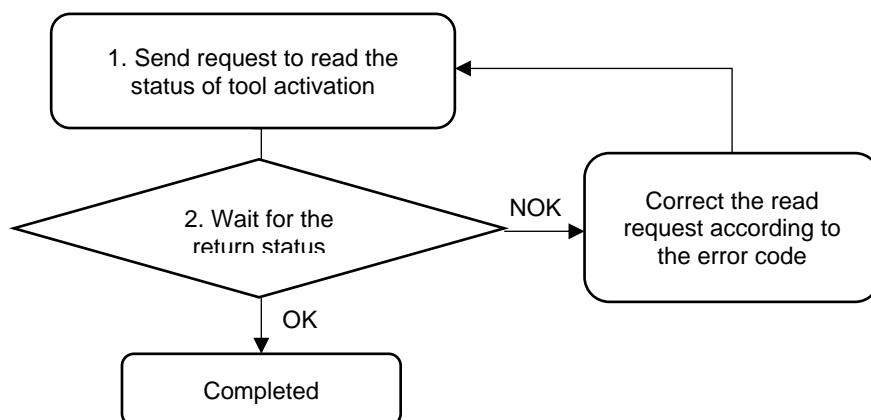
B

## #659 Read the status of tool activation

Content description:

Use function code #659 to read the status of the tool activation.

Handshake signal description:



1. Send the request to read the status of tool activation.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	659	9302
3 - 4	Version number	-	0000
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the status of tool activation.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	659	9302
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
7 - 8	Tool activation	0: Off; 1: On	0100
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	659	9302
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Tool 1 / Tool 2	Must be 0 or 1

### B.3.7 Reports operations

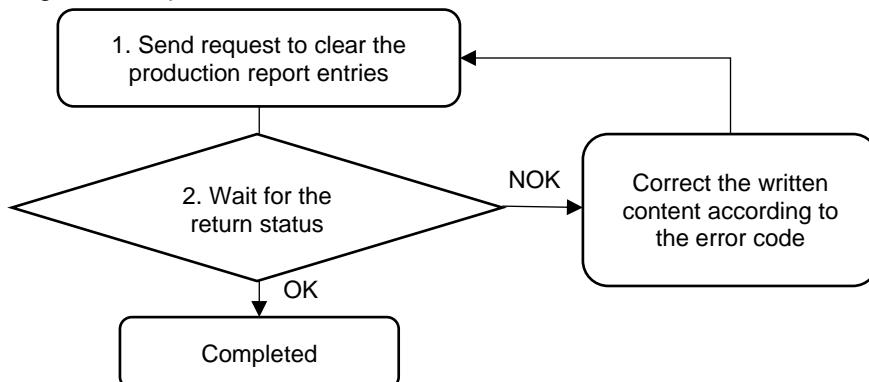
#### #700 Clear the production report entries

Content description:

Use function code #700 to delete all the production report entries from the controller.

B

Handshake signal description:



1. Send the request to clear the production report entries.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	700	BC02
3 - 4	Version number	-	0000
5 - 6	Confirm command	99	6300
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	700	BC02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Confirm command	99	6300
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	700	BC02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

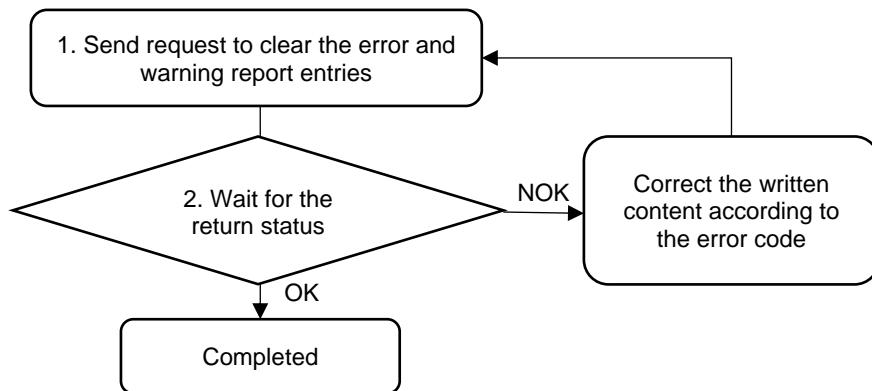
Code	Error description	Description
1	Confirm command	Must be 99

## #701 Clear the error and warning report entries

Content description:

Use function code #701 to delete all the error and warning report entries from the controller.

Handshake signal description:



1. Send the request to clear the error and warning report entries.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	701	BD02
3 - 4	Version number	-	0000
5 - 6	Confirm command	99	6300
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	701	BD02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Confirm command	99	6300
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	701	BD02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

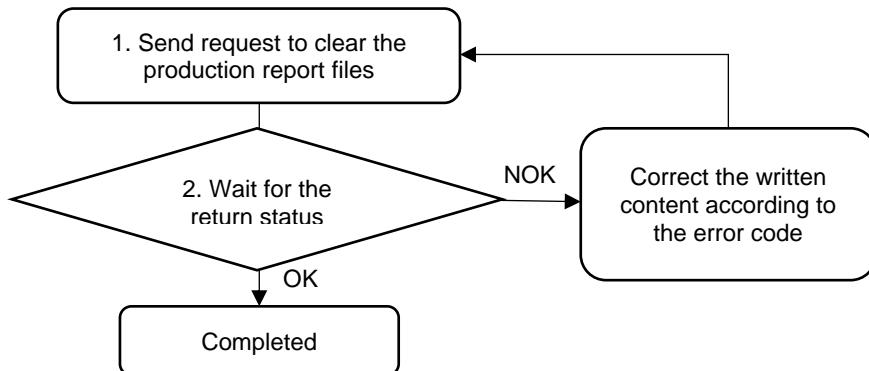
Code	Error description	Description
1	Confirm command	Must be 99

## #702 Clear the production report files

Content description:

Use function code #702 to delete all the production report files exported to the HMI.

Handshake signal description:



1. Send the request to clear the production report files.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	702	BE02
3 - 4	Version number	-	0000
5 - 6	Confirm command	99	6300
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the writing is successful from the return status.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	702	BE02
3 - 4	Return data length	Unit: Word	0A00
5 - 6	Confirm command	99	6300
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	702	BE02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Confirm command	Must be 99

B

## #750 Find and read the production report entries

Content description:

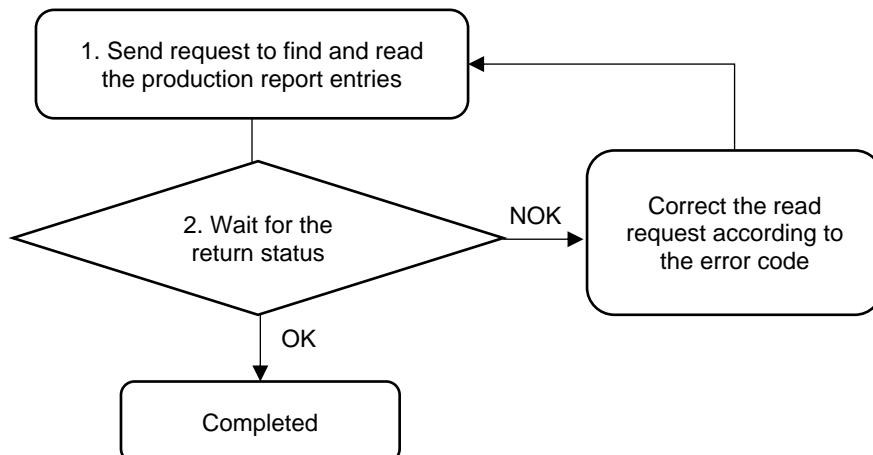
Use function code #750 to read the content of the production report.

- A. Use with bytes 235 - 236 and bytes 237 - 238 to read the content of the latest production report.

Byte	Tool 1 / Tool 2 common status
235 - 236	Current No. of production report entries (L)
237 - 238	Current No. of production report entries (H)

- B. Read the content of history report entries.

Handshake signal description:



### ■ When the version number is 0:

1. Send the request to find and read the production report.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	750	EE02
3 - 4	Version number	0 or 1	0000
5 - 6	Production report ID (L)	1 to 200000 0: the latest production report	0100
7 - 8	Production report ID (H)		0000
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the content of a single entry of the production report.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	750	EE02
3 - 4	Return data length	Unit: Word	CB00
5 - 6	Production report ID (L)	1 to 200000 0: the latest production report	0100
7 - 8	Production report ID (H)		0000
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	750	EE02
17 - 18	Status	1: OK; 2: NOK	0100

Byte	Return status	Description	Example (Hex)
19 - 20	Error code	-	0000
21 - 220	Saved barcode string	ASCII code (100 words)	...
221 - 222	Year	-	E607
223 - 224	Month	-	0B00
225 - 226	Day	-	1E00
227 - 228	Hour	-	0900
229 - 230	Minute	-	0500
231 - 232	Second	-	1D00
233 - 234	Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
235 - 236	Screw ID (L)	-	0100
237 - 238	Screw ID (H)	-	0000
239 - 240	Sequence ID	-	0000
241 - 242	Parameter ID	-	0100
243 - 244	Target torque	Unit: 0.001 x torque of the current report Refer to DWORD (bytes 327 - 330) when the torque specification of the tool is 5 Nm or higher.	1327
245 - 246	Target angle	-	0000
247 - 248	Target torque rate	Unit: 0.0001 x torque/degree of the current report Refer to DWORD (bytes 331 - 334) when the torque specification of the tool is 5 Nm or higher.	0000
249 - 250	Final torque	Refer to DWORD (bytes 335 - 338) when the torque specification of the tool is 5 Nm or higher.	2727
251 - 252	Tightening angle	-	1900
253 - 254	Rotation angle	-	2F08
255 - 256	Status	1: tightening OK; 2: tightening NOK; 3: loosening OK; 4: loosening NOK; 5: pass	0100
257 - 258	Operation time	Unit: 0.001 second	6804
259 - 260	AL / NG / WN code	Refer to CH12	0000
261 - 262	Max. angle of final stage	-	0000
263 - 264	Min. angle of final stage	-	0000
265 - 266	Max. torque of final stage	Refer to DWORD (bytes 339 - 342) when the torque specification of the tool is 5 Nm or higher.	6F27
267 - 268	Min. torque of final stage	Refer to DWORD (bytes 343 - 346) when the torque specification of the tool is 5 Nm or higher.	441F
269 - 270	Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in	0100
271 - 272	Torque specification of the tool	Unit: 0.001 Nm	B004
273 - 274	Max. torque of the tool	Unit: 0.001 Nm	7805
275 - 276	Pre-tightening torque	Refer to DWORD (bytes 347 - 350) when the torque specification of the tool is 5 Nm or higher.	C209
277 - 278	The set total operation time	Timeout setting for a single tightening parameter.	6400
279 - 280	Max. total angle	-	FF7F

B

Byte	Return status	Description	Example (Hex)
281 - 282	Max. torque	Torque upper limit when the current stage finishes. Refer to DWORD (bytes 351 - 354) when the torque specification of the tool is 5 Nm or higher.	6F27
283 - 284	Min. torque	Torque lower limit when the current stage finishes. Refer to DWORD (bytes 355 - 358) when the torque specification of the tool is 5 Nm or higher.	441F
285 - 286	Max. angle	Angle upper limit when the current stage finishes.	0000
287 - 288	Min. angle	Angle lower limit when the current stage finishes.	0000
289 - 290	Max. operation time	Time upper limit when the current stage finishes.	0000
291 - 292	Min. operation time	Time lower limit when the current stage finishes.	0000
293 - 294	Prevail torque	Refer to DWORD (bytes 359 - 362) when the torque specification of the tool is 5 Nm or higher.	0000
295 - 296	Final + Prevail torque	Refer to DWORD (bytes 363 - 366) when the torque specification of the tool is 5 Nm or higher.	2727
297 - 298	Actual current	Unit: 0.01 Amp	EF02
299 - 300	Clamp torque	Refer to DWORD (bytes 367 - 370) when the torque specification of the tool is 5 Nm or higher.	0000
301 - 302	Max. clamp torque	Clamp torque upper limit when the current stage finishes. Refer to DWORD (bytes 371 - 374) when the torque specification of the tool is 5 Nm or higher.	0000
303 - 304	Min. clamp torque	Clamp torque lower limit when the current stage finishes. Refer to DWORD (bytes 375 - 378) when the torque specification of the tool is 5 Nm or higher.	0000
305 - 306	Clamp angle	-	0000
307 - 308	Max. clamp angle	-	0000
309 - 310	Min. clamp angle	-	0000
311 - 312	Min. total angle	-	0000
313 - 314	Permissions account	0: reserved 1: User1 2: User2 3: User3 4: User4 5: User5 6: Admin	0000
315 - 326	Reserved	12 bytes	...
327 - 328	Target torque (L)	Unit: 0.001 x torque of the current report	1327
329 - 330	Target torque (H)		0000
331 - 332	Target torque rate (L)	Unit: 0.0001 x torque/degree of the current report	0000
333 - 334	Target torque rate (H)		0000

Byte	Return status	Description	Example (Hex)
335 - 336	Final torque (L)	Unit: 0.001 x torque of the current report	2727
337 - 338	Final torque (H)		0000
339 - 340	Final stage max. torque (L)	Unit: 0.001 x torque of the current report	6F27
341 - 342	Final stage max. torque (H)		0000
343 - 344	Final stage min. torque (L)	Unit: 0.001 x torque of the current report	441F
345 - 346	Final stage min. torque (H)		0000
347 - 348	Pre-tightening torque (L)	Unit: 0.001 x torque of the current report	C209
349 - 350	Pre-tightening torque (H)		0000
351 - 352	Max. torque (L)	Unit: 0.001 x torque of the current report Torque upper limit when the current stage finishes.	6F27
353 - 354	Max. torque (H)		0000
355 - 356	Min. torque (L)	Unit: 0.001 x torque of the current report Torque lower limit when the current stage finishes.	441F
357 - 358	Min. torque (H)		0000
359 - 360	Prevail torque (L)	Unit: 0.001 x torque of the current report	0000
361 - 362	Prevail torque (H)		0000
363 - 364	Final + Prevail torque (L)	Unit: 0.001 x torque of the current report	2727
365 - 366	Final + Prevail torque (H)		0000
367 - 368	Clamp torque (L)	Unit: 0.001 x torque of the current report	0000
369 - 370	Clamp torque (H)		0000
371 - 372	Max. clamp torque (L)	Unit: 0.001 x torque of the current report Clamp torque upper limit when the current stage finishes.	0000
373 - 374	Max. clamp torque (H)		0000
375 - 376	Min. clamp torque (L)	Unit: 0.001 x torque of the current report Clamp torque lower limit when the current stage finishes.	0000
377 - 378	Min. clamp torque (H)		0000
379 - 380	Tool spec. torque (L)	Unit: 0.001 x torque of the current report	CC2F
381 - 382	Tool spec. torque (H)		0000
383 - 384	Tool max. torque (L)	Unit: 0.001 x torque of the current report	C337
385 - 386	Tool max. torque (H)		0000
387 - 526	Reserved	-	-

B

■ When the version number is 1:

- Send the request to find and read the content of the production report.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	750	EE02
3 - 4	Version number	0 or 1	0100
5 - 6	Production report ID (L)	1 to 200000	0100
7 - 8	Production report ID (H)	0: the latest production report	0000
9 - 12	Reserved	4 bytes	...
13 - 14	Request to send command	-	0100

- Check whether the reading is successful from the return status and read the content of a single entry of the production report.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	750	EE02
3 - 4	Return data length	Unit: Word	3001
5 - 6	Production report ID (L)	1 to 200000	0100
7 - 8	Production report ID (H)	0: the latest production report	0000
9 - 14	Reserved	6 bytes	...
15 - 16	Return function code	750	EE02
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 526	Refer to the return status list of version number 0.		
527 - 566	Sequence title	ASCII code (20 words)	...
567 - 607	Parameter title	ASCII code (20 words)	...

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Production report ID	Exceeds the range of 0 to 200000

## #751 Find and read curves

Content description:

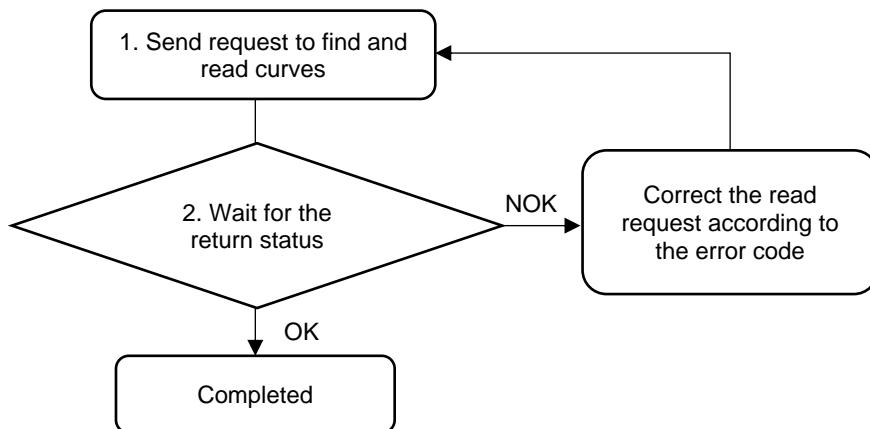
Use function code #751 to read the content of the operating curve.

- A. Use with bytes 235 - 236 and bytes 237 - 238 to read the content of the latest curve.

Byte	Tool 1 / Tool 2 common status
235 - 236	Current No. of production report entries (L)
237 - 238	Current No. of production report entries (H)

- B. Check the content of history curves.  
 C. Set the time as X axis and the torque as Y axis to draw a torque-time coordinate graph.  
 D. Set the angle as X axis and the torque as Y axis to draw a torque-angle coordinate graph.  
 E. Set the angle as X axis and the torque rate as Y axis to draw a torque rate-angle coordinate graph.  
 F. Read the parameters content of the curve.

Handshake signal description:



B

## 1. Send the request to find and read curves.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	751	EF02
3 - 4	Version number	-	0000
5 - 6	Production report ID (L)	1 to 200000	0100
7 - 8	Production report ID (H)	0: the latest production report	0000
9 - 10	Query type	0: time scale data (1 to 2000) 1: angle scale data (1 to 2000) 2: torque scale data (1 to 2000) 3: torque rate scale data (1 to 2000) 4: torque scale data DWORD (1 to 1000) 5: torque scale data DWORD (1001 to 2000) 6: torque rate scale data DWORD (1 to 1000) 7: torque rate scale data DWORD (1001 to 2000) 10: values of coordinate axis 11: parameters 20: time scale data (2001 to 4000) 21: angle scale data (2001 to 4000) 22: torque scale data (2001 to 4000) 23: torque rate scale data (2001 to 4000) 24: torque scale data DWORD (2001 to 3000) 25: torque scale data DWORD (3001 to 4000) 26: torque rate scale data DWORD (2001 to 3000) 27: torque rate scale data DWORD (3001 to 4000) 30: time scale data (4001 to 6000) 31: angle scale data (4001 to 6000) 32: torque scale data (4001 to 6000) 33: torque rate scale data (4001 to 6000) 34: torque scale data DWORD (4001 to 5000) 35: torque scale data DWORD (5001 to 6000) 36: torque rate scale data DWORD (4001 to 5000) 37: torque rate scale data DWORD (5001 to 6000) 40: time scale data (6001 to 8000) 41: angle scale data (6001 to 8000) 42: torque scale data (6001 to 8000) 43: torque rate scale data (6001 to 8000) 44: torque scale data DWORD (6001 to 7000) 45: torque scale data DWORD (7001 to 8000) 46: torque rate scale data DWORD (6001 to 7000) 47: torque rate scale data DWORD (7001 to 8000)	0000
11 - 12	Reserved	-	0000
13 - 14	Request to send command	-	0100

B

2. Check whether the reading is successful from the return status and read the content of the operating curve.

Byte	Return status	Description		Example (Hex)
1 - 2	Function code	751		EF02
3 - 4	Return data length	Unit: Word	Query types 0 to 7	DA07
			Query types 20 to 27	
			Query types 30 to 37	
			Query types 40 to 47	6800
			Query type 10	
			Query type 11 (version number 0)	3002
5 - 6	Production report ID (L)	Query type 11 (version number 1)		0100
	Production report ID (H)	1 to 200000 0: the latest production report		0000
9 - 10	Query type	Refer to the description of query types in the previous page.		0000
11 - 14	Reserved	4 bytes		...
15 - 16	Return function code	751		EF02
17 - 18	Status	1: OK; 2: NOK		0100
19 - 20	Error code	-		0000
21 - ...	Curve content	Refer to the following tables.		-

If successful, the read status is 1.

If failed, the read status is 2. The error codes are as follows:

Code	Error description	Description
1	Production report ID	Exceeds the range of 0 to 200000
2	Query type	Must be 0 to 7, 10, 11, 20 to 27, 30 to 37, or 40 to 47

B

The contents of each query type starting from byte 21 are as follows:

Byte	Query type 0	Example (Hex)	Query type 1	Example (Hex)
21 - 22	Time scale 1 data	0A00	Angle scale 1 data	0000
23 - 24	Time scale 2 data	1400	Angle scale 2 data	0300
25 - 26	Time scale 3 data	1E00	Angle scale 3 data	0800
27 - 28	Time scale 4 data	2800	Angle scale 4 data	0D00
29 - 30	Time scale 5 data	3200	Angle scale 5 data	1100
31 - 32	Time scale 6 data	3C00	Angle scale 6 data	1600
33 - 34	Time scale 7 data	4600	Angle scale 7 data	1B00
35 - 36	Time scale 8 data	5000	Angle scale 8 data	2000
37 - 38	Time scale 9 data	5A00	Angle scale 9 data	2500
...	Time scale N data	...	Angle scale N data	...
4001 - 4002	Time scale 1991 data	5604	Angle scale 1991 data	2F08
4003 - 4004	Time scale 1992 data	5804	Angle scale 1992 data	2D08
4005 - 4006	Time scale 1993 data	5A04	Angle scale 1993 data	2E08
4007 - 4008	Time scale 1994 data	5C04	Angle scale 1994 data	2C08
4009 - 4010	Time scale 1995 data	5E04	Angle scale 1995 data	2A08
4011 - 4012	Time scale 1996 data	6004	Angle scale 1996 data	2708
4013 - 4014	Time scale 1997 data	6204	Angle scale 1997 data	2508
4015 - 4016	Time scale 1998 data	6404	Angle scale 1998 data	2208
4017 - 4018	Time scale 1999 data	6604	Angle scale 1999 data	2008
4019 - 4020	Time scale 2000 data	6804	Angle scale 2000 data	1E08

Byte	Query type 2	Example (Hex)	Query type 3	Example (Hex)
21 - 22	Torque scale 1 data	0000	Torque rate scale 1 data	0000
23 - 24	Torque scale 2 data	7A00	Torque rate scale 2 data	0000
25 - 26	Torque scale 3 data	4700	Torque rate scale 3 data	0000
27 - 28	Torque scale 4 data	3D00	Torque rate scale 4 data	0000
29 - 30	Torque scale 5 data	5B00	Torque rate scale 5 data	0000
31 - 32	Torque scale 6 data	4700	Torque rate scale 6 data	1E00
33 - 34	Torque scale 7 data	7A00	Torque rate scale 7 data	3200
35 - 36	Torque scale 8 data	7A00	Torque rate scale 8 data	1400
37 - 38	Torque scale 9 data	5100	Torque rate scale 9 data	1400
...	Torque scale N data	...	Torque rate scale N data	...
4001 - 4002	Torque scale 1991 data	D725	Torque rate scale 1991 data	C409
4003 - 4004	Torque scale 1992 data	8822	Torque rate scale 1992 data	D609
4005 - 4006	Torque scale 1993 data	3F1A	Torque rate scale 1993 data	F509
4007 - 4008	Torque scale 1994 data	370F	Torque rate scale 1994 data	EB09
4009 - 4010	Torque scale 1995 data	7F05	Torque rate scale 1995 data	EB09
4011 - 4012	Torque scale 1996 data	7A00	Torque rate scale 1996 data	EB09
4013 - 4014	Torque scale 1997 data	0000	Torque rate scale 1997 data	EB09
4015 - 4016	Torque scale 1998 data	0000	Torque rate scale 1998 data	EB09
4017 - 4018	Torque scale 1999 data	6500	Torque rate scale 1999 data	EB09
4019 - 4020	Torque scale 2000 data	7000	Torque rate scale 2000 data	EB09

Byte	Query type 4	Example (Hex)	Query type 5	Example (Hex)
21 - 22	Torque scale 1 data (L)	0000	Torque scale 1001 data (L)	D725
23 - 24	Torque scale 1 data (H)	0000	Torque scale 1001 data (H)	0000
25 - 26	Torque scale 2 data (L)	7A00	Torque scale 1002 data (L)	8822
27 - 28	Torque scale 2 data (H)	0000	Torque scale 1002 data (H)	0000
29 - 30	Torque scale 3 data (L)	4700	Torque scale 1003 data (L)	3F1A
31 - 32	Torque scale 3 data (H)	0000	Torque scale 1003 data (H)	0000
33 - 34	Torque scale 4 data (L)	3D00	Torque scale 1004 data (L)	370F
35 - 36	Torque scale 4 data (H)	0000	Torque scale 1004 data (H)	0000
...	Torque scale N data (L)	...	Torque scale N data (L)	...
...	Torque scale N data (H)	...	Torque scale N data (H)	...
4001 - 4002	Torque scale 996 data (L)	4700	Torque scale 1996 data (L)	7F05
4003 - 4004	Torque scale 996 data (H)	0000	Torque scale 1996 data (H)	0000
4005 - 4006	Torque scale 997 data (L)	7A00	Torque scale 1997 data (L)	7A00
4007 - 4008	Torque scale 997 data (H)	0000	Torque scale 1997 data (H)	0000
4009 - 4010	Torque scale 998 data (L)	7A00	Torque scale 1998 data (L)	6700
4011 - 4012	Torque scale 998 data (H)	0000	Torque scale 1998 data (H)	0000
4013 - 4014	Torque scale 999 data (L)	5100	Torque scale 1999 data (L)	6500
4015 - 4016	Torque scale 999 data (H)	0000	Torque scale 1999 data (H)	0000
4017 - 4018	Torque scale 1000 data (L)	4A00	Torque scale 2000 data (L)	7000
4019 - 4020	Torque scale 1000 data (H)	0000	Torque scale 2000 data (H)	0000

Byte	Query type 6	Example (Hex)	Query type 7	Example (Hex)
21 - 22	Torque rate scale 1 data (L)	0000	Torque rate scale 1001 data (L)	C409
23 - 24	Torque rate scale 1 data (H)	0000	Torque rate scale 1001 data (H)	0000
25 - 26	Torque rate scale 2 data (L)	0000	Torque rate scale 1002 data (L)	D609
27 - 28	Torque rate scale 2 data (H)	0000	Torque rate scale 1002 data (H)	0000
29 - 30	Torque rate scale 3 data (L)	0000	Torque rate scale 1003 data (L)	F509
31 - 32	Torque rate scale 3 data (H)	0000	Torque rate scale 1003 data (H)	0000
33 - 34	Torque rate scale 4 data (L)	0000	Torque rate scale 1004 data (L)	EB09
35 - 36	Torque rate scale 4 data (H)	0000	Torque rate scale 1004 data (H)	0000
...	Torque rate scale N data (L)	...	Torque rate scale N data (L)	...
...	Torque rate scale N data (H)	...	Torque rate scale N data (H)	...
4001 - 4002	Torque rate scale 996 data (L)	1E00	Torque rate scale 1996 data (L)	EB09
4003 - 4004	Torque rate scale 996 data (H)	0000	Torque rate scale 1996 data (H)	0000
4005 - 4006	Torque rate scale 997 data (L)	3200	Torque rate scale 1997 data (L)	EB20
4007 - 4008	Torque rate scale 997 data (H)	0000	Torque rate scale 1997 data (H)	0000
4009 - 4010	Torque rate scale 998 data (L)	1400	Torque rate scale 1998 data (L)	EB80
4011 - 4012	Torque rate scale 998 data (H)	0000	Torque rate scale 1998 data (H)	0000
4013 - 4014	Torque rate scale 999 data (L)	1400	Torque rate scale 1999 data (L)	EB50
4015 - 4016	Torque rate scale 999 data (H)	0000	Torque rate scale 1999 data (H)	0000
4017 - 4018	Torque rate scale 1000 data (L)	1200	Torque rate scale 2000 data (L)	EB09
4019 - 4020	Torque rate scale 1000 data (H)	0000	Torque rate scale 2000 data (H)	0000

B

Byte	Query type 10	Description	Example (Hex)
21 - 22	Running angle of stage 1	Unit: degree	5A00
23 - 24	Running angle of stage 2		B307
25 - 26	Running angle of stage 3		0900
27 - 28	Running angle of stage 4		1900
29 - 30	Running angle of stage 5		0000
31 - 32	Running angle of stage 6		0000
33 - 34	Running angle of loosening stage 1		0000
35 - 36	Running angle of loosening stage 2		0000
37 - 38	Max. torque of stage 1		B700
39 - 40	Max. torque of stage 2		CC09
41 - 42	Max. torque of stage 3	Unit: current torque unit	380E
43 - 44	Max. torque of stage 4		2727
45 - 46	Max. torque of stage 5		0000
47 - 48	Max. torque of stage 6		0000
49 - 50	Max. torque of loosening stage 1		7000
51 - 52	Max. torque of loosening stage 2		7A00
53 - 54	Operation time of stage 1	Unit: ms	0401
55 - 56	Operation time of stage 2		3202
57 - 58	Operation time of stage 3		3200
59 - 60	Operation time of stage 4		0001
61 - 62	Operation time of stage 5		0000
63 - 64	Operation time of stage 6		0000
65 - 66	Operation time of loosening stage 1		0000
67 - 68	Operation time of loosening stage 2		0000
69 - 70	Max. time on the scale	Unit: ms	6804
71 - 72	Max. angle on the scale	Unit: degree	3208
73 - 74	Max. torque on the scale	Unit: current torque unit	D229
75 - 76	Max. torque rate on the scale	Unit: current torque rate unit	550F
77 - 78	Total number of curve coordinates	-	EC00
79 - 80	Max. torque	Unit: current torque unit	6F27
81 - 82	Min. torque	Unit: current torque unit	441F
83 - 84	Max. torque rate	Unit: current torque rate unit	0000
85 - 86	Max. angle	Unit: degree	3108
87 - 88	Min. angle	Unit: degree	1608
89 - 90	Version of the curve scale	-	0100
91 - 92	Sampling rate for curves	0: 10 ms → 2 ms when start torque is reached 1: 2 ms; max. 4 seconds per production report entry 2: 2 ms; max. 8 seconds per production report entry 3: 1 ms; max. 4 seconds per production report entry 4: 1 ms; max. 8 seconds per production report entry	0000
93 - 94	Max. torque rate of curve	Unit: current torque rate unit	0000
95 - 96	Min. time on the scale	Unit: ms	0000
97 - 98	Min. angle on the scale	Unit: degree	0000
99 - 100	Min. torque on the scale	Unit: current torque unit	0000

Byte	Query type 10	Description	Example (Hex)
101 - 102	Min. torque rate on the scale	Unit: current torque rate unit	0000
103 - 120	Reserved	18 bytes	...
121 - 122	Max. torque of stage 1 (L)	Unit: 0.001 x current torque unit	B700
123 - 124	Max. torque of stage 1 (H)		0000
125 - 126	Max. torque of stage 2 (L)	Unit: 0.001 x current torque unit	CC09
127 - 128	Max. torque of stage 2 (H)		0000
129 - 130	Max. torque of stage 3 (L)	Unit: 0.001 x current torque unit	380E
131 - 132	Max. torque of stage 3 (H)		0000
133 - 134	Max. torque of stage 4 (L)	Unit: 0.001 x current torque unit	2727
135 - 136	Max. torque of stage 4 (H)		0000
137 - 138	Max. torque of stage 5 (L)	Unit: 0.001 x current torque unit	0000
139 - 140	Max. torque of stage 5 (H)		0000
141 - 142	Max. torque of stage 6 (L)	Unit: 0.001 x current torque unit	0000
143 - 144	Max. torque of stage 6 (H)		0000
145 - 146	Max. torque of loosening stage 1 (L)	Unit: 0.001 x current torque unit	7000
147 - 148	Max. torque of loosening stage 1 (H)		0000
149 - 150	Max. torque of loosening stage 2 (L)	Unit: 0.001 x current torque unit	7A00
151 - 152	Max. torque of loosening stage 2 (H)		0000
153 - 168	Reserved	16 bytes	...
169 - 170	Max. torque on the scale (L)	Unit: 0.001 x current torque unit	D229
171 - 172	Max. torque on the scale (H)		0000
173 - 174	Max. torque rate on the scale (L)	Unit: 0.001 x current torque rate unit	880F
175 - 176	Max. torque rate on the scale (H)		0000
177 - 178	Max. torque (L)	Unit: 0.001 x current torque unit	6F27
179 - 180	Max. torque (H)		0000
181 - 182	Min. torque (L)	Unit: 0.001 x current torque unit	441F
183 - 184	Min. torque (H)		0000
185 - 186	Max. torque rate (L)	Unit: 0.001 x current torque rate unit	0000
187 - 188	Max. torque rate (H)		0000
189 - 190	Max. torque rate of curve (L)	Unit: 0.0001 x current torque rate unit	0000
191 - 192	Max. torque rate of curve (H)		0000
193 - 194	Min. torque on the scale (L)	Unit: 0.001 x current torque unit	0000
195 - 196	Min. torque on the scale (H)		0000
197 - 198	Min. torque rate on the scale (L)	Unit: 0.001 x current torque rate unit	0000
199 - 200	Min. torque rate on the scale (H)		0000
201 - 208	Reserved	-	-

B

B

Byte		Query type 11 (version number 0)	Description	Example (Hex)					
21 - 22		Parameter ID	1 to 500	0100					
23 - 24		Version number	0	0000					
25 - 26		Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in	0100					
27 - 40		Reserved	14 bytes	...					
41 - 42		Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000					
43 - 62		Reserved	20 bytes	...					
63 - 64		Max. current for tightening	-	0000					
65 - 66		Max. tightening time	Unit: ms	6400					
67 - 68		Max. tightening angle	Unit: degree	FF7F					
69 - 70		Reserved	-	0000					
71 - 72		Delay before tightening starts	Unit: ms	0000					
73 - 74		Min. tightening angle	Unit: degree	0000					
75 - 84		Reserved	10 bytes	...					
85 - 86		Max. loosening time	Unit: ms	6400					
87 - 88		Max. loosening angle	Unit: degree	FF7F					
89 - 90		Reserved	-	0000					
91 - 92		Delay before loosening starts	Unit: ms	0000					
93 - 102		Reserved	10 bytes	...					
103 - 104		ID of the prevail torque to be linked	1 to 500	0000					
105 - 120		Reserved	16 bytes	...					
121 122	221 222	321 322	421 422	521 522	621 622	Target On / Off (L)	Bit 0 to 1 Control method type	0: position 1: speed	0500
							Bit 2 to 3 Operation after stage completion	0: stop 1: execute the next stage	
							Bit 4 to 5 Control method	0: angle 1: torque 2: torque rate	
							Bit 6 Rotation direction of the stage	0: CW 1: CCW	
							Bit 7 to 8 Hold time switch of the final stage	0: Off 1: On	
							Bit 9 Prevail torque	0: Off 1: On	
123 124	223 224	323 324	423 424	523 524	623 624	Target On / Off (H)	-	0000	
125 126	225 226	325 326	425 426	525 526	625 626	Target torque	Unit: 0.001 Nm (used with Target On / Off Bit 4, 1: torque)	3200	
127 128	227 228	327 328	427 428	527 528	627 628	Rotation speed	Unit: rpm	5000	

Byte						Query type 11 (version number 0)	Description	Example (Hex)
129 - 130	229 - 230	329 - 330	429 - 430	529 - 530	629 - 630	Target angle	Unit: degree (used with Target On / Off Bit 4, 0: angle)	5A00
131 - 132	231 - 232	331 - 332	431 - 432	531 - 532	631 - 632	Hold / pause time after stage completion	Unit: ms	0000
133 - 134	233 - 234	333 - 334	433 - 434	533 - 534	633 - 634	Acceleration time	Unit: ms	1E00
135 - 136	235 - 236	335 - 336	435 - 436	535 - 536	635 - 636	Deceleration time	Unit: ms	0A00
137 - 138	237 - 238	337 - 338	437 - 438	537 - 538	637 - 638	Start torque for torque rate calculation	-	0000
139 - 140	239 - 240	339 - 340	439 - 440	539 - 540	639 - 640	Angle interval for torque rate calculation	-	0000
141 - 142	241 - 242	341 - 342	441 - 442	541 - 542	641 - 642	Target torque rate	Unit: 0.0001 Nm/degree (used with Target On / Off Bit 4, 2: torque rate)	0000
143 - 172	243 - 272	343 - 372	443 - 472	543 - 572	643 - 672	Reserved	30 bytes	...
173 - 174	273 - 274	373 - 374	473 - 474	573 - 574	673 - 674	Max. angle	Used with Limit On / Off (L) Bit 2	0807
175 - 176	275 - 276	375 - 376	475 - 476	575 - 576	675 - 676	Min. angle	Used with Limit On / Off (L) Bit 2	0000
177 - 178	277 - 278	377 - 378	477 - 478	577 - 578	677 - 678	Max. clamp torque	Used with Limit On / Off (L) Bit 3	FA00
179 - 180	279 - 280	379 - 380	479 - 480	579 - 580	679 - 680	Min. clamp torque	Used with Limit On / Off (L) Bit 3	0000
181 - 182	281 - 282	381 - 382	481 - 482	581 - 582	681 - 682	Max. torque	Used with Limit On / Off (H) Bit 0	D503
183 - 184	283 - 284	383 - 384	483 - 484	583 - 584	683 - 684	Min. torque	Used with Limit On / Off (H) Bit 0	0000
185 - 198	285 - 298	385 - 398	485 - 498	585 - 598	685 - 698	Reserved	14 bytes	...
199 - 200	299 - 300	399 - 400	499 - 500	599 - 600	699 - 700	Max. operation time	Unit: ms Used with Limit On / Off (H) Bit 15	6400
201 - 202	301 - 302	401 - 402	501 - 502	601 - 602	701 - 702	Min. operation time	Unit: ms Used with Limit On / Off (H) Bit 15	0000
203 - 206	303 - 306	403 - 406	503 - 506	603 - 606	703 - 706	Reserved	4 bytes	...
207 - 208	307 - 308	407 - 408	507 - 508	607 - 608	707 - 708	Angle range for prevail torque calculation	Set the angle range (%) of the stage to calculate the average torque.	0000
209 - 212	309 - 312	409 - 412	509 - 512	609 - 612	709 - 712	Reserved	4 bytes	...
213 - 214	313 - 314	413 - 414	513 - 514	613 - 614	713 - 714	Limit On / Off (L)	Bit 2: limit the angle	0000
215 - 216	315 - 316	415 - 416	515 - 516	615 - 616	715 - 716	Limit On / Off (H)	Bit 0: limit the torque Bit 15: limit the operation time	0100
217 - 218	317 - 318	417 - 418	517 - 518	617 - 618	717 - 718	Reserved	-	0000

B

**B**

Byte							Query type 11 (version number 0)	Description	Example (Hex)
219 - 319 - 419 - 519 - 619 - 719 - 220 320 420 520 620 720							Stage code	10: start stage 20: rundown stage (angle / torque mode) 29: rundown stage (torque rate mode) 30: pre-tightening stage 40: tightening stage 90: first stage of loosening 91: second stage of loosening	0A00
721 - 1120							Reserved	-	-

Byte		Query type 11 (version number 1)	Description	Example (Hex)
21 - 22		Parameter ID	1 to 500	0100
23 - 24		Version number	1	0100
25 - 26		Torque unit	0: N.m; 1: kgf.cm; 2: lbf.ft; 3: lbf.in	0100
27 - 32		Reserved	6 bytes	...
33 - 34		1st stage loosening angle	-	6400
35 - 36		2nd stage loosening angle	-	FF7F
37 - 38		Switch for monitoring the min. loosening torque	-	0000
39 - 40		Reserved	-	0000
41 - 42		Tool 1 / Tool 2	0: Tool 1; 1: Tool 2	0000
43 - 62		Reserved	20 bytes	...
63 - 64		Max. current for tightening	-	0000
65 - 66		Max. tightening time	Unit: ms	6400
67 - 68		Max. tightening angle	Unit: degree	FF7F
69 - 70		Reserved	-	0000
71 - 72		Delay before tightening starts	Unit: ms	0000
73 - 74		Min. tightening angle	Unit: degree	0000
75 - 80		Reserved	6 bytes	...
81 - 82		Rotation direction of loosening	-	0000
83 - 84		Reserved	-	0000
85 - 86		Max. loosening time	Unit: ms	6400
87 - 88		Max. loosening angle	Unit: degree	FF7F
89 - 90		Reserved	-	0000
91 - 92		Delay before loosening starts	Unit: ms	0000
93 - 94		Min. loosening angle	Unit: degree	0000
95 - 98		Reserved	4 bytes	...
99 - 100		Min. loosening torque (L)	Unit: 0.001 Nm	0000
101 - 102		Min. loosening torque (H)		0000
103 - 104		ID of the prevail torque to be linked	1 to 500	0000
105 - 116		Reserved	12 bytes	...

Byte						Query type 11 (version number 1)	Description		Example (Hex)
117 - 118						1st stage loosening speed	-		6400
119 - 120						2nd stage loosening speed	-		F401
121 - 122	221 - 222	321 - 322	421 - 422	521 - 522	621 - 622	Target On / Off (L)	Bit 0 to 1 Control method type	0: position 1: speed	0500
							Bit 2 to 3 Operation after stage completion	0: stop 1: execute the next stage	
							Bit 4 to 5 Control method	0: angle 1: torque 2: torque rate	
							Bit 6 Rotation direction of the stage	0: CW 1: CCW	
							Bit 7 to 8 Hold time switch of the final stage	0: Off 1: On	
							Bit 9 Prevail torque	0: Off 1: On	
							Bit 10 Reserved	-	
							Bit 11 Relative / absolute torque command	0: absolute 1: relative	
							Bit 12 Timing to add the relative torque	0: beginning of a stage 1: snug point	
							-		0000
123 - 124	223 - 224	323 - 324	423 - 424	523 - 524	623 - 624	Target On / Off (H)	-		0000
125 - 126	225 - 226	325 - 326	425 - 426	525 - 526	625 - 626	Final target speed	-		0000
127 - 128	227 - 228	327 - 328	427 - 428	527 - 528	627 - 628	Rotation speed	Unit: rpm		5000
129 - 130	229 - 230	329 - 330	429 - 430	529 - 530	629 - 630	Target angle	Unit: degree (used with Target On / Off Bit 4, 0: angle)		5A00
131 - 132	231 - 232	331 - 332	431 - 432	531 - 532	631 - 632	Hold / pause time after stage completion	Unit: ms		0000
133 - 134	233 - 234	333 - 334	433 - 434	533 - 534	633 - 634	Acceleration time	Unit: ms		1E00
135 - 136	235 - 236	335 - 336	435 - 436	535 - 536	635 - 636	Deceleration time	Unit: ms		0A00
137 - 138	237 - 238	337 - 338	437 - 438	537 - 538	637 - 638	Acceleration time of 2nd stage	-		0000
139 - 140	239 - 240	339 - 340	439 - 440	539 - 540	639 - 640	Angle interval for torque rate calculation	-		0000
141 - 142	241 - 242	341 - 342	441 - 442	541 - 542	641 - 642	Final pause time	Unit: ms		0000
143 - 144	243 - 244	343 - 344	443 - 444	543 - 544	643 - 644	Reserved	-		0000

B

B

Byte						Query type 11 (version number 1)	Description	Example (Hex)
145 146	245 246	345 346	445- 446	545 546	645- 646	Target torque (L)	Unit: 0.001 Nm (used with Target On / Off Bit 4, 1: torque)	3200
147 148	247 248	347 348	447- 448	547 548	647- 648	Target torque (H)		0000
149 152	249 252	349 352	449- 452	549 552	649- 652	Reserved	-	0000
153 154	253 254	353 354	453- 454	553 554	653- 654	Target torque rate (L)	Unit: 0.0001 Nm/degree (used with Target On / Off Bit 4, 2: torque rate)	0000
155 156	255 256	355 356	455- 456	555 556	655- 656	Target torque rate (H)		0000
157 158	257 258	357 358	457- 458	557 558	657- 658	Torque of 1st stage (L)	Unit: 0.001 Nm	0000
159 160	259 260	359 360	459- 460	559 560	659- 660	Torque of 1st stage (H)		0000
161 164	261 264	361 364	461- 464	561 564	661- 664	Reserved	4 bytes	...
165 166	265 266	365 366	465- 466	565 566	665- 666	Max. clamp torque (L)	Unit: 0.001 Nm Used with Limit On / Off (L) Bit 3	FA00
167 168	267 268	367 368	467- 468	567 568	667- 668	Max. clamp torque (H)		0000
169 170	269 270	369 370	469- 470	569 570	669- 670	Min. clamp torque (L)	Unit: 0.001 Nm Used with Limit On / Off (L) Bit 3	0000
171 172	271 272	371 372	471- 472	571 572	671- 672	Min. clamp torque (H)		0000
173 174	273 274	373 374	473- 474	573 574	673- 674	Max. angle	Used with Limit On / Off (L) Bit 2	0807
175 176	275 276	375 376	475- 476	575 576	675- 676	Min. angle	Used with Limit On / Off (L) Bit 2	0000
177 178	277 278	377 378	477- 478	577 578	677- 678	Max. torque (L)	Unit: 0.001 Nm Used with Limit On / Off (H) Bit 0	D503
179 180	279 280	379 380	479- 480	579 580	679- 680	Max. torque (H)		0000
181 182	281 282	381 382	481- 482	581 582	681- 682	Min. torque (L)	Unit: 0.001 Nm Used with Limit On / Off (H) Bit 0	0000
183 184	283 284	383 384	483- 484	583 584	683- 684	Min. torque (H)		0000
185 198	285 298	385 398	485- 498	585 598	685- 698	Reserved	14 bytes	...
199 200	299 300	399 400	499- 500	599 600	699- 700	Max. operation time	Unit: ms Used with Limit On / Off (H) Bit 15	6400
201 202	301 302	401 402	501- 502	601 602	701- 702	Min. operation time	Unit: ms Used with Limit On / Off (H) Bit 15	0000
203 206	303 306	403 406	503- 506	603 606	703- 706	Reserved	4 bytes	...
207 208	307 308	407 408	507- 508	607 608	707- 708	Angle range for prevail torque calculation	Set the angle range (%) of the stage to calculate the average torque.	0000
209 212	309 312	409 412	509- 512	609 612	709- 712	Reserved	4 bytes	...
213 214	313 314	413 414	513- 514	613 614	713- 714	Limit On / Off (L)	Bit 2: limit the angle	0000
215 216	315 316	415 416	515- 516	615 616	715- 716	Limit On / Off (H)	Bit 0: limit the torque Bit 15: limit the operation time	0100

Byte							Query type 11 (version number 1)	Description	Example (Hex)					
217 - 218	317 - 318	417 - 418	517 - 518	617 - 618	717 - 718	Reserved							-	0000
219 - 220	319 - 320	419 - 420	519 - 520	619 - 620	719 - 720	Stage code							10: start stage 20: rundown stage (angle / torque mode) 29: rundown stage (torque rate mode) 30: pre-tightening stage 40: tightening stage 90: 1st stage of loosening 91: 2nd stage of loosening	0A00
721 - 1120							Reserved	-	-					

B

Byte	Query type 20	Example (Hex)	Query type 21	Example (Hex)
21 - 22	Time scale 2001 data	0000	Angle scale 2001 data	0000
23 - 24	Time scale 2002 data	0000	Angle scale 2002 data	0000
25 - 26	Time scale 2003 data	0000	Angle scale 2003 data	0000
27 - 28	Time scale 2004 data	0000	Angle scale 2004 data	0000
29 - 30	Time scale 2005 data	0000	Angle scale 2005 data	0000
31 - 32	Time scale 2006 data	0000	Angle scale 2006 data	0000
33 - 34	Time scale 2007 data	0000	Angle scale 2007 data	0000
35 - 36	Time scale 2008 data	0000	Angle scale 2008 data	0000
37 - 38	Time scale 2009 data	0000	Angle scale 2009 data	0000
...	Time scale N data	...	Angle scale N data	...
4001 - 4002	Time scale 3991 data	0000	Angle scale 3991 data	0000
4003 - 4004	Time scale 3992 data	0000	Angle scale 3992 data	0000
4005 - 4006	Time scale 3993 data	0000	Angle scale 3993 data	0000
4007 - 4008	Time scale 3994 data	0000	Angle scale 3994 data	0000
4009 - 4010	Time scale 3995 data	0000	Angle scale 3995 data	0000
4011 - 4012	Time scale 3996 data	0000	Angle scale 3996 data	0000
4013 - 4014	Time scale 3997 data	0000	Angle scale 3997 data	0000
4015 - 4016	Time scale 3998 data	0000	Angle scale 3998 data	0000
4017 - 4018	Time scale 3999 data	0000	Angle scale 3999 data	0000
4019 - 4020	Time scale 4000 data	0000	Angle scale 4000 data	0000

**B**

Byte	Query type 22	Example (Hex)	Query type 23	Example (Hex)
21 - 22	Torque scale 2001 data	0000	Torque rate scale 2001 data	0000
23 - 24	Torque scale 2002 data	0000	Torque rate scale 2002 data	0000
25 - 26	Torque scale 2003 data	0000	Torque rate scale 2003 data	0000
27 - 28	Torque scale 2004 data	0000	Torque rate scale 2004 data	0000
29 - 30	Torque scale 2005 data	0000	Torque rate scale 2005 data	0000
31 - 32	Torque scale 2006 data	0000	Torque rate scale 2006 data	0000
33 - 34	Torque scale 2007 data	0000	Torque rate scale 2007 data	0000
35 - 36	Torque scale 2008 data	0000	Torque rate scale 2008 data	0000
37 - 38	Torque scale 2009 data	0000	Torque rate scale 2009 data	0000
...	Torque scale N data	...	Torque rate scale N data	...
4001 - 4002	Torque scale 3991 data	0000	Torque rate scale 3991 data	0000
4003 - 4004	Torque scale 3992 data	0000	Torque rate scale 3992 data	0000
4005 - 4006	Torque scale 3993 data	0000	Torque rate scale 3993 data	0000
4007 - 4008	Torque scale 3994 data	0000	Torque rate scale 3994 data	0000
4009 - 4010	Torque scale 3995 data	0000	Torque rate scale 3995 data	0000
4011 - 4012	Torque scale 3996 data	0000	Torque rate scale 3996 data	0000
4013 - 4014	Torque scale 3997 data	0000	Torque rate scale 3997 data	0000
4015 - 4016	Torque scale 3998 data	0000	Torque rate scale 3998 data	0000
4017 - 4018	Torque scale 3999 data	0000	Torque rate scale 3999 data	0000
4019 - 4020	Torque scale 4000 data	0000	Torque rate scale 4000 data	0000

Byte	Query type 24	Example (Hex)	Query type 25	Example (Hex)
21 - 22	Torque scale 2001 data (L)	0000	Torque scale 3001 data (L)	0000
23 - 24	Torque scale 2001 data (H)	0000	Torque scale 3001 data (H)	0000
25 - 26	Torque scale 2002 data (L)	0000	Torque scale 3002 data (L)	0000
27 - 28	Torque scale 2002 data (H)	0000	Torque scale 3002 data (H)	0000
29 - 30	Torque scale 2003 data (L)	0000	Torque scale 33003 data (L)	0000
31 - 32	Torque scale 2003 data (H)	0000	Torque scale 3003 data (H)	0000
33 - 34	Torque scale 2004 data (L)	0000	Torque scale 3004 data (L)	0000
35 - 36	Torque scale 2004 data (H)	0000	Torque scale 3004 data (H)	0000
...	Torque scale N data (L)	...	Torque scale N data (L)	...
...	Torque scale N data (H)	...	Torque scale N data (H)	...
4001 - 4002	Torque scale 2996 data (L)	0000	Torque scale 3996 data (L)	0000
4003 - 4004	Torque scale 2996 data (H)	0000	Torque scale 3996 data (H)	0000
4005 - 4006	Torque scale 2997 data (L)	0000	Torque scale 3997 data (L)	0000
4007 - 4008	Torque scale 2997 data (H)	0000	Torque scale 3997 data (H)	0000
4009 - 4010	Torque scale 2998 data (L)	0000	Torque scale 3998 data (L)	0000
4011 - 4012	Torque scale 2998 data (H)	0000	Torque scale 3998 data (H)	0000
4013 - 4014	Torque scale 2999 data (L)	0000	Torque scale 3999 data (L)	0000
4015 - 4016	Torque scale 2999 data (H)	0000	Torque scale 3999 data (H)	0000
4017 - 4018	Torque scale 3000 data (L)	0000	Torque scale 4000 data (L)	0000
4019 - 4020	Torque scale 3000 data (H)	0000	Torque scale 4000 data (H)	0000

Byte	Query type 26	Example (Hex)	Query type 27	Example (Hex)
21 - 22	Torque rate scale 2001 data (L)	0000	Torque rate scale 3001 data (L)	0000
23 - 24	Torque rate scale 2001 data (H)	0000	Torque rate scale 3001 data (H)	0000
25 - 26	Torque rate scale 2002 data (L)	0000	Torque rate scale 3002 data (L)	0000
27 - 28	Torque rate scale 2002 data (H)	0000	Torque rate scale 3002 data (H)	0000
29 - 30	Torque rate scale 2003 data (L)	0000	Torque rate scale 3003 data (L)	0000
31 - 32	Torque rate scale 2003 data (H)	0000	Torque rate scale 3003 data (H)	0000
33 - 34	Torque rate scale 2004 data (L)	0000	Torque rate scale 3004 data (L)	0000
35 - 36	Torque rate scale 2004 data (H)	0000	Torque rate scale 3004 data (H)	0000
...	Torque rate scale N data (L)	...	Torque rate scale N data (L)	...
...	Torque rate scale N data (H)	...	Torque rate scale N data (H)	...
4001 - 4002	Torque rate scale 2996 data (L)	0000	Torque rate scale 3996 data (L)	0000
4003 - 4004	Torque rate scale 2996 data (H)	0000	Torque rate scale 3996 data (H)	0000
4005 - 4006	Torque rate scale 2997 data (L)	0000	Torque rate scale 3997 data (L)	0000
4007 - 4008	Torque rate scale 2997 data (H)	0000	Torque rate scale 3997 data (H)	0000
4009 - 4010	Torque rate scale 2998 data (L)	0000	Torque rate scale 3998 data (L)	0000
4011 - 4012	Torque rate scale 2998 data (H)	0000	Torque rate scale 3998 data (H)	0000
4013 - 4014	Torque rate scale 2999 data (L)	0000	Torque rate scale 3999 data (L)	0000
4015 - 4016	Torque rate scale 2999 data (H)	0000	Torque rate scale 3999 data (H)	0000
4017 - 4018	Torque rate scale 3000 data (L)	0000	Torque rate scale 4000 data (L)	0000
4019 - 4020	Torque rate scale 3000 data (H)	0000	Torque rate scale 4000 data (H)	0000

Byte	Query type 30	Example (Hex)	Query type 31	Example (Hex)
21 - 22	Time scale 4001 data	0000	Angle scale 4001 data	0000
23 - 24	Time scale 4002 data	0000	Angle scale 4002 data	0000
25 - 26	Time scale 4003 data	0000	Angle scale 4003 data	0000
27 - 28	Time scale 4004 data	0000	Angle scale 4004 data	0000
29 - 30	Time scale 4005 data	0000	Angle scale 4005 data	0000
31 - 32	Time scale 4006 data	0000	Angle scale 4006 data	0000
33 - 34	Time scale 4007 data	0000	Angle scale 4007 data	0000
35 - 36	Time scale 4008 data	0000	Angle scale 4008 data	0000
37 - 38	Time scale 4009 data	0000	Angle scale 4009 data	0000
...	Time scale N data	...	Angle scale N data	...
4001 - 4002	Time scale 5991 data	0000	Angle scale 5991 data	0000
4003 - 4004	Time scale 5992 data	0000	Angle scale 5992 data	0000
4005 - 4006	Time scale 5993 data	0000	Angle scale 5993 data	0000
4007 - 4008	Time scale 5994 data	0000	Angle scale 5994 data	0000
4009 - 4010	Time scale 5995 data	0000	Angle scale 5995 data	0000
4011 - 4012	Time scale 5996 data	0000	Angle scale 5996 data	0000
4013 - 4014	Time scale 5997 data	0000	Angle scale 5997 data	0000
4015 - 4016	Time scale 5998 data	0000	Angle scale 5998 data	0000
4017 - 4018	Time scale 5999 data	0000	Angle scale 5999 data	0000
4019 - 4020	Time scale 6000 data	0000	Angle scale 6000 data	0000

B

B

Byte	Query type 32	Example (Hex)	Query type 33	Example (Hex)
21 - 22	Torque scale 4001 data	0000	Torque rate scale 4001 data	0000
23 - 24	Torque scale 4002 data	0000	Torque rate scale 4002 data	0000
25 - 26	Torque scale 4003 data	0000	Torque rate scale 4003 data	0000
27 - 28	Torque scale 4004 data	0000	Torque rate scale 4004 data	0000
29 - 30	Torque scale 4005 data	0000	Torque rate scale 4005 data	0000
31 - 32	Torque scale 4006 data	0000	Torque rate scale 4006 data	0000
33 - 34	Torque scale 4007 data	0000	Torque rate scale 4007 data	0000
35 - 36	Torque scale 4008 data	0000	Torque rate scale 4008 data	0000
37 - 38	Torque scale 4009 data	0000	Torque rate scale 4009 data	0000
...	Torque scale N data	...	Torque rate scale N data	...
4001 - 4002	Torque scale 5991 data	0000	Torque rate scale 5991 data	0000
4003 - 4004	Torque scale 5992 data	0000	Torque rate scale 5992 data	0000
4005 - 4006	Torque scale 5993 data	0000	Torque rate scale 5993 data	0000
4007 - 4008	Torque scale 5994 data	0000	Torque rate scale 5994 data	0000
4009 - 4010	Torque scale 5995 data	0000	Torque rate scale 5995 data	0000
4011 - 4012	Torque scale 5996 data	0000	Torque rate scale 5996 data	0000
4013 - 4014	Torque scale 5997 data	0000	Torque rate scale 5997 data	0000
4015 - 4016	Torque scale 5998 data	0000	Torque rate scale 5998 data	0000
4017 - 4018	Torque scale 5999 data	0000	Torque rate scale 5999 data	0000
4019 - 4020	Torque scale 6000 data	0000	Torque rate scale 6000 data	0000

Byte	Query type 34	Example (Hex)	Query type 35	Example (Hex)
21 - 22	Torque scale 4001 data (L)	0000	Torque scale 5001 data (L)	0000
23 - 24	Torque scale 4001 data (H)	0000	Torque scale 5001 data (H)	0000
25 - 26	Torque scale 4002 data (L)	0000	Torque scale 5002 data (L)	0000
27 - 28	Torque scale 4002 data (H)	0000	Torque scale 5002 data (H)	0000
29 - 30	Torque scale 4003 data (L)	0000	Torque scale 5003 data (L)	0000
31 - 32	Torque scale 4003 data (H)	0000	Torque scale 5003 data (H)	0000
33 - 34	Torque scale 4004 data (L)	0000	Torque scale 5004 data (L)	0000
35 - 36	Torque scale 4004 data (H)	0000	Torque scale 5004 data (H)	0000
...	Torque scale N data (L)	...	Torque scale N data (L)	...
...	Torque scale N data (H)	...	Torque scale N data (H)	...
4001 - 4002	Torque scale 4996 data (L)	0000	Torque scale 5996 data (L)	0000
4003 - 4004	Torque scale 4996 data (H)	0000	Torque scale 5996 data (H)	0000
4005 - 4006	Torque scale 4997 data (L)	0000	Torque scale 5997 data (L)	0000
4007 - 4008	Torque scale 4997 data (H)	0000	Torque scale 5997 data (H)	0000
4009 - 4010	Torque scale 4998 data (L)	0000	Torque scale 5998 data (L)	0000
4011 - 4012	Torque scale 4998 data (H)	0000	Torque scale 5998 data (H)	0000
4013 - 4014	Torque scale 4999 data (L)	0000	Torque scale 5999 data (L)	0000
4015 - 4016	Torque scale 4999 data (H)	0000	Torque scale 5999 data (H)	0000
4017 - 4018	Torque scale 5000 data (L)	0000	Torque scale 6000 data (L)	0000
4019 - 4020	Torque scale 5000 data (H)	0000	Torque scale 6000 data (H)	0000

Byte	Query type 36	Example (Hex)	Query type 37	Example (Hex)
21 - 22	Torque rate scale 4001 data (L)	0000	Torque rate scale 5001 data (L)	0000
23 - 24	Torque rate scale 4001 data (H)	0000	Torque rate scale 5001 data (H)	0000
25 - 26	Torque rate scale 4002 data (L)	0000	Torque rate scale 5002 data (L)	0000
27 - 28	Torque rate scale 4002 data (H)	0000	Torque rate scale 5002 data (H)	0000
29 - 30	Torque rate scale 4003 data (L)	0000	Torque rate scale 5003 data (L)	0000
31 - 32	Torque rate scale 4003 data (H)	0000	Torque rate scale 5003 data (H)	0000
33 - 34	Torque rate scale 4004 data (L)	0000	Torque rate scale 5004 data (L)	0000
35 - 36	Torque rate scale 4004 data (H)	0000	Torque rate scale 5004 data (H)	0000
...	Torque rate scale N data (L)	...	Torque rate scale N data (L)	...
...	Torque rate scale N data (H)	...	Torque rate scale N data (H)	...
4001 - 4002	Torque rate scale 4996 data (L)	0000	Torque rate scale 5996 data (L)	0000
4003 - 4004	Torque rate scale 4996 data (H)	0000	Torque rate scale 5996 data (H)	0000
4005 - 4006	Torque rate scale 4997 data (L)	0000	Torque rate scale 5997 data (L)	0000
4007 - 4008	Torque rate scale 4997 data (H)	0000	Torque rate scale 5997 data (H)	0000
4009 - 4010	Torque rate scale 4998 data (L)	0000	Torque rate scale 5998 data (L)	0000
4011 - 4012	Torque rate scale 4998 data (H)	0000	Torque rate scale 5998 data (H)	0000
4013 - 4014	Torque rate scale 4999 data (L)	0000	Torque rate scale 5999 data (L)	0000
4015 - 4016	Torque rate scale 4999 data (H)	0000	Torque rate scale 5999 data (H)	0000
4017 - 4018	Torque rate scale 5000 data (L)	0000	Torque rate scale 6000 data (L)	0000
4019 - 4020	Torque rate scale 5000 data (H)	0000	Torque rate scale 6000 data (H)	0000

Byte	Query type 40	Example (Hex)	Query type 41	Example (Hex)
21 - 22	Time scale 6001 data	0000	Angle scale 6001 data	0000
23 - 24	Time scale 6002 data	0000	Angle scale 6002 data	0000
25 - 26	Time scale 6003 data	0000	Angle scale 6003 data	0000
27 - 28	Time scale 6004 data	0000	Angle scale 6004 data	0000
29 - 30	Time scale 6005 data	0000	Angle scale 6005 data	0000
31 - 32	Time scale 6006 data	0000	Angle scale 6006 data	0000
33 - 34	Time scale 6007 data	0000	Angle scale 6007 data	0000
35 - 36	Time scale 6008 data	0000	Angle scale 6008 data	0000
37 - 38	Time scale 6009 data	0000	Angle scale 6009 data	0000
...	Time scale N data	...	Angle scale N data	...
4001 - 4002	Time scale 7991 data	0000	Angle scale 7991 data	0000
4003 - 4004	Time scale 7992 data	0000	Angle scale 7992 data	0000
4005 - 4006	Time scale 7993 data	0000	Angle scale 7993 data	0000
4007 - 4008	Time scale 7994 data	0000	Angle scale 7994 data	0000
4009 - 4010	Time scale 7995 data	0000	Angle scale 7995 data	0000
4011 - 4012	Time scale 7996 data	0000	Angle scale 7996 data	0000
4013 - 4014	Time scale 7997 data	0000	Angle scale 7997 data	0000
4015 - 4016	Time scale 7998 data	0000	Angle scale 7998 data	0000
4017 - 4018	Time scale 7999 data	0000	Angle scale 7999 data	0000
4019 - 4020	Time scale 8000 data	0000	Angle scale 8000 data	0000

B

**B**

Byte	Query type 42	Example (Hex)	Query type 43	Example (Hex)
21 - 22	Torque scale 6001 data	0000	Torque rate scale 6001 data	0000
23 - 24	Torque scale 6002 data	0000	Torque rate scale 6002 data	0000
25 - 26	Torque scale 6003 data	0000	Torque rate scale 6003 data	0000
27 - 28	Torque scale 6004 data	0000	Torque rate scale 6004 data	0000
29 - 30	Torque scale 6005 data	0000	Torque rate scale 6005 data	0000
31 - 32	Torque scale 6006 data	0000	Torque rate scale 6006 data	0000
33 - 34	Torque scale 6007 data	0000	Torque rate scale 6007 data	0000
35 - 36	Torque scale 6008 data	0000	Torque rate scale 6008 data	0000
37 - 38	Torque scale 6009 data	0000	Torque rate scale 6009 data	0000
...	Torque scale N data	...	Torque rate scale N data	...
4001 - 4002	Torque scale 7991 data	0000	Torque rate scale 7991 data	0000
4003 - 4004	Torque scale 7992 data	0000	Torque rate scale 7992 data	0000
4005 - 4006	Torque scale 7993 data	0000	Torque rate scale 7993 data	0000
4007 - 4008	Torque scale 7994 data	0000	Torque rate scale 7994 data	0000
4009 - 4010	Torque scale 7995 data	0000	Torque rate scale 7995 data	0000
4011 - 4012	Torque scale 7996 data	0000	Torque rate scale 7996 data	0000
4013 - 4014	Torque scale 7997 data	0000	Torque rate scale 7997 data	0000
4015 - 4016	Torque scale 7998 data	0000	Torque rate scale 7998 data	0000
4017 - 4018	Torque scale 7999 data	0000	Torque rate scale 7999 data	0000
4019 - 4020	Torque scale 8000 data	0000	Torque rate scale 8000 data	0000

Byte	Query type 44	Example (Hex)	Query type 45	Example (Hex)
21 - 22	Torque scale 6001 data (L)	0000	Torque scale 7001 data (L)	0000
23 - 24	Torque scale 6001 data (H)	0000	Torque scale 7001 data (H)	0000
25 - 26	Torque scale 6002 data (L)	0000	Torque scale 7002 data (L)	0000
27 - 28	Torque scale 6002 data (H)	0000	Torque scale 7002 data (H)	0000
29 - 30	Torque scale 6003 data (L)	0000	Torque scale 7003 data (L)	0000
31 - 32	Torque scale 6003 data (H)	0000	Torque scale 7003 data (H)	0000
33 - 34	Torque scale 6004 data (L)	0000	Torque scale 7004 data (L)	0000
35 - 36	Torque scale 6004 data (H)	0000	Torque scale 7004 data (H)	0000
37 - 38	Torque scale N data (L)	...	Torque scale N data (L)	...
...	Torque scale N data (H)	...	Torque scale N data (H)	...
4001 - 4002	Torque scale 6996 data (L)	0000	Torque scale 7996 data (L)	0000
4003 - 4004	Torque scale 6996 data (H)	0000	Torque scale 7996 data (H)	0000
4005 - 4006	Torque scale 6997 data (L)	0000	Torque scale 7997 data (L)	0000
4007 - 4008	Torque scale 6997 data (H)	0000	Torque scale 7997 data (H)	0000
4009 - 4010	Torque scale 6998 data (L)	0000	Torque scale 7998 data (L)	0000
4011 - 4012	Torque scale 6998 data (H)	0000	Torque scale 7998 data (H)	0000
4013 - 4014	Torque scale 6999 data (L)	0000	Torque scale 7999 data (L)	0000
4015 - 4016	Torque scale 6999 data (H)	0000	Torque scale 7999 data (H)	0000
4017 - 4018	Torque scale 7000 data (L)	0000	Torque scale 8000 data (L)	0000
4019 - 4020	Torque scale 7000 data (H)	0000	Torque scale 8000 data (H)	0000

Byte	Query type 46	Example (Hex)	Query type 47	Example (Hex)
21 - 22	Torque rate scale 6001 data (L)	0000	Torque rate scale 7001 data (L)	0000
23 - 24	Torque rate scale 6001 data (H)	0000	Torque rate scale 7001 data (H)	0000
25 - 26	Torque rate scale 6002 data (L)	0000	Torque rate scale 7002 data (L)	0000
27 - 28	Torque rate scale 6002 data (H)	0000	Torque rate scale 7002 data (H)	0000
29 - 30	Torque rate scale 6003 data (L)	0000	Torque rate scale 7003 data (L)	0000
31 - 32	Torque rate scale 6003 data (H)	0000	Torque rate scale 7003 data (H)	0000
33 - 34	Torque rate scale 6004 data (L)	0000	Torque rate scale 7004 data (L)	0000
35 - 36	Torque rate scale 6004 data (H)	0000	Torque rate scale 7004 data (H)	0000
37 - 38	Torque rate scale N data (L)	...	Torque rate scale N data (L)	...
...	Torque rate scale N data (H)	...	Torque rate scale N data (H)	...
4001 - 4002	Torque rate scale 6996 data (L)	0000	Torque rate scale 7996 data (L)	0000
4003 - 4004	Torque rate scale 6996 data (H)	0000	Torque rate scale 7996 data (H)	0000
4005 - 4006	Torque rate scale 6997 data (L)	0000	Torque rate scale 7997 data (L)	0000
4007 - 4008	Torque rate scale 6997 data (H)	0000	Torque rate scale 7997 data (H)	0000
4009 - 4010	Torque rate scale 6998 data (L)	0000	Torque rate scale 7998 data (L)	0000
4011 - 4012	Torque rate scale 6998 data (H)	0000	Torque rate scale 7998 data (H)	0000
4013 - 4014	Torque rate scale 6999 data (L)	0000	Torque rate scale 7999 data (L)	0000
4015 - 4016	Torque rate scale 6999 data (H)	0000	Torque rate scale 7999 data (H)	0000
4017 - 4018	Torque rate scale 7000 data (L)	0000	Torque rate scale 8000 data (L)	0000
4019 - 4020	Torque rate scale 7000 data (H)	0000	Torque rate scale 8000 data (H)	0000

B

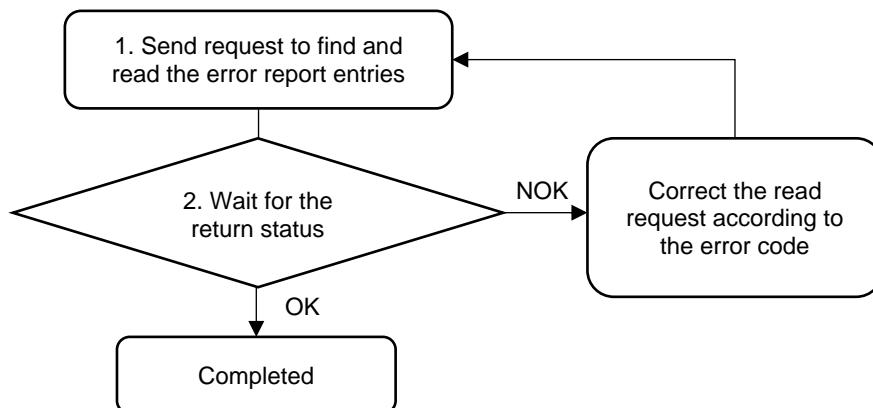
## #752 Find and read the error report entries

Content description:

Use function code #752 with bytes 231 - 232 to read the content of the error report.

Byte	Tool 1 / Tool 2 common status
231 - 232	Current No. of error report entries

Handshake signal description:



1. Send the request to find and read the error report entries.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	752	F002
3 - 4	Version number	-	0000
5 - 6	Error report ID	1 to 60000 0: the latest error report	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the content of the error report.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	752	F002
3 - 4	Return data length	Unit: Word	1100
5 - 6	Error report ID	1 to 60000 0: the latest error report	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	752	F002
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 22	Date / Time	Year	E607
23 - 24		Month	0B00
25 - 26		Day	1C00
27 - 28		Hour	1200
29 - 30		Minute	1100
31 - 32		Second	1000

Byte	Return status	Description	Example (Hex)
33 - 34	AL / NG code	Refer to CH12*	0230

Note: 0x1001 - 0x1999: Tool 1 device alarm (AL); 0x2000 - 0x2999: Tool 2 device alarm (AL).  
0x3001 - 0x3999: Tool 1 tightening error (NG); 0x4000 - 0x4999: Tool 2 tightening error (NG).

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Error report ID	Exceeds the range of 0 to 60000

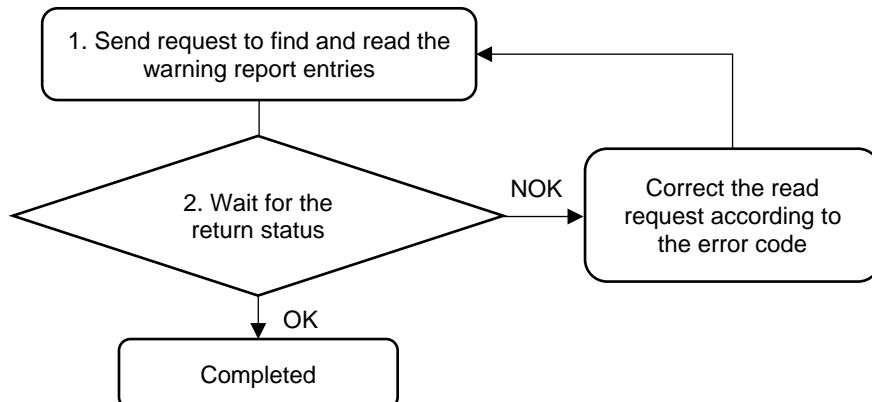
## #753 Find and read the warning report entries

Content description:

Use function code #753 with bytes 233 - 234 to read the content of the warning report.

Byte	Tool 1 / Tool 2 common status
233 - 234	Current No. of warning report entries

Handshake signal description:



- Send the request to find and read the warning report entries.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	753	F102
3 - 4	Version number	-	0000
5 - 6	Warning report ID	1 to 60000 0: the latest warning report	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

B

2. Check whether the reading is successful from the return status and read the content of the warning report.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	753	F102
3 - 4	Return data length	Unit: Word	1100
5 - 6	Warning report ID	1 to 60000 0: the latest warning report	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	753	F102
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 22	Date / Time	Year	E607
23 - 24		Month	0B00
25 - 26		Day	1C00
27 - 28		Hour	1200
29 - 30		Minute	1100
31 - 32		Second	1000
33 - 34	WN code	Refer to CH12*	5005

Note: 0x5001 - 0x5999: Tool 1 operation warning (WN); 0x6000 - 0x6999: Tool 2 operation warning (WN).

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Warning report ID	Exceeds the range of 0 to 60000

## #754 Find and read the button report entries

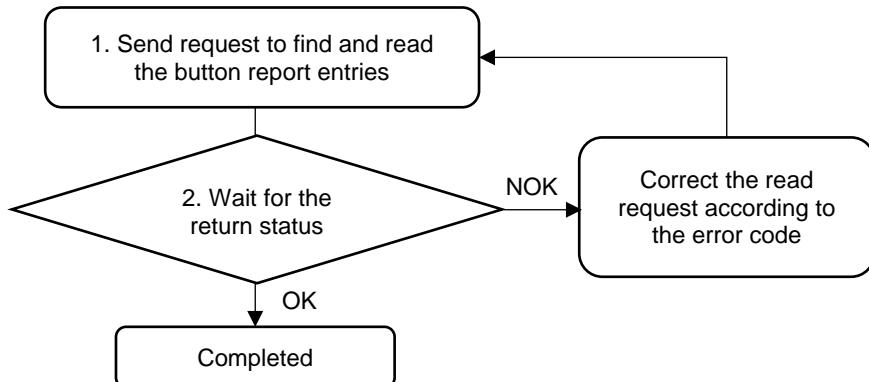
Content description:

Use function code #754 with bytes 239 - 240 and bytes 241 - 242 to read the content of the button report.

B

Byte	Tool 1 / Tool 2 common status
239 - 240	Current No. of button report entries (L)
241 - 242	Current No. of button report entries (H)

Handshake signal description:



1. Send the request to find and read the button report entries.

Byte	Write / Read request	Description	Example (Hex)
1 - 2	Function code	754	F202
3 - 4	Version number	-	0000
5 - 6	Button report ID	1 to 60000 0: the latest button report	0100
7 - 12	Reserved	6 bytes	...
13 - 14	Request to send command	-	0100

2. Check whether the reading is successful from the return status and read the content of the button report.

Byte	Return status	Description	Example (Hex)
1 - 2	Function code	754	F202
3 - 4	Return data length	Unit: Word	1600
5 - 6	Button report ID	1 to 60000 0: the latest button report	0100
7 - 14	Reserved	8 bytes	...
15 - 16	Return function code	754	F202
17 - 18	Status	1: OK; 2: NOK	0100
19 - 20	Error code	-	0000
21 - 22	Date / Time	Year	E607
23 - 24		Month	0B00
25 - 26		Day	1E00
27 - 28		Hour	0800
29 - 30		Minute	3500
31 - 32		Second	3300
33 - 34	Button ID	Refer to Section 11.4 Button Report.	581B
35 - 36	Value before change (L)	0 to 4294967295	0000
37 - 38	Value before change (H)		0000
39 - 40	Value after change (L)	0 to 4294967295	0100
41 - 42	Value after change (H)		0000
43 - 44	Permissions account	0: reserved 1: User1 2: User2 3: User3 4: User4 5: User5 6: Admin	0100

If successful, the read status is 1.

If failed, the read status is 2. The error code is as follows:

Code	Error description	Description
1	Button report ID	Exceeds the range of 0 to 60000

# Revision History

Release date	Version	Chapter	Revision contents
March, 2024	V2.0 (Second edition)		Optimize the page layout and the descriptions. Modify the terms: The term “smart servo screwdriver system” is changed to “smart screwdriving system”. The term “servo screwdriver controller” is changed to “smart screwdriving controller”. The term “servo screwdriver” is changed to “transducerized smart screwdriver”. Chapter rearrangement: delete the chapter “Modbus Communications”, and renumber the chapter “Troubleshooting” as CH12. Add the 75 kgf-cm smart screwdriver.
			Preface Add the precaution for Operation: do not hit the tool.
			1.5 Modify the description for Status LED indicator.
			2.6 Add the precaution for Others: suggestion for using the screwdriver with a torque arm.
			2.7 Modify the description for maintenance cycle and measures.
			3 Delete the RS232 section.
			3.2.1 Add the note for the I/O connector pin assignment of the single-tool controller.
			5.3.1 Add the function descriptions for Advanced Setting.
			5.3.2.1 5.3.2.4 Add the Clamp Torque Control and Clamp Angle Control. Add the Two-stage mode.
			8 Add the chapters 8.3 HDMI output, 8.4 VNC remote connection.

<b>Release date</b>	<b>Version</b>	<b>Chapter</b>	<b>Revision contents</b>
March, 2024	V2.0 (Second edition)	9	Add the functions: Export / Import Two-stage Mode under Self-defined Torque Control Display the Limits of All Stages for Curves Display Operation Warning Window Export Result File for Each Screw Send Result TCP for Each Screw Sampling Rate for Curves Always Monitor the Tool Current Compensation for Tool Temperature Rise Controller Temperature
	9.3		Modify the description for Peripheral Device.
	10.2		Modify the description for Lever Start Level and Push Start Level.
	11.4		Add the chapter: Button Report
		12	Change the alarm display of tightening errors from NG1xxx to NG3xxx and operation warnings from WN1xxx to WN5xxx for Tool 1. Add the alarms for Tool 2. Add the device alarms for Tool 1: AL1016, AL1037 - AL1039, AL1083, AL1088, AL1090 - AL1095, AL1887, AL1888, AL1890 - AL1895. Add the tightening errors for Tool 1: NG3011, NG3426 - NG3429, NG3A26 - NG3A29, NG3B26 - NG3B29, NG3C26 - NG3C29, NG3D26 - NG3D29, NG3E26 - NG3E29, NG3F26 - NG3F29. Add the operation warnings for Tool 1: WN5006, WN5007, WN5058. Modify the descriptions: NG3013 & NG4013, NG3035 & NG4035, NG3881 & NG4881.

Release date	Version	Chapter	Revision contents
March, 2024	V2.0 (Second edition)	A	Add the function codes: #110, #201 - #203, #210, #251 - #253, #302, #303, #310, #409 - #412, #453, #511 - #529, #557 - #573, #657 - #659, #702, #754. Modify the function descriptions: #100, #200, #401, #451, #507, #607, #656, #750, #751, #752, #753.
		B	Add the chapter: TCP/IP Communication - Function Codes
April, 2022	V1.0 (First edition)		

(This page is intentionally left blank.)



Smarter. Greener. Together.

## Industrial Automation Headquarters

### Delta Electronics, Inc.

Taoyuan Technology Center  
No.18, Xinglong Rd., Taoyuan District,  
Taoyuan City 330477, Taiwan  
TEL: +886-3-362-6301 / FAX: +886-3-371-6301

## Asia

### Delta Electronics (Shanghai) Co., Ltd.

No.182 Minyu Rd., Pudong Shanghai, P.R.C.  
Post code : 201209  
TEL: +86-21-6872-3988 / FAX: +86-21-6872-3996  
Customer Service: 400-820-9595

### Delta Electronics (Japan), Inc.

Industrial Automation Sales Department  
2-1-14 Shibadaimon, Minato-ku  
Tokyo, Japan 105-0012  
TEL: +81-3-5733-1155 / FAX: +81-3-5733-1255

### Delta Electronics (Korea), Inc.

1511, 219, Gasan Digital 1-Ro., Geumcheon-gu,  
Seoul, 08501 South Korea  
TEL: +82-2-515-5305 / FAX: +82-2-515-5302

### Delta Energy Systems (Singapore) Pte Ltd.

4 Kaki Bukit Avenue 1, #05-04, Singapore 417939  
TEL: +65-6747-5155 / FAX: +65-6744-9228

### Delta Electronics (India) Pvt. Ltd.

Plot No.43, Sector 35, HSIIDC Gurgaon,  
PIN 122001, Haryana, India  
TEL: +91-124-4874900 / FAX: +91-124-4874945

### Delta Electronics (Thailand) PCL.

909 Soi 9, Moo 4, Bangpoo Industrial Estate (E.P.Z),  
Pattana 1 Rd., T.Phraksa, A.Muang,  
Samutprakarn 10280, Thailand  
TEL: +66-2709-2800 / FAX: +66-2709-2827

### Delta Electronics (Australia) Pty Ltd.

Unit 2, Building A, 18-24 Ricketts Road,  
Mount Waverley, Victoria 3149 Australia  
Mail: IA.au@deltaww.com  
TEL: +61-1300-335-823 / +61-3-9543-3720

## Americas

### Delta Electronics (Americas) Ltd.

5101 Davis Drive, Research Triangle Park, NC 27709, U.S.A.  
TEL: +1-919-767-3813 / FAX: +1-919-767-3969

### Delta Electronics Brazil Ltd.

Estrada Velha Rio-São Paulo, 5300 Eugênio de  
Melo - São José dos Campos CEP: 12247-004 - SP - Brazil  
TEL: +55-12-3932-2300 / FAX: +55-12-3932-237

### Delta Electronics International Mexico S.A. de C.V.

Gustavo Baz No. 309 Edificio E PB 103  
Colonia La Loma, CP 54060  
Tlalnepantla, Estado de México  
TEL: +52-55-3603-9200

## EMEA

### Delta Electronics (Netherlands) B.V.

Sales: Sales.IA.EMEA@deltaww.com  
Marketing: Marketing.IA.EMEA@deltaww.com  
Technical Support: iatechnicalsupport@deltaww.com  
Customer Support: Customer-Support@deltaww.com  
Service: Service.IA.emea@deltaww.com  
TEL: +31(0)40 800 3900

### Delta Electronics (Netherlands) B.V.

Automotive Campus 260, 5708 JZ Helmond, The Netherlands  
Mail: Sales.IA.Benelux@deltaww.com  
TEL: +31(0)40 800 3900

### Delta Electronics (Netherlands) B.V.

Coesterweg 45, D-59494 Soest, Germany  
Mail: Sales.IA.DACH@deltaww.com  
TEL: +49 2921 987 238

### Delta Electronics (France) S.A.

ZI du bois Challand 2, 15 rue des Pyrénées,  
Lisses, 91090 Evry Cedex, France  
Mail: Sales.IA.FR@deltaww.com  
TEL: +33(0)1 69 77 82 60

### Delta Electronics Solutions (Spain) S.L.U

Ctra. De Villaverde a Vallecas, 265 1º Dcha Ed.  
Hormigueras – P.I. de Vallecas 28031 Madrid  
TEL: +34(0)91 223 74 20  
Carrer Llacuna 166, 08018 Barcelona, Spain  
Mail: Sales.IA.Iberia@deltaww.com

### Delta Electronics (Italy) S.r.l.

Via Meda 2-22060 Novedrate(CO)  
Piazza Grazioli 18 00186 Roma Italy  
Mail: Sales.IA.Italy@deltaww.com  
TEL: +39 039 8900365

### Delta Greentech Elektronik San. Ltd. Sti. (Turkey)

Şerifali Mah. Hendem Cad. Kule Sok. No:16-A  
34775 Ümraniye – İstanbul  
Mail: Sales.IA.Turkey@deltaww.com  
TEL: + 90 216 499 9910

### Eltek Dubai (Eltek MEA DMCC)

OFFICE 2504, 25th Floor, Saba Tower 1,  
Jumeirah Lakes Towers, Dubai, UAE  
Mail: Sales.IA.MEA@deltaww.com  
TEL: +971(0)4 2690148

\*We reserve the right to change the information in this manual without prior notice.