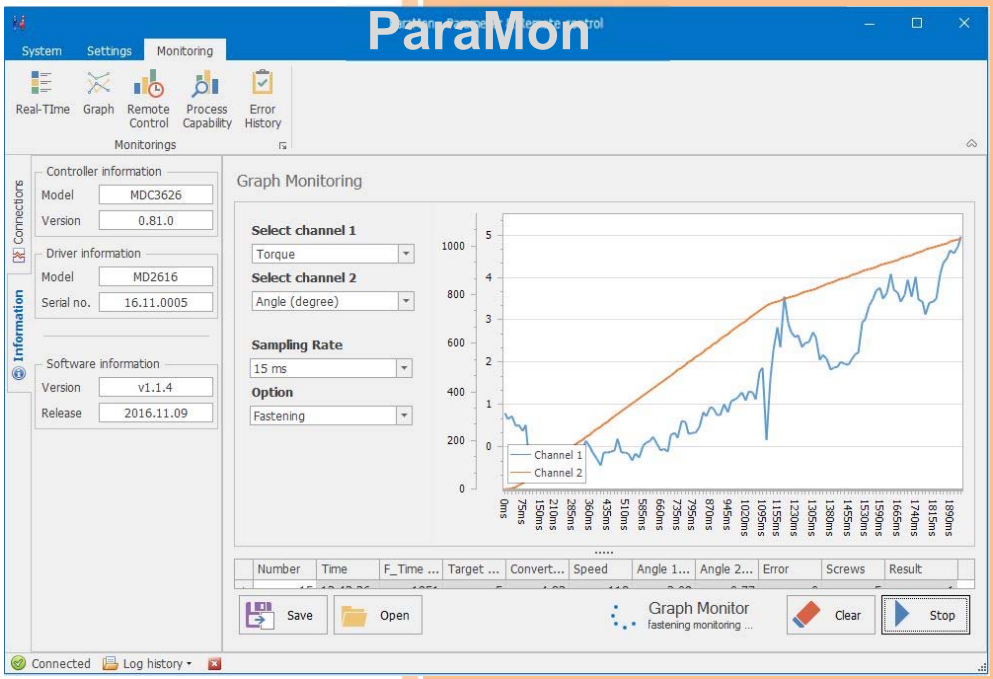
Revision 0

November 14, 2016

Parameter setting and monitoring PC software for MDC & ADC

ParaMon Operation Manual



HANTAS

Human And Tightening Assembly Specialist

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1. Software installation

1.1 Required PC specification

- OS : Windows 7 or later version

- COM port : RS-232C, USB 2.0, Ethrnet

1.2 Software

- Software file : ParaMon v0.00 yyyymmdd.zip

- Install file : setup.exe

The higher version of software will overwrite the lower version of ParaMon software.

2. Operation

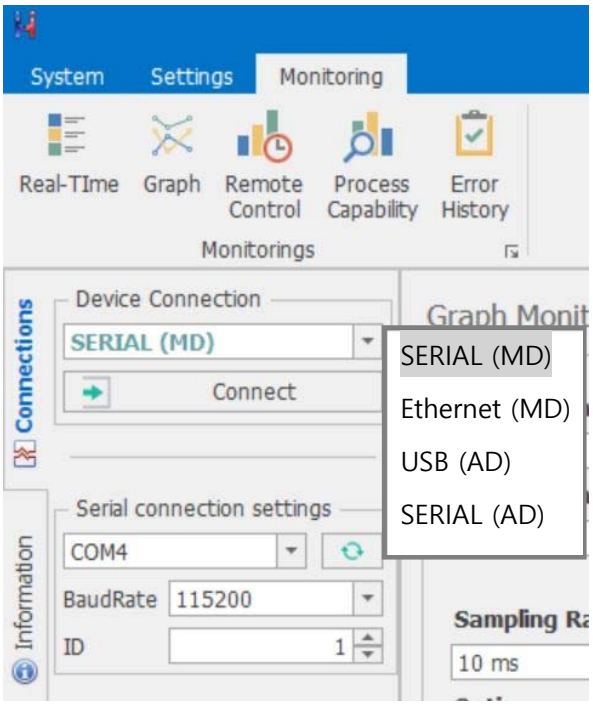
2.1 Connection

ParaMon pc software have 4 selectable connecting options to the MDC or ADC controller.

MDC controller : Serial RS232C or Ethernet

ADC controller : Serial RS422 or USB

Serial COM port connection requires the information about COM port, Baud rate and the device ID



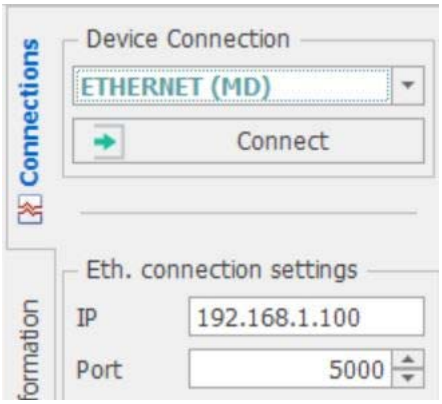
Ethernet connection requires IP and port address.

The followings are the factory setting address for the Ethernet connection

IP : 192.168.1.100

Port : 5000

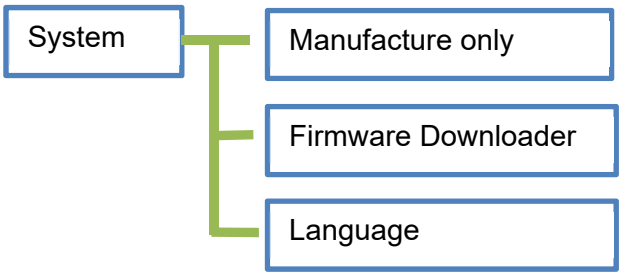
Use the IP address 192.168.1.1 or any other nearby address for your PC, avoiding conflict with other devices.

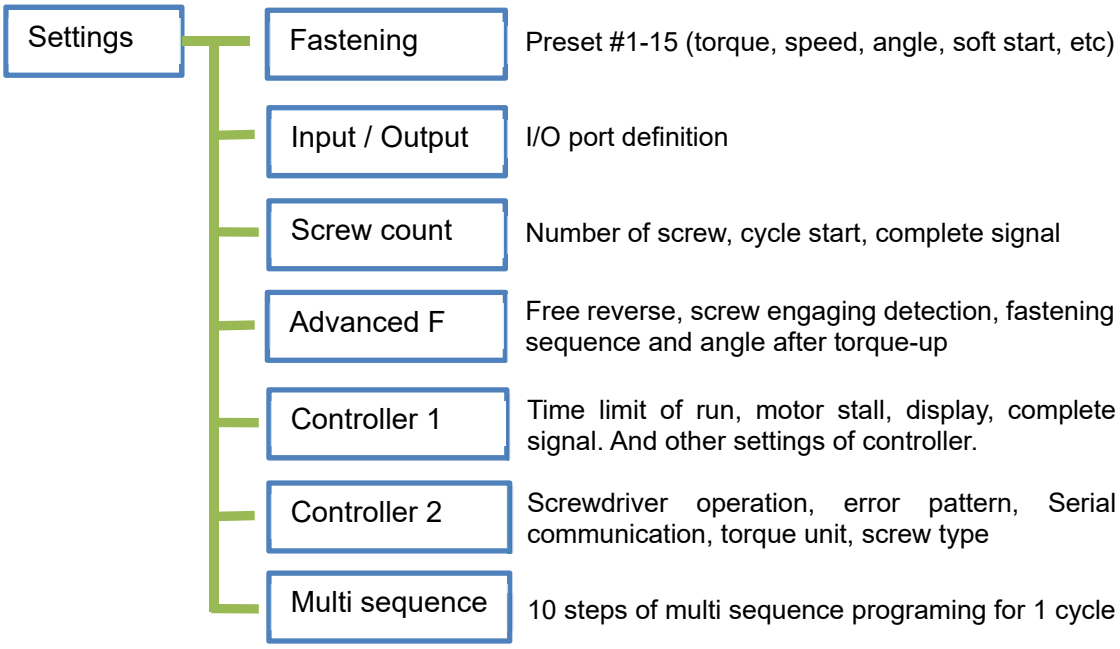


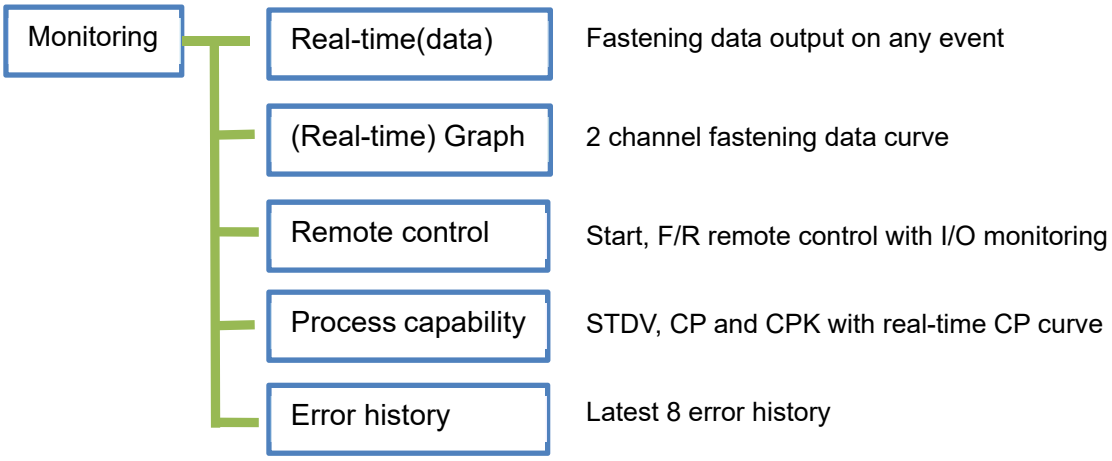
2.2 Menu

There are 3 main menu.

- System
- Settings
- Monitoring





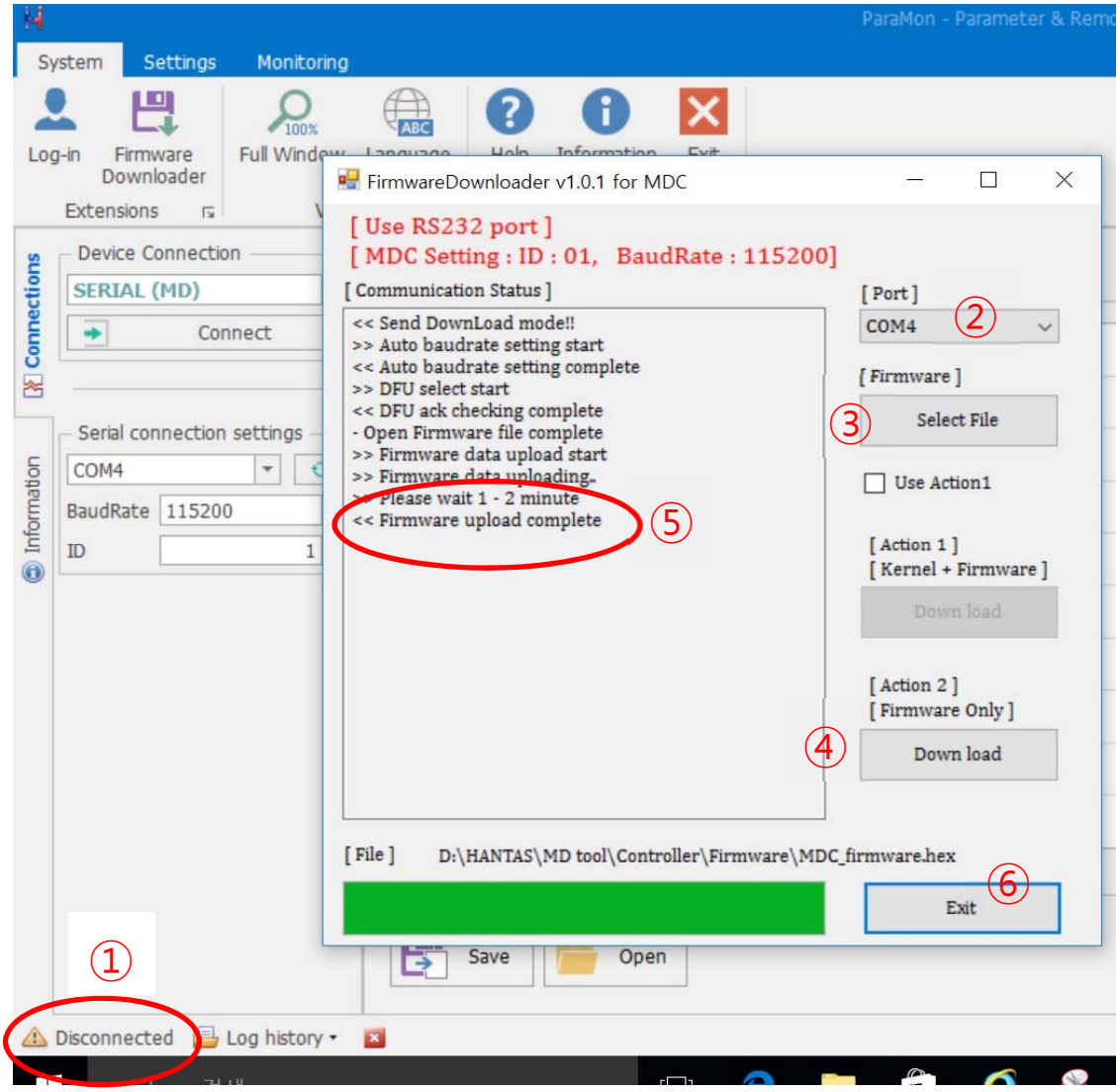


Be sure that the changed parameter on the ParaMon pc software is reflected to the MDC and ADC controller immediately.

2.2.1 System

1) Firmware downloader

Controller firmware is downloaded as below process. **Use RS232C port for MDC and USB port for ADC. Ethernet is not allowed for firmware download.**



1) Disconnect communication connection of PC

2) Click " Firmware Downloader "

3) Select the same COM port, firmware file in the PC

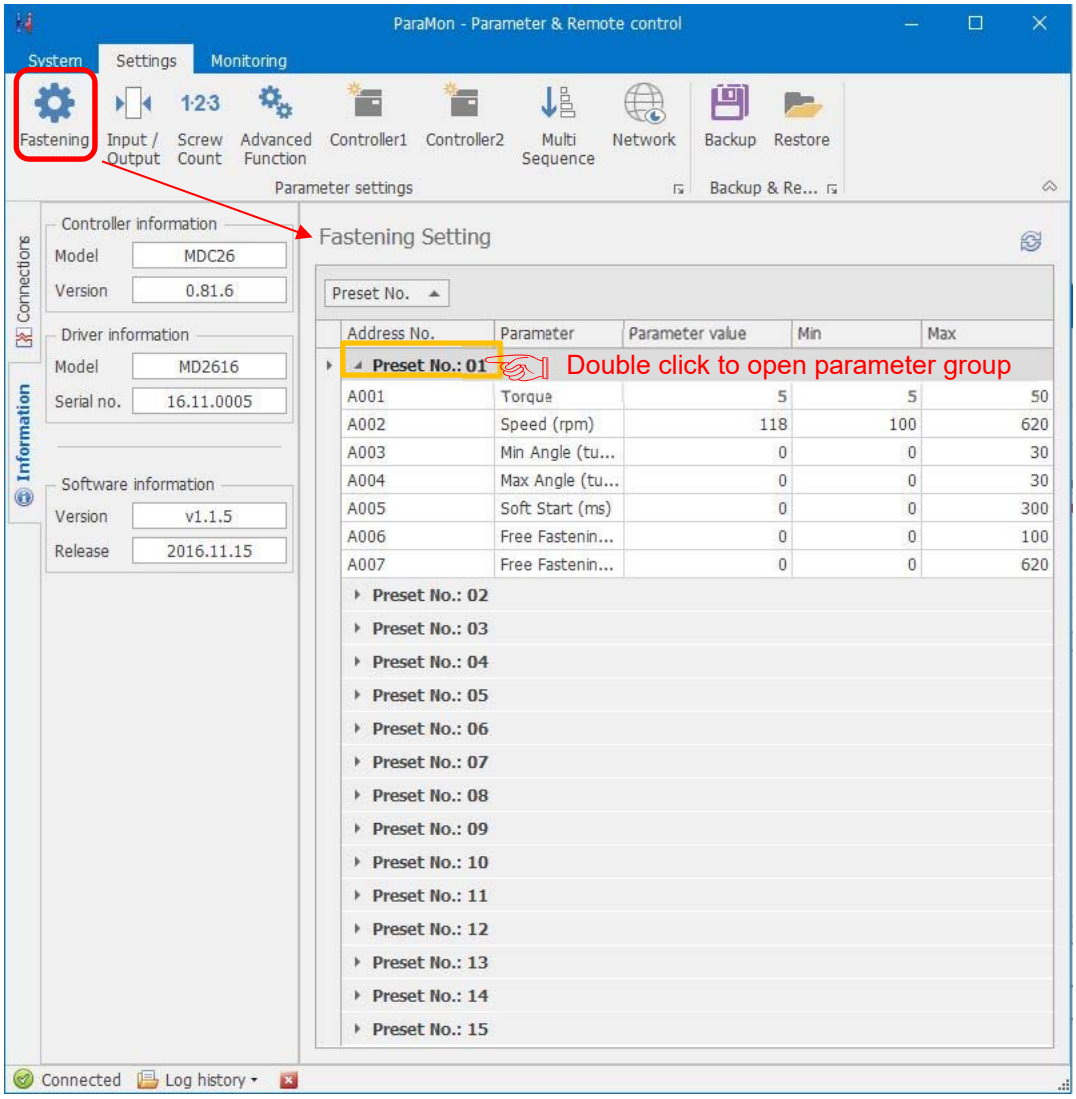
4) Click " Down load " for [Action 2, Firmware only]. If there is no existing firmware in the controller, select [Action 1, Kernel+Firmware] and click " Down load "

5) See the message " Firmware upload complete " in the message window, and click " Exit " to finish the process.

6) Turn the power of the controller OFF, and ON again to initialize the settings

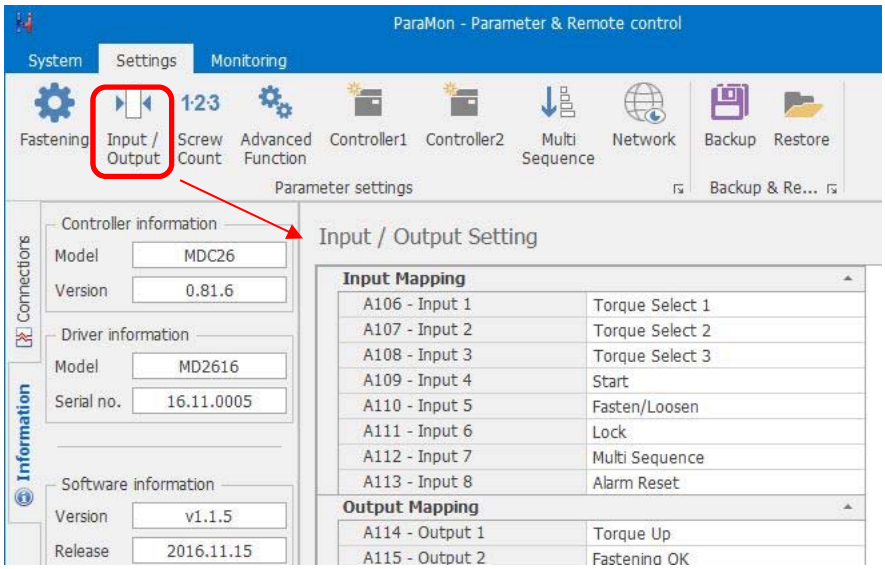
2.2.2 Settings

1) Fastening



There are 15 preset group for fastening setting. Each preset # consists of torque, speed, Min & Max angle for fastening OK range, soft start, Free speed before tightening.

2) Input / Output management



The digital I/O provide the free assignment feature for Input and Output.

Factory setting of I/O assignments are as following.

◆ MDC (25P D-Sub connector)

Pin No	Description	**Factory setting**
1	IN 1	Preset select 1
2	IN 2	Preset select 2
3	IN 3	Preset select 3
4	IN 4	Start
5	IN 5	Forward / Reverse
6	IN 6	Driver Lock
7	IN 7	Multi sequence
8	IN 8	Reset
9	X	
10	OUT 1	Torque UP
11	OUT 2	Fastening OK
12	OUT 3	Ready
13	OUT 4	Motor RUN
14	OUT 5	Alarm
15	OUT 6	Status F/L
16	OUT 7	Count complete
17	OUT 8	
18	X	
19	X	
20	X	
21	Out COM	
22	In COM	
23	X	
24	X	
25	X	

◆ ADC 50P I/O details

50P I/O pin no.	Description	Factory setting
21	*IN COM*	
12	IN 1	Preset select 1
13	IN 2	Preset select 2
14	IN 3	Preset select 3
15	IN 4	Start
16	IN 5	Forward / Reverse
17	IN 6	Driver Lock
18	IN 7	Multi sequence
19	IN 8	Reset
22	IN 9	No use (reserved)
23	IN 10	No use (reserved)
24	IN 11	No use (reserved)
25	IN 12	No use (reserved)
26	IN 13	No use (reserved)
27	IN 14	No use (reserved)
28	IN 15	No use (reserved)
29	IN 16	No use (reserved)
35	OUT 1	Torque UP
36	*OUT COM*	
37	OUT 2	Fastening OK
38	*OUT COM*	
39	OUT 3	Ready
40	*OUT COM*	
41	OUT 4	Motor RUN
42	*OUT COM*	
43	OUT 5	Alarm
44	*OUT COM*	
45	OUT 6	Status F/L
46	*OUT COM*	
47	OUT 7	Count complete
48	*OUT COM*	
49	OUT 8	
50	*OUT COM*	

Connector model : 3M MDR10250-52A2PL

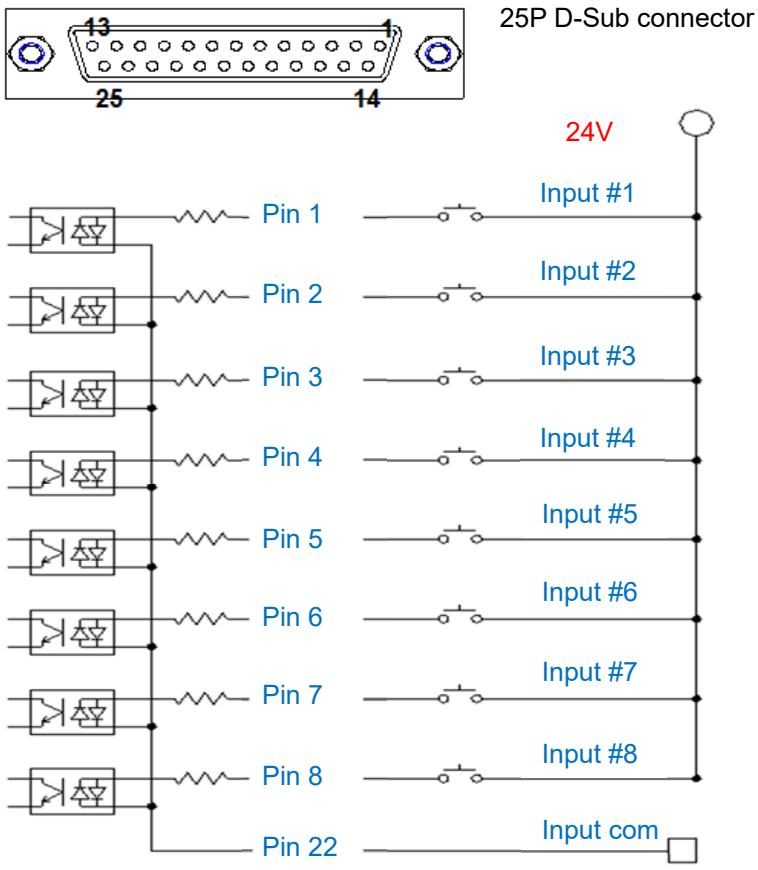
◆ Binary coding with 5 inputs to select preset #

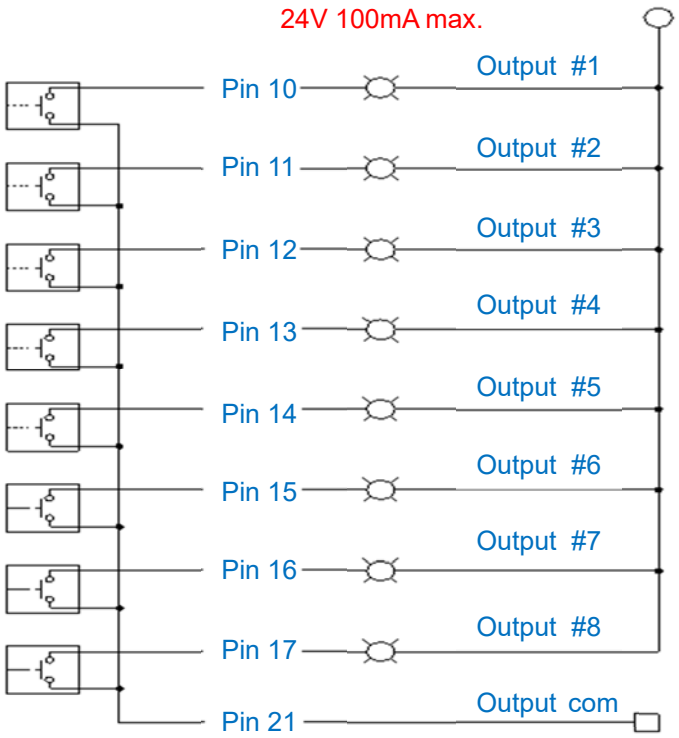
Preset #	Input				
	Torque select 4	Torque select 3	Torque select 2	Torque select 1	Multi sequence
1	0	0	0	1	
2	0	0	1	0	
3	0	0	1	1	
4	0	1	0	0	
5	0	1	0	1	
6	0	1	1	0	
7	0	1	1	1	
8	1	0	0	0	
9	1	0	0	1	
10	1	0	1	0	
11	1	0	1	1	
12	1	1	0	0	
13	1	1	0	1	
14	1	1	1	0	
15	1	1	1	1	
Multi A	0	0	0	1	1
Multi B	0	0	1	0	1

◆ Binary coding with 3 outputs for error codes in 7 groups

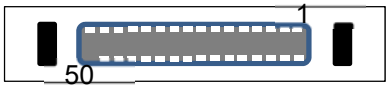
Error code	Alarm 3	Alarm 2	Alarm 1
110,111,112,113,114,115,116,118,200,201,220	0	0	1
300,301,302,303,304,309	0	1	0
310,311	0	1	1
330,331	1	0	0
332	1	0	1
333,334,335,336	1	1	0
400,401,500	1	1	1

◆ MDC 25P I/O schematic

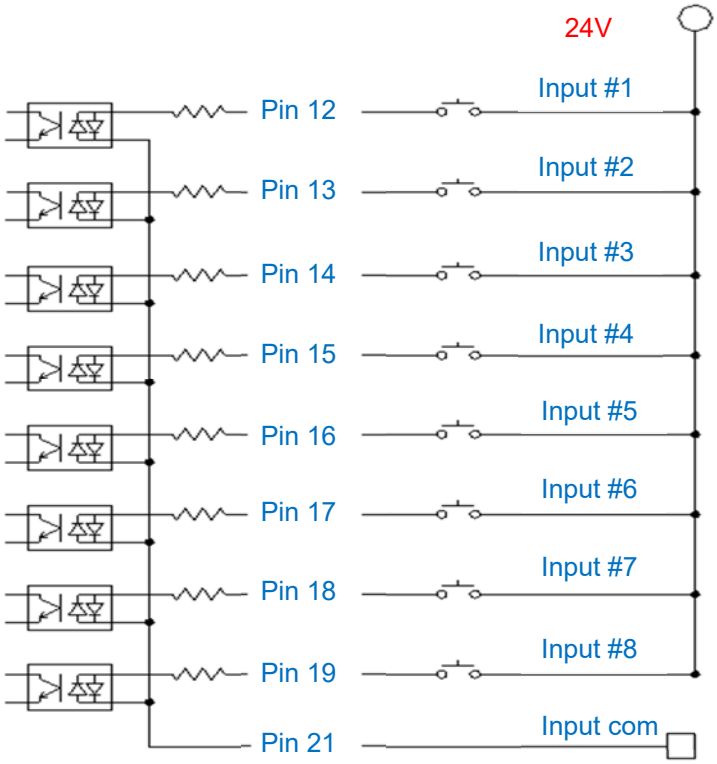


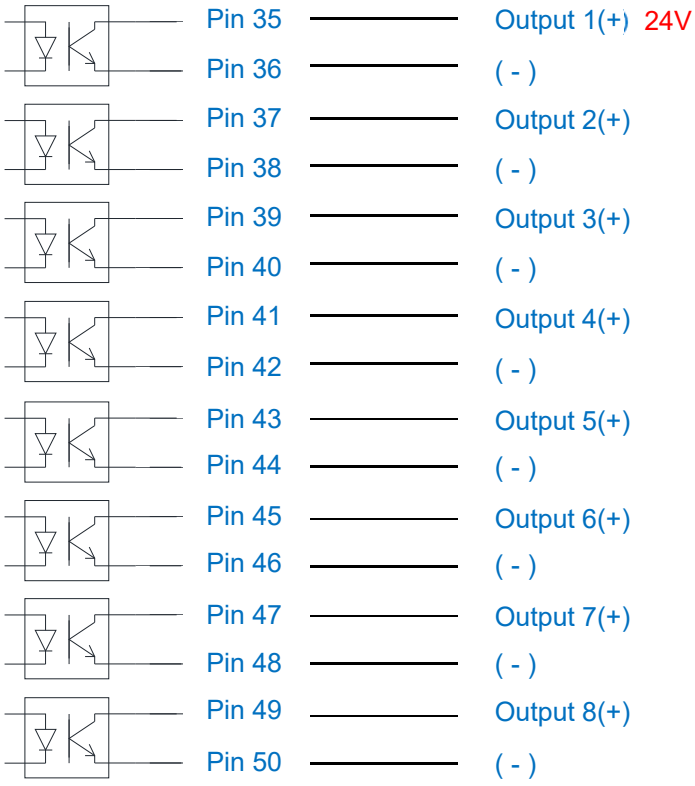


◆ ADC 50P I/O schematic

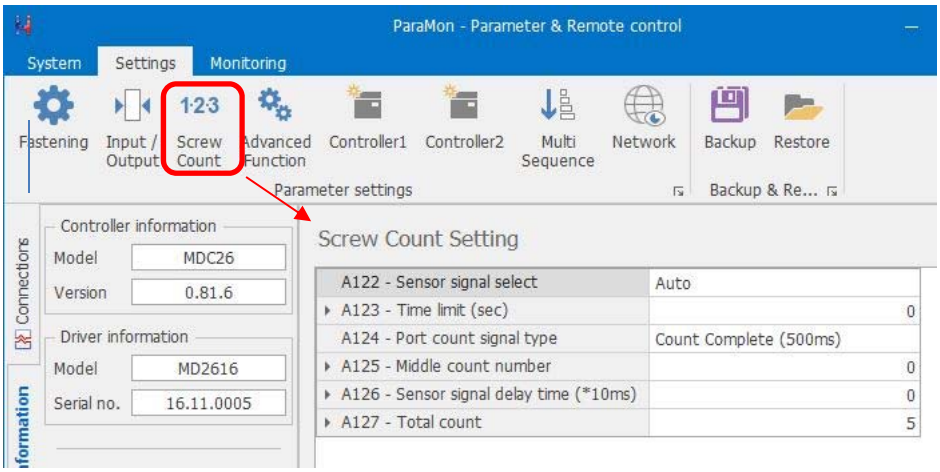


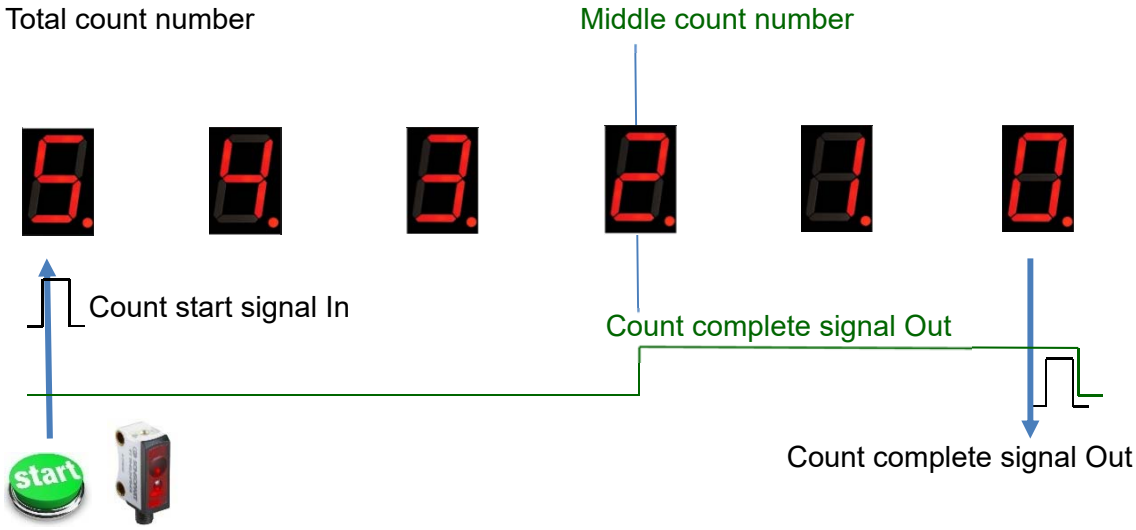
3M Mini D Ribbon connector
MDR 10250-52A2PL





3) Screw count





◆ Count start signal (IN)

1) No signal, auto start (Auto) - auto reset to total number after “0”

2) Sensor or switch with one trigger pulse - Count starts with only trigger pulse. Counting is valid until complete or reset. Reset calls count NG

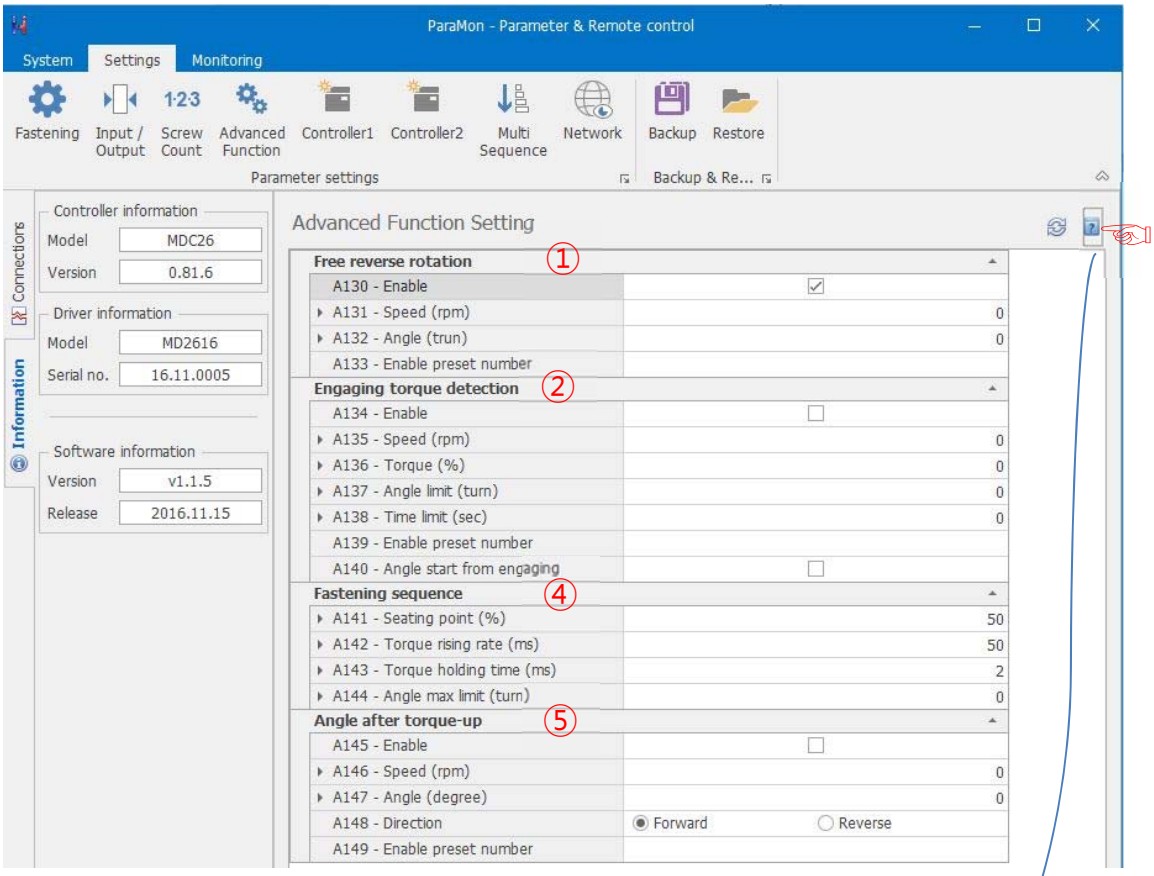
3) One trigger pulse with timer for counting - Counting should be completed within the time of timer from the trigger pulse, otherwise count NG

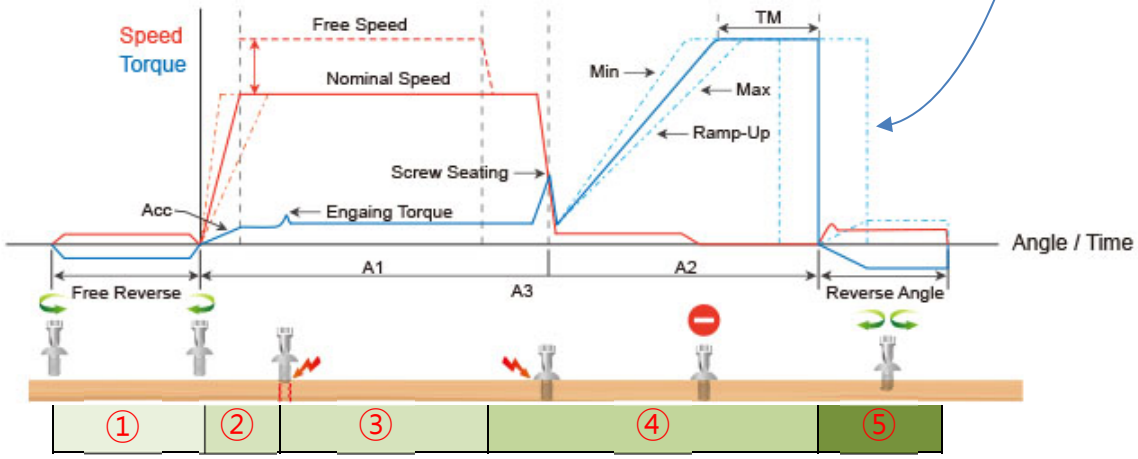
4) One trigger pulse to start counting, another trigger pulse to stop counting and evaluate OK or NG. Any remaining number calls count NG

◆ Count complete signal (OUT)

If mid count number is used, count complete signal out is provided on mid count nnumber and reset on the cycle completed.

4) Advanced functions





There are 4 steps of Advanced Function to customize the screw fastening process.

Step 1 (Option) : Free Reverse rotation to guide the screw into the screw hole smoothly with low speed

Step 2 (Option) : Engaging torque detection – The monitoring angle count is reset and start again from the engaging torque detection point which the screw start joining the thread. It is possible only when the screw engaging provide significantly higher torque than previous free run. Engaging torque setting is by percentage of target torque.

Step 3 (Option) : Free Speed – The system auto speed by torque setting can be manually replaced to have higher or lower speed than it's original auto speed during the limited angle setting. Be sure that the free speed run should stop before the screw seating point which screw start to tightening joint. To use this option, go the Fastening setting menu.

Step 4 (Basic) : Fastening sequence – have the important parameter factors to the tightening quality.

1) Seating point (A141) : It is trash hold point at that the target speed is shifting to torque up process. The factory setting is guided from hard joint. If the it is soft joint, the setting can be higher percentage of the target torque.

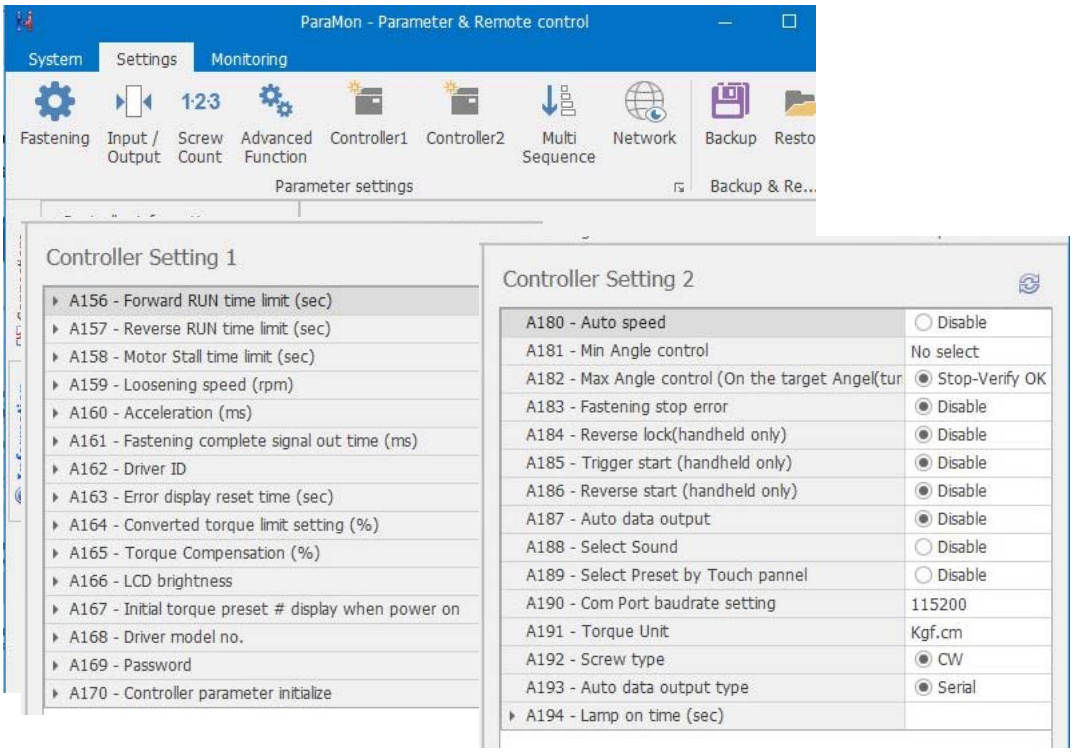
2) Torque rising rate(A142) : It is the speed and time during ramp-up to the target torque. Quick or slow speed to the target torque according to the condition.

3) Torque holding time(A143) : Tool holds the target torque for the time setting. It stabilizes the tightening condition.

4) Angle limit(A144) : If the tool rotate more than angle limit(A144) during the torque holding time(A143), it stop and verify NG

Step 5 (Option) : Angle after torque-up(A145) : It manage extra angle control in both forward or reverse direction after tightening by torque.

5) Controller 1 & 2



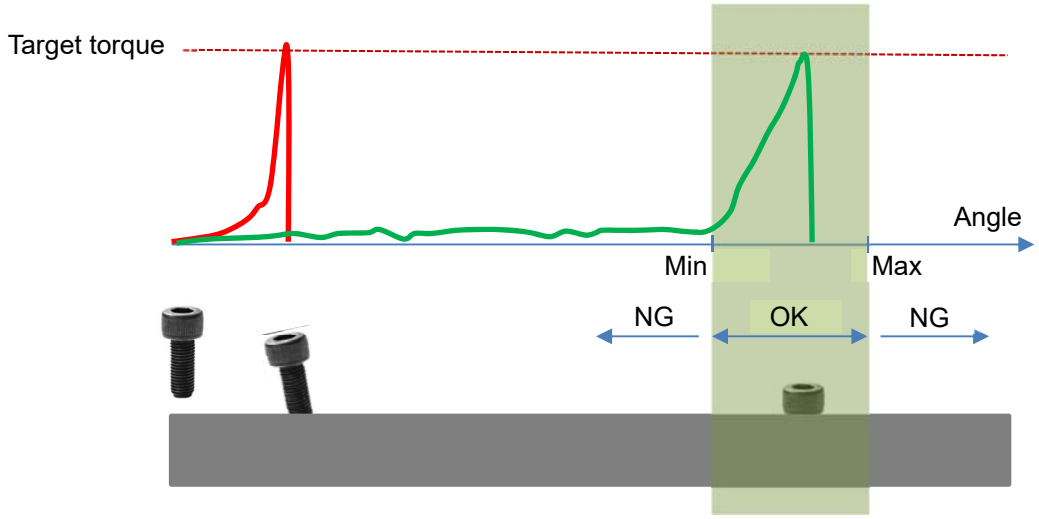
Forward / Reverse motor RUN time, and motor stall time is limited for motor safety. The following parameters is ideally recommended to be kept with factory setting in all application.

- Forward RUN time limit (A156) : Run limit to forward rotation
- Reverse RUN time limit (A157) : Run limit to reverse rotation
- Motor Stall time limit (A158)
- Acceleration (A160) : Slow start of motor to the target speed
- Auto speed (A180) : ENABLE provide the safe speed on the torque setting
- Driver model no.(A168) : not changeable. Auto recognized

Other parameters are selectable and changeable for application requirements.

- Password (A169) : Factory setting is “ 0 “. Be careful not to lose the PW.
- Controller parameter initialize (A170) : Key in “ 77 “ to flash the parameters back to the factory settings.
- Torque unit (A191) : Kgf.cm / Kgf.m / cNm / Nm / ozf.in / lbf.in / lbf.ft
  Whenever the unit is changed, the controller should be reboot again

- Fastening OK/NG verification by angle setting



Go the Fastening setting to set the MIN & Max angle for each Preset #.

Verification of Fastening OK & NG can be adjustable by the below settings.

Min Angle control (A182) : options to creat NG verification

No select	No verification
No torque up After Min angle	If the tool stop without torque up only after the Min angle, it creates fastening NG (error code 330)
Torque up before Min angle	If the tool stop with torque up only before the Min angle, it creates fastening NG (error code 331)
Both select	NG is created by the any of above two conditions

Max Angle control (A182) : options to creat NG verification

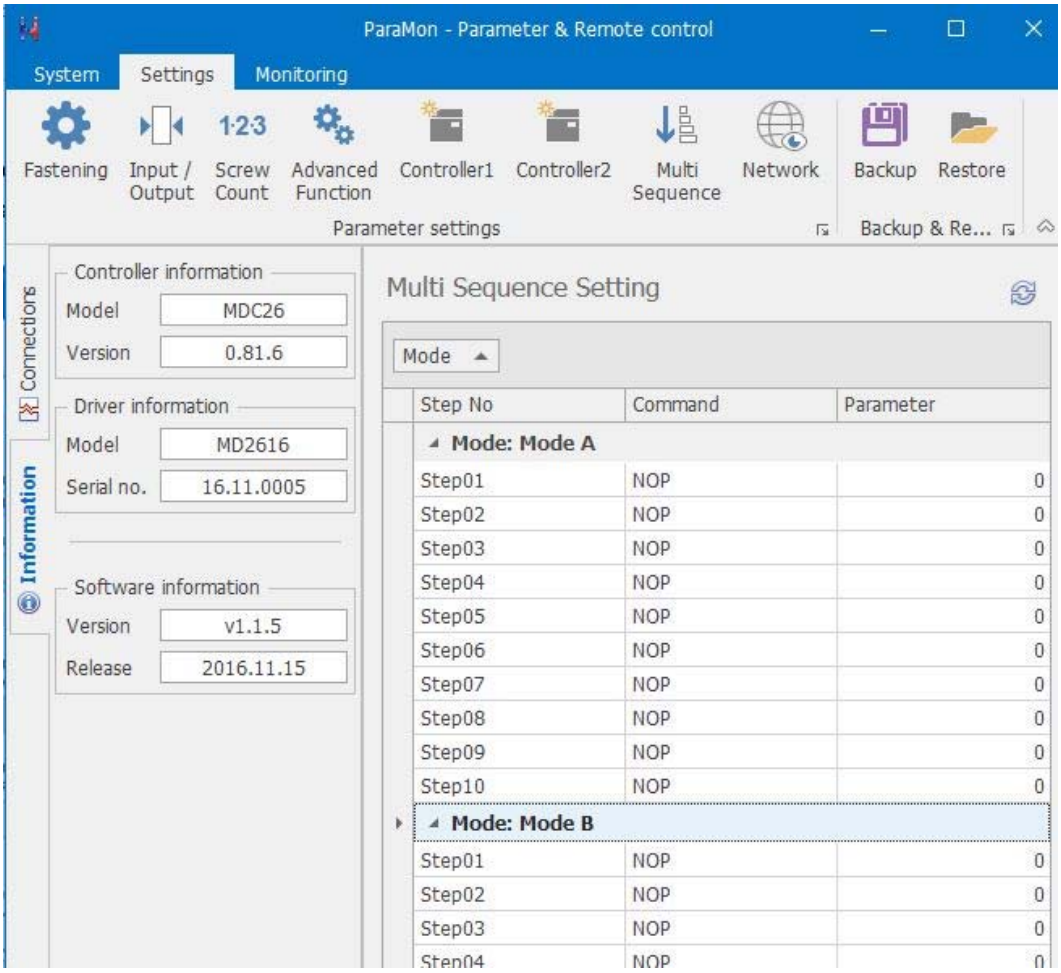
Stop and verify OK	If the tool reach to the Max angle setting, it stop and verify OK. Fastening OK output
Stop and verify NG	If the tool reach to the Max angle setting, it stop and verify NG. Fastening NG output (error code 332)

Fastening stop error (A183) : DISABLE does not creat any NG when the tool stop without torque up fully tightening.

Auto Data output (A187) : To use ParaMon PC software, DISABLE should be selected. If ENABLE selected, every fastening data come out on the events without Query communication

Lamp on time (A194) : LED lamp off timer from operation stop for sleep.

6) Multi sequence



Multi sequence provide a cycle of fastening by a start signal.

Total 10 steps of programing is allowed in MA and MB presets

To program, select the command and required parameter on each step.

To finish the multi sequence programing, last step command should be “END”

Command details are as below ;

NOP : No operation

Fastening : tool start fastening process in forward rotation

Loosening : tool start loosening process in reverse rotation

Select preset# : change preset # to preset# selected

Delay : time delay to the time setting

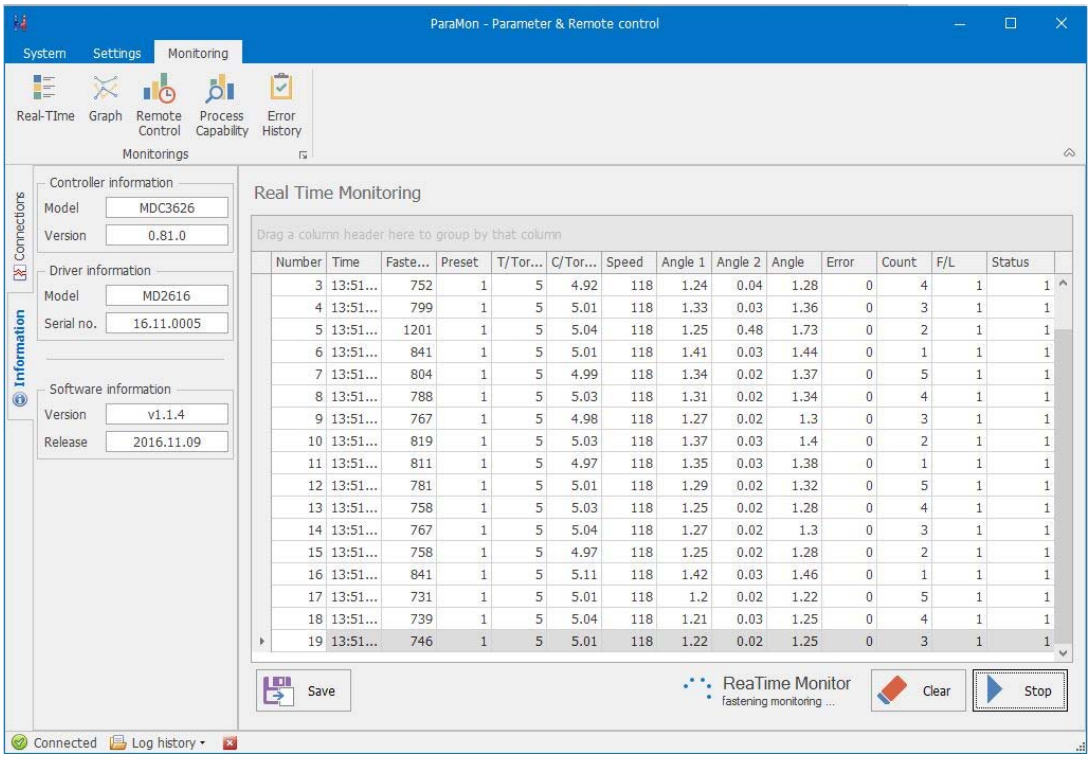
Jump : jump to the step selected

End : Finish step.

2.2.3 Monitoring

Setting of Auto Data Out (A187) should be " Disable " for Monitoring

1) Real-time monitoring

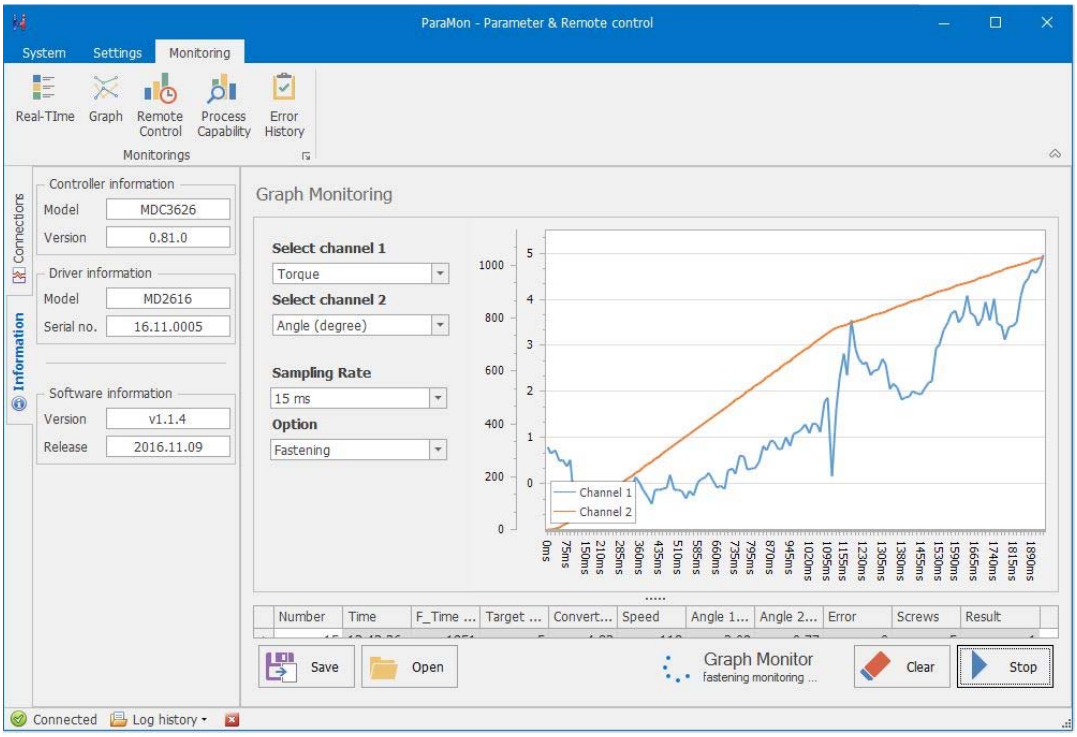


The monitoring data can be saved in CSV file.

2) Graph monitoring

Total 200 real-time data are displayed with curve together in two channel.

- Torque, Speed, Angle(degree), Angle(turn) and current
- Data sampling rate : 5ms, 10ms, 15ms, 20ms
- Data display option : Fastening, Loosening, All



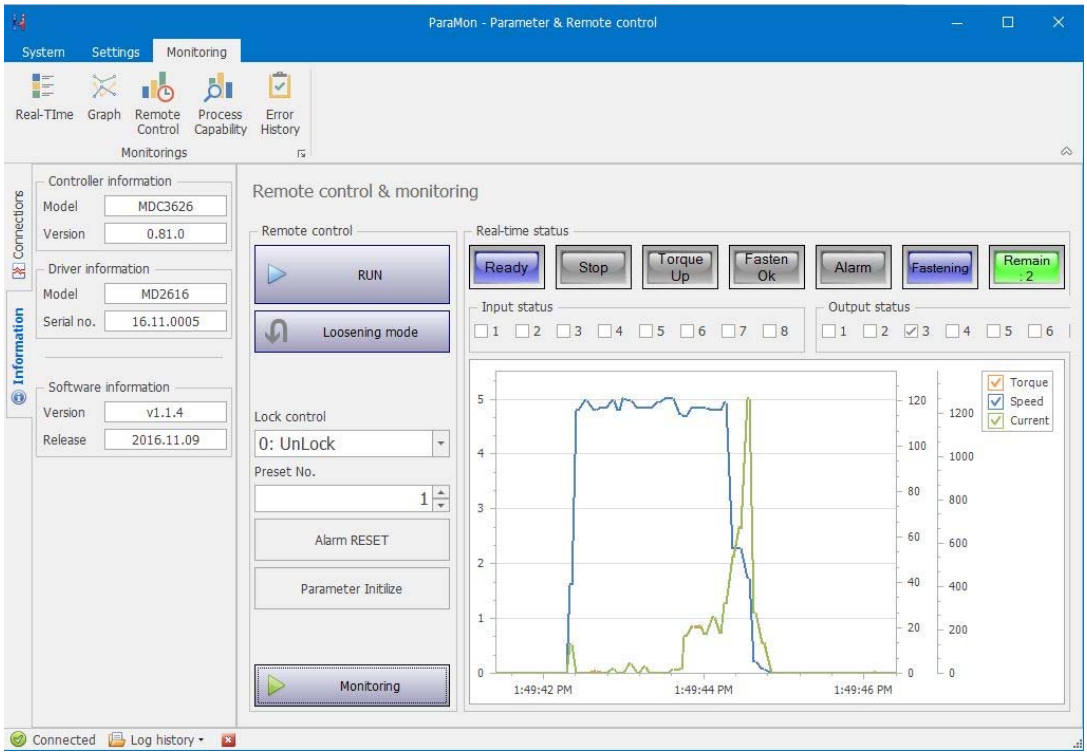
3) Remote control & I/O status monitoring

The tool is operated remotely for the followings.

- Fastening / loosening rotation,
- Tool Start
- Tool lock & unlock

The following main signal status and I/O are monitored and displayed together with torque, speed and current curves.

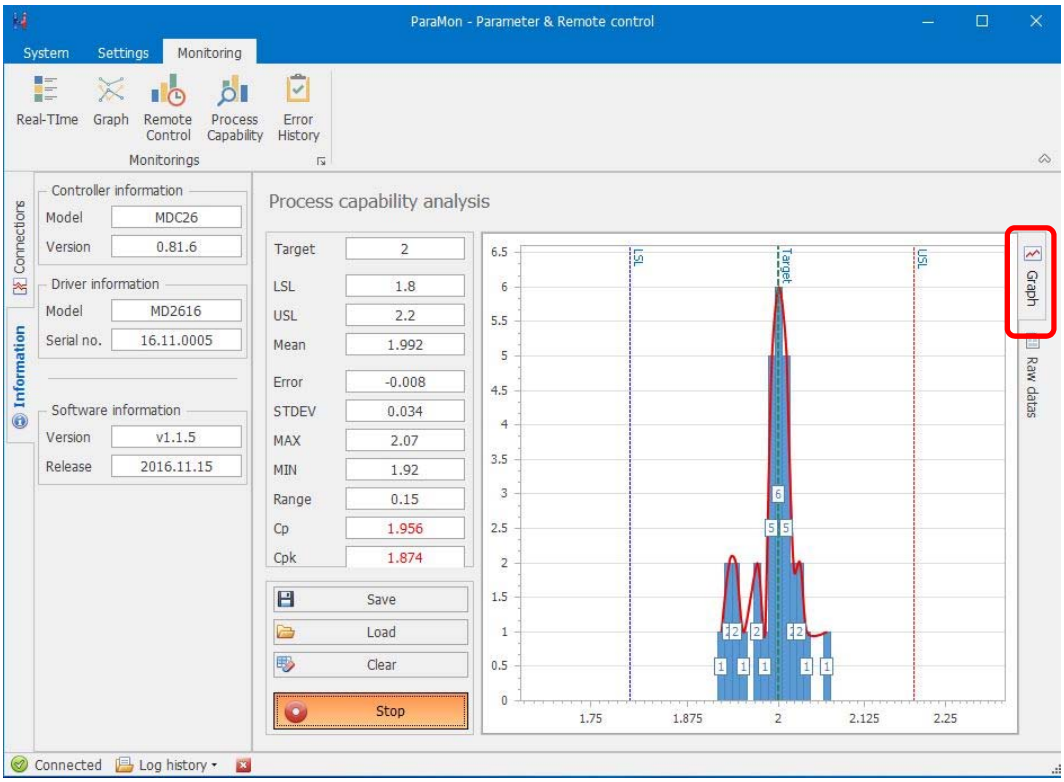
- Ready, Tool start/stop, Torque up, Fastening OK, Alarm, F/R, I/O

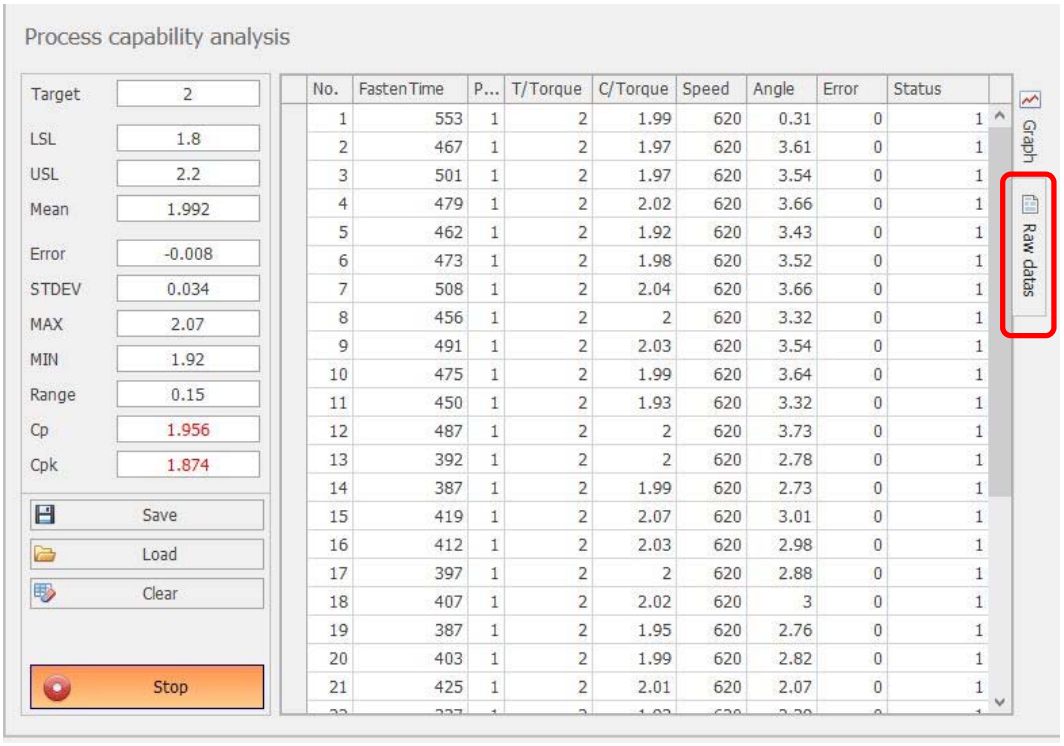


4) Process capability display

From real-time monitoring fastening torque data, the following statistical data are calculated and displayed. The data is updated automatically for every fastening until monitoring cancelled.

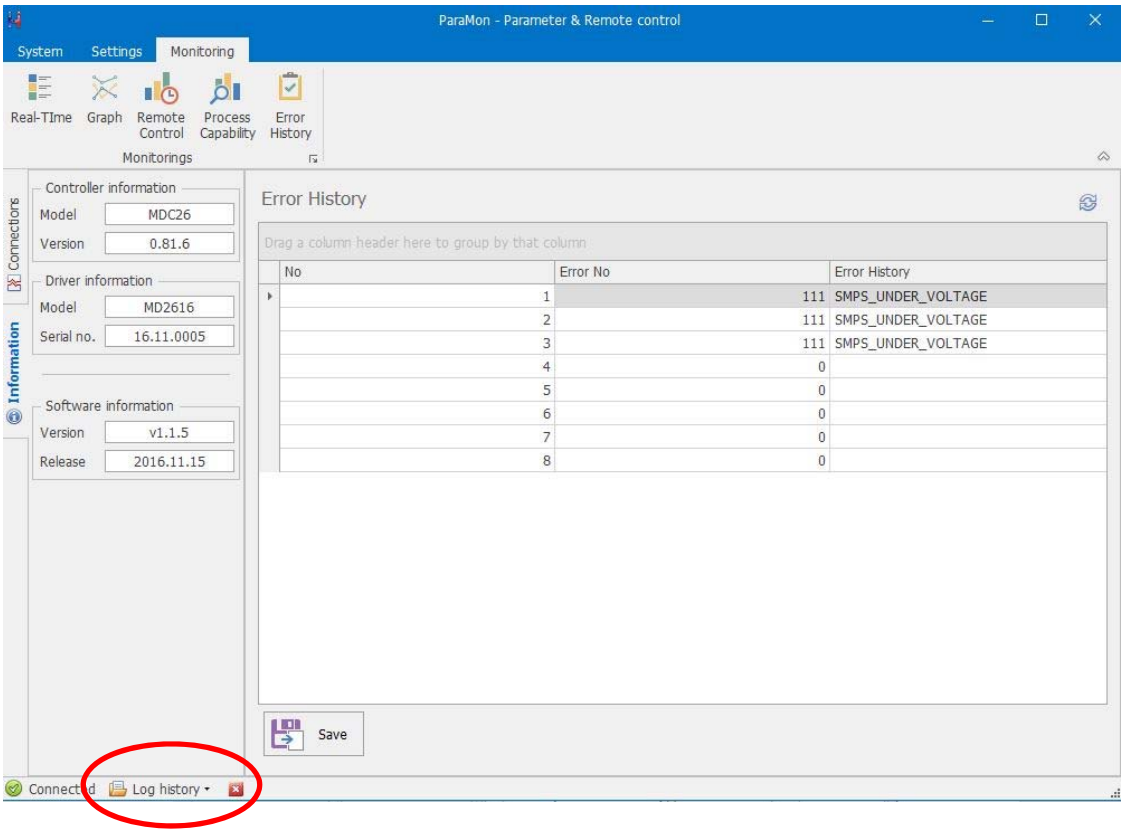
- Average, Standard deviation, CP, CPK

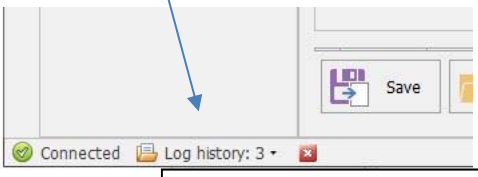




5) Error history display

The latest 8 tool error histories which are saved in the controller





ATTENTION : communication is disconnected

ATTENTION : communication is disconnected

ATTENTION : communication is disconnected

Log history is information about the communication of PC to the tool.

3. Error code

3.1 System error

code	Error	Description	How to reset
110	AD offset error	When the power of controller is ON, the current offset is out of range. Reset and retry booting. If failed, repair is required	RESET button
111	SMPS Fault by overload	Overload protection over 8A on SMPS power supply circuit.	Power Off →On after 1 min.
112	Over speed	Over rotation speed than the set value. Check the cable connection.	Auto reset after 1 sec.
113	Communication error	Communication error during connected	Power Off →On
114	Screwdriver recognition error	Controller can not recognize the connected screwdriver	Power Off →On
115	Controller recognition error	Program itself can not recognize the controller information.	Power Off →On
116	Com error related with I/O data	System failed to read the data from I/O port by communication issue	Power Off →On
118	No motor rotation error	When motor rotation is not monitored	RESET button
200	Parameter reading failure	It failed to read parameter at all. Check the EEP-ROM damage or communication failure	Power Off →On
201	Parameter Checksum error	The read parameter is wrong by the checksum routine	Power Off →On
220	Multi-sequence program error	Multi-sequence program is wrong	RESET button

3.2 Fastening error by the pattern setting

code	Error	Description	How to reset
300	Fastening time limit	Over the fastening time limit on P60	Auto reset after set time
301	Loosening time limit	Over the loosening time limit on P61	Auto reset after set time
302	Angle limit during ramp-up	Angle is over the setting limit on P73 during ramp-up	
303	Angle limit during torque holding(Tm)	Angle is over the setting on P72 during torque holding	
304	Motor stall by loosening failure	Motor stall by loosening failure within time limit on P62	Auto reset after set time
309	Bit socket tray	Bit socket tray application error	
310	Time over in screw counting	Over the time limit of screw counting on P81	Auto reset after set time
311	Screw missing	When the work-piece moves out of the working area without complete number of fastening, it provide alarm for set time(P74) and display the latest number. It can be clear to "0" by pressing RESET button.	Auto reset after set time or RESET button
330	No torque-up	When the driver stops without torque-up after set time in P21~28	Auto reset after set time
331	Angle laps	Torque up too earlier than the time on P21~28	Auto reset after set time
332	Angle over	There is no torque up over the set max. angle on P31~38	Auto reset after set time
333	No torque complete	Operation stops before complete cycle of torque up by releasing lever trigger	Auto reset after set time

334	Engaging torque detection fail	The engaging torque is not detected in time or angle limit	
335	Converted torque error	Converted torque is out of OK range	
336	Loosening fail	Loosening failed by over torque capacity of tool	
400	Ethernet port fail	Ethernet device IC initializing fail	
401	Ethernet socket error	Ethernet communication error related with socket	
500	Over temperature	Overtemperature over 80°C	Auto reset under 80°C