SIEMENS

SINAMICS
V20
Getting Started
Compact Operating Instructions

Table of contents

1   Safety instructions

Before installing and putting this equipment into operation, read the following safety instructions and all the warning labels attached to the equipment carefully. Make sure that the warning labels are kept in a legible condition and replace missing or damaged labels. For more information, refer to the SINAMICS V20 Operating Instructions.

General

> ⚠ **DANGER**
>
> **Death from electric shock**
>
> Hazardous voltage remains present in the internal DC link capacitors when the power is removed.
>
> Touching terminals could lead to death from electric shock.
>
> **Do not touch any terminals within five minutes after the power supply for the inverter has been switched off.**
>
> **Protective earthing conductor current**
>
> The earth leakage current of the SINAMICS V20 inverter may exceed 3.5 mA AC. Therefore, a fixed earth connection is required and the minimum size of the protective earth conductor shall comply with the local safety regulations for high leakage current equipment.
>
> The SINAMICS V20 inverter has been designed to be protected by fuses; however, as the inverter can cause a DC current in the protective earthing conductor, if a Residual Current Device (RCD) or Residual Current Monitoring Device (RCM) is to be used upstream in the supply, the device must be of type B.

> ⚠ **WARNING**
>
> **Safe use of inverters**
>
> This equipment contains dangerous voltages and controls potentially dangerous rotating mechanical parts. Loss of life, severe personal injury, or property damage could result if the instructions contained in this manual are not followed.
>
> Only suitably qualified personnel should work on this equipment, and only after becoming familiar with all safety instructions, installation, commissioning, operation, and maintenance procedures contained in this manual.
>
> Any unauthorized modifications of the equipment are not allowed.
>
> Protection in case of direct contact by means of voltages < 60 V (PELV = Protective Extra Low Voltage according to EN 61800-5-1) is only permissible in areas with equipotential bonding and in dry indoor rooms. If these conditions are not fulfilled, other protective measures against electric shock must be applied, for example, protective insulation.
>
> The inverter must always be grounded. If the inverter is not correctly grounded, this can lead to extremely hazardous conditions which, under certain circumstances, can result in death.
>
> The device must be disconnected from the electrical power supply before any connections with the device are established or in any way altered.
>
> Install the inverter on a metal mounting plate in a control cabinet. The mounting plate has to be unpainted and with a good electrical conductivity.
>
> It is strictly prohibited for any mains disconnection to be performed on the motor-side of the system, if the inverter is in operation and the output current is not zero.
>
> Take particular notice of the general and regional installation and safety regulations regarding work on dangerous voltage installations (for example, 61800-5-1) as well as the relevant regulations regarding the correct use of tools and personal protective equipment (PPE).
>
> Only permanently-wired input power connections are allowed. The equipment must be earthed (IEC 536 Class 1, NEC and other applicable standards).
>
> Wherever faults occurring in the control equipment can lead to substantial material damage or even grievous bodily injury (that is, potentially dangerous faults), additional external precautions must be taken to ensure or enforce safe operation, even when a fault occurs (for example, independent limit switches, mechanical interlocks, and so on).

Commissioning

> ⚠ **WARNING**
>
> **High-voltage terminals**
>
> The following terminals can carry dangerous voltages even if the inverter is not operating:
> - The mains input terminals L1, L2, L3, and PE terminal
> - The motor terminals U, V, W, and output earth terminal
> - The DC link terminals DC+ and DC-
> - The braking resistor terminals R1 and R2 (Frame size D only)
>
> This equipment must not be used as an "emergency stop" mechanism (*see EN 60204, 9.2.5.4*).
>
> It is not allowed to open, connect or disconnect the equipment during its operation.

Operation

> ⚠ **WARNING**
>
> **Risks with incorrect parameterization**
>
> Certain parameter settings (for example, P1210) may cause the inverter to restart automatically after an input power failure, for example, the automatic restart function.
>
> Motor parameters must be accurately configured for motor overload protection to operate correctly.
>
> **Use of braking resistor**
>
> If an unsuitable braking resistor is used, this could result in a fire and severe damage to people, property and equipment. Use an appropriate braking resistor and install it correctly.
>
> The temperature of a braking resistor increases significantly during operation. Avoid coming into direct contact with braking resistors.

⚠ **WARNING**
Hot surface
During operation and for a short time after switching-off the inverter, the marked surfaces of the inverter can reach a high temperature. Avoid coming into direct contact with these surfaces.

Repair

⚠ **WARNING**
Repair and replacement of equipment
Repairs on equipment may only be carried out by Siemens Service, by repair centers authorized by Siemens or by authorized personnel who are thoroughly acquainted with all the warnings and operating procedures contained in this manual.
Any defective parts or components must be replaced using parts contained in the relevant spare parts lists.
Disconnect the power supply before opening the equipment for access.

Residual risks

| ⚠ **CAUTION** |
|---|
| **Residual risks associated with the control and drive components of a PDS** |
| The control and drive components of a power drive system (PDS) are approved for industrial and commercial use in industrial line supplies. Their use in public line supplies requires a different configuration and/or additional measures. |
| These components may only be operated in closed housings or in higher-level control cabinets with protective covers that are closed, and when all of the protective devices are used. |
| These components may only be handled by qualified and trained technical personnel who are knowledgeable and observe all of the safety information and instructions on the components and in the associated technical user documentation. |
| When carrying out a risk assessment of a machine in accordance with the EU Machinery Directive, the machine manufacturer must consider the following residual risks associated with the control and drive components of a PDS. |

1. Unintentional movements of driven machine components during commissioning, operation, maintenance, and repairs caused by, for example:
   - Hardware defects and / or software errors in the sensors, controllers, actuators, and connection technology
   - Response times of the controller and drive
   - Operating and/or ambient conditions not within the scope of the specification
   - Condensation / conductive contamination
   - Parameterization, programming, cabling, and installation errors
   - Use of radio devices / cellular phones in the immediate vicinity of the controller
   - External influences / damage
2. Exceptional temperatures as well as emissions of noise, particles, or gas caused by, for example:
   - Component malfunctions
   - Software errors
   - Operating and/or ambient conditions not within the scope of the specification
   - External influences / damage
3. Hazardous shock voltages caused by, for example:
   - Component malfunctions
   - Influence of electrostatic charging
   - Induction of voltages in moving motors
   - Operating and/or ambient conditions not within the scope of the specification
   - Condensation / conductive contamination
   - External influences / damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, if they are too close.
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly.

2 Installation

2.1 Mechanical installation

Mounting orientation and clearance
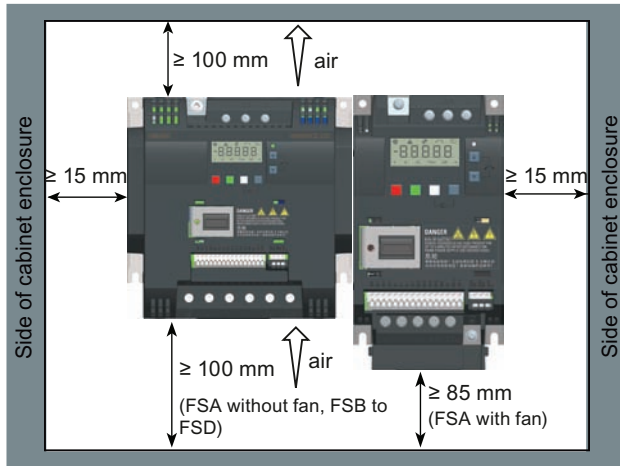
The inverter must be mounted vertically to a flat and non-combustible surface in an enclosed electrical operating area or a control cabinet.

Outline dimensions and drill patterns (cabinet-panel mounting)

(Unit: mm)	FSA	FSB	FSC	FSD
W	90	140	184	240
H	150	160	182	206.5
H1	166	-	-	-
D	145.5 (114.5*)	164.5	169	172.5
D1	-	106	108	98
Drill pattern	79 / ⌀4.6 / 140	127 / ⌀4.6 / 135	170 / ⌀5.8 / 140	223 / ⌀5.8 / 166
Fixings	4 x M4 screws 4 x M4 nuts 4 x M4 washers Tightening torque: 1.8 Nm ± 10%		4 x M5 screws 4 x M5 nuts 4 x M5 washers Tightening torque: 2.5 Nm ± 10%	

H1: height of frame size A with fan
D1: depth inside the cabinet for push-through mounting

* Depth of Flat Plate inverter (400 V 0.75 kW variant only).

Outline dimensions and drill patterns (push-through mounting)

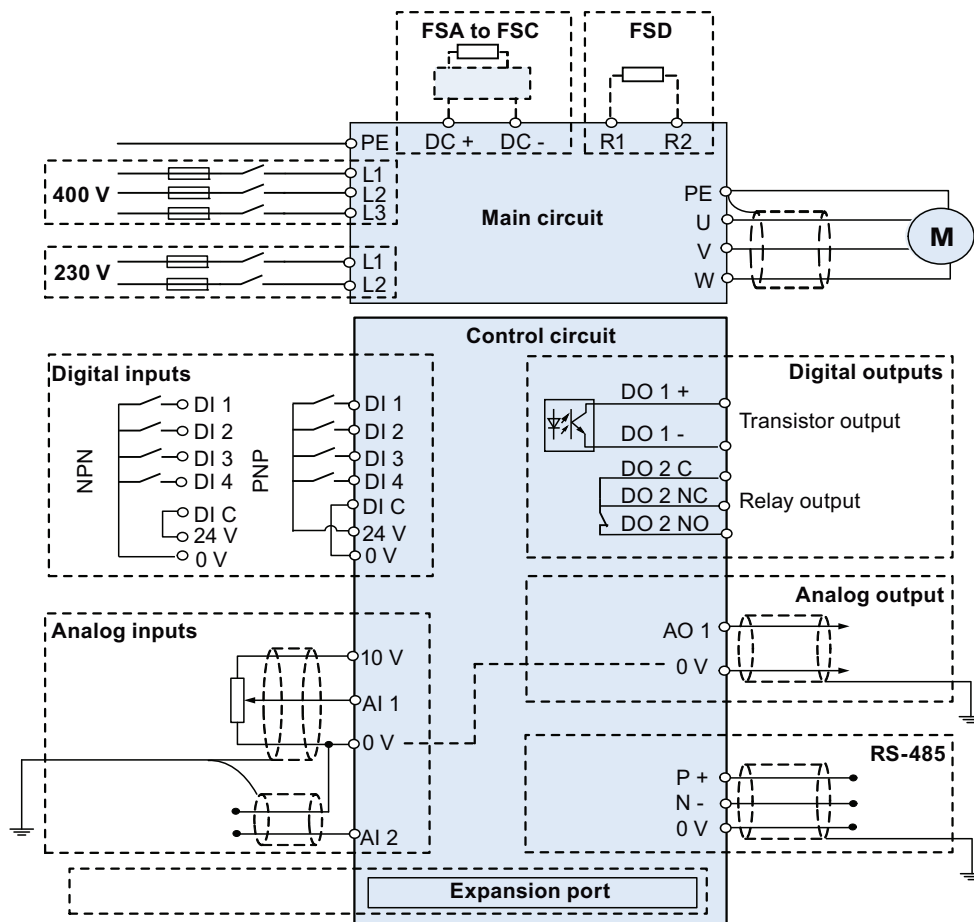|	Frame size B	Frame size C	Frame size D
Drill pattern and cut-out (mm)			
Fixings	4 x M4 screws	4 x M5 screws	4 x M5 screws
Tightening torque	1.8 Nm ± 10%	2.5 Nm ± 10%	2.5 Nm ± 10%

For more information about the push-through mounting and the installation of the Flat Plate inverter, refer to the SINAMICS V20 Inverter Operating Instructions.

2.2   Electrical installation

⚠ WARNING
Requirements for United States / Canadian installations (UL/cUL)
Suitable for use on a circuit capable of delivering not more than 40000 rms Symmetrical Amperes, 480 Vac maximum for 400 V variants of inverters or 240 Vac maximum for 230 V variants of inverters, when protected by UL/cUL-certified Class J fuses only. For each frame size A to D use class 1 75 °C copper wire only.
This equipment is capable of providing internal motor overload protection according to UL508C. In order to comply with UL508C, parameter P0610 must not be changed from its factory setting of 6.
For Canadian (cUL) installations the inverter mains supply must be fitted with any external recommended suppressor with the following features:
• Surge-protective devices; device shall be a Listed Surge-protective device (Category code VZCA and VZCA7)
• Rated nominal voltage 480/277 VAC (for 400 V variants) or 240 VAC (for 230 V variants), 50/60 Hz, 3-phase (for 400 V variants) or 1-phase (for 230V variants)
• Clamping voltage VPR = 2000 V (for 400 V variants) / 1000 V (for 230 V variants), IN = 3 kA min, MCOV = 508 VAC (for 400 V variants) / 264 VAC (for 230V variants), SCCR = 40 kA
• Suitable for Type 1 or Type 2 SPD application
• Clamping shall be provided between phases and also between phase and ground

Wiring diagram

Recommended fuse types

This equipment is suitable for use in a power system up to 40,000 symmetrical amperes (rms), for the maximum rated voltage +10% when protected by an appropriate standard fuse.

Frame size		Recommended fuse type		Frame size		Recommended fuse type	
		CE-compliant (Siba URZ)	UL-compliant			CE-compliant (Siba URZ)	UL-compliant
400 V	A	50 124 34 (16 A)	15 A 600 VAC, class J	230 V	A	3NA3805 (16 A)	15 A 600 VAC, class J
	B	50 124 34 (20 A)	20 A 600 VAC, class J		B	3NA3812 (32 A)	30 A 600 VAC, class J
	C	50 140 34 (30 A)	30 A 600 VAC, class J		C	3NA3820 (50 A)	50 A 600 VAC, class J
	D	50 140 34 (63 A)	60 A 600 VAC, class J				

Terminal description

Mains terminals
(L1, L2/N, L3)

PE terminal

230 V variants

L1   L2/N

Frame size A

Frame sizes B and C

U   V   W   DC-   DC+

Expansion port

Frame size D

U   V   W   R2   DC-   DC+/R1

User terminals

Align a flat-bit screwdriver (bit size: 0.4 x 2.5 mm) with the terminal. Push it downwards on the release lever with a maximum force of 12 N and insert the control wire from below.

Output earth terminal

DC terminals (DC-, DC+)

Motor terminals (U, V, W)

Braking resistor terminals (R1, R2)

Recommended cable cross-sections and screw tightening torques

Frame size	Rated output power	Mains and PE terminals		Motor / DC / braking resistor / output earth terminals	
		Cable cross-section	Screw tightening torque (tolerance: ± 10%)	Cable cross-section	Screw tightening torque (tolerance: ± 10%)
400 V					
A	0.37 to 0.75 kW	1.0 mm²	1.0 Nm	1.0 mm²	1.0 Nm
	1.1 to 2.2 kW	1.5 mm²		1.5 mm²	
B	3.0 to 4.0 kW	2.5 mm²		2.5 mm²	1.5 Nm
C	5.5 kW	4.0 mm²	2.4 Nm	4.0 mm²	2.4 Nm
D	7.5 kW	6.0 mm²		6.0 mm²	
	11 to 15 kW	10 mm²		10 mm²	
230 V					
A	0.12 to 0.25 kW	1.5 mm²	1.0 Nm	1.0 mm²	1.0 Nm
	0.37 to 0.55 kW	2.5 mm²			
	0.75 kW	4.0 mm²			
B	1.1 to 1.5 kW	6.0 mm² *		2.5 mm²	1.5 Nm
C	2.2 to 3.0 kW	10 mm²	2.4 Nm	4.0 mm²	2.4 Nm

* With a UL-certified, suitable fork crimp

NOTICE
Damage to the mains terminals
During electrical installation of the inverter frame size A / B, use stranded cables / cables with UL-certified, suitable fork crimps rather than solid cables / cables with pin crimps for mains terminal connection.

| Cable with UL-certified fork crimp | ✔ | Cable with pin crimp | ✘ |
| Stranded cable | | Solid cable | |
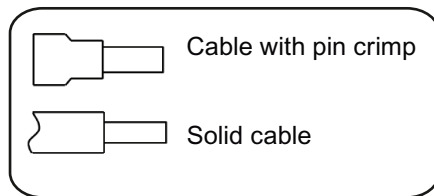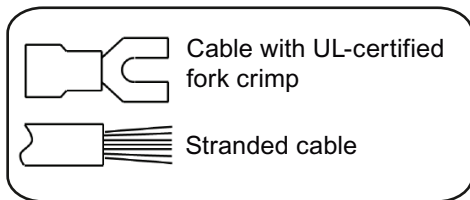
Maximum motor cable lengths

Inverter variant	Maximum cable length					
	Without output reactor or external EMC filter			With output reactor		With external EMC filter [1]
400 V	Unshielded	Shielded	EMC compliant (RE/CE C3) [2]	Unshielded	Shielded	EMC compliant (RE/CE C2)
FSA	50 m	25 m	10 m	150 m	150 m	25 m
FSB to FSD	50 m	25 m	25 m	150 m	150 m	25 m
230 V	Unshielded	Shielded	EMC compliant (RE/CE C2) [2]	Unshielded	Shielded	EMC compliant (RE/CE C2) [3]
FSA	50 m	25 m	10 m	200 m	200 m	5 m
FSB to FSC	50 m	25 m	25 m	200 m	200 m	5 m

[1] As specified in Section B.1.8 of the SINAMICS V20 Inverter Operating Instructions.

[2] For filtered variants only. RE/CE C3 refers to EMC compliance to EN61800-3 Category C3 for Radiated and Conducted Emissions; RE/CE C2 refers to EMC compliance to EN61800-3 Category C2 for Radiated and Conducted Emissions.

[3] For unfiltered variants only.

Permissible I/O terminal cable cross-sections

Cable type	Permissible cable cross-section
Solid or stranded cable	0.5 to 1.5 mm^2
Ferrule with insulating sleeve	0.5 mm^2

2.3 Technical specifications

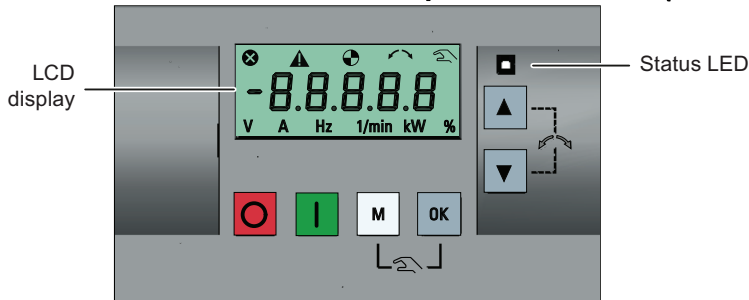|	Three phase AC 400 V inverters	Single phase AC 230 V inverters
Line supply characteristics		
Voltage range	380 V to 480 V AC (tolerance: -15 % to +10 %) 47 Hz to 63 Hz Current derating exists at the input voltages / switching frequencies higher than 400 V / 4kHz. *	200 V to 240 V AC (tolerance: -10 % to +10 %) 47 Hz to 63 Hz Current derating exists at the input voltages / switching frequencies higher than 230 V / 8kHz. *
Overvoltage category	EN 60664-1 Category III	
Permissible supply configuration	TN, TT, IT **, TT earthed line	TN, TT
Supply environment	Second environment (private power network) *	
Environmental conditions		
Surrounding air temperature	0 °C to 40 °C: without derating 40 °C to 60 °C: with derating *	
Storage temperature	- 40 °C to + 70 °C	
Protection class	IP 20	
Maximum humidity level	95% (non-condensing)	
Shock and vibration	Long-term storage in the transport packaging according to EN 60721-3-1 Class 1M2	
	Transport in the transport packaging according to EN 60721-3-2 Class 2M3	
	Vibration during operation according to EN 60721-3-3 Class 3M2	
Operating altitude	Up to 4000 m above sea level 1000 m to 4000 m: output current derating * 2000 m to 4000 m: input voltage derating *	
Environmental classes	Pollution class: 3S2 Gas class: 3C2 (SO_2, H_2S) Climate class: 3K3	

* For more information, refer to the SINAMICS V20 Inverter Operating Instructions.

** Note that only unfiltered inverters can be operated on IT power system.

3 Commissioning

For more information about parameters, faults, and alarms, refer to Appendix A of the English or Chinese version of this document.

3.1 The built-in Basic Operator Panel (BOP)

Button functions

⭕	**Stops the inverter**	
	Single press	OFF1 stop reaction in HAND mode.
	Double press (< 2 s) or long press (> 3 s)	OFF2 stop reaction: the inverter allows the motor to coast to a standstill without using any ramp-down timings.
❙	Starts the inverter in HAND / JOG mode.	
M	**Multi-function button**	
	Short press (< 2 s)	• Enters the parameter setting menu or moves to the next screen • Restarts the digit by digit editing on the selected item • Press twice in digit by digit editing to discard change and return
	Long press (> 2 s)	• Returns to the status screen • Enters the setup menu
OK	Short press (< 2 s)	• Switches between status values • Enters edit value mode or change to the next digit • Clears faults
	Long press (> 2 s)	• Quick parameter number or value edit
M + OK	Press to switch between HAND (with hand icon) / JOG (with flashing hand icon) / AUTO (no icon) mode. **Note:** Jog mode is only available if the motor is stopped.	
▲	• Moves the selection up through a menu, increases a value or a setpoint. • Long press (>2 s) to quickly scroll up the values.	
▼	• Moves the selection down through a menu, decreases a value or a setpoint. • Long press (>2 s) to quickly scroll down the values.	
▲ + ▼	Reverses the direction of rotation of the motor.	

Inverter status icons

⊗	Inverter has at least one pending fault.	
⚠	Inverter has at least one pending alarm.	
◑	◑ :	Inverter is running (motor frequency may be 0 rpm).
	◑ (flashing):	Inverter may be energized unexpectedly (for example, in frost protection mode).
↶	Motor rotates in the reversed direction.	
✍	✍ :	Inverter is in HAND mode.
	✍ (flashing):	Inverter is in JOG mode.

Menu structure

First power-on / factory reset

50 / 60 Hz Selection Menu

`50.?` ↔ `60hP.?` ↔ `60.?`

(50 ?)   (60 hp ?)   (60 ?)

OK (< 2 s)

Subsequent power-on

M (< 2 s) / ⬤ / ▮

M (> 2 s)

M (< 2 s)

Setup Menu ↔ **Display Menu** ↔ **Parameter Menu**

M (> 2 s)

Setup Menu	Display Menu	Parameter Menu
Motor data	Output frequency Hz	Edit or view all available parameters
Connection macro	Output voltage V	
Application macro	Motor current A	
Common parameters	Vdc V	
	Setpoint	

(< 2 s) M

(< 2 s) OK

Digit-by-digit editing of parameters

Example: editing parameter numbers

OK (> 2 s)   ▲   OK (< 2 s)   OK (< 2 s)

`P0003` ↔ `P0003` ↔ `P0007` ↔ `P0007` ⋯ → `P0947` → `r0947`

M (< 2 s)   ▼   M (< 2 s)

M (Double press)

M (< 2 s)   OK (< 2 s)
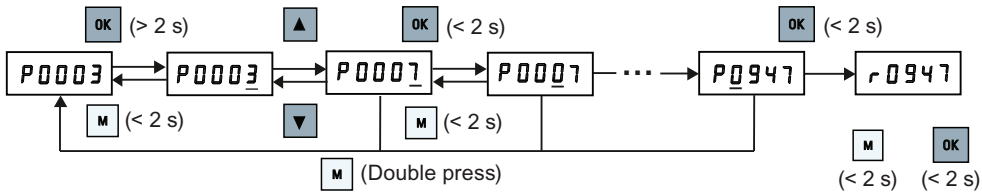
3.2 Quick commissioning

Note

This section describes how to perform the quick commissioning through the setup menu. If you are used to commissioning the inverter by setting parameters of your choice in the parameter menu, refer to the SINAMICS V20 Inverter Operating Instructions for a detailed description.

Structure of the setup menu
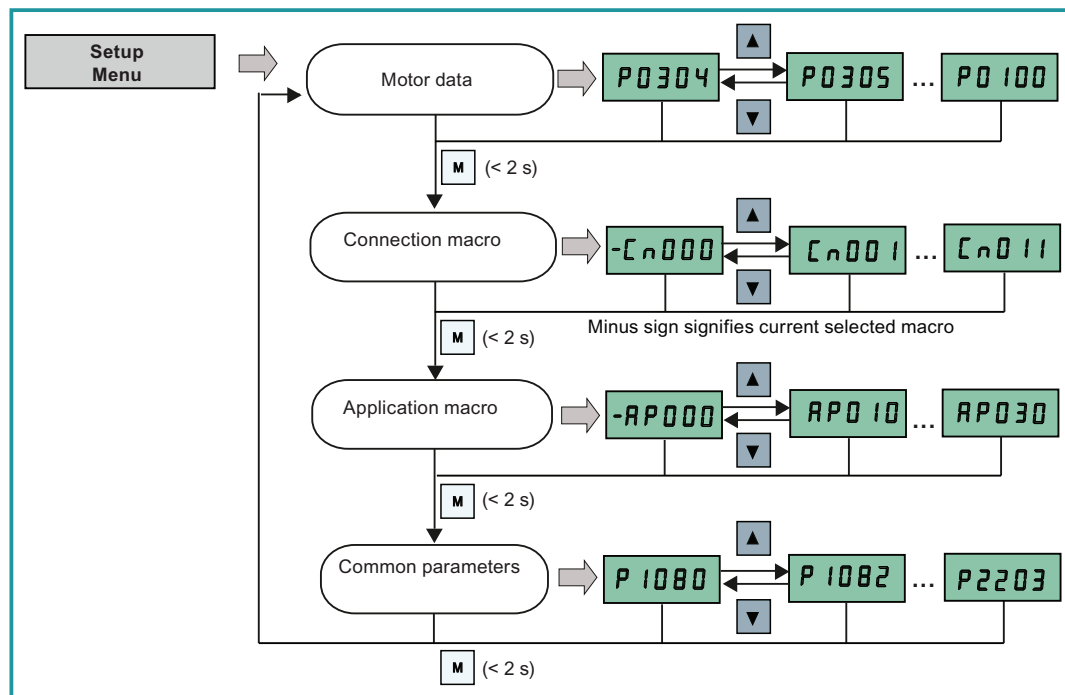
3.2.1 Setting motor data

Parameter	Description	Parameter	Description
P0100	50 / 60 Hz selection	P0309[0] ●	Rated motor efficiency [%]
P0304[0] ●	Rated motor voltage [V]	P0310[0] ●	Rated motor frequency [Hz]
P0305[0] ●	Rated motor current [A]	P0311[0] ●	Rated motor speed [RPM]
P0307[0] ●	Rated motor power [kW / hp]	P1900	Select motor data identification
P0308[0] ●	Rated motor power factor (cosφ)		
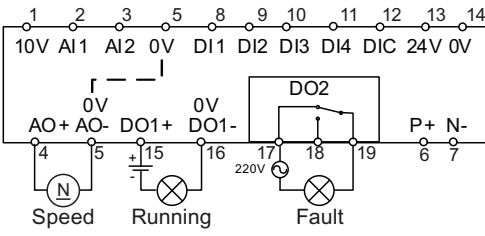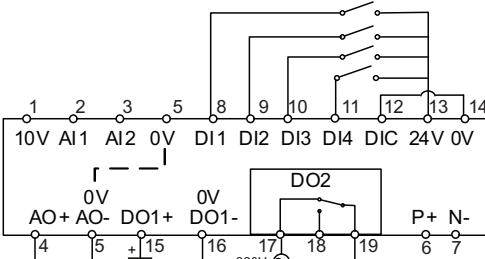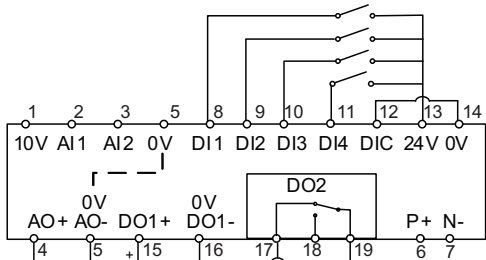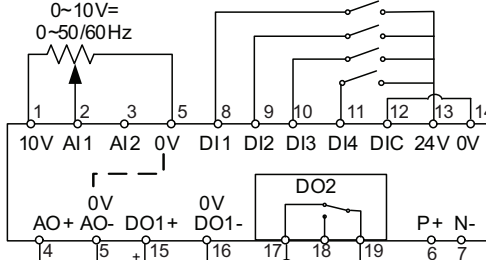
Note: "●" indicates that the value of this parameter must be entered according to the rating plate of the motor.

3.2.2   Setting connection macros

Functionality

This menu selects which macro is required for standard wiring arrangements. The default one is "Cn000" for connection macro 0.

Connection macros

Cn001 - BOP as the only control source	Cn002 - Control from terminals (PNP / NPN)
  0~20mA= 0~50/60Hz	External control - Potentiometer with setpoint • Hand / Auto switch between the BOP and terminals by pressing M + OK • Both NPN and PNP can be realized with the same parameters. You can change the connection of the digital input common terminal to 24 V or 0 V to decide the mode. 0~20mA= 0~50/60Hz **PNP**
Cn003 - Fixed speeds	Cn004 - Fixed speeds in binary mode
Three fixed speeds with ON / OFF • Hand / Auto switch between the BOP and terminal by pressing M + OK • If several digital inputs are active at the same time, the selected frequencies are summed, e.g. FF1 + FF2 + FF3 0~20mA= 0~50/60Hz	Fixed speeds with ON command in binary mode • Up to 16 different fixed frequency values (0 Hz, P1001 ... P1015) can be selected by the fixed frequency selectors (P1020 ... P1023) 0~20mA= 0~50/60Hz

Cn005 - Analog input and fixed frequency

The analog input works as an additional setpoint.

- If DI2 and DI3 are active together, the selected frequencies are summed, i.e. FF1 + FF2

0~10V=
0~50/60Hz

| 1 | 2 | 3 | 5 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 10V | AI1 | AI2 | 0V | DI1 | DI2 | DI3 | DI4 | DIC | 24V | 0V |

DO2

AO+	AO-	DO1+	DO1-				P+	N-
0V		0V						
4	5	+15	16	17	18	19	6	7
		220V						

Speed   Running   Fault

0~20mA=
0~50/60Hz
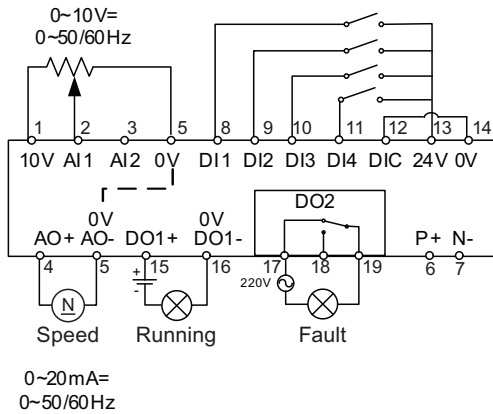
Cn006 - External push button control

Note that the command sources are pulse signals.

| 1 | 2 | 3 | 5 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 10V | AI1 | AI2 | 0V | DI1 | DI2 | DI3 | DI4 | DIC | 24V | 0V |

DO2

AO+	AO-	DO1+	DO1-				P+	N-
0V		0V						
4	5	+15	16	17	18	19	6	7
		220V						

Speed   Running   Fault

0~20mA=
0~50/60Hz
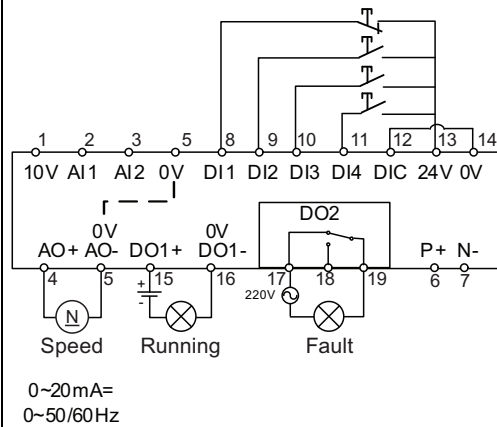
Cn007 - External push buttons with analog control

Note that the command sources are pulse signals.

0~10V=
0~50/60Hz

| 1 | 2 | 3 | 5 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 10V | AI1 | AI2 | 0V | DI1 | DI2 | DI3 | DI4 | DIC | 24V | 0V |

DO2

AO+	AO-	DO1+	DO1-				P+	N-
0V		0V						
4	5	+15	16	17	18	19	6	7
		220V						

Speed   Running   Fault

0~20mA=
0~50/60Hz
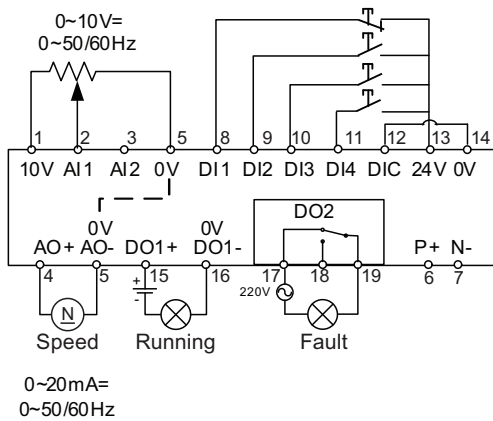
Cn008 - PID control with analog reference

If a negative setpoint for the PID control is desired, change the setpoint and feedback wiring as needed.

0 ~ 20 mA
Actual value

PID
setpoint

| 1 | 2 | 3 | 5 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 10V | AI1 | AI2 | 0V | DI1 | DI2 | DI3 | DI4 | DIC | 24V | 0V |

DO2

AO+	AO-	DO1+	DO1-				P+	N-
0V		0V						
4	5	+15	16	17	18	19	6	7
		220V						

Speed   Running   Fault

0~20mA=
0~50/60Hz
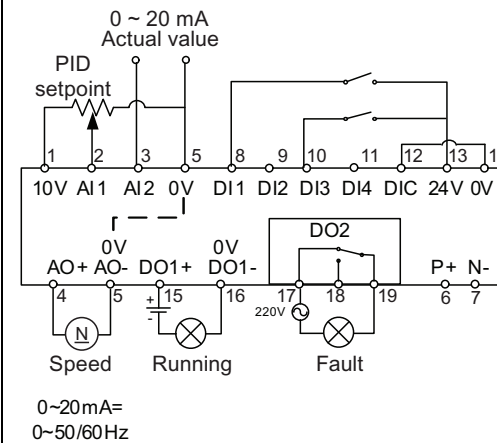
Cn009 - PID control with the fixed value reference

0 ~ 20 mA
Actual value

| 1 | 2 | 3 | 5 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 10V | AI1 | AI2 | 0V | DI1 | DI2 | DI3 | DI4 | DIC | 24V | 0V |

DO2

AO+	AO-	DO1+	DO1-				P+	N-
0V		0V						
4	5	+15	16	17	18	19	6	7
		220V						

Speed   Running   Fault

0~20mA=
0~50/60Hz

Cn010 - USS control

| 1 | 2 | 3 | 5 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 10V | AI1 | AI2 | 0V | DI1 | DI2 | DI3 | DI4 | DIC | 24V | 0V |

DO2

AO+	AO-	DO1+	DO1-				P+	N-
0V		0V						
4	5	+15	16	17	18	19	6	7
		220V						

Speed   Running   Fault

0~20mA=
0~50/60Hz

RS-485 USS
ON / OFF, speed

Cn011 - MODBUS RTU control

```
    1   2   3   5   8   9  10  11  12  13  14
   10V AI1 AI2 0V  DI1 DI2 DI3 DI4 DIC 24V 0V

         0V              DO2
   AO+ AO- DO1+ DO1-              P+  N-
    4   5   +15  16   17  18  19   6   7
                       220V
   (N)     (X)        (X)
  Speed   Running     Fault

  0~20mA=              RS-485 MODBUS RTU
  0~50/60Hz            ON / OFF, speed
```

Parameters for setting the connections macros

| | Description | Default values for connection macros (Cn...) | | | | | | | | | | |
		001	002	003	004	005	006	007	008	009	010	011
P0700[0]	Selection of command source	1	2	2	2	2	2	2	2	2	5	5
P0701[0]	Function of digital input 1	-	1	1	15	1	2	1	1	1	-	-
P0702[0]	Function of digital input 2	-	12	15	16	15	1	2	-	15	-	-
P0703[0]	Function of digital input 3	-	9	16	17	16	13	12	9	16	-	-
P0704[0]	Function of digital input 4	-	10	17	18	9	14	9	-	17	-	-
P0727[0]	Selection of 2 / 3-wire method	-	-	-	-	-	3	2	-	-	-	-
P0731[0]	BI: Function of digital output 1	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2	-	-	-
P0732[0]	BI: Function of digital output 2	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3	-	-	-
P0756[1]	Type of AI	-	-	-	-	-	-	-	2	-	-	-
P0771[0]	CI: Analog output	21	21	21	21	21	21	21	21	-	-	-
P0810[0]	BI: CDS bit 0 (Hand/Auto)	0	-	-	-	-	-	-	-	-	-	-
P0840[0]	BI: ON / OFF1	-	-	-	1025.0	-	-	-	-	-	-	-
P1000[0]	Selection of frequency	1	2	3	3	23	1	2	-	-	5	5
P1001[0]	Fixed frequency 1	-	-	10	-	10	-	-	-	-	-	-
P1002[0]	Fixed frequency 2	-	-	15	-	15	-	-	-	-	-	-
P1003[0]	Fixed frequency 3	-	-	25	-	-	-	-	-	-	-	-
P1016[0]	Fixed frequency mode	-	-	1	2	1	-	-	-	-	-	-
P1020[0]	BI: Fixed frequency selection bit 0	-	-	722.1	722.0	722.1	-	-	-	-	-	-
P1021[0]	BI: Fixed frequency selection bit 1	-	-	722.2	722.1	722.2	-	-	-	-	-	-
P1022[0]	BI: Fixed frequency selection bit 2	-	-	722.3	722.2	-	-	-	-	-	-	-
P1023[0]	BI: Fixed frequency selection bit 3	-	-	-	722.3	-	-	-	-	-	-	-
P1040[0]	Setpoint of the MOP	-	-	-	-	-	0	-	-	-	-	-
P1047[0]	MOP ramp-up time of the RFG	-	-	-	-	-	10	-	-	-	-	-
P1048[0]	MOP ramp-down time of the RFG	-	-	-	-	-	10	-	-	-	-	-
P1074[0]	BI: Disable additional setpoint	-	-	-	-	1025.0	-	-	-	-	-	-
P2010[0]	USS / MODBUS baudrate	-	-	-	-	-	-	-	-	-	8	6
P2011[0]	USS address	-	-	-	-	-	-	-	-	-	1	-
P2012[0]	USS PZD length	-	-	-	-	-	-	-	-	-	2	-
P2013[0]	USS PKW length	-	-	-	-	-	-	-	-	-	127	-
P2014[0]	USS / MODBUS telegram off time	-	-	-	-	-	-	-	-	-	500	100
P2021[0]	MODBUS address	-	-	-	-	-	-	-	-	-	-	1
P2022[0]	MODBUS reply timeout	-	-	-	-	-	-	-	-	-	-	1000
P2023[0]	RS485 protocol selection	-	-	-	-	-	-	-	-	-	1	2
P2200[0]	Enable PID controller	-	-	-	-	-	-	-	1	1	-	-
P2216[0]	Fixed PID setpoint mode	-	-	-	-	-	-	-	-	1	-	-
P2220[0]	BI: Fixed PID setpoint select bit 0	-	-	-	-	-	-	-	-	722.1	-	-
P2221[0]	BI: Fixed PID setpoint select bit 1	-	-	-	-	-	-	-	-	722.2	-	-
P2222[0]	BI: Fixed PID setpoint select bit 2	-	-	-	-	-	-	-	-	722.3	-	-
P2253[0]	CI: PID setpoint	-	-	-	-	-	-	-	755.0	2224	-	-
P2264[0]	CI: PID feedback	-	-	-	-	-	-	-	755.1	755.1	-	-

3.2.3 Setting application macros

Functionality

This menu defines certain common applications. Each application macro provides a set of parameter settings for a specific application. After you select an application macro, the corresponding settings are applied to the inverter to simplify the commissioning process.

Application macro specific parameters

Parameter	Description	Factory default	Default for application macro				Remarks
			AP010	AP020	AP021	AP030	
P1080[0]	Minimum frequency	0	15	20	-	-	Inverter running at a lower speed inhibited
P1300[0]	Control mode	0	7	7	0	1	=7: Quadratic V/f =0: Linear V/f =1: V/f with FCC
P1110[0]	BI: Inhibit negative frequency setpoint	0	1	-	-	-	Reverse rotation inhibited
P1200[0]	Flying start	0	-	2	-	-	Search for the speed of the running motor with a heavy inertia load so that the motor runs up to the setpoint
P1210[0]	Automatic restart	1	2	2	-	-	Fault acknowledgement at power-on
P1120[0]	Ramp-up time	10	10	10	10	5	Ramp-up time from zero to maximum frequency
P1121[0]	Ramp-down time	10	10	20	10	5	Ramp-down time from maximum frequency to zero
P1312[0]	Starting boost	0	-	-	30	30	Boost only effective when accelerating for the first time (standstill)
P1311[0]	Acceleration boost	0	-	-	0	-	Boost only effective when accelerating or braking
P1310[0]	Continuous boost	50		-	50	-	Additional boost over the complete frequency range

3.2.4 Setting common parameters

Parameter	Description	Parameter	Description
P1080[0]	Minimum motor frequency	P1001[0]	Fixed frequency setpoint 1
P1082[0]	Maximum motor frequency	P1002[0]	Fixed frequency setpoint 2
P1120[0]	Ramp-up time	P1003[0]	Fixed frequency setpoint 3
P1121[0]	Ramp-down time	P2201[0]	Fixed PID frequency setpoint 1
P1058[0]	JOG frequency	P2202[0]	Fixed PID frequency setpoint 2
P1060[0]	JOG ramp-up time	P2203[0]	Fixed PID frequency setpoint 3

3.3 Restoring to defaults

Parameter	Function	Setting
P0003	User access level	= 1 (standard user access level)
P0010	Commissioning parameter	= 30 (factory setting)
P0970	Factory reset	= 1: parameter reset to user defaults if stored, else factory defaults (restoring to user defaults) = 21: parameter reset to factory defaults deleting user defaults if stored (restoring to factory defaults)

After the setting for P0970, the inverter displays "8 8 8 8 8" and then the screen shows "P0970". P0970 and P0010 are automatically reset to their original value 0.

4 Technical support information

Country	Hotline
China	+86 400 810 4288
Germany	+49 (0) 911 895 7222
Italy	+39 (02) 24362000
Brazil	+55 11 3833 4040
India	+91 22 2760 0150
Korea	+82 2 3450 7114
Turkey	+90 (216) 4440747
USA	+1 423 262 5710
Further service contact information: Support contacts (http://support.automation.siemens.com/WW/view/en/16604999)	

A. Parameters, faults, and alarms

A.1 Parameter list

Parameter	Description		Range	Factory default	Acc. level
r0002	Inverter state		-	-	2
P0003	User access level		0 - 4	1	1
	0	Use-defined parameter list (defines a limited set of parameters to which the end user has access. See P0013 for details on use.)			
	1	Standard (allows access into most frequently used parameters)			
	2	Extended (allows extended access to more parameters			
	3	Expert (for expert use only)			
	4	Service (only for use by authorized service personnel, password protected)			
P0004	Parameter filter		0 - 22	0	1
	0	All parameters	12	Inverter features	
	2	Inverter	13	Motor control	
	3	Motor	19	Motor identification	
	5	Technology application / units	20	Communication	
	7	Commands, binary I/O	21	Warnings / faults / monitoring	
	8	Analog input and analog output	22	Technology controller	
	10	Setpoint channel / RFG			
P0010	Commissioning parameter		0 - 30	0	1
	0	Ready	29	Download	
	1	Quick commissioning	30	Factory setting	
	2	Inverter			
r0018	Firmware version		-	-	1
r0021	CO: Actual filtered frequency [Hz]		-	-	2
r0025	CO: Actual output voltage [V]		-	-	2
r0026[0]	CO: Actual filtered DC-link voltage [V]		-	-	2
r0027	CO: Actual output current [A]		-	-	2
r0031	CO: Actual filtered torque [Nm]		-	-	2
r0032	CO: Actual filtered power		-	-	2
r0035[0...2]	CO: Actual motor temperature [°C]		-	-	2
r0039	CO: Energy consumpt. meter [kWh]		-	-	2
P0040	Reset energy consumpt. and energy saved meter		0 - 1	0	2
	0	No reset			
	1	Reset r0039 to 0			
P0042[0...1]	Energy saving scaling		0.000 - 100.00	0.000	2
Index:	[0]	Factor for kWh to currency conversion			
	[1]	Factor for kWh to CO2 conversion			
r0043[0...2]	Energy saved [kWh]		-	-	2

Parameter	Description		Range	Factory default	Acc. level
r0050	CO / BO: Active command data set		-	-	2
r0051[0...1]	CO: Active inverter data set (DDS)		-	-	2
r0052.0...15	CO / BO: Active status word 1		-	-	2
r0053.0...15	CO / BO: Active status word 2		-	-	2
P0100	Europe / North America		0 - 2	0	1
	0	Europe [kW], motor base frequency is 50 Hz			
	1	North America [hp], motor base frequency is 60 Hz			
	2	North America [kW], motor base frequency is 60 Hz			
r0206	Rated inverter power [kW] / [hp]		-	-	2
r0207[0...2]	Rated inverter current [A]		-	-	2
r0208	Rated inverter voltage [V]		-	-	2
r0209	Maximum inverter current [A]		-	-	2
P0304[0...2]	Rated motor voltage [V]		10 - 2000	400	1
P0305[0...2]	Rated motor current [A]		0.01 - 10000.00	1.86	1
P0307[0...2]	Rated motor power		0.01 - 2000.00	0.75	1
P0308[0...2]	Rated motor cosφ		0.000 - 1.000	0.000	1
P0309[0...2]	Rated motor efficiency [%]		0.0 - 99.9	0.0	1
P0310[0...2]	Rated motor frequency [Hz]		12.00 - 599.00	50.00	1
P0311[0...2]	Rated motor speed [RPM]		0 - 40000	1395	1
P0335[0...2]	Motor cooling		0 - 3	0	2
	0	Self-cooled: Shaft mounted fan attached motor (IC410 or IC411)			
	1	Force-cooled: Separately powered cooling fan (IC416)			
	2	Self-cooled and internal fan			
	3	Force-cooled and internal fan			
P0340[0...2]	Calculation of motor parameters		0 - 4	0	2
	0	No calculation	3	Calculation of V/f control data	
	1	Complete parameterization	4	Calculation of controller settings only	
	2	Calculation of equivalent circuit data			
P0507	Application macro		0 - 255	0	1
r0512	CO: Scaled filtered frequency		-	-	2
P0604[0...2]	Threshold motor temperature [°C]		0.0 - 200.0	130.0	2
P0640[0...2]	Motor overload factor [%]		10.0 - 400.0	150.0	2
P0700[0...2]	Selection of command source		0 - 5	1	1
	0	Factory default setting	2	Terminal	
	1	Operator panel (keypad)	5	USS / MBUS on RS485	
P0701[0...2]	Function of digital input 1		0 - 99	0	2
	0	Digital input disabled	16	Fixed frequency selector bit1	
	1	ON / OFF1	17	Fixed frequency selector bit2	
	2	ON reverse / OFF1	18	Fixed frequency selector bit3	
	3	OFF2 - coast to standstill	22	QuickStop Source 1	
	4	OFF3 - quick ramp-down	23	QuickStop Source 2	
	9	Fault acknowledge	24	QuickStop Override	
	10	JOG right	25	DC brake enable	
	11	JOG left	27	Enable PID	
	12	Reverse	29	External trip	
	13	MOP up (increase frequency)	33	Disable additional freq setpoint	
	14	MOP down (decrease frequency)	99	Enable BICO parameterization	
	15	Fixed frequency selector bit0			
P0702[0...2]	Function of digital input 2		0 - 99	0	2
P0703[0...2]	Function of digital input 3		0 - 99	9	2
P0704[0...2]	Function of digital input 4		0 - 99	15	2
P0712 [0...2]	Analog / digital input 1		0 - 99	0	2
P0713[0...2]	Analog / digital input 2		0 - 99	0	2
P0717	Connection macro		0 - 255	0	1
r0722.0...12	CO / BO: Digital input values		-	-	2

Parameter	Description		Range		Factory default	Acc. level
P0727[0...2]	Selection of 2 / 3-wire method		0 - 3		0	2
	0	Siemens (start / dir)	2	3-wire (fwd / rev)		
	1	2-wire (fwd / rev)	3	3-wire (start / dir)		
P0731[0...2]	BI: Function of digital output 1		-		52.3	2
P0732[0...2]	BI: Function of digital output 2		-		52.7	2
r0752[0...1]	Actual analog input [V] or [mA]		-		-	2
r0754[0...1]	Actual analog input value after scaling [%]		-		-	2
r0755[0...1]	CO: Actual analog input after scaling [4000h]		-		-	2
P0756[0...1]	Type of analog input		0 - 4		0	2
	0	Unipolar voltage input (0 to +10 V)				
	1	Unipolar voltage input with monitoring (0 to 10 V)				
	2	Unipolar current input (0 to 20 mA)				
	3	Unipolar current input with monitoring (0 to 20 mA)				
	4	Bipolar voltage input (-10 V to +10 V)				
P0757[0...1]	Value x1 of analog input scaling		-20 - 20		0	2
P0758[0...1]	Value y1 of analog input scaling [%]		-99999 - 99999		0.0	2
P0759[0...1]	Value x2 of analog input scaling		-20 - 20		10	2
P0760[0...1]	Value y2 of analog input scaling [%]		-99999 - 99999		100.0	2
P0761[0...1]	Width of analog input deadband		0 - 20		0	2
P0771[0]	CI: Analog output		-		21[0]	2
P0773[0]	Smooth time analog output [ms]		0 - 1000		2	2
r0774[0]	Actual analog output value [V] or [mA]		-		-	2
P0775[0]	Permit absolute value		0 - 65535		0	2
P0777[0]	Value x1 of analog output scaling [%]		-99999 - 99999		0.0	2
P0778[0]	Value y1 of analog output scaling		0 - 20		0	2
P0779[0]	Value x2 of analog output scaling [%]		-99999 - 99999		100.0	2
P0780[0]	Value y2 of analog output scaling		0 - 20		20	2
P0781[0]	Width of analog output deadband		0 - 20		0	2
r0785.0	CO / BO: Status word of analog output		-		-	2
P0809[0...2]	Copy command data set (CDS)		0 - 2		[0] 0 [1] 1 [2] 0	2
Index:	[0]	Copy from CDS				
	[1]	Copy to CDS				
	[2]	Start copy				
P0810	BI: command data set bit 0 (Hand / Auto)		-		0	2
P0811	BI: command data set bit 1		-		0	2
P0819[0...2]	Copy inverter data set (DDS)		0 - 2		[0] 0 [1] 1 [2] 0	2
Index:	[0]	Copy from DDS				
	[1]	Copy to DDS				
	[2]	Start copy				
P0927	Parameter changeable via		-		1111 bin	2
r0947[0...63]	CO: Last fault code		-		-	2
P0970	Factory reset		0 - 21		0	1
	0	Disabled				
	1	Parameter reset				
	21	User Default Parameter Reset				
P1000[0...2]	Selection of frequency setpoint		0 - 77		1	1
	0	No main setpoint	30	No main setpoint + Fixed frequency		
	1	MOP setpoint	31	MOP setpoint + Fixed frequency		
	2	Analog setpoint	32	Analog setpoint + Fixed frequency		
	3	Fixed frequency	33	Fixed frequency + Fixed frequency		
	5	USS on RS485	35	USS on RS485 + Fixed frequency		
	7	Analog setpoint 2	37	Analog setpoint 2 + Fixed frequency		
	10	No main setpoint + MOP setpoint	50	No main setpoint + USS on RS485		
	11	MOP setpoint + MOP setpoint	51	MOP setpoint + USS on RS485		
	12	Analog setpoint + MOP setpoint	52	Analog setpoint + USS on RS485		

Parameter	Description		Range		Factory default	Acc. level
	13	Fixed frequency + MOP setpoint	53	Fixed frequency + USS on RS485		
	15	USS on RS485 + MOP setpoint	55	USS on RS485 + USS on RS485		
	17	Analog setpoint 2 + MOP setpoint	57	Analog setpoint 2 + USS on RS485		
	20	No main setpoint + Analog setpoint	70	No main setpoint + Analog setpoint 2		
	21	MOP setpoint + Analog setpoint	71	MOP setpoint + Analog setpoint 2		
	22	Analog setpoint + Analog setpoint	72	Analog setpoint + Analog setpoint 2		
	23	Fixed frequency + Analog setpoint	73	Fixed frequency + Analog setpoint 2		
	25	USS on RS485 + Analog setpoint	75	USS on RS485 + Analog setpoint 2		
	27	Analog setpoint 2 + Analog setpoint	77	Analog setpoint 2 + Analog setpoint 2		
P1001[0...2]	Fixed frequency 1 [Hz]		-599.00 - 599.00		10.00	2
P1002[0...2]	Fixed frequency 2 [Hz]		-599.00 - 599.00		15.00	2
P1003[0...2]	Fixed frequency 3 [Hz]		-599.00 - 599.00		25.00	2
P1004[0...2]	Fixed frequency 4 [Hz]		-599.00 - 599.00		50.00	2
P1005[0...2]	Fixed frequency 5 [Hz]		-599.00 - 599.00		0.00	2
P1006[0...2]	Fixed frequency 6 [Hz]		-599.00 - 599.00		0.00	2
P1007[0...2]	Fixed frequency 7 [Hz]		-599.00 - 599.00		0.00	2
P1008[0...2]	Fixed frequency 8 [Hz]		-599.00 - 599.00		0.00	2
P1009[0...2]	Fixed frequency 9 [Hz]		-599.00 - 599.00		0.00	2
P1010[0...2]	Fixed frequency 10 [Hz]		-599.00 - 599.00		0.00	2
P1011[0...2]	Fixed frequency 11 [Hz]		-599.00 - 599.00		0.00	2
P1012[0...2]	Fixed frequency 12 [Hz]		-599.00 - 599.00		0.00	2
P1013[0...2]	Fixed frequency 13 [Hz]		-599.00 - 599.00		0.00	2
P1014[0...2]	Fixed frequency 14 [Hz]		-599.00 - 599.00		0.00	2
P1015[0...2]	Fixed frequency 15 [Hz]		-599.00 - 599.00		0.00	2
P1016[0...2]	Fixed frequency mode		1 - 2		1	2
	1	Direct selection				
	2	Binary selection				
P1031[0...2]	MOP mode		-		1	2
P1032	Inhibit reverse direction of MOP		0 - 1		1	2
	0	Reverse direction is allowed				
	1	Reverse direction inhibited				
P1040[0...2]	Setpoint of the MOP [Hz]		-599.00 - 599.00		5.00	2
P1047[0...2]	MOP ramp-up time of the RFG [s]		0.00 - 1000.00		10.00	2
P1048[0...2]	MOP ramp-down time of the RFG [s]		0.00 - 1000.0		10.00	2
r1050	CO: Actual output freq. of the MOP [Hz]		-		-	2
P1058[0...2]	JOG frequency [Hz]		0.00 - 599.00		5.00	2
P1059[0...2]	JOG frequency left [Hz]		0.00 - 599.00		5.00	2
P1060[0...2]	JOG ramp-up time [s]		0.00 - 650.00		10.00	2
P1061[0...2]	JOG ramp-down time [s]		0.00 - 650.00		10.00	2
P1080[0...2]	Minimum frequency [Hz]		0.00 - 599.00		0.00	1
P1082[0...2]	Maximum frequency [Hz]		0.00 - 599.00		50.00	1
P1120[0...2]	Ramp-up time [s]		0.00 - 650.00		10.00	1
P1121[0...2]	Ramp-down time [s]		0.00 - 650.00		10.00	1
P1130[0...2]	Ramp-up initial rounding time [s]		0.00 - 40.00		0.00	2
P1131[0...2]	Ramp-up final rounding time [s]		0.00 - 40.00		0.00	2
P1132[0...2]	Ramp-down initial rounding time [s]		0.00 - 40.00		0.00	2
P1133[0...2]	Ramp-down final rounding time [s]		0.00 - 40.00		0.00	2
P1134[0...2]	Rounding type		0 - 1		0	2
	0	Continuous smoothing				
	1	Discontinuous smoothing				
P1135[0...2]	OFF3 ramp-down time [s]		0.00 - 650.00		5.00	2
P1200	Flying start		0 - 6		0	2
	0	Flying start disabled				
	1	Flying start always active; searches in both directions				
	2	Flying start active after power on, fault, OFF2; searches in both directions				

Parameter	Description		Range		Factory default	Acc. level
	3	Flying start active after fault, OFF2; searches in both directions				
	4	Flying start always active; searches in direction of setpoint only				
	5	Flying start active after power on, fault, OFF2; searches in direction of setpoint only				
	6	Flying start active after fault, OFF2; searches in direction of setpoint only				
P1210	Automatic restart		0 - 7		1	2
	0	Disabled				
	1	Trip reset after power on, P1211 disabled				
	2	Restart after mains blackout, P1211 disabled				
	3	Restart after mains brownout or fault, P1211 enabled				
	4	Restart after mains brownout, P1211 enabled				
	5	Restart after mains blackout and fault, P1211 disabled				
	6	Restart after mains brown- /blackout or fault, P1211 enabled				
	7	Restart after mains brown- /blackout or fault, trip when P1211 expires				
P1215	Holding brake enable		0 - 1		0	2
	0	Motor holding brake disabled				
	1	Motor holding brake enabled				
P1216	Holding brake release delay [s]		0.0 - 20.0		1.0	2
P1217	Holding time after ramp down [s]		0.0 - 20.0		1.0	2
P1227[0...2]	Zero speed detection monitoring time [s]		0.0 - 300.0		4.0	2
P1232[0...2]	DC braking current [%]		0 - 250		100	2
P1233[0...2]	Duration of DC braking [s]		0.00 - 250.00		0.00	2
P1234[0...2]	DC braking start frequency [Hz]		0.00 - 599.00		599.00	2
P1236[0...2]	Compound braking current [%]		0 - 250		0	2
P1237	Dynamic braking		0 - 5		0	2
	0	Disabled	3	20 % duty cycle		
	1	5 % duty cycle	4	50 % duty cycle		
	2	10 % duty cycle	5	100 % duty cycle		
P1300[0...2]	Control mode		0 - 19		0	2
	0	V/f with linear characteristic	5	V/f for textile applications		
	1	V/f with FCC	6	V/f with FCC for textile applications		
	2	V/f with quadratic characteristic	7	V/f with quadratic eco		
	3	V/f with programmable characteristic	19	V/f control with independent voltage setpoint		
	4	V/f with linear eco				
P1310[0...2]	Continuous boost [%]		0.0 - 250.0		50.0	2
P1311[0...2]	Acceleration boost [%]		0.0 - 250.0		0.0	2
P1312[0...2]	Starting boost [%]		0.0 - 250.0		0.0	2
P1335[0...2]	Slip compensation [%]		0.0 - 600.0		0.0	2
P1336[0...2]	Slip limit [%]		0 - 600		250	2
r1348	Economy mode factor [%]		-		-	2
P1800[0...2]	Pulse frequency [kHz]		2 - 16		4	2
P1820[0...2]	Reverse output phase sequence		0 - 1		0	2
	0	Forward				
	1	Reverse the Motor				
P1900	Select motor data identification		0 - 2		0	2
	0	Disabled				
	2	Identification of all parameters in standstill				
r1926	Identified gating unit dead time [µs]		-		-	2
P2010[0...1]	USS / MODBUS baudrate		6 - 12		8	2
	6	9600 bps	10	76800 bps		
	7	19200 bps	11	93750 bps		
	8	38400 bps	12	115200 bps		
	9	57600 bps				
Index:	[0]	USS / MODBUS on RS485				
	[1]	USS on RS232 (reserved)				
P2011[0...1]	USS address		0 - 31		0	2

Parameter	Description		Range	Factory default	Acc. level
P2021	Modbus address		1 - 247	1	2
P2023	RS485 protocol selection		0 - 2	1	1
	0	None			
	1	USS			
	2	Modbus			
Note:	After changing P2023, a power-cycle of the inverter (which may take several seconds) is required.				
r2110[0...3]	CO: Warning number		-	-	2
P2157[0...2]	Threshold frequency f_2 [Hz]		0.00 - 599.00	30.00	2
P2158[0...2]	Delay time of threshold freq f_2 [ms]		0 - 10000	10	2
P2159[0...2]	Threshold frequency f_3 [Hz]		0.00 - 599.00	30.00	2
P2160[0...2]	Delay time of threshold freq f_3 [ms]		0 - 10000	10	2
P2200[0...2]	BI: Enable PID controller		-	0	2
P2201[0...2]	Fixed PID setpoint 1 [%]		-200.00 - 200.00	10.00	2
P2202[0...2]	Fixed PID setpoint 2 [%]		-200.00 - 200.00	20.00	2
P2203[0...2]	Fixed PID setpoint 3 [%]		-200.00 - 200.00	50.00	2
P2204[0...2]	Fixed PID setpoint 4 [%]		-200.00 - 200.00	100.00	2
P2205[0...2]	Fixed PID setpoint 5 [%]		-200.00 - 200.00	0.00	2
P2206[0...2]	Fixed PID setpoint 6 [%]		-200.00 - 200.00	0.00	2
P2207[0...2]	Fixed PID setpoint 7 [%]		-200.00 - 200.00	0.00	2
P2208[0...2]	Fixed PID setpoint 8 [%]		-200.00 - 200.00	0.00	2
P2209[0...2]	Fixed PID setpoint 9 [%]		-200.00 - 200.00	0.00	2
P2210[0...2]	Fixed PID setpoint 10 [%]		-200.00 - 200.00	0.00	2
P2211[0...2]	Fixed PID setpoint 11 [%]		-200.00 - 200.00	0.00	2
P2212[0...2]	Fixed PID setpoint 12 [%]		-200.00 - 200.00	0.00	2
P2213[0...2]	Fixed PID setpoint 13 [%]		-200.00 - 200.00	0.00	2
P2214[0...2]	Fixed PID setpoint 14 [%]		-200.00 - 200.00	0.00	2
P2215[0...2]	Fixed PID setpoint 15 [%]		-200.00 - 200.00	0.00	2
P2216[0...2]	Fixed PID setpoint mode		1 - 2	1	2
	1	Direct selection			
	2	Binary selection			
r2224	CO: Actual fixed PID setpoint [%]		-	-	2
P2231[0...2]	PID-MOP mode		-	0	2
P2232	Inhibit reverse direction of PID-MOP		0 - 1	1	2
	0	Reverse direction is allowed			
	1	Reverse direction inhibited			
P2240[0...2]	Setpoint of PID-MOP [%]		-200.00 - 200.00	10.00	2
P2247[0...2]	PID-MOP ramp-up time of the RFG [s]		0.00 - 1000.0	10.00	2
P2248[0...2]	PID-MOP ramp-down time of the RFG [s]		0.00 - 1000.0	10.00	2
r2250	CO: Output setpoint of PID-MOP [%]		-	-	2
P2253[0...2]	CI: PID setpoint		-	0	2
P2257	Ramp-up time for PID setpoint [s]		0.00 - 650.00	1.00	2
P2258	Ramp-down time for PID setpoint [s]		0.00 - 650.00	1.00	2
r2260	CO: PID setpoint after PID-RFG [%]		-	-	2
P2264[0...2]	CI: PID feedback		-	755[0]	2
P2265	PID feedback filter time constant [s]		0.00 - 60.00	0.00	2
r2266	CO: PID filtered feedback [%]		-	-	2
P2271	PID transducer type		0 - 1	0	2
	0	Disabled			
	1	Inversion of PID feedback signal			
r2272	CO: PID scaled feedback [%]		-	-	2
r2273	CO: PID error [%]		-	-	2
P2274	PID derivative time [s]		0.000 - 60.000	0.000	2
P2280	PID proportional gain		0.000 - 65.000	3.000	2
P2285	PID integral time [s]		0.000 - 60.000	0.000	2
P2291	PID output upper limit [%]		-200.00 - 200.00	100.00	2

Parameter	Description		Range	Factory default	Acc. level
P2292	PID output lower limit [%]		-200.00 - 200.00	0.00	2
r2294	CO: Actual PID output [%]		-	-	2
P2350	PID autotune enable		0 - 4	0	2
	0	PID autotuning disabled			
	1	PID autotuning via Ziegler Nichols (ZN) standard			
	2	PID autotuning as 1 plus some overshoot (O/S)			
	3	PID autotuning as 2 little or no overshoot (O/S)			
	4	PID autotuning PI only, quarter damped response			
P2360[0...2]	Enable cavitation protection		0 - 2	0	2
	0	Disable			
	1	Fault			
	2	Warn			
P2361[0...2]	Cavitation threshold [%]		0.00 - 200.00	40.00	2
P2362[0...2]	Cavitation protection time [s]		0 - 65000	30	2
P2365[0...2]	Hibernation enable / disable		0 - 1	0	2
	0	Disabled			
	1	Enabled			
P2940	BI: Release wobble function		-	0.0	2
P2945	Wobble signal frequency [Hz]		0.001 - 10.000	1.000	2
P2946	Wobble signal amplitude [%]		0.000 - 0.200	0.000	2
P2947	Wobble signal decrement step		0.000 - 1.000	0.000	2
P2948	Wobble signal increment step		0.000 - 1.000	0.000	2
P2949	Wobble signal pulse width [%]		0 - 100	50	2
r2955	CO: Wobble signal output [%]		-	-	2
r3113.0...15	CO / BO: Fault bit array		-	-	1
P3350[0...2]	Super torque mode		0 - 3	0	2
	0	Super torque modes disabled	2	Hammer start enabled	
	1	Super torque enabled	3	Blockage clearing enabled	
P3351[0...2]	BI: Super torque enable		-	0	2
P3352[0...2]	Super torque startup mode		0 - 2	1	2
	0	Enabled on first run after power-up			
	1	Enabled on every run			
	2	Enabled by digital input			
P3353[0...2]	Super torque ramp time [s]		0.0 - 650.0	5.0	2
P3354[0...2]	Super torque frequency [Hz]		0.0 - 599.0	5.0	2
P3355[0...2]	Super torque boost level [%]		0.0 - 200.0	150.0	2
P3356[0...2]	Super torque boost time [s]		0.0 - 20.0	5.0	2
P3357[0...2]	Hammer start boost level [%]		0.0 - 200.0	150.0	2
P3358[0...2]	Number of hammer cycles		1 - 10	5	2
P3359[0...2]	Hammer on time [ms]		0 - 1000	300	2
P3360[0...2]	Hammer off Time [ms]		0 - 1000	100	2
P3361[0...2]	Blockage clearing frequency [Hz]		0.0 - 599.0	5.0	2
P3362[0...2]	Blockage clearing reverse time [s]		0.0 - 20.0	5.0	2
P3363[0...2]	Enable rapid ramp		0 - 1	0	2
	0	Disable rapid ramp for blockage clearing			
	1	Enable rapid ramp for blockage clearing			
P3364[0...2]	Number of blockage clearing cycles		1 - 10	1	2
r3365	Status word: super torque		-	-	2
P3852[0...2]	BI: Enable frost protection		-	0	2
P3853[0...2]	Frost protection frequency [Hz]		0.00 - 599.00	5.00	2
P3854[0...2]	Condensation protection current [%]		0 - 250	100	2
P3900	End of quick commissioning		0 - 3	0	1
	0	No quick commissioning			
	1	End quick commissioning with factory reset			
	2	End quick commissioning			

Parameter	Description		Range	Factory default	Acc. level
	3	End quick commissioning only for motor data			
P8553	Menu type		0 - 1	0	1
	0	Menus with no text			
	1	Menus with some text			

A.2 Fault and warning codes

Fault code list

Fault	Description	Fault	Description
F1	Overcurrent	F62	Parameter cloning contents invalid
F2	Overvoltage	F63	Parameter cloning contents incompatible
F3	Undervoltage	F64	Inverter attempted to do an automatic clone during startup
F4	Inverter overtemperature	F71	USS setpoint fault
F5	Inverter I^2t	F72	USS / MODBUS setpoint fault
F6	Chip temperature rise exceeds critical levels	F80	AI lost input signal
F11	Motor overtemperature	F85	External fault
F12	Inverter temperature signal lost	F100	Watchdog reset
F20	DC ripple too high	F101	Stack overflow
F35	Auto restart after n	F221	PID feedback below minimum value
F41	Motor data identification failure	F222	PID feedback above maximum value
F51	Parameter EEPROM fault	F350	Configuration vector for the inverter failed
F52	Inverter software fault	F395	Acceptance test / confirmation pending
F60	Asic timeout	F410	Cavitation protection failure
F61	MMC / SD card parameter cloning failed	F452	Belt failure

- To navigate through the current list of faults, press ▲ or ▼.

- To clear / acknowledge the fault, press OK or acknowledge externally if the inverter has been set up so.

- To ignore the fault, press M.

After you acknowledge or ignore the fault, the screen returns to the previous display. The fault icon remains active until the fault is cleared / acknowledged.

Alarm code list

Alarm	Description	Alarm	Description
A501	Current limit	A600	RTOS overrun warning
A502	Overvoltage limit	A910	Vdc_max controller deactivated
A503	Undervoltage limit	A911	Vdc_max controller active
A504	Inverter overtemperature	A912	Vdc_min controller active
A505	Inverter I^2t	A921	AO parameters not set properly
A506	IGBT junction temperature rise warning	A922	No load applied to inverter
A507	Inverter temperature signal lost	A923	Both JOG left and JOG right are requested
A511	Motor overtemperature I^2t	A930	Cavitation protection warn
A535	Braking resistor overload	A936	PID autotuning active
A541	Motor data identification active	A952	Belt failure detected

Note that alarms cannot be acknowledged. They are cleared automatically once the warning has been rectified.