PowerXL™

DC1…E1
Variable Frequency Drives

Parameter Manual

Para-meter	Bezeichnung	Beschreibung	WE
P-01	f-max	Sets the upper limit for the speed of the motor. This can be set to any value between "f-min" and 5x the "motor nom frequency". When "Motor Nom Frequency" (P-09) is changed, P-01 is set to the value of P-09. "Motor Nom Speed" (P-10) = 0, the maximum speed limit will be displayed in Hz. "Motor Nom Speed" (P-10) > 0, the maximum speed limit will be displayed in rpm.	50.0 Hz
P-02	f-min	Sets the lower limit for the speed of the motor This can be set to any value between 0 and "f-max" (P-01). When "Motor Nom Frequency" (P-09) is changed, P-01 is set to zero.	0.0 Hz

…

E·T·N

Powering Business Worldwide

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Original operating manual
The German-language edition of this document is the original operating manual.

Translation of the original operating manual
All editions of this document other than those in German language are translations of the original operating manual.

1. Edition 2016, publication date 08/16
2. Edition 2016, publication date 11/16
3. Edition 2022, publication date 01/22
4. Edition 2022, publication date 05/22
See revision protocol in the "About this manual" chapter.

Danger!
Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.

- Ensure that devices cannot be accidentally retriggered.

- Verify isolation from the supply.

- Ground and short-circuit.

- Cover or enclose neighbouring units that are live.

- Follow the engineering instructions (IL) of the device concerned.

- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/ system.

- Before installation and before touching the device ensure that you are free of electrostatic charge.

- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalizing. The system installer is responsible for implementing this connection.

- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.

- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.

- Suitable safety hardware and software measures should be implemented for the I/O connection so that a cable or wire breakage on the signal side does not result in undefined states in the automation device.

- Ensure a reliable electrical isolation of the low voltage for the 24 V supply. Only use power supply units complying with IEC 60364-4-41 or HD 384.4.41 S2 (VDE 0100 part 410).

- Deviations of the mains voltage from the nominal value must not exceed the tolerance limits given in the technical data, otherwise this may cause malfunction and dangerous operation.

- Emergency-Stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency switching off devices must not cause restart.

- Built-in devices for enclosures or cabinets must only be run and operated in an installed state, desk-top devices or portable devices only when the housing is closed.

- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency switching off devices should be implemented.

- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks, etc.).

- During operation, and depending on their degree of protection, variable frequency drives may have live, uninsulated, moving, and/or rotating parts, as well as hot surfaces.

- The impermissible removal of the required cover, improper installation or incorrect operation of the motor or variable frequency drive can cause the failure of the device and serious injury and/or material damage.

- Comply with all applicable national accident prevention regulations (e.g. BGV A3) when working with energized variable frequency drives.

- The electrical installation must be carried out in accordance with the relevant regulations (e.g. with regard to cable cross sections, fuses, PE).

- All transport, installation, commissioning and mainte-nance work must only be carried out by trained personnel (observe IEC 60364, HD 384 or DIN VDE 0100 and national accident prevention regulations).

- If applicable, systems in which variable frequency drives are installed must be equipped with additional monitoring and protective devices in accordance with the applicable safety regulations, e.g., the German Equipment and Product Safety Act, accident prevention regulations, etc. Making changes to the variable frequency drives by using the operating software is allowed.

- Keep all covers and doors closed during operation.

- When designing the machine, the user must incorporate mechanisms and measures that limit the consequences of a drive controller malfunction or failure (an increase in motor speed or the motor?9s sudden stop) so as to prevent hazards to people and property, e.g.:

  – Additional stand-alone devices for monitoring parame-ters that are relevant to safety (speed, travel, end positions, etc.)

  – Electrical and non-electrical safety devices (interlocks or mechanical locks) for mechanisms that protect the entire system

  – Due to the possibility of there being capacitors that are still holding a charge, do not touch live device parts or terminals immediately after disconnecting the variable frequency drives from the supply voltage. Heed the corresponding labels on the variable frequency drives

Content

0 About this manual

This manual provides special information that is intended to enable you to configure the parameters of a variable frequency drive in the DC1…E1 series according to your needs.

The details apply to the indicated hardware and software versions.

➡️   The general description (installation, technical data, etc.) of the variable frequency drives in the DC1…E1 series can be found in the manual MN040023EN ("installation manual").

0.1 Target audience

This manual MN040022EN is intended for engineers and electricians. Electrical engineering and practical knowledge and skills will be required in order to be able to commission these devices.

We assume that you have a good knowledge of engineering fundamentals and that you are familiar with handling electrical systems and machines, as well as with reading technical drawings.

0.2 List of revisions

Publication date	Page	Description	New	Modi-fied	Deleted
05/22	34 ff.	Parameter		✓	
01/22	16–29	Configuration of the control signal terminals		✓	
	28	P-12 = 12	✓		
	30	List of messages		✓	
	33	DX-COM-STICK2 replaced by DX-COM-STICK…		✓	
	48	Parameter P-69, P-70	✓		
11/16		P-12 = 12: SWD Control + setpoint, auto			✓
08/16	–	First edition			

0.3 Writing conventions

Symbols with the following meaning are used in this manual:

▶ Indicates instructions to be followed.

0.3.1 Safety warning concerning property damage

> *ATTENTION*
> Indicates a potentially hazardous situation that may result in property damage.

0.3.2 Safety warning concerning personal injury hazards

> **CAUTION**
> Warns of hazardous situations that may cause slight injury.

> **WARNING**
> Warns of hazardous situations that could result in serious injury or death.

> **DANGER**
> Warns of hazardous situations that result in serious injury or death.

0.3.3 Hints

Indicates useful tips.

All the specifications in this manual refer to the hardware and software versions documented in it.

More information on the devices described here can be found online at:

www.eaton.eu/powerxl

as well as:

www.eaton.eu/documentation

1 General

1.1 Parameter groups

The functions of the DC1 variable frequency drive are configured using parameters. These parameters are subdivided into four groups (P00-01 to P00-50, P-01 to P-14, P-15 to P-59, and P-60 to P-70):

Table 1:   Parameter Groups

Parameter group	Subject
P00-01 – P00-50	Monitor
P-01 – P-14	"Basic" (Level 1)
P-15 – P-59	"Extended" (Level 2)
P-60 – P-70	"Advanced" (Level 3)

➜ The graphic on the following page ("Menu structure") shows how to switch between the parameter groups.

Default setting

By default (= unit as supplied), only parameter group 1 (Level 1 "Basic") is accessible.

"Extended" and "Advanced" parameter group

The "Extended" parameter group (Level 2) can be accessed by entering a password in parameter P-14.

The default password is:

- Access to the "Extended" parameter group (Level 2): 101
  Users can change this password as required.
- Change the password for the "Extended" parameter group by changing the value of parameter P-37
- "Advanced" parameter group (Level 3):
  Access the parameter group by entering the password for Level 2
  (P-37 + 100).

1.2 Menu structure

Monitor   "Basic"   "Extended"   "Advance"

P00-31 32	P00-01 02	OK ↔ P0-00	P-01 02	P-15 16	P-60 61
.	.		.	.	.
▲▼	▲▼		▲▼	▲▼	▲▼
.	.		.	.	.
.	.		.	.	.
.	.		.	.	.
49 50	19 20		13 14	58 59	67 68

Level 1

Password entry

Level 2, "Extended" (password set with: P-37, default password = 101)

Level 3, "Advanced" (password set with: P-37 + 100, default password = 201)
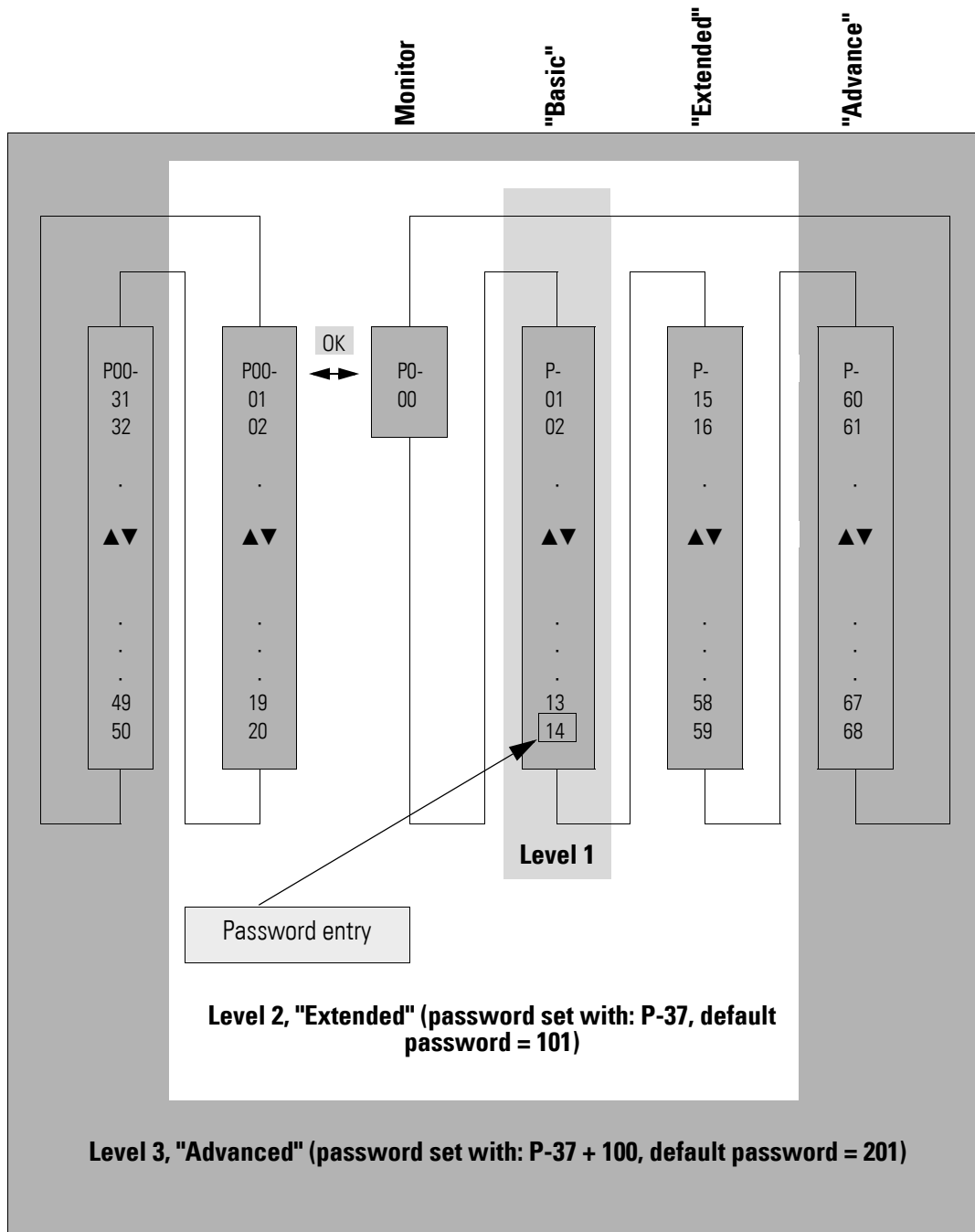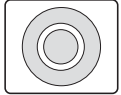
2 Keypad

2.1 Keypad elements

The following figure shows the elements of the integrated keypad for the DC1 variable frequency drive.

Display

Buttons

Figure 1:   View of keypad

Table 2:   Keypad elements – Buttons

Button	Command	Explanation
OK	**OK**	• Opens and closes the parameter interface • Saves parameter values
	START	• Starts the variable frequency drive[1] • Changes the operating direction[2]
	STOP	• Stops the variable frequency drive[1] • Reset – Reset after an error message
	UP	• Increases the speed[1] • Increases the parameter value
	DOWN	• Decreases the speed[1] • Decreases the parameter value
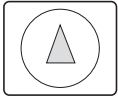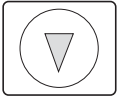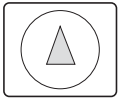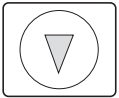
Note:
1)   Only if P-12 = 1 (one operating direction) or = 2 (two operating directions)
2)   Only if P-12 = 2
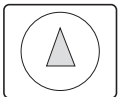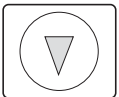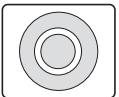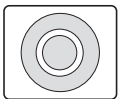
2.2 Setting parameters

Table 3:   Navigating within the keypad

Commands	Description
OK	Press the **OK** button and hold it down for two seconds to access the parameter interface → The display shows the parameter that was used last.
▲ ▼	Select the parameters using the ▲ and ▼ buttons
OK	Press the **OK** button.
▲ ▼	Use the ▲ and ▼ buttons to change the parameter's value
OK	Press the **OK** button to confirm the parameter value change.
OK	Press the **OK** button and hold it down for two seconds to exit the parameter interface
Navigating between parameter groups	
	The parameters are in sequential order. This means that moving forward from the last parameter in a parameter group will take you to the first parameter in the next parameter group and the other way around.
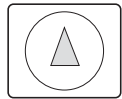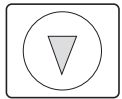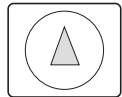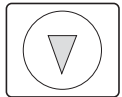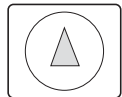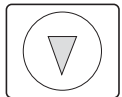
2.3 Resetting parameters (RESET)

Table 4:   Resetting parameters (RESET)

Commands	Description
Reset to default settings	
▲ ▼ ◎	Press the ▲ and ▼ and STOP buttons and hold them down for two seconds. → All parameters will be restored to their default settings. The keypad will show *P - dE F* .
Reset after a fault	
◎	Press the **STOP** button to reset after a fault.

2.4 "Extended" parameter set

Table 5: Opening and exiting the "Extended" parameter set

Commands	Description
Open the extended parameter set	
OK	Press the **OK** button and hold it down for two seconds to access the parameter interface. → The display shows the parameter that was used last.
△ ▽	Use the ▲ and ▼buttons to select parameter P-14.
OK	Press the **OK** button.
△ ▽	Use the ▲ and ▼ buttons to enter the password set with P-37 (default setting: 101).
OK	Press the **OK** button to confirm. → The "Extended" parameter set (parameters > P-14 and display values P00-…) will now be available.
Exit the "Extended" parameter set	
△ ▽	Use the ▲ and ▼ buttons to set a value for P-14 that does not match the password (P-37).
OK	Press the **OK** button to confirm. → Only the "Basic" parameters, i.e. the parameters P-01 to P-14), will now be accessible.

→ The extended parameter set (default setting for P-37 = 101) contains parameters P-01 to P-59.
Additional parameters (up to to P-68) can be configured for specific applications.
The password that needs to be entered in P-14 is equal to the value yielded by P-37 + 100.
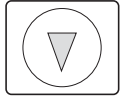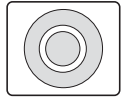
2.5 "Monitor" submenu

Table 6:   "Monitor" submenu

Commands	Description
Open the "Monitor" submenu	
	The "Extended" parameter group (Level 2) must be enabled with parameter P-14.
	Use the ▲ and ▼ buttons to select parameter P-00.
	Press the **OK** button. → The submenu with P00-01 to P00-30 will now be accessible. **Note:** The parameter range from P00-01 to P00-50 is available in the menu for "Advanced" users (Level 3).
Navigate within the "Monitor" submenu	
	Use the ▲ and ▼ buttons to select parameters P00-01 to P00-30 (or P00-01 to P00-50 in the case of level 3).
	Press the **OK** button to confirm.
Exit the "Monitor" submenu	
	Press the **OK** button (several times if necessary). → Only parameter P-00 will be available now.

2.6 Control via the keypad

Table 7: Control via the keypad

Button	Command	Explanation
OK	**OK**	P-12 = 1 or = 2 • P-12 = 1: one operating direction (FWD) • P-12 = 2: two operating directions (FWD/REV)
(I)	**START**	Starts the variable frequency drive
(▲) (▼)		▲ Increase speed ▼ Decrease speed
(I)	**START**	Changes the operating direction if the motor is running. **Note:** Only if P-12 = 2
OK	**OK**	Changes the value being displayed: A, rpm, etc.
(◉)	**STOP**	Stops the variable frequency drive.

Note:
In this mode, a high-level signal must be applied at terminal 2 (DI1) as an enable signal for the DC1 variable frequency drive.

3 Control signal terminals

3.1 Correspondence between the inputs/outputs and terminals

Input/output	Terminals
Inputs	
DI1	Terminal 2
DI2	Terminal 3
DI3/AI2	Terminal 4
DI4/AI1	Terminal 6
Outputs	
A01/D01	Terminal 8
R01 (relay, N/O)	Terminals 10/11

You can select predefined terminal configurations in the settings for P-15.

The setting (digital/analog) for terminals 4 and 6 will be configured automatically based on the value set for P-15.

→ See also the section "Control signal terminal connection information and functions" in the installation manual MN040023EN.

The following abbreviations are used throughout this document:

Table 8:   Abbreviations

Abbreviation	Meaning
AI1 REF	Analog input AI1 (terminal 6) Used as a speed setpoint input • P-16: Configuration (voltage input, current input, etc.) • P-35: Scaling • P-39: Offset
AI2 REF	Analog input AI2 (terminal 4) Used as a speed setpoint input. • P-47: Configuration (voltage input, current input, etc.)
DIR	Used to select an operating direction Used together with the START command. • Low = Forward (FWD) • High = Reverse (REV) **Note:** If there is a wire breakage and the REV operating direction is selected, this will cause the drive to reverse! Alternative: Use configuration with FWD/REV.
DOWN	Used to reduce the speed if a digital setpoint value is selected (P-12 = 1 or = 2). Used together with the UP command.
ENA	Variable frequency drive enable signal A start signal (START, FWD, REV) is additionally required for starting. If ENA is removed, the drive will coast.
EXTFLT	External fault This enables an external signal to be incorporated into the variable frequency drive's error messages. A high-level signal must be present on the terminal during operation. A low-level signal causes the drive to switch off with the E-tr iP error message.
FWD	Used to start the drive in the forward direction (FWD = Forward) If a high-level signal is applied at the corresponding terminal, the drive will accelerate with the selected ramp. Removing the signal will cause the drive to stop. In this case, the specific way in which it stops will depend on the value set for P1-05 (stop mode). Once the variable frequency drive stops, it will be locked. In applications with two operating directions, the reverse direction can be selected with REV. FWD and REV are XOR'd. If both signals are applied simultaneously, the drive will ramp down to zero with the quick stop ramp (P-24).
INV	Used to reverse the operating direction The operating direction will be reversed as per the configured ramps: Low = do not reverse, High = reverse
Pulse FWD (NO) Pulse REV (NO) Pulse STOP (NC)	Pulse control Used to control the drive like a latching reversing contactor circuit. The Pulse STOP signal must always be present when operating the drive. If the signal is not present, it will not be possible to start the drive / the drive will ramp down to zero. To start, all that is required is a pulse via the FWD (forward) or REV (reverse) signal. The FWD and REV signals do not need to be continuously applied during operation.
REV	Used to start the drive in the reverse direction (REV = Reverse) If a high-level signal is applied at the corresponding terminal, the drive will accelerate with the selected ramp. Removing the signal will cause the drive to stop. In this case, the specific way in which it stops will depend on the value set for P-05 (stop mode). Once the variable frequency drive stops, it will be locked. In applications with two operating directions, the forward direction is selected with FWD. FWD and REV are XOR'd. If both signals are applied simultaneously, the drive will ramp down to zero with the quick stop ramp (P-24).
Select AI1 REF/AI2 REF	Used to select between the analog setpoint values on AI1 (terminal 6) and AI2 (terminal 4) • AI1 = Low • AI2 = High
Select AI1 REF/f-Fix	Used to select between the analog speed reference value at analog input 1 (AI1 = terminal 6) and a fixed frequency. The fixed frequency itself can be selected with the Select f-Fix Bit0, Select f-Fix Bit1, Select f-Fix Bit2 commands. • Low = Analog setpoint value • High = fixed frequency

3 Control signal terminals

3.1 Correspondence between the inputs/outputs and terminals

Abbreviation	Meaning
Select AI1 REF/f-Fix1	Used to select between the analog speed reference value at analog input 1 (AI1 = terminal 6) and fixed frequency 1 (f-Fix1), which is set with P-20. • Low = Analog setpoint value • High = f-Fix1
Select AI1 REF/f-Fix2	Used to select between the analog speed reference value at analog input 1 (AI1 = terminal 6) and the fixed frequency (f-Fix2) set with P-21. • Low = Analog setpoint value • High = f-Fix2
Select BUS REF/AI1 REF	Used to select between setpoint values • Low = Setpoint value from bus • High = AI1
Select BUS REF/DIG REF	Used to select between setpoint values • Low = Setpoint value from bus • High = fixed frequency The fixed frequency itself is selected with the Select f-Fix Bit0, Select f-Fix Bit1 commands.
Select BUS REF/f-Fix1	Used to select between the setpoint value from the bus and fixed frequency 1 (f-Fix1), which is set with P-20 • Low = Setpoint value from bus • High = f-Fix1
Select BUS REF/f-Fix4	Used to select between the setpoint value from the bus and fixed frequency 4 (f-Fix4), which is set with P-23 • Low = Setpoint value from bus • High = f-Fix4
Select DIG REF/AI1 REF	Used to select between the digital speed reference value, set with the keypad or with the UP and DOWN commands, and analog setpoint value AI1 REF (terminal 6) • Low = Digital setpoint value • High = AI1
Select DIG REF/f-Fix1	Used to select between the digital speed reference value, set with the keypad or with the UP and DOWN commands, and fixed frequency 1 (f-Fix1) set with P-20. • Low = Digital setpoint value • High = f-Fix1
Select DIG REF/f-Fix4	Used to select between the digital speed reference value (set with the keypad or with the UP and DOWN commands) and fixed frequency 4 (f-Fix4), which is set with P-23 • Low = Digital setpoint value • High = f-Fix4
Select f-Fix Bit0/f-Fix Bit1	Used to select a fixed frequency with digital commands Fixed frequencies f-Fix1 to f-Fix4 are defined with parameters P-20 to P-23. _table below_ 0 = Low 1 = High
Select f-Fix/BUS REF	Used to select between a fixed frequency and the setpoint value from the bus. • Low = Fixed frequency • High = Setpoint value from bus
Select f-Fix/DIG REF	Used to select between a fixed frequency and the digital setpoint value, which is set with the keypad or with the UP and DOWN commands. • Low = Fixed frequency • High = Digital setpoint value

Table within "Select f-Fix Bit0/f-Fix Bit1":

Fixed	Bit 1	Bit 0
f-Fix1 (P-20)	0	0
f-Fix2 (P-21)	0	1
f-Fix3 (P-22)	1	0
f-Fix4 (P-23)	1	1

Abbreviation	Meaning
Select f-Fix/f-max	Used to select between a fixed frequency and the maximum speed set with P-01. • Low = Fixed frequency • High = maximum speed The fixed frequency itself is selected with the Select f-Fix Bit0 or Select f-Fix Bit1 commands.
Select f-Fix2/f-Fix4	Used to select between f-Fix2 and f-Fix4 • Low = f-Fix2 • High = f-Fix4
Select f-Fix4/AI1 REF	Used to select between f-Fix4 and the analog setpoint value (terminal 6) • Low = f-Fix4 • High = Analog setpoint value
Select f-Fix4/BUS REF	Used to select between fixed frequency f-Fix4 (P-23) and the setpoint value from the bus • Low = f-Fix4 • High = Setpoint value from bus
Select f-Fix4/DIG REF	Used to select between fixed frequency f-Fix4 (P-23) and the digital setpoint value, which is set with the keypad or with the UP and DOWN commands • Low = f-Fix4 • High = Digital setpoint value
Select f-Fix4/f-Fix2	Used to select between f-Fix4 and f-Fix2 • Low = f-Fix4 • High = f-Fix2
Select f-Fix4/PI REF	Used to select between fixed frequency 4 (f-Fix4) and the setpoint value from the PI controller's output • Low = f-Fix4 • High = Setpoint value from PI controller output
Select Fire Mode/Normal OP	The fire mode function allows the variable frequency drive to keep running in emergency situations until it is no longer able to work. When this mode is selected, drive fault signals will be ignored. • Low = Fire mode • High = Normal mode
Select PI REF/AI1 REF	Used to select between setpoint values • Low = setpoint from the PI controller's output • High = AI1
Select PI REF/f-Fix1	Used to select between setpoint values • Low = setpoint from the PI controller's output • High = f-Fix1, set with P-20
Select t-dec/t-Quick-dec	This command must be present (there must be a high-level signal at the corresponding terminal) in order to be able to run the variable frequency drive. If the signal is removed (low level), the unit will immediately do a quick stop with the ramp defined in P-24.
START	Used to start/stop the drive If a high-level signal is applied at the corresponding terminal, the drive will accelerate with the selected ramp. Removing the signal will cause the drive to stop. In this case, the specific way in which it stops will depend on the value set for P-05 (stop mode). Once the variable frequency drive stops, it will be locked. In applications with two operating directions, the directions are selected using the DIR and INV commands.
START INV	In applications in which the keypad is used to set a setpoint value: When the START command is issued, the drive will start running in the operating direction that was last selected. If START INV is used to start the drive, the drive will run in the opposite direction.
UP	Used to increase the speed if a digital setpoint is selected (P-12 = 1 or = 2). Used together with the DOWN command.

3.2 Configuration of the control signal terminals

3.2.1 P-12 = 0: Local – Control and setpoint via digital and analog inputs

Table 9:   P-12 = 0: Local – Control and setpoint via digital and analog inputs

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	DIR	Select AI1 REF/f-Fix1	AI1 REF
1	FWD	Select AI1 REF/f-Fix	Select f-Fix Bit0	AI1 REF
2	FWD	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix/f-max
3	FWD	Select AI1 REF/f-Fix1	EXTFLT	AI1 REF
4	FWD	Select AI1 REF/AI2 REF	AI2 REF	AI1 REF
5	FWD	REV	Select AI1 REF/f-Fix1	AI1 REF
6	START	DIR	EXTFLT	AI1 REF
7	FWD	REV	EXTFLT	AI1 REF
8	START	DIR	Select f-Fix Bit0	Select f-Fix Bit1
9	FWD	REV	Select f-Fix Bit0	Select f-Fix Bit1
10	Pulse FWD (NO)	Pulse STOP (NC)	Select AI1 REF/f-Fix1	AI1 REF
11	Pulse FWD (NO)	Pulse STOP (NC)	Pulse REV (NO)	AI1 REF
12	FWD	Select t-dec/t-QuickDec	Select AI1 REF/f-Fix1	AI1 REF
13	FWD	Select f-Fix Bit0	EXTFLT	Select f-Fix Bit1
14	Pulse FWD (NO)	Pulse STOP (NC)	Pulse REV (NO)	Select DIG REF/f-Fix1
15	FWD	Select f-Fix4/AI1 REF	Select Fire Mode/Normal OP	AI1 REF
16	FWD	Select f-Fix4/f-Fix2	Select Fire Mode/Normal OP	DIR
17	FWD	Select f-Fix Bit0	Select Fire Mode/Normal OP	Select f-Fix Bit1

The setpoint and the control commands are set via terminals.

3.2.2 P-12 = 1: Local – Control and digital setpoint using the keypad, one operating direction

Table 10:   P-12 = 1: Local – Control and digital setpoint using the keypad, one operating direction

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	UP	DOWN	DIR
1	START	UP	DOWN	DIR
2	FWD	UP	DOWN	Select DIG REF/f-Fix1
3	FWD	UP	EXTFLT	DOWN
4	START	UP	Select DIG REF/AI1 REF	AI1 REF
5	START	UP	DOWN	DIR
6	START	DIR	EXTFLT	Select DIG REF/f-Fix1
7	FWD	REV	EXTFLT	Select DIG REF/f-Fix1
8	START	UP	DOWN	DIR
9	START	UP	DOWN	DIR
10	START	UP	DOWN	DIR
11	START	UP	DOWN	DIR
12	START	UP	DOWN	DIR
13	FWD	No function	EXTFLT	No function
14	START	UP	DOWN	DIR
15	FWD	Select f-Fix/DIG REF	Select Fire Mode/Normal OP	Select f-Fix4/f-Fix2
16	FWD	Select f-Fix4/DIG REF	Select Fire Mode/Normal OP	DIR
17	FWD	Select DIG REF/f-Fix4	Select Fire Mode/Normal OP	DIR

The setpoint value is set using the keypad = digital setpoint value.
The arrow buttons are used to adjust the setpoint value.

3.2.3 P-12 = 2: Local – Control and digital setpoint using the keypad, two operating directions

Table 11:   P-12 = 2: Local – Control and digital setpoint using the keypad,
two operating directions

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	UP	DOWN	DIR
1	START	UP	DOWN	DIR
2	FWD	UP	DOWN	Select DIG REF/f-Fix1
3	FWD	UP	EXTFLT	DOWN
4	START	UP	Select DIG REF/AI1 REF	AI1 REF
5	START	UP	DOWN	DIR
6	START	DIR	EXTFLT	Select DIG REF/f-Fix1
7	FWD	REV	EXTFLT	Select DIG REF/f-Fix1
8	START	UP	DOWN	DIR
9	START	UP	DOWN	DIR
10	START	UP	DOWN	DIR
11	START	UP	DOWN	DIR
12	START	UP	DOWN	DIR
13	FWD	No function	EXTFLT	No function
14	START	UP	DOWN	DIR
15	FWD	Select f-Fix/DIG REF	Select Fire Mode/Normal OP	Select f-Fix4/f-Fix2
16	FWD	Select f-Fix4/DIG REF	Select Fire Mode/Normal OP	DIR
17	FWD	Select DIG REF/f-Fix4	Select Fire Mode/Normal OP	DIR

The setpoint value is set using the keypad = digital setpoint value.
The arrow buttons are used to adjust the setpoint value.

P-12 = 2: If the motor is running, pressing the green button again will reverse the operating direction. The last operating direction will be stored when the unit is switched off.

3.2.4 P-12 = 3: Modbus – Internal acceleration and deceleration ramps, control via fieldbus

Table 12:   Modbus – Internal acceleration and deceleration ramps,
control via fieldbus

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	No function	No function	No function
1	Not permissible	Not permissible	Not permissible	Not permissible
2	START	No function	No function	No function
3	START	Select BUS REF/f-Fix1	EXTFLT	No function
4	START	No function	No function	No function
5	START	Select f-Fix/BUS REF	Select f-Fix1/f-Fix2	No function
6	START	Select BUS REF/AI1 REF	EXTFLT	AI1 REF
7	START	Select BUS REF/DIG REF	EXTFLT	No function
8	START	No function	No function	No function
9	START	No function	No function	No function
10	START	No function	No function	No function
11	START	No function	No function	No function
12	START	No function	No function	No function
13	START	No function	EXTFLT	No function
14	START	No function	No function	No function
15	FWD	Select f-Fix/BUS REF	Select Fire Mode/Normal OP	Select f-Fix4/f-Fix2
16	FWD	Select f-Fix4/BUS REF	Select Fire Mode/Normal OP	No function
17	FWD	Select DIG REF/f-Fix4	Select Fire Mode/Normal OP	No function

3.2.5 P-12 = 4: Modbus – Control, setpoint and ramps via fieldbus

Table 13:   P-12 = 4: Modbus – Control, setpoint and ramps via fieldbus

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	No function	No function	No function
1	Not permissible	Not permissible	Not permissible	Not permissible
2	START	No function	No function	No function
3	START	Select BUS REF/f-Fix1	EXTFLT	No function
4	START	No function	No function	No function
5	Not permissible	Not permissible	Not permissible	Not permissible
6	START	Select BUS REF/AI1 REF	EXTFLT	AI1 REF
7	START	Select BUS REF/DIG REF	EXTFLT	No function
8	START	No function	No function	No function
9	START	No function	No function	No function
10	START	No function	No function	No function
11	START	No function	No function	No function
12	START	No function	No function	No function
13	START	No function	EXTFLT	No function
14	START	No function	No function	No function
15	FWD	Select f-Fix/BUS REF	Select Fire Mode/Normal OP	Select f-Fix4/f-Fix2
16	FWD	Select f-Fix4/BUS REF	Select Fire Mode/Normal OP	No function
17	FWD	Select DIG REF/f-Fix4	Select Fire Mode/Normal OP	No function

3.2.6 P-12 = 5: Local – PID controller

Table 14:   P-12 = 5: Local – PID controller

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	FWD	Select PI REF/f-Fix1	No function	No function
1	FWD	Select PI REF/AI1 REF	No function	AI1 REF
2	FWD	Select PI REF/f-Fix1	No function	No function
3	FWD	Select PI REF/f-Fix1	No function	PI feedback
4	Pulse FWD (NO)	Pulse STOP (NC)	No function	No function
5	Pulse FWD (NO)	Pulse STOP (NC)	PI REF/f-Fix1	No function
6	Pulse FWD (NO)	Pulse STOP (NC)	EXTFLT	No function
7	FWD	Select PI REF/f-Fix1	No function	PI feedback
8	START	FWD/REV	AI2 REF	No function
9	FWD	Select PI REF/f-Fix1	No function	No function
10	FWD	Select PI REF/f-Fix1	No function	No function
11	FWD	Select PI REF/f-Fix1	No function	No function
12	FWD	Select PI REF/f-Fix1	No function	No function
13	START	No function	EXTFLT	No function
14	FWD	Select PI REF/f-Fix1	No function	No function
15	FWD	Select f-Fix4/PI REF	Select Fire Mode/Normal OP	No function
16[1]	FWD	Select f-Fix4/f-Fix2	Select Fire Mode/Normal OP	No function
17[1]	FWD	Select f-Fix2/f-Fix4	Select Fire Mode/Normal OP	No function

1)   If P-15 = 16 or 17, the fixed frequencies will only be enabled in fire mode.

3.2.7 P-12 = 6: Local – PID controller with summation of AI1

Table 15: P-12 = 6: Local – PI controller with summation of AI1

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	FWD	Select PI REF/f-Fix1	No function	No function
1	FWD	Select PI REF/AI1 REF	No function	AI1 REF
2	FWD	Select PI REF/f-Fix1	No function	No function
3	FWD	Select PI REF/f-Fix1	No function	PI feedback
4	Pulse FWD (NO)	Pulse STOP (NC)	No function	No function
5	Pulse FWD (NO)	Pulse STOP (NC)	PI REF/f-Fix1	No function
6	Pulse FWD (NO)	Pulse STOP (NC)	EXTFLT	No function
7	FWD	Select PI REF/f-Fix1	No function	PI feedback
8	START	FWD/REV	AI2 REF	No function
9	FWD	Select PI REF/f-Fix1	No function	No function
10	FWD	Select PI REF/f-Fix1	No function	No function
11	FWD	Select PI REF/f-Fix1	No function	No function
12	FWD	Select PI REF/f-Fix1	No function	No function
13	START	No function	EXTFLT	No function
14	FWD	Select PI REF/f-Fix1	No function	No function
15	FWD	Select f-Fix4/PI REF	Select Fire Mode/Normal OP	No function
16[1]	FWD	Select f-Fix4/f-Fix2	Select Fire Mode/Normal OP	No function
17[1]	FWD	Select f-Fix2/f-Fix4	Select Fire Mode/Normal OP	No function

1) If P-15 = 16 or 17, the fixed frequencies will only be enabled in fire mode.

3.2.8 P-12 = 7: CANopen – Internal acceleration and deceleration ramps, control via fieldbus

Table 16:   P-12 = 7: CANopen – Internal acceleration and deceleration ramps, control via fieldbus

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	No function	No function	No function
1	START	No function	No function	No function
2	START	No function	No function	No function
3	START	Select BUS REF/f-Fix	EXTFLT	No function
4	START	No function	No function	No function
5	START	Select BUS REF/f-Fix	Select f-Fix1/f-Fix2	No function
6	START	Select BUS REF/AI1 REF	EXTFLT	AI1 REF
7	START	Select BUS REF/DIG REF	EXTFLT	No function
8	START	No function	No function	No function
9	START	No function	No function	No function
10	START	No function	No function	No function
11	START	No function	No function	No function
12	START	No function	No function	No function
13	START	No function	EXTFLT	No function
14	START	No function	No function	No function
15	FWD	Select f-Fix/BUS REF	Select Fire Mode/Normal OP	Select f-Fix4/f-Fix2
16	FWD	Select f-Fix4/BUS REF	Select Fire Mode/Normal OP	No function
17	FWD	Select BUS REF/f-Fix4	Select Fire Mode/Normal OP	No function

3.2.9 P-12 = 8: CANOpen – Control, setpoint and ramps via fieldbus

Table 17:   P-12 = 8: CANOpen – Control, setpoint and ramps via fieldbus

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	No function	No function	No function
1	START	No function	No function	No function
2	START	No function	No function	No function
3	START	Select BUS REF/f-Fix1	EXTFLT	No function
4	START	No function	No function	No function
5	START	Select BUS REF/f-Fix1	Select f-Fix1/f-Fix2	No function
6	START	Select BUS REF/AI1 REF	EXTFLT	AI1 REF
7	START	Select BUS REF/DIG REF	EXTFLT	No function
8	START	No function	No function	No function
9	START	No function	No function	No function
10	START	No function	No function	No function
11	START	No function	No function	No function
12	START	No function	No function	No function
13	START	No function	EXTFLT	No function
14	START	No function	No function	No function
15	FWD	Select f-Fix/BUS REF	Select Fire Mode/Normal OP	Select f-Fix4/f-Fix2
16	FWD	Select f-Fix4/BUS REF	Select Fire Mode/Normal OP	No function
17	FWD	Select BUS REF/f-Fix4	Select Fire Mode/Normal OP	No function

3.2.10 P-12 = 9: PROFIdrive – Control and setpoint via fieldbus

Table 18: P-12 = 9: PROFIdrive – Control and setpoint via fieldbus

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	No function	Select AI1 REF/f-Fix1	AI1 REF
1	START	Select AI1 REF/f-Fix	Select f-Fix1/f-Fix2	AI1 REF
2	START	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix/max. speed
3	START	Select AI1 REF/f-Fix1	EXTFLT	AI1 REF
4	START	Select AI1 REF/AI2 REF	AI2 REF	AI1 REF
5	START	No function	Select AI1 REF/f-Fix1	AI1 REF
6	START	No function	EXTFLT	AI1 REF
7	START	No function	EXTFLT	AI1 REF
8	START	No function	Select f-Fix Bit0	Select f-Fix Bit1
9	START	No function	Select f-Fix Bit0	Select f-Fix Bit1
10	START	No function	Select AI1 REF/f-Fix1	AI1 REF
11	START	No function	Select AI1 REF/f-Fix1	AI1 REF
12	START	No function	Select AI1 REF/f-Fix1	AI1 REF
13	START	No function	EXTFLT	No function
14	START	No function	Select AI1 REF/f-Fix1	AI1 REF
15[1]	START	No function	Select Fire Mode/Normal OP	No function
16[2]	START	Select AI1/f-Fix2	Select Fire Mode/Normal OP	AI1 REF
17	START	Select f-Fix Bit0	Select Fire Mode/Normal OP	Select f-Fix Bit1

1) If P-15 = 15 and fire mode is active, the drive will run with fixed frequency 4 (f-Fix4), which is set with P-13.
2) If P-15 = 16, the setpoint value selection will be independent from fire mode.

3.2.11 P-12 = 10: PROFIdrive: Control via network, local setpoint

Table 19:   P-12 = 10: PROFIdrive: Control via network, local setpoint

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	No function	Select AI1 REF/f-Fix1	AI1 REF
1	START	Select AI1 REF/f-Fix	Select f-Fix1/f-Fix2	AI1 REF
2	START	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix/max. speed
3	START	Select AI1 REF/f-Fix1	EXTFLT	AI1 REF
4	START	Select AI1 REF/AI2 REF	AI2 REF	AI1 REF
5	START	No function	Select AI1 REF/f-Fix1	AI1 REF
6	START	No function	EXTFLT	AI1 REF
7	START	No function	EXTFLT	AI1 REF
8	START	No function	Select f-Fix Bit0	Select f-Fix Bit1
9	START	No function	Select f-Fix Bit0	Select f-Fix Bit1
10	START	No function	Select AI1 REF/f-Fix1	AI1 REF
11	START	No function	Select AI1 REF/f-Fix1	AI1 REF
12	START	No function	Select AI1 REF/f-Fix1	AI1 REF
13	START	No function	EXTFLT	No function
14	START	No function	Select AI1 REF/f-Fix1	AI1 REF
15[1]	START	No function	Select Fire Mode/Normal OP	No function
16[2]	START	Select AI1/f-Fix2	Select Fire Mode/Normal OP	AI1 REF
17	START	Select f-Fix Bit0	Select Fire Mode/Normal OP	Select f-Fix Bit1

1)   If P-15 = 15 and fire mode is active, the drive will run with fixed frequency 4 (f-Fix4), which is set with P-13.
2)   If P-15 = 16, the setpoint value selection will be independent from fire mode.

3.2.12 P-12 = 11: PROFIdrive – Control via terminals, setpoint via fieldbus

Table 20:   P-12 = 11: PROFIdrive – Control via terminals, setpoint via fieldbus

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	No function	Select AI1 REF/f-Fix1	AI1 REF
1	START	Select AI1 REF/f-Fix	Select f-Fix1/f-Fix2	AI1 REF
2	START	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix/max. speed
3	START	Select AI1 REF/f-Fix1	EXTFLT	AI1 REF
4	START	Select AI1 REF/AI2 REF	AI2 REF	AI1 REF
5	START	No function	Select AI1 REF/f-Fix1	AI1 REF
6	START	No function	EXTFLT	AI1 REF
7	START	No function	EXTFLT	AI1 REF
8	START	No function	Select f-Fix Bit0	Select f-Fix Bit1
9	START	No function	Select f-Fix Bit0	Select f-Fix Bit1
10	START	No function	Select AI1 REF/f-Fix1	AI1 REF
11	START	No function	Select AI1 REF/f-Fix1	AI1 REF
12	START	No function	Select AI1 REF/f-Fix1	AI1 REF
13	START	No function	EXTFLT	No function
14	START	No function	Select AI1 REF/f-Fix1	AI1 REF
15[1]	START	No function	Select Fire Mode/Normal OP	No function
16[2]	START	Select AI1/f-Fix2	Select Fire Mode/Normal OP	AI1 REF
17	START	Select f-Fix Bit0	Select Fire Mode/Normal OP	Select f-Fix Bit1

1)   If P-15 = 15 and fire mode is active, the drive will run with fixed frequency 4 (f-Fix4), which is set with P-13.
2)   If P-15 = 16, the setpoint value selection will be independent from fire mode.

3.2.13 P-12 = 12: PROFIdrive: Control and setpoint via fieldbus, automatic switchover to local control (P-12 = 0) in the event of communication loss

Table 21:   P-12 = 12: PROFIdrive: Control and setpoint via fieldbus, automatic switchover to local control (P-12 = 0) in the event of communication loss

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	No function	Select AI1 REF/f-Fix1	AI1 REF
1	START	Select AI1 REF/f-Fix	Select f-Fix1/f-Fix2	AI1 REF
2	START	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix/max. speed
3	START	Select AI1 REF/f-Fix1	EXTFLT	AI1 REF
4	START	Select AI1 REF/AI2 REF	AI2 REF	AI1 REF
5	START	No function	Select AI1 REF/f-Fix1	AI1 REF
6	START	No function	EXTFLT	AI1 REF
7	START	No function	EXTFLT	AI1 REF
8	START	No function	Select f-Fix Bit0	Select f-Fix Bit1
9	START	No function	Select f-Fix Bit0	Select f-Fix Bit1
10	START	No function	Select AI1 REF/f-Fix1	AI1 REF
11	START	No function	Select AI1 REF/f-Fix1	AI1 REF
12	START	No function	Select AI1 REF/f-Fix1	AI1 REF
13	START	No function	EXTFLT	No function
14	START	No function	Select AI1 REF/f-Fix1	AI1 REF
15[1]	START	No function	Select Fire Mode/Normal OP	No function
16[2]	START	Select AI1/f-Fix2	Select Fire Mode/Normal OP	AI1 REF
17	START	Select f-Fix Bit0	Select Fire Mode/Normal OP	Select f-Fix Bit1

1)   If P-15 = 15 and fire mode is active, the drive will run with fixed frequency 4 (f-Fix4), which is set with P-13.
2)   If P-15 = 16, the setpoint value selection will be independent from fire mode.

3.2.14 P-12 = 13: Dual mode – Control and setpoint via PROFIdrive telegram – enable via DI1

Table 22:   P-12 = 13: Dual mode – Control and setpoint via PROFIdrive telegram –
enable via DI1

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	START	No function	Select AI1 REF/f-Fix1	AI1 REF
1	START	Select AI1 REF/f-Fix	Select f-Fix1/f-Fix2	AI1 REF
2	START	Select f-Fix Bit0	Select f-Fix Bit1	Select f-Fix/max. speed
3	START	Select AI1 REF/f-Fix1	EXTFLT	AI1 REF
4	START	Select AI1 REF/AI2 REF	AI2 REF	AI1 REF
5	START	No function	Select AI1 REF/f-Fix1	AI1 REF
6	START	No function	EXTFLT	AI1 REF
7	START	No function	EXTFLT	AI1 REF
8	START	No function	Select f-Fix Bit0	Select f-Fix Bit1
9	START	No function	Select f-Fix Bit0	Select f-Fix Bit1
10	START	No function	Select AI1 REF/f-Fix1	AI1 REF
11	START	No function	Select AI1 REF/f-Fix1	AI1 REF
12	START	No function	Select AI1 REF/f-Fix1	AI1 REF
13	START	No function	EXTFLT	No function
14	START	No function	Select AI1 REF/f-Fix1	AI1 REF
15[1]	START	No function	Select Fire Mode/Normal OP	No function
16[2]	START	Select AI1/f-Fix2	Select Fire Mode/Normal OP	AI1 REF
17	START	Select f-Fix Bit0	Select Fire Mode/Normal OP	Select f-Fix Bit1

1)   If P-15 = 15 and fire mode is active, the drive will run with fixed frequency 4 (f-Fix4), which is set with P-13.
2)   If P-15 = 16, the setpoint value selection will be independent from fire mode.

4 Messages

4.1 List of messages

Table 23:   Error messages list

Message	Error no. [dec]	Possible cause and remedy
StoP	–	Ready to start. There is no drive enable signal present. There are no error messages present.
OI -b	01	Excessively high braking current • Check the brake resistor and its wiring for short-circuits and ground faults. • Make sure that the braking resistance value is not lower than the minimum permissible braking resistance.
OL -br	02	Thermal overload on brake resistor. The drive has been switched off in order to prevent the brake resistor from being thermally destroyed. This message will only be output if P-34 = 1 ("braking chopper") • Make the P-04 and P-24 ramp times longer in order to have less frequent braking. • Reduce the load's inertia (if possible). If the protection achieved with P-34 = 1 is not adequate for the brake resistor being used: • Provide external protection for the brake resistor and set P-34 to a value of 2.
O -I	03	Overcurrent at variable frequency drive output Occurs right after switching on the unit: • Check the cable connection between the variable frequency drive and the motor • Check the motor for shorted windings and ground faults Occurs when starting the motor: • Check whether the motor can rotate freely and make sure that it is not being blocked mechanically. • Motor with mechanical brake: Check whether this has been triggered. • Check the connection configuration (star/delta) • Check to make sure that the correct rated motor current has been entered in P-08 • Increase the acceleration ramp time (t-acc, P-03) if necessary. • Reduce the voltage boost with P-11. Occurs during operation at a constant speed: • Check whether the motor is overloaded. Occurs during acceleration/deceleration: • The ramp times are too short and require too much power. If P-03/P-04 cannot be increased, a larger device may be required.
I.t -trP	04	Motor overload. The thermal protection mechanism has tripped as a result of the device being run above the rated motor current set with P-08 longer than a specific time. • Check to make sure that the rated motor current has been entered in P-08. • Check the motor's connection configuration (e.g., start/delta) • If the decimal points on the display flash during operation, this means that the unit is being run in its overload range (> P-08). In this case, use P-03 to make the acceleration ramp longer or reduce the load. • Check whether the motor is being blocked mechanically or whether there are any additional loads.
PS -trP	05	Overcurrent (Hardware) • Check the wiring to the motor and the motor itself for short-circuits and ground faults. • Disconnect the motor cable from the variable frequency drive and switch the variable frequency drive back on. • If the fault message still appears, the device needs to be replaced. Before commissioning the new device, check the system for short-circuits or ground faults that could have caused the device to fail.

Message	Error no. [dec]	Possible cause and remedy
O.Uol t	06	Overvoltage in DC link • Check to make sure that the supply voltage falls within the range for which the variable frequency drive is sized. If the error occurs during deceleration or stopping: • Make the deceleration ramp (P-04/P-24) longer or use the brake resistor and activate the braking chopper with P-34 (only on devices with frame size FS2, FS3, or FS4).
UUol t	07	Undervoltage in DC link **Note:** Generally, this message will appear when the supply voltage is switched off on the device and the DC link voltage dies away. In this case, there is no fault. If the message appears during operation: • Check whether the power supply voltage is too low. • Check all components/devices in the variable frequency drive's feeder circuit (circuit-breaker, contactor, choke, etc.) to make sure they are connected properly and have an adequate contact resistance.
O-t	08	Overtemperature at heat sink. The drive is too hot. • Check to make sure that the variable frequency drive is being operated within the ambient temperature range specified for it. (IP20 devices: max. 50 °C; IP66 devices: max. 40 °C). • Make sure that cooling air can circulate freely (clearances to neighboring devices above and below the variable frequency drive). • Improve the ventilation in the control cabinet if necessary. The device's vents must not be obstructed, e.g., by dirt or as a result of devices being installed too close to each other.
U-t	09	Under-temperature. The message will appear if the ambient temperature falls below -10 °C. In order to be able to start the drive, the temperature must be higher than this.
P-dEF	10	The parameters' default settings have been loaded.
E-tr iP	11	External fault (at digital input 3, terminal 4). There must be a high-level signal at this input in order to be able to run the variable frequency drive. If a thermistor is connected to terminal 4: • Check whether the motor is too hot.
SC-Ob5	12	Serial communication lost • Check whether the connection to other variable frequency drives and external devices is working correctly: Each module on the bus must have its own address. There must not be two or more modules with the exact same address!
Fl t-dc	13	Excessively high DC-Link voltage ripple
P-LO55	14	Incoming power phase failure (only for devices with a three-phase power supply)
hO-I	15	Overcurrent at output. See fault 03 (*O-I*).
th-FLt	16	Malfunctioning heat sink thermistor. • Please contact your nearest Eaton sales branch.
dAtA-F	17	Error in internal memory. The parameters have not been saved and the default settings have been loaded. Change the parameter values (again) and save them once more. If the message appears again, please contact your nearest Eaton sales branch.
4-20 F	18	The analog input's input current does not fall within the specified range. • Check the setting in P-16 for AI1 and P-47 for AI2 In the case of 4-20mA: • Check the setpoint connection for wire breakage

4 Messages

4.1 List of messages

Message	Error no. [dec]	Possible cause and remedy
dAtA-E	19	Internal memory error (DSP) • Press the Stop button. • If the fault persists, please contact your nearest Eaton sales branch.
F-Ptc	21	Motor PTC thermistor input select fault – Overheating of the connected motor thermistor • Check the cable connections and the motor.
FAn-F	22	Cooling fan fault (IP66 only) • Check or replace the cooling fan.
O-hEAt	23	Internal temperature too high/ambient temperature of the variable frequency drive too high • Check that adequate cooling is provided.
AtF-01	40	Motor identification failed
AtF-02	41	Motor identification failed: The measured stator resistance is too large.
AtF-03	42	Motor identification failed: The measured motor inductance is too low.
AtF-04	43	Motor identification failed: The measured motor inductance is too high.
AtF-05	44	Motor identification failed: The measured motor parameters do not match.
Out-Ph	49	A phase in the motor cable is not connected or has a discontinuity.
SC-F01	50	Fault due to Modbus communication loss • Check the incoming Modbus RTU connection cable. • Check that at least one register within the time-out limit set in P-36 Index 3 is queried cyclically.
SC-F02	51	Fault trip occurred due to loss of CANopen communication • Check the incoming CAN connection cable. • Check whether cyclic communications occur within the time-out limit set in P-36 Index 3.
Err254	–	Internal error Try to install the latest firmware version on the device. If this does not work, please contact your nearest Eaton sales branch.
SC-FLt	–	Internal error • Please contact your nearest Eaton sales branch.
FAULty	–	Internal error • Please contact your nearest Eaton sales branch.
SC-trIP	–	Serial communication lost • Check whether the connection to other variable frequency drives and external devices is working correctly: Each module on the bus must have its own address. There must not be two or more modules with the exact same address!
SPI n-F	–	Speed detection before switching (on the running motor) unsuccessful
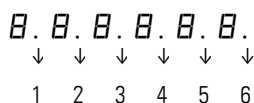
4.2 Messages after a data transfer with a DX-COM-STICK…

Table 24:   Possible messages displayed after a data transfer

Message displayed	Description
PASS-r	Parameter transfer to DX-COM-STICK… interface card was successful.
OS-Loc	DX-COM-STICK… is locked. In order to transfer data, check the switch position on the side.
FAiL-r	Error while attempting to read the parameters from the variable frequency drive.
PASS-t	Parameter transfer to variable frequency drive successful.
FAiL-P	The parameter set stored in the DX-COM-STICK… is for a different output variable (different motor current or motor output, etc.) than that of the connected variable frequency drive.
FAil-t	Error when attempting to copy parameter set to variable frequency drive
no-dAt	No data saved on DX-COM-STICK…
dr-Loc	Parameter set in variable frequency drive locked. Unlock variable frequency drive first.
dr-rUn	The variable frequency drive has an enable signal and cannot take new parameters. Stop the variable frequency drive.
tYPE-E	The parameter set stored in the DX-COM-STICK… does not match the variable frequency drive. Only transfers from the variable frequency drive to the DX-COM-STICK… are possible.
tYPE-F	The DX-COM-STICK… is not compatible with the variable frequency drive.

4.3 Operating status indicators

The six flashing dots on the seven-segment display are used to indicate various operating statuses.

```
8.8.8.8.8.8.
↓  ↓  ↓  ↓  ↓  ↓
1  2  3  4  5  6
```

Number(s)	Behavior	Meaning
1, 2, 3, 4, 5, 6	Flash synchronously	Overload The current currently exceeds the value set with P-08.
1, 6	Flash in an alternating pattern	Power outage or power supply switched off
1	flashes	Fire Mode enabled

5 Parameters

The abbreviations used in the following tables are defined below:

Abbreviation	Meaning
Min. value	Minimum value
Max. value	Maximum value
DS	Default setting (the parameter's value when using the device's factory settings)

➡ None of the parameters in parameter group 0 can be modified by the user; they are read-only parameters.

5.1 "Monitor" parameter group

Table 25: "Monitor" parameter group

Parameter	Designation	Min. value	Max. value	Description
P00-01	Analog Input1	0 %	100 %	Analog Input 1 Level of the signal applied to analog input 1 after scaling and offsets have been applied.
P00-02	Analog Input2	0 %	100 %	Analog Input 2 Level of the signal applied to analog input 2 after scaling and offsets have been applied.
P00-03	Frequency Reference	-P-01	P-01	Frequency Reference in Hz. Will be calculated into rpm when motor data are available. Value of the drive internal digital reference
P00-04	DI Status	0	1	Status of the Digital Inputs Status of the digital inputs starting on the left hand side with digital input 1 etc.
P00-05	PID1 Output	0 %	100 %	PI(D) controller 1 Output
P00-06	DC-Link Voltage Ripple	0 V	1000 V	DC-Link Voltage Ripple
P00-07	Motor Voltage	0 V	600 V AC	Instantaneous output voltage
P00-08	DC-Link Voltage	0 V	1000 V DC	Instantaneous DC Link Voltage
P00-09	Heatsink Temperature	-20 °C	100 °C	Instantaneous Heatsink Temperature
P00-10	t-Run	0 h	99999 h	Total operating time of the drive since the date of manufacture
P00-11	t-Run since Trip	0 h	65000 h	Total operating time of the drive since the last trip occurred. Run-time clock stopped by drive disable (or trip), reset on next enable only if a trip occurred. Reset also on next enable after a drive power down. Displayed in hours, minutes and seconds. Pressing the UP key on the drive keypad will change the display from "hours" to "minutes and seconds".

Parameter	Designation	Min. value	Max. value	Description
P00-12	t-Run since Trip	0 h	65000 h	Total operating time of the drive since the last trip occurred Run-time clock stopped by drive disable (or trip), reset on next enable only if a trip occurred (under-volts not considered a trip) – not reset by power down / power up cycling unless a trip occurred prior to power down. Displayed in hours, minutes and seconds. Pressing the UP key ▲ on the drive keypad will change the display from "hours" to "minutes and seconds".
P00-13	Last Fault PDP	0 h	65000 h	Last faul, second to last fault, third to last fault, fourth last fault Fault time in the operating hour xxx
P00-14	t-HoursRun Enable	0 h	65000 h	Total operating time of the drive since the last drive ENABLE signal was applied. Displayed in hours, minutes and seconds. Pressing the UP key ▲ on the drive keypad will change the display from "hours" to "minutes and seconds".
P00-15	DC-Link Log	0 V	1000 V DC	DC link voltage log Recording of the most recent 8 samples of the DC bus voltage prior to a drive trip condition occurring. The sample interval is 256 ms.
P00-16	Heatsink Log	-20 °C	120 °C	Heatsink temperature log Recording of the most recent 8 samples of the heatsink temperature prior to a drive trip condition occurring. The sample interval is 30 s.
P00-17	MotorCurrent Log	0 A	$2 \cdot I_e$	Motor current log Recording of the most recent 8 samples of the Motor current prior to a drive trip condition occurring. The sample interval is 256 ms.
P00-18	DC-Link V-Ripple Log	0 V	1000 V	DC bus Voltage Ripple Log Recording of the most recent 8 samples of the Voltage Ripple prior to a drive trip condition occurring. The sample interval is 22 ms.
P00-19	AmbientTemp Log	-20 °C	120 °C	Internal Ambient Temperature Log Recording of the most recent 8 samples of the Internal Ambient Temperature prior to a drive trip condition occurring. The sample interval is 30 s.
P00-20	T-Controlboard	-80 °C	120 °C	Internal ambient temperature of the device, measured on the control board
P00-21	Input Data Value	–	–	Input Data Value
P00-22	Ouput Data Value	–	–	Output Data Value
P00-23	t-Run IGBT in OT	0 h	65000 h	Time elapsed, in which the drive has operated with a high heatsink temperature (> 85 °C).
P00-24	t-Run PCB in OT	0 h	65000 h	Time elapsed, in which the drive has operated with a high temperature at the PCBs (ambient temperature) (> 80 °C).
P00-25	Motor Speed	-P-01	P-01	Motorspeed (calculated or measured)

5 Parameters

5.1 "Monitor" parameter group

Parameter	Designation	Min. value	Max. value	Description
P00-26	MWh Meter	–	–	Energy Consumption kWh/MWh Meter (not resettable) Pressing UP key ▲ on the drive keypad will change the display from "kWh" to "MWh".
P00-27	Fan Runtime	0 h	65000 h	Run time of the integrated fan (not resettable)
P00-28	Application Software Version	–	–	I/O Controller / Application SW Version
P00-29	NoOfInputPhases	–	–	Number of input phases
	FrameSize	–	–	Frame Size
	kW/HP	–	–	Motor Power
	Power@Ue	–	–	Device Power at Device Voltage Rating
	Device Voltage			Device Voltage Rating
	DeviceType			Device Type
P00-30	Serial Number	–	–	Serial Number of the device
P00-31	Magnetizing current I_d	0 A	100.0 A	Calculated Magnetizing Current
	Torque current I_q	0 A	100.0 A	Calculated Torque producing Current
P00-32	Switching Frequency	4 kHz	32 kHz	Power stage switching frequency. Higher frequency reduces the audible 'ringing' noise from the motor, and improves the output current waveform, at the expense of increased heat losses within the drive.
P00-33	FaultCounter Overcurrent	0	65535	Counts, how often "Overcurrent" occured
P00-34	FaultCounter DC-Overvoltage	0	65535	Counts, how often "DC-Overvoltage" occured
P00-35	FaultCounter DC-Undervoltage	0	65535	Counts, how often "DC-Undervoltage" occured
P00-36	FaultCounter Overtemperature Heatsink	0	65535	Counts, how often "Overtemperature Heatsink" occured
P00-37	FaultCounter Overcurrent Brake Chopper	0	65535	Counts, how often "Overcurrent Brake Chopper" occured
P00-38	FaultCounter Overtemperature Ambient	0	65535	Counts, how often "Overtemperature Ambient" occured
P00-39	FaultCounter Communication Loss	0	65535	Counts, how often "Communication Loss" occured
P00-40	FaultCounter CANopen COM Loss	0	65535	Counts, how often "CANopen COM Loss" occured
P00-41	FaultCounter Internal Fault (IO)	0	65535	Counts, how often "Internal Fault (IO)" occured
P00-42	FaultCounter Internal Fault (DSP)	0	65535	Counts, how often "Internal Fault (DSP)" occured
P00-43	t-PowerOn			Total time for which the drive was powered up since the day of manufacture.
P00-47	t-FireMode Active			Run time in Fire Mode
	FaultCounter Fire detected			Counts, how often "Fire detected" occured
P00-48	Scope Channel 1 & 2			The values of Scope Channel 1 and 2.
P00-49	Scope Channel 3 & 4			The values of Scope Channel 3 and 4.
P00-50	System Software Version	–	–	System Software Version

5.2 "Basic" parameter group

Table 26: "Basic" parameter group

Para-meter	Designation	Min. value	Max. value	Description	DS
P-01	f-max	0.0 Hz	5 x P-09	Sets the upper limit for the speed of the motor. This can be set to any value between "f-min" and 5x the "motor nom frequency". When "Motor Nom Frequency" (P-09) is changed, P-01 is set to the value of P-09. "Motor Nom Speed" (P-10) = 0, the maximum speed limit will be displayed in Hz. "Motor Nom Speed" (P-10) > 0, the maximum speed limit will be displayed in rpm.	50.0 Hz
P-02	f-min	0.0 Hz	P-01	Sets the lower limit for the speed of the motor This can be set to any value between 0 and "f-max" (P-01). When "Motor Nom Frequency" (P-09) is changed, P-01 is set to zero. "Motor Nom Speed" (P-10) = 0, the minimum speed limit will be displayed in Hz. "Motor Nom Speed" (P-10) > 0, the minimum speed limit will be displayed in rpm.	0.0 Hz
P-03	t-acc	0.00 s	600 s	Sets the acceleration ramp time in seconds. The time interval set in "t-acc" represents the time taken to accelerate from zero to "Motor Nom Frequency" (P-09).	5.0 s
P-04	t-dec	0.00 s	600 s	Sets the deceleration ramp time in seconds. The time interval set in "t-dec" represents the time taken to decelerate from "Motor Nom Frequency" (P-09) to zero.	5.0 s
P-05	Stop Mode	0	3	Determines the action taken by the drive in the event of the drive enable signal being removed. 0: Ramping. When the enable signal is removed, the drive will ramp to stop, with the rate controlled by "t-dec" (P-04). 1: Coasting. When the enable signal is removed, the drive output is immediately disabled, and the motor will coast (freewheel) to stop. 2: Ramping. When the enable signal is removed, the drive will ramp to stop, with the rate controlled by "t-dec" (P-04). If the mains supply is lost the drive will ramp to stop using the deceleration ramp set by P-24. Condition: P-24 is set to a time which is shorter than the one for discharging the DC link. Otherwise the drive will trip due to "under voltage". 3: AC flux braking. When stopping the drive, AC flux braking is used to reduce the stopping time.	1
P-06	EnergyOptimizer	0	1	When energy optimization is activated, the motor voltage is dynamically varied, dependent on load. This results in reduced voltage being applied to the motor on light load, significantly reduce energy consumption. This mode of operation is less suitable for dynamic applications where the load conditions can suddenly increase significantly.	0

5 Parameters

5.2 "Basic" parameter group

Para-meter	Designation	Min. value	Max. value	Description	DS
P-07	Motor Nom Voltage	0 / 20 V	U_e	Defines the Motor rated voltage. When the output frequency is greater than the "Motor Nom Frequency" (P-09), the output voltage is controlled at the level set with "Motor Nom Voltage" (P-07).	U_e
P-08	Motor Nom Current	0.25 I_e - I_e	I_e	Motor rated current. By setting the "Motor Nom Current" in the drive, the motor overload protection is configured to match the motor rating. When the measured motor current exceeds "Motor Nom Current", the decimal points on the drive display will flash to indicate an overload condition. If this condition persists, the drive will eventually trip, displaying $I.t-trP$, preventing thermal overload of the motor.	I_e
P-09	Motor Nom Frequency	25 Hz	500 Hz	The rated frequency of the motor. This is the frequency at which "Motor Nom Voltage" is applied to the motor. Below this frequency, the applied motor voltage will be reduced. Above this frequency the voltage remains limited to "Motor Nom Voltage". **Hint:** If the value for P-09 is changed, the following parameters will be reset to their default settings: P-01 f-max P-02 f-min P-10 Motor Nom Speed P-20 f-Fix1 P-21 f-Fix2 P-22 f-Fix3 P-23 f-Fix4	50 Hz
P-10	Motor Nom Speed	0 / 200 rpm	30000 rpm	Motor rated speed P-10 = 0: the speed of the motor will be displayed in Hz. P-10 > 0: the speed related parameters (f-max, f-min etc.) will be displayed in rpm. The slip compensation is also activated, where the shaft speed of the motor is maintained under varying load conditions by compensating for the load-dependent slip of the motor. If "Motor Nom Speed" = motor synchronous speed (e.g. 3000 rpm for a 2-pole 50 Hz motor), the speed can be displayed in rpm without activating the slip compensation.	0 rpm
P-11	V-Boost	0.0 %	f (FS) FS1: 25,0 % U_e FS2: 20,0 % U_e FS3: 15,0 % U_e FS4: 10,0 % U_e	Voltage is used to increase the applied motor voltage at low output frequency, in order to improve low speed and starting torque. Excessive voltage boost levels may result in increased motor current and temperature, and forced ventilation may be required.	f (FS) FS1: 3,0 % U_e FS2: 2,5 % U_e FS3: 2,0 % U_e FS4: 1,5 % U_e

Para-meter	Designation	Min. value	Max. value	Description	DS
P-12	Local ProcessData Source	0	13	Local Configuration of Command and Reference Sources 0: Local: Control and Reference via digital and analog inputs 1: Local: Control and digital reference via keypad, 1 direction 2: Local: Control and digital reference via keypad, 2 directions Pressing the keypad START button toggles between forward and reverse. 3: Modbus: Internal acceleration and deceleration ramps, Control via fieldbus communication. 4: Modbus: Control, set point and ramps via fieldbus communication. 5: Local: PI-Controller 6: Local: PI-Controller with accumulation of AI1 7: CAN: Internal acceleration and deceleration ramps, Control via fieldbus communication. 8: CAN: Control, set point and ramps via fieldbus communication. 9: PROFIdrive: Control and set point via network 10: PROFIdrive: Control via network, local set point 11: PROFIdrive: Control via terminals, set point via network 12: PROFIdrive: Control and set point via network, in case of communication loss automatical change to local control (P-12 = 0) 13: Dual Mode: Control and set point via Network - Enabling via DI1	0
P-13	Application Mode Macro	0	2	Influences multiple parameter values inside the drive and combines them to an application specific configuration. 0: Industrial mode (constant torque, no spin start) 1: Pump mode (variable torque for induction motors, no spin start) 2: Fan mode (variable torque for induction motors, spin start)	0
P-14	Access Key	0	65535	Entry of the password to get access to the extended parameter set. The value to be put in is determined by P-37 (default: 101). Access to Level 2 (extended ➞ P-01 to P-59 and P00-01 to P00-30): P-37 Access to Level 3 (advanced ➞ P-01 to P-68 and P00-01 to P00-50): P-37 + 100	0

5.3 "Extended" parameter group

Table 27: "Extended" parameter group

Para-meter	Designation	Min. value	Max. value	Description	DS
P-15	DI Config Select	0	17	Configuration of digital inputs with a fix set of combinations The setting of P-15 determines the input configuration depending on P-12. Possible configurations → section 3.2, "Configuration of the control signal terminals", page 16	5
P-16	AI1 Signal Range	0	7	Configures the Analog input 1 for the selected signal source type. 0: 0 - 10 V 1: bipolar 0 - 10 V 2: 0 - 20 mA 3: t 4 - 20 mA (Trips in case of wire break) 4: r 4 - 20 mA (Ramps to f-fix1 (P-20) in case of wire break) 5: t 20 - 4 mA (Trips in case of wire break) 6: r 20 - 4 mA (Ramps to f-fix1 (P-20) in case of wire break) 7: 10 - 0 V	0
P-17	Switching Frequency	0	f (I_e)	Power stage switching frequency. Higher frequency reduces the audible "ringing" noise from the motor, and improves the output current waveform, at the expense of increased heat losses within the drive. 0: 4 kHz 1: 8 kHz 2: 12 kHz 3: 16 kHz 4: 24 kHz 5: 32 kHz	1
P-18	RO1 Function	0	11	Selection of the function of output relay RO1 0: RUN, enable (FWD/REV) 1: READY, DC1 ready for operation (The relay contact is closed when the drive is powered on and no trip condition is present) 2: Speed = frequency reference value 3: Fault (DC1 not ready) 4: Speed ≧ RO1 Upper Limit (P-19) 5: Motor current ≧ RO1 Upper Limit (P-19) 6: Speed < RO1 Upper Limit (P-19) 7: Motor current < RO1 Upper Limit (P-19) 8: Drive not enabled 9: Motor not at target speed 10: Analog Input AI2 > RO1 Upper Limit 11: READY. DC1…E1 ready for operation. The relay contact is closed when the drive is powered on and no trip condition is present. In addition the hardware enable signal (ENA) must be present at the terminal.	0
P-19	RO1 upper Limit	0.00 %	200.00 %	Switching ON threshold of relay RO1 with P-18 = 4, …, 7, 10	100.00 %

Para-meter	Designation	Min. value	Max. value	Description	DS
P-20	f-Fix1	P-02	P-01	Preset Fixed Frequency 1 Value can be adjusted between f-min and f-max. Selection via a digital control signal. If P-09 is changed, the value is reset to default.	15.0 Hz
P-21	f-Fix2	P-02	P-01	Preset Fixed Frequency 2 Value can be adjusted between f-min and f-max. Selection via a digital control signal. If P-09 is changed, the value is reset to default.	0.0 Hz
P-22	f-Fix3	P-02	P-01	Preset Fixed Frequency 3 Value can be adjusted between f-min and f-max. Selection via a digital control signal. If P-09 is changed, the value is reset to default.	0.0 Hz
P-23	f-Fix4	P-02	P-01	Preset Fixed Frequency 4 Value can be adjusted between f-min and f-max. Selection via a digital control signal. If P-09 is changed, the value is reset to default.	0.0 Hz
P-24	t-QuickDec	0.00 s	600.0 s	Quick Stop Ramp In default the second deceleration ramp is activated by applying voltage to DI1 and DI2 (terminals 2 and 3) at the same time	0.00 s
P-25	AO1 Function	0	12	Select Signal to show on the analog output P-25 = 0, …, 7, 10, 11 = digital output 0: RUN, enable (FWD/REV) 1: READY, DC1…E1 ready for operation 2: Speed = speed reference value 3: Fault (DC1…E1 not ready) 4: Speed ≧ RO1 Upper Limit (P-19) 5: Motor current ≧ RO1 Upper Limit (P-19) 6: Speed < RO1 Upper Limit (P-19) 7: Motor current < RO1 Upper Limit (P-19) 8: Output Frequency (0 - 100 % f-max (P-01)) 9: Motor current (0 - 200 % Motor Nom Current (P-08)) 10: Drive not enabled 11: Speed not at reference value P-25 = 8, 9, 12 = analog output 12: Motor power	8
P-26	f-SkipBand1	0.0 Hz	P-01	Skip frequency band width Defines the frequency range around f-Skip1 in which the drive doesn't work in steady-state to avoid mechanical resonances in the application. During acceleration and deceleration this range is passed through by using the ramps set with P-03 and P-04.	0.0 Hz
P-27	f-Skip1	0.0 Hz	P-01	Centre point of the frequency band defined by f-Skip-Band1 in which the drive doesn't work in steady-state.	0.0 Hz
P-28	V-MidV/f	0 V	P-07	Voltage to shape V/f curve Defines the adjustment voltage at the frequency set in P-29.	0 V
P-29	f-MidV/f	0 Hz	P-09	Frequency to shape V/f curve Sets the frequency at which the adjustment voltage defined with P-28 is applied to the motor.	0 Hz

Para-meter	Designation	Min. value	Max. value	Description	DS
P-30	Start Mode	0	6	Defines the behaviour of the drive relating to the enable digital input and also configures the automatic restart function. Edge-r : Following power on or reset, the drive will not start if a start signal (FWD/REV) is still present. To start DC1 a rising edge is necessary. Auto-0 : Following a power on or reset, the drive will automatically start if digital input 1 is closed. Auto-1 to 5: Following a trip, the drive will make up to 5 attempts to restart at 25 second intervals. The drive must be powered down to reset the counter. The number of restart attempts are counted, and if the drive fails to start on the final attempt, the drive will trip, and will require the user to manually reset the fault. **Attention:** An automatic restart is only possible when the control commands are given via terminals (P-12 = 0 and P-12 = 11 when, after a communication loss, the control is toggled to the terminals).	0
P-31	Digital Reference Reset Mode	0	7	Defines the behavior of the drive on START when used in Keypad control or when controlled with UP/DOWN commands via terminals. 0: Start at min speed 1: Start with latest speed before switching off 2: Start at min speed (Auto-r) 3: Start with latest speed before switching off (Auto-r) 4: Start with current running speed 5: Start with f-Fix4 6: Start with current running speed (Auto-r) 7: Start mit f-Fix4 (Auto-r) Auto r: START and STOP button on the keypad are disabled. DC1…E1 starts with a START command at the terminals.	1
P-32	t-DCBrake@Stop	0.0 s	25.0 s	Duration of DC braking at Stop and before Start. Setting "0" disables DC braking. The braking level is set with P-68.	0.0 s
	DCBrake	0	2	Sets the instances when DC braking is enabled. 0: DC braking on Stop 1: DC braking before Start 2: DC braking before Start and on Stop	0
P-33	Spin Start Enable	0	2	Spin Start Enable Enables spin start, where the drive starts from the detected motor speed. A short start delay is possible if the rotor is stationary. Recommended for applications where the motor spins when applying the FWD/REV signal to the drive (high inertia loads, fans, …) 0: Spin start disabled 1: Spin start enabled 2: Spin start enabled on trip, brown our coast to stop (P-05 = 1) **Hint:** The setting of P-33 will be adopted at a change of P-13 (P-33 = 0 when P-13 = 0 or 1, P-33 = 2 when P-13 = 2)	0

Para-meter	Designation	Min. value	Max. value	Description	DS
P-34	Brake Chopper	0	4	Enable Brake Chopper Enables Brake Chopper on sizes FS2 up to FS4. Software protection can be selected for brake resistors with a 200 W rating. 0: Disabled 1: Enabled with software protection 2: Enabled without software protection 3: Enabled during speed reference change with software protection 4: Enabled during speed reference change without software protection **Hint:** This parameter can only be set to a value > 0 on drives sizes FS2 to FS4. Size FS1 does not have a brake chopper inside the drive.	0
P-35	AI1 Gain	0.00 %	2000.00 %	Scaling of the Analog Input 1 Output value = Input value * Scaling. **Example:** P-16 = 0 - 10 V, P-35 = 200 %: at 5 V the motor turns with max speed (P-01) (5 V * 200 % = 10 V)	100.00 %
P-36	RS485-0 Address	1	63	RS485-0 Address	1
	RS485-0 Baudrate	0	6	RS485 Baudrate 2: 9.6 kBit/s 3: 19.2 kBit/s 4: 38.4 kBit/s 5: 57.6 kBit/s 6: 115.2 kBit/s	6
	Modbus RTU0 COM Timeout	0	8	Modbus RTU COM Timeout Time between a communication loss and the resulting action. Setting "0" disables the action after communications trip. t: indicates the drive will trip if time exceeded. r: indicates the drive will ramp to stop if time exceeded. 0: no action 1: t 30 ms 2: t 100 ms 3: t 1000 ms 4: t 3000 ms 5: r 30 ms 6: r 100 ms 7: r 1000 ms 8: r 3000 ms	4
P-37	Access Key Level2	0	9999	Defines the password which is used to get access to extended parameter set (Level 2). In addition, it also defines the password needed to get access to the advanced parameter set (P-37 + 100). Access via P-14.	101
P-38	Parameter Lock	0	1	Determines whether to lock the parameters 0: OFF. All parameters can be accessed and changed 1: ON. Parameter values can be displayed, but cannot be changed. If a remote keypad is connected, parameters cannot be accessed by the remote keypad if they are locked.	0

Para-meter	Designation	Min. value	Max. value	Description	DS
P-39	AI1 Offset	-500.00 %	500.00 %	Offset Analog Input 1 Resolution 0.1 %	0.00 %
P-40	Display Scale	0.000	16000 %	Scale factor display Customer specific scaling factor. With P-40 > 0 a "c" appears on the left hand side of the display. With P-10 = 0 the scaling factor is applied to the frequency, with P-10 > 0, to the speed. The value is displayed in real-time on the drives display.	0.000
	Display Scale Source	0	3	Source to Scale factor display Source of the displayed value 0: Motor speed 1: Motor current 2: Analog Input AI2 3: PI controller feedback	0
P-41	PID1 Kp	0.0	30	PI(D) controller proportional gain Higher values will result in a larger change at the frequency inverter output frequency as a response to small changes in the feedback. Too high value can cause instability	1
P-42	PID1 Ti	0.0 s	30.0 s	PI(D) controller integral time constant Higher values will result in a more damped response. Used in systems in which the overall process responds slowly.	1.0 s
P-43	PID1 Mode	0	1	PI(D) controller 1 mode 0: direct mode. This setting is used when an increase of the feedback signal should lead to a decrease of the motor speed. When the controller is activated after a standby, its output is set to 0 %. 1: inverse mode. If an increasing feedback signal should increase the speed of the motor, use inverse mode. When the controller is activated after a standby, its output is set to 0 %. 2: direct mode. This setting is used when an increase of the feedback signal should lead to a decrease of the motor speed. When the controller is activated after a standby, its output is set to 100 %. 3: inverse mode. If an increasing feedback signal should increase the speed of the motor, use inverse mode. When the controller is activated after a standby, its output is set to 100 %.	0
P-44	PID1 Set Point 1 Source	0	1	Defines the set point source 1 of controller 1 0: digital set point signal, set with P-45 1: analog input 1	0
P-45	PID1 Set Point Digital	0.0 %	100.0 %	Digital set point controller 1 Digital set point of the PI controller in case P44 = 0	0.00 %
P-46	PID1 Feedback 1 Source	0	5	Defines the feedback source 1 of controller 1 0: analog input 2 (AI2) 1: analog input 1 (AI1) 2: motor current 3: DC-link voltage 4: difference AI1 - AI2 5: max value of AI1 and AI2	0

Para-meter	Designation	Min. value	Max. value	Description	DS
P-47	AI2 Signal Range	0	6	Configures the Analog input 2 for the selected signal source type. 0: 0 - 10 V 1: 0 - 20 mA 2: t 4 - 20 mA (Trips in case of wire break) 3: r 4 - 20 mA (Ramps to f-fix1 (P-20) in case of wire break) 4: t 20 - 4 mA (Trips in case of wire break) 5: r 20 - 4 mA (Ramps to f-fix1 (P-20) in case of wire break) 6: Ptc-th (connection of a thermistor for motor protection)	0
P-48	t-Standby	0.0 s	25.0 s	Time after which the drive changes to stand by mode (inverter output disabled) when running at min speed (f-min) 0: Standby mode disabled non-zero: enter standby mode after the time specified in this parameter. Operation automatically resumes as soon as the speed set point increases above P-02.	0.0 s
P-49	PID1 WakeUpLevel	0.0 %	100.0 %	Wake-up level controller 1 Sets an error level (difference between the PID reference and feedback values) above which the PID controller will wake from Standby mode. Sets an error level (difference between PI set point and feedback values) above which the PI controller will wake from standby mode.	0.0 %
P-50	CAN0 Baudrate	0	5	CANopen Baudrate Sets the Baudrate in case CANopen is used 0: 125 kBit/s 1: 250 kBit/s 2: 500 kBit/s 3: 1 MBit/s 4: 50 kBit/s 5: 20 kBit/s	2
P-51	T-Memory Enable	0	1	When enabled, the motor thermal memory retention function will save the calculated motor thermal history on drive power down, using this saved value as the starting value on next power up. If this function is disabled, the motor thermal history is reset to zero on every power up. 0: Thermal memory disabled 1: Thermal memory enabled	1
P-52	ParameterAccess	0	1	Parameter Access 0: All parameters can be changed by any source. 1: All parameters locked; can only be changed by the SWD Device.	0
P-53	Action@Communication Loss	0	4	Device reaction after occuring of "Communication Loss". Possibilities device dependent Drive reaction after communication loss. Master communication loss delay time is set by "Modbus RTU0 COM Timeout" (P-36) 0: No reaction, continue work 1: Set warning, continue work 2: stop (if ramp enabled) 3: quick stop 4: coast stop	0

5 Parameters

5.3 "Extended" parameter group

Para-meter	Designation	Min. value	Max. value	Description	DS
P-54	RO1 Hysteresis	0.0 %	100.0 %	Hysteresis for relay output 1 This parameter defines a lower reaction threshold level in case P-18 is set to 4, …, 7. Threshold level = limit (P-19) - hysteresis (P-54) P-18 = 4 or 5: output will be logic 1 if the value ≥ limit , output will be logic 0 if value < level P-18 = 6 or 7: output will be logic 0 if the value ≥ limit, output will be logic 1 if value < level	0.0 %
P-55	RO1 Switch-On Delay	0.0 s	250.0 s	Delay time before the Relay switches from logic 0 to logic 1.	0.0 s
P-56	RS485-0 ParityType	0s	3	Modbus Parity Type 0: No parity, 1 stop bit (N-1) 1: No parity, 2 stop bits (N-2) 2: Odd parity, 1 stop bit (O-1) 3: Even parity, 1 stop bit (E-1)	0
P-57	TCP Enable Service	0	7	Cyber Security Enable communications interfaces This is a bitmap parameter where: 0000b = All services disabled xxx1b = reserved xx1xb = TFTP/FTP server enabled x1xxb = reserved	0
P-58	TCP0 SecurityTimeout	0 s	60 s	If set to 0, then cyber security settings will not change. Otherwise, the cyber security option in P-57 will be reset to 0 after time delay definied by P-58.	10 s

5.4 "Advanced" parameter group

Table 28: "Advanced" parameter group

Para-meter	Designation	Min. value	Max. value	Description	DS
P-60	Motor Control Mode	0	4	Motor Control Mode An autotune must be performed if setting 2 up to 4 is used. It is recommended with setting 0 0: Speed Control with Torque Limit (vector) 1: Speed Control (V/f) 2: PM Motor Speed Control 3: Brushless DC Motor Speed Control 4: SyncRel Motor Speed Control	1
P-61	Motor Identification	0	1	Motor Identification When set to 1, the drive immediately carries out a non-rotating autotune to measure the motor parameters for optimum control and efficiency. Following completion of the autotune, the parameter automatically returns to 0. Remark: This function cannot be activated by using the drivesConnect software!	0
P-62	MSC Gain	0.00 %	200.00 %	Speed controller Gain for Kp and Ti as combined value	50.00 %
P-63	I-CurrentLimit	0.00 %	175 %	Defines the maximum current limit in vector control modes. The percentage value belongs to the motor current set in P-08.	150 %
P-64	Motor Stator Resistance R1	0.00 Ohm	655.35 Ohm	Stator resistance of the motor For induction and PM motors: phase to phase resistance value [Rs] in Ohms. This value is determined during the motor identification run.	$f(I_e)$
P-65	Motor Stator Inductance d-Axis	0.0 mH	6553.5 mH	Stator inductance of the motor, torque producing For induction motors: Phase to phase inductance value in Henry [H] For PM-Motors: phase d-axis inductance value [Lsd] in Henry [H]	$f(I_e)$
P-66	Motor Stator Inductance q-Axis	0.0 mH	6553.5 mH	Stator inductance of the motor, magnetizing For PM-Motors: phase d-axis inductance value [Lsd] in Henry [H]	$f(I_e)$
P-67	f-DCBrake@Stop	0.0 Hz	P-01	Output frequency in Hz at which DC braking starts during the deceleration phase. If "Stop Mode" is set to coasting, DC braking starts at stop command immediately.	0.0 Hz
P-68	DC-Brake Current	0.0 %	100.0 %	Amount of DC current as a percentage of the "Motor Nom Current" that is injected into the motor during DC braking.	20.0 %
P-69	LocalControl Logic1	0	4	0: Terminal 2 or Switche Forward 1: Terminal 2 only 2: Terminal 2 or Switch Forward or Switch Reverse 3: Terminal 2 and (Switch Forward or Reverse) 4: Terminal 2 and Switch Forward	0
P-70	LocalControl Logic2	0	2	0: Terminal 3 or Switch Reverse 1: Terminal 3 2: Terminal 3 and Switch Reverse	0

5.5 "Advanced" parameter group

Table 29: "Advanced" parameter group

Parameter	Designation	Min. value	Max. value	Description	DS
P-60	Motor Control Mode	0	4	Motor Control Mode An autotune must be performed if setting 2 up to 4 is used. It is recommended with setting 0 0: Speed Control with Torque Limit (vector) 1: Speed Control (V/f) 2: PM Motor Speed Control 3: Brushless DC Motor Speed Control 4: SyncRel Motor Speed Control	1
P-61	Motor Identification	0	1	Motor Identification When set to 1, the drive immediately carries out a non-rotating autotune to measure the motor parameters for optimum control and efficiency. Following completion of the autotune, the parameter automatically returns to 0. **Note:** This function can not be used with the drivesConnect Software	0
P-62	MSC Gain	0.0 %	200.0 %	Speed controller Gain for Kp and Ti as combined value	50.0 %
P-63	I-CurrentLimit	0.0 %	175 %	Defines the maximum current limit in vector control modes.	150 %
P-64	Motor Stator Resistance R1	0.00 Ohm	655.35 Ohm	Stator resistance of the motor For induction and PM motors: phase to phase resistance value [Rs] in Ohms. This value is determined during the motor identification run.	$f(I_e)$
P-65	Motor Stator Inductance d-Axis	0.0 mH	6553.5 mH	Stator inductance of the motor, torque producing for induction motors: Phase to phase inductance value in Henry [H] For PM-Motors: phase d-axis inductance value [Lsd] in Henry [H]	$f(I_e)$
P-66	Motor Stator Inductance q-Axis	0.0 mH	6553.5 mH	Stator inductance of the motor, magnetizing For PM-Motors: phase d-axis inductance value [Lsd] in Henry [H]	$f(I_e)$
P-67	f-DCBrake@Stop	0.0 Hz	P-01	Output frequency in Hz at which DC braking starts during the deceleration phase. If "Stop Mode" is set to coasting, DC braking starts at stop command immediately.	0.0 Hz
P-68	DC-Brake Current	0.0 %	100.0 %	Amount of DC current as a percentage of the "Motor Nom Current" that is injected into the motor during DC braking.	20.0 %
P-69	LocalControl Logic1	0	4	0: Terminal 2 or Switche Forward 1: Terminal 2 only 2: Terminal 2 or Switch Forward or Switch Reverse 3: Terminal 2 and Switch Forward or Reverse 4: Terminal 2 and Switch Forward	0
P-70	LocalControl Logic2	0	2	0: Terminal 3 or Switch Reverse 1: Terminal 3 2: Terminal 3 and Switch Reverse	0

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