Zakład Energoelektroniki TWERD
TWERD Power Electronics

Frequency converter type:

MFC 810

3 x 1140 V
2 x 250 kW

- Vector controled
- Three level topology
- Liquid cooled heatsink

User Manual

Part I: Hardware
Instalation and technical data

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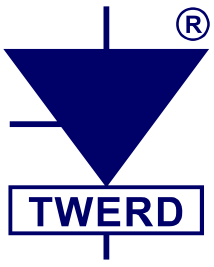

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H.1. Safety principles

Leveling connections

Touch protection encompasses the automatic switching off of the power supply by means of the special short circuit (differential type) or limitation of voltages which may be touched if the insulation is damaged to a level not exceeding the permissible values.

Due to the intermediate circuit operation, a short to ground in the output circuit of the frequency converter may not be detected by the short circuit protection. The frequency converter provides protection against short circuits between the phases and the output, but this protection is based on putting the IGBT transistors in the blocking state, which does not meet the requirements of fire protection.

In this regard, in order to ensure the staff safety, it is necessary to make local leveling connections in a corresponding way.

The special, respectively designated and protected from corrosion points for connection of the leveling wires are provided in the frequency converter.

Protections

The are some protections provided in the frequency converter: against the motor overload, against the motor overheat, against too low or too high voltage in the intermediate circuit of the converter, against the short circuit at the output of the frequency converter (protecting only the converter!!).

The switching devices

To comply with the EU Directive, in accordance with PN-EN 60204-1: 2010, a device for switching off the power must be provided in the motor controller system, which consists of a frequency converter and an electric machine. This device must be one of the following:

- a disconnector (with or without fuses), an AC-23B category of use that meets the requirements EN 60947-3,
- a disconnector (with or without fuses), which ensures disconnection of the load circuit by opening the main contacts, complying with the requirements of EN 60947-3,
- circuit breaker complying with EN 60947-2.

Fulfilment of the requirements is the responsibility of the organization performing the installation.

Emergency stop

To comply with the EU Directive, in accordance with PN-EN 60204-1: 2010, on the basis of the staff and equipment safety, it is necessary to use an emergency stop switch, which has an advantage over other functions, regardless of the operation mode. The STOP key on the operator panel cannot be considered as an emergency stop switch, because pressing it does not turn off the frequency converter from the power supply.

Fulfilment of the requirements is the responsibility of the organization performing the installation.

Housing

The housing meets the requirements of IP00 degree of protection. The surface on which the operator panel of the frequency converter is located meets the requirements of IP00 degree of protection. The housing is designed in such a way that it cannot be removed without the use of tools.

Discharging capacitors

There is a battery of relatively large capacitors in the intermediate circuit of the frequency converter. After turning off the supply voltage of the frequency converter, dangerous voltage is held at its terminals for a certain time. It is necessary to wait 15 min. before switching at the terminals of the power terminal connections of the frequency converter. Information about the danger of such a voltage is on the panel, which closes the terminal connections of the supply voltage.

H.1.1. Principles of electromagnetic compatibility (EMC)

According to PN-EN 61800-3 (2008), part 3: “EMC requirements and special test methods”, devices for which:

- voltage above 1000V and
- current above 400A,

belong to the C4 class. According to the requirements of the above norm, a user and a manufacturer agree on an EMC plan to fulfil the EMC requirements for the intended use. A user determines the characteristics of the EMC environment taking into account the entire installation and its environment.

H.2. TECHNICAL DATA

Table H.2.1 shows the technical data.

Table H.2.1 – Technical data

Power supply	Voltage U_{in} / freq.	Three-phase power: 1100..1140 V (-15%, +5%), 45..66Hz
Output	Output voltage	0..U_{in} [V]
	Frequency	0,0..400 Hz - U/f operation mode 0,0..100 Hz – Vector operation mode
	Frequency resolution	0.01Hz
Cooling system	Coolant	Water / glycol
	Inlet fluid temperature	20 – 50 ^{0}C
	Coolant flow	20 l / min
	Operating pressure	2.5 bar
	Maximum pressure	5 bar
	Internal diameter of the water/glycol supply wires	19 mm
Control system	Modulator	SVPWM
	Operation mode	U/f (linear, exponential), Vector DTC-SVM without sensor Vector DTC-SVM with sensor of the rotor position
	Switching frequency	2..5 kHz (2,5 kHz for nominal power)
	Rotation speed setting	Analog inputs, control panel, motopotentiometer, PID controller, communication unit RS-485 and other possibilities. Resolution of 0.1% for analog inputs or 0.1Hz / 1 rpm for the control panel and RS.
Control inputs/outputs	Analog inputs	5 analog inputs (1 voltage mode, 4 voltage-current mode): AI0: voltage mode 0(2) ... 10V, Rin ≥ 200kΩ; AI1, AI2, AI3, AI4: voltage mode 0(2) ... 10V, Rin ≥ 100kΩ; current mode 0(4)...20mA, Rin = 250Ω, Operation mode and polarity are chosen by parameters. Accuracy: 0.5 % of the full range.
	Digital inputs	10 digital separated inputs 0/(15...24)V, Rin ≥ 3kΩ. The possibility of obtaining up to 30 digital inputs on expansion cards.
	Analog outputs	2 analog outputs (voltage-current mode) AO1, AO2: Voltage mode 0(2)...10 V Current mode 0(4)...20 mA Configured by parameters, accuracy: 0.5%. The possibility of obtaining up to 10 digital inputs on expansion cards (2 inputs on one each expansion card).
	Digital outputs	6 output relays K1 … K6 – breaking capacity: 250V/1A AC, 24V/1A DC. Fully programmable signal source. The possibility of obtaining up to 5 digital inputs on expansion cards.
	Encoder interface	Possibility of direct connection of incremental encoder (A B Z optical connectors on the MFC810 / 05 board). Recommended pulse rate: 1024-2048.
	Temperature sensor	Pt100

Communication	Connectors	RS-485 x2, USB, Ethernet, CAN
	Communication protocol	MODBUS RTU. Function 3 (Read Register), function 6 (Write Register), function 16 (Write Multiple Registers).
	Baud-rate	2400, 4800,9600, 19200, 38400, 57600, 115200 bit/s
	Application	Remote control of unit operation and programming of all parameters of the frequency converter.
Special functions	PID controller	Build-in 4 PIC controllers. Choice of referencing-unit signal source and feedback signal source, possibility of inverting polarity of an control error signal , SLEEP function and output erasing on STOP signal, limitation of an output value.
	PLC controller	Possibility of taking control over converter's operation, START / STOP system, direction of rotation and frequency, possibility of controlling any external process without connection of external PLC controller. 100 universal functional blocks, 43 functions: simple logic and arithmetic blocks; block of 8-state sequencer, 2 multiplexers with 8 inputs, curve shaping unit, maximum execution time of the PLC program: 10ms.
	Additional functions of the panel	Definition of User's values for direct observation of the process variables- choice of measurement unit, scale and data source (e.g. from PLC controller).
		Definition of User's referencing-device for direct changing of the process variables – choice of measurement unit and scale
		Copying parameter settings between frequency converters
Protections	Short-circuit	Short-circuit on unit output
	Overcurrent	Instantaneous value 3.2 $I_{n;}$; effective value 2.25 I_n
	Overvoltage AC/DC	1,46 U_{in} AC
	Undervoltage	0.65 U_{in}
	Thermal: device	Heatsink's heat sensor
	Thermal: motor	I^2t limit, motor heat sensor
	Supervision of communication with control panel	Established permissible time of connection absence
	Supervision of communication through RS	Established permissible time of connection absence
	Control of analog inputs	Check of absence of “living null” in modes 2..10 V and 4..20mA
	Control of a load symmetry	E.g. break in one of the motor phases
	Underload	Protection from operating without any load
	Stall	Protection against stall of a motor

Table H.2.2 – Technical data: nominal power and nominal current

Type of frequency converter	**P_n [kW]**	**I_n [A]**	**I_p [A]**
MFC810 / 2x250kW	2x250	2x180	2x240

P_n – nominal output power
I_n – nominal output current
I_p – overload current: 60 seconds every 10 minutes

MECHANICAL DIMENSIONS

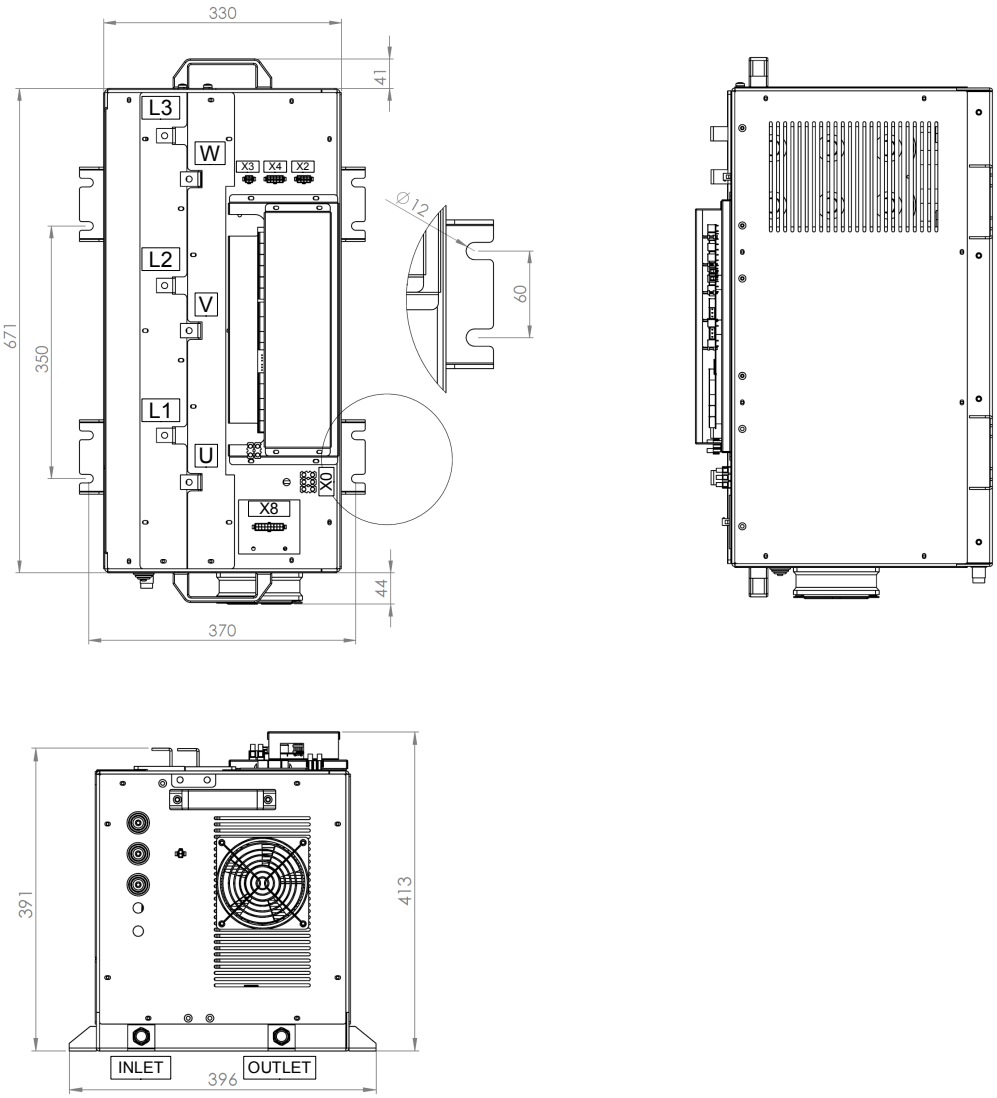

Fig . H.2.1. Mechanical dimensions of MFC810 1140V 200 kW converter

Weight: approximately 70 kg of each unit.

H.3. FREQUENCY CONVERTER INSTALLATION

H.3.1. Electrical connections

The MFC810 converter is powered by a three-phase power supply of 3 x 1100..1140 V (L1, L2, L3). Auxiliary power (circuits) supply: 230 V (L, N) on X0 connection terminal X0.

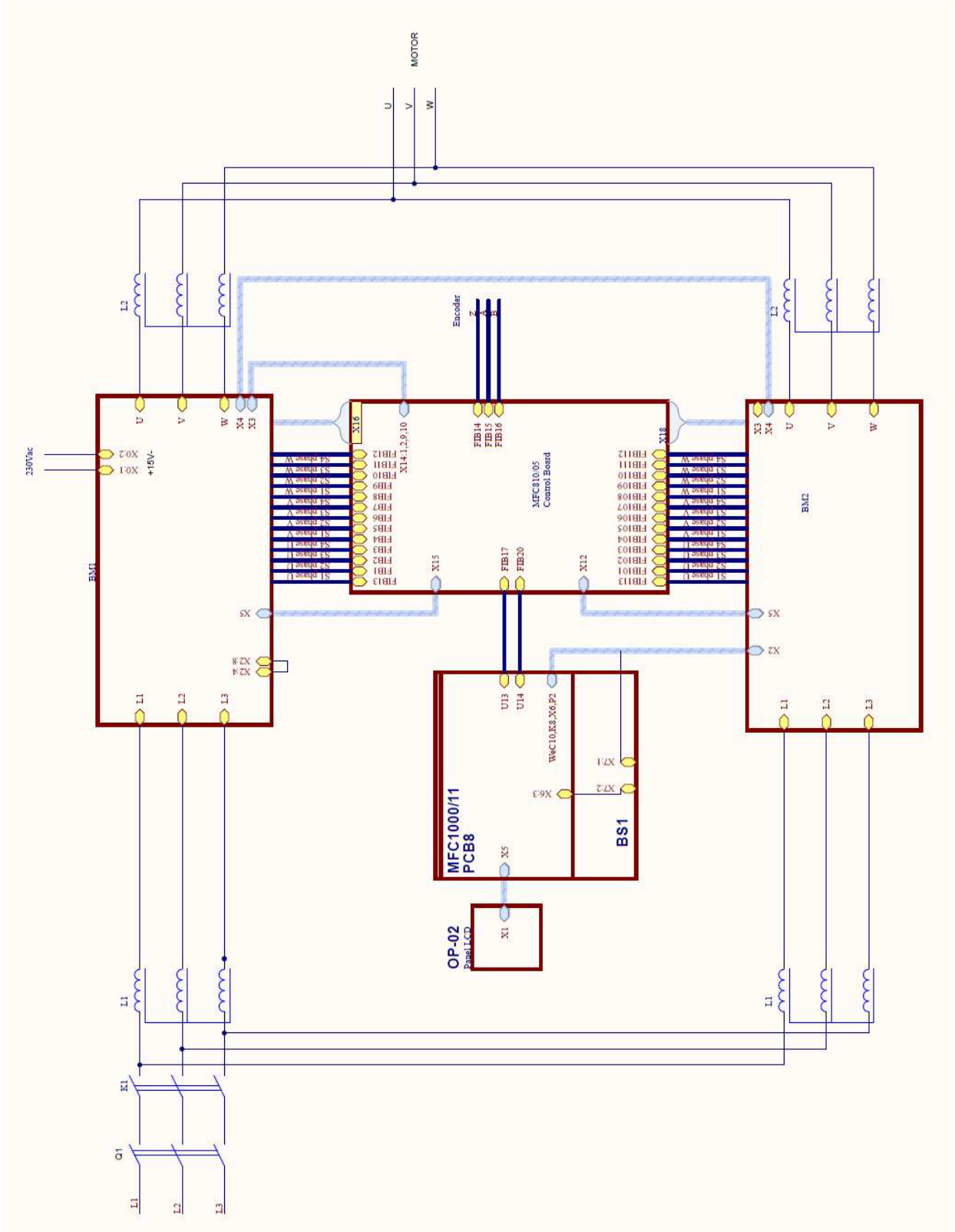

Fig. H.3.1. Electrical connections

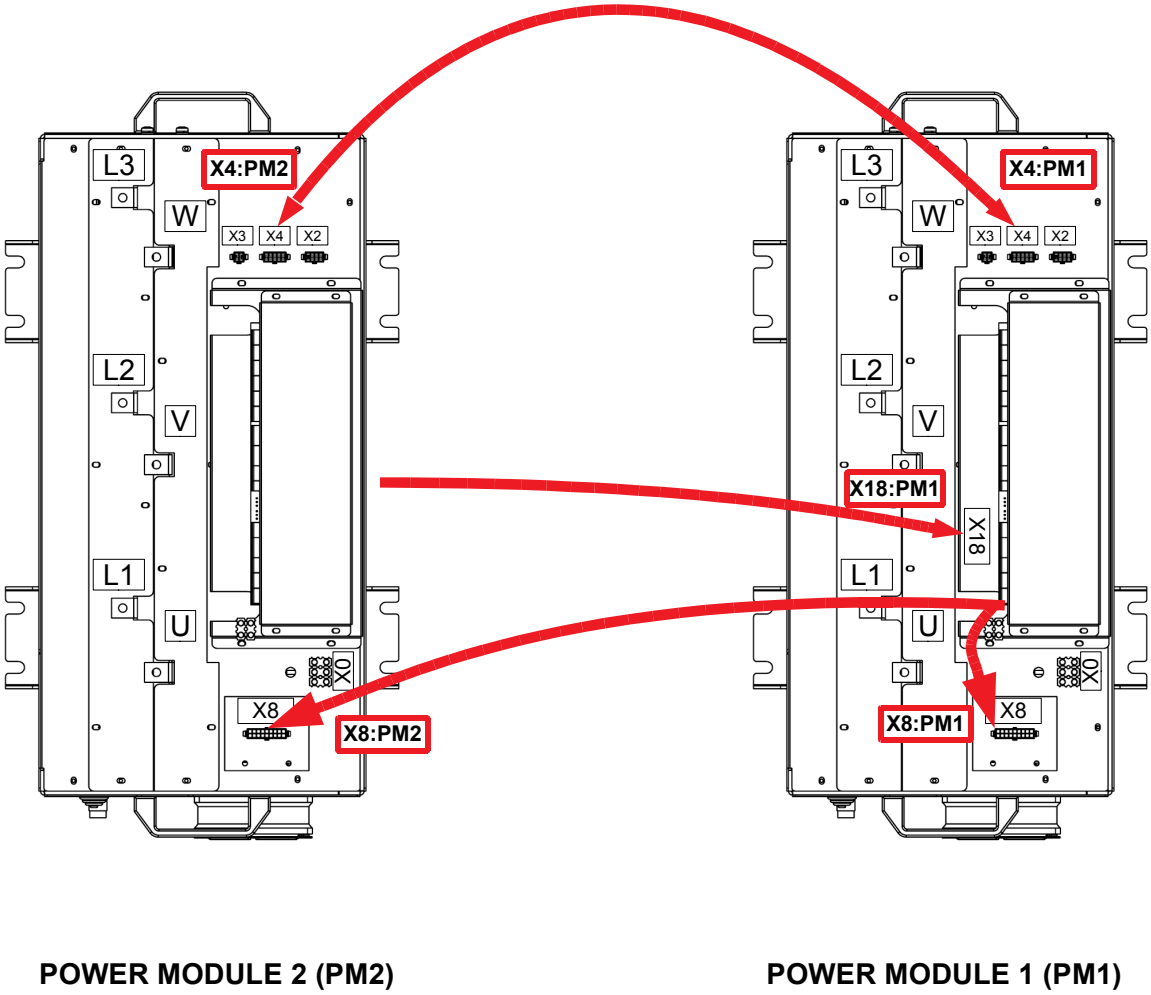

Fig. H.3.2. Electrical connections between power modules PM1 and PM2

H.3.2. Fiber-optic connections

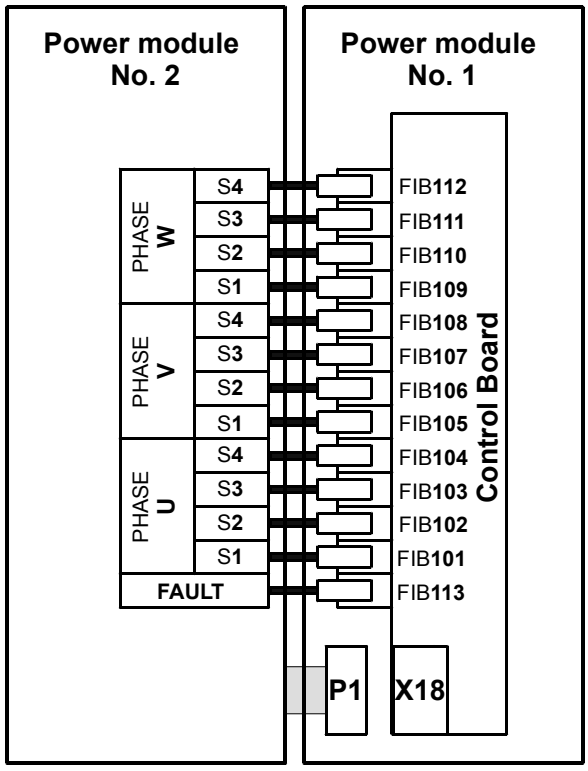

Fig. H.3.3. Fiber-optic connections (FIB101-FIB113) between power modules PM1 and PM2

H.3.2. Liquid cooling

It is necessary to connect hoses and to provide a stream of cooling liquid to every power block (fig. H.2.1 - inlet/outlet), according to the data from the table H.2.1.

H.3.3. The printed circuit board (PCB) 810/05

The printed circuit board 810/05 controls the switching of the IGBT transistors in the Power Modules. This occurs through fiber optic connectors. One MFC810/05 board serves up to two power modules. The fiber optic connectors FIB1 ÷ FIB13 control the operation of the power module 1 (Power Module No. 1). In turn, the fiber optic connectors FIB101 ÷ FIB113 control the operation of the power module 2 (Power Module No. 2).

SW100 switch
The SW100 switch (fig. 3.4) allows you to configure the converter's operation by turning on / off the individual power modules: Power Module No. 1 and Power Module No. 2. This can be useful if one of the modules fails — then you can turn it off with the SW100 switch and continue to work only with another working module.

Caution:
Before changing the SW100 position, it is necessary to disconnect all voltage sources from the converter:

1. The main circuit of 1100..1400 V
2. Auxiliary 230 V.

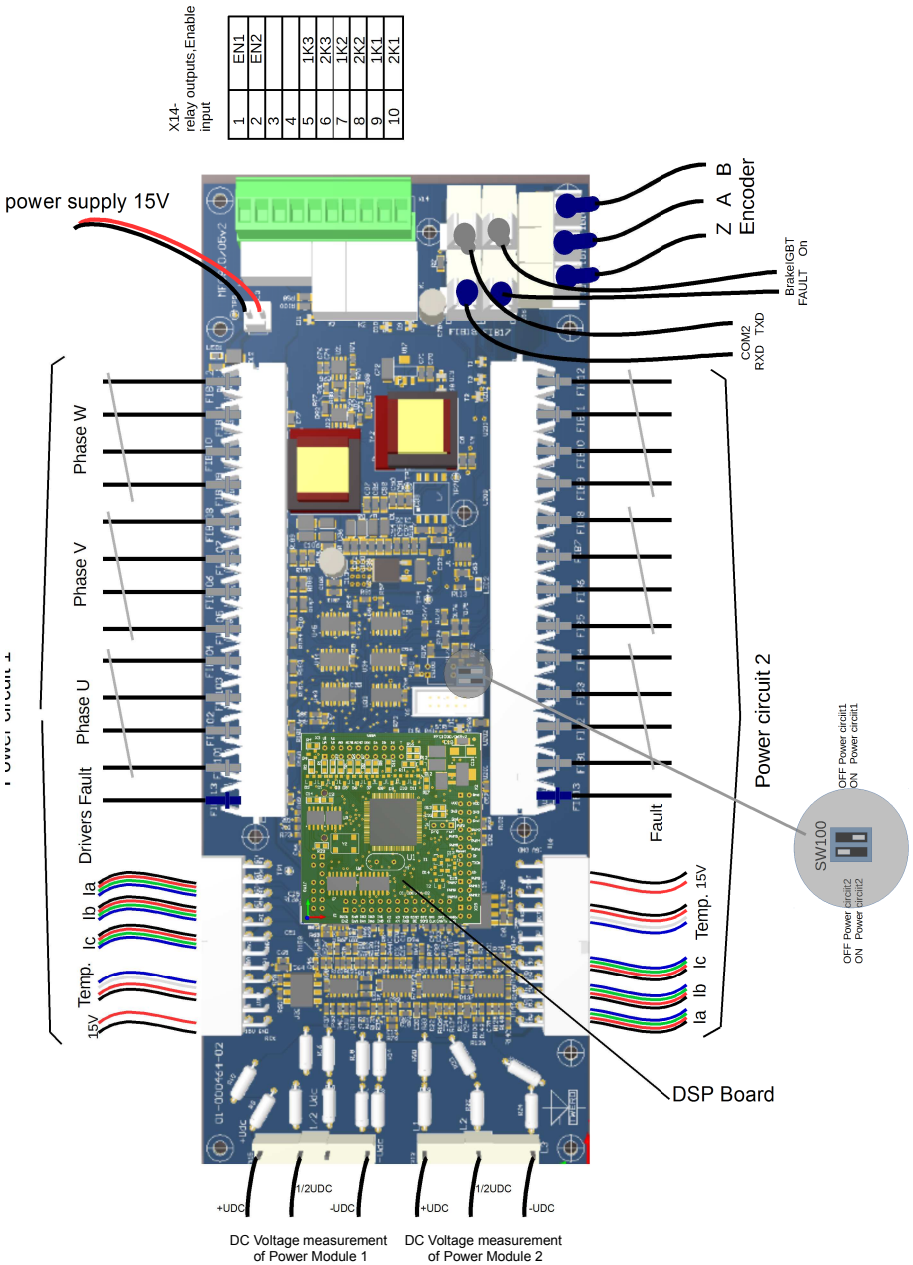

Fig. H.3.4. PCB MFC 810/05: SW100 switch

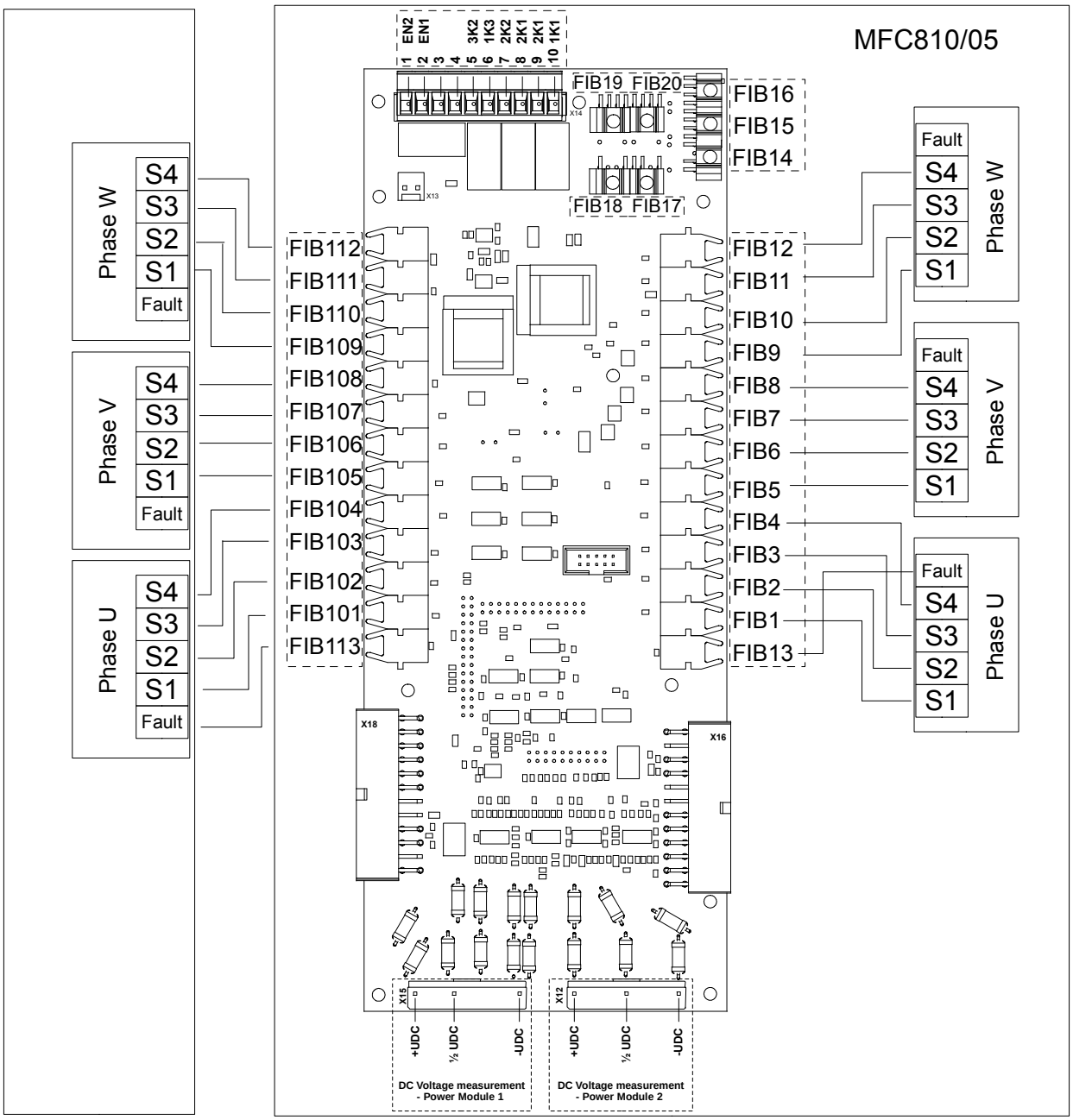

Fig. H.3.5. PCB MFC 810/05: Fiber-optic connections between Control Board MFC810/05 and Power Module 1 and Power Module 2

H.3.4. Connection of the control circuits

Figure H. 3.6. shows the control electronics board used in the converter.

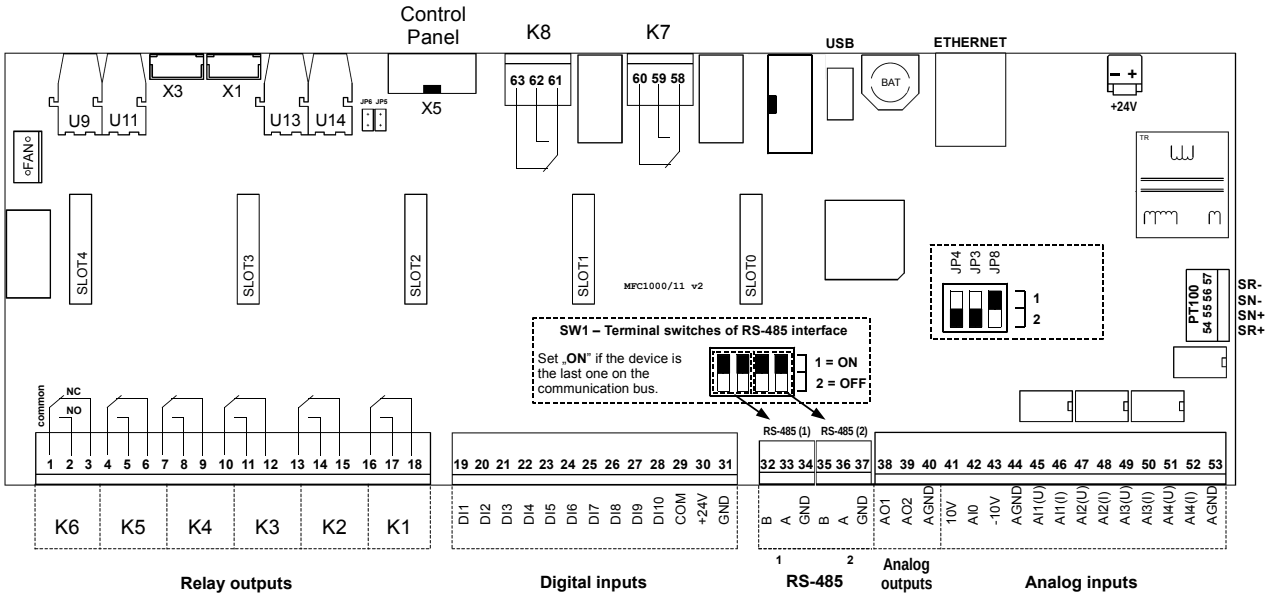

Fig. H.3.6. MFC1000/11 board - the placement of the main elements: analog / digital inputs / outputs, configuration jumpers and fiber optic connections

Note: The JP8 micro switch is used only for device diagnostics. During normal operation should be set to position 1.

Table H.3.1 – Description of the connections used by a user

K1[16-18] - K6[1-3]	Digital relay outputs
DI1[19] - DI10[28]	To trigger the digital inputs, use the output voltage of 24V DC [30] or external voltage
+24 V [30]	Internal power supply for digital inputs (max. 200mA)
GND [31]	The GND potential for digital inputs
B[32], A[33], B[35], A[36]	RS-485 communication
GND [34], [37]	The GND potential for RS-485
AO1[38], AO2[39]	Analog outputs
+10V [41], -10V [43]	+/- 10V DC voltage (max. 20mA)
AGND [40], [44], [53]	The GND potential for analogue inputs / outputs
AI1(U)[45] - AI4(I)[52]	Analog inputs

Digital inputs can work in two variants: common ground or common + 24V. The choice of the variant is made by shortening the clamps on the terminal block:

- variant 1 - common mass: COM - GND terminals
- variant 2 - common + 24V: COM terminals - + 24V

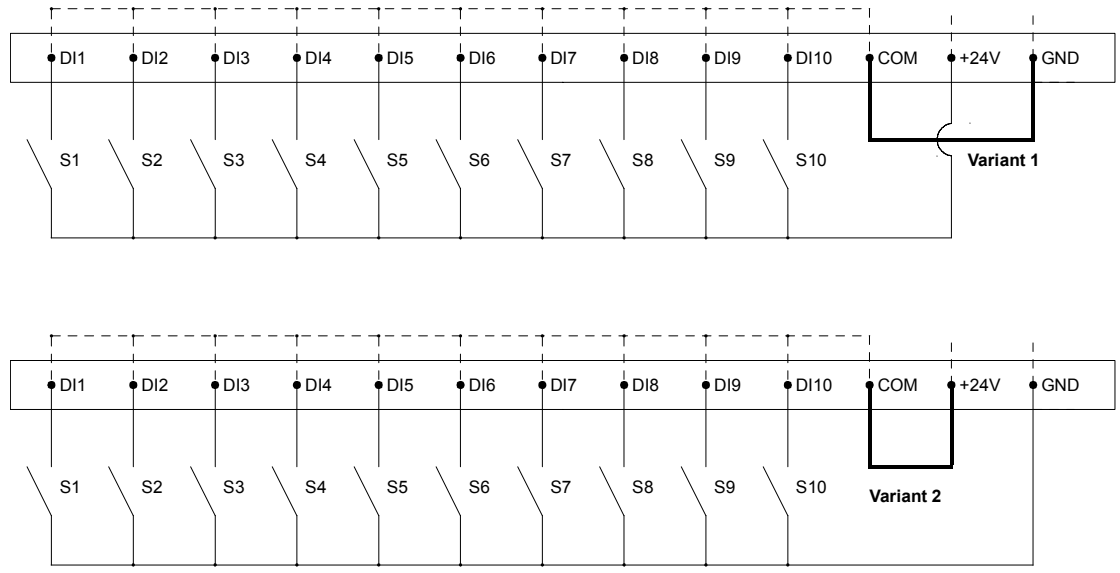

Fig. 3.7: Two variants of using digital inputs: variant 1 and 2. The internal connections of the board are marked by a dashed line.S1 ÷ S10: exemplary connectors to switch on/off the digital inputs.

H.3.5. Expansion cards

Expansion cards enable extending the drive with additional inputs / outputs. There are 5 slots available: 0 ÷ 4. In each of them, one expansion card can be installed. Expansion boards are available:

- 6 digital inputs,
- 6 digital outputs,
- 3 relay outputs,
- 2 analog outputs.

H.3.6. Single module working mode

Each power module has a possibility to work as single power module. When Power module 1 (PM1) and Power module 2 (PM2)work together than one PCB MFC810/05 (placed on top of the PM1) controls both power modules. Also both power modules have one common inputs/outputs board PCB MFC1000/11 – placed on top of the PM2.
In single working mode each power module needs separated PCB'S MFC810/05 and PCB MFC1000/11.

Power module 1 (PM1)
PCB MFC810/05 placed on the top of the PM1 should be moved inside the PM1 to the prepared place – Fig. 3.8. On the top of PM1 the PCB MFC1000/11 should be placed.

Power module21 (PM2)
Power module21 (PM2)
The PCB MFC1000/11 is already placed on the top of PM2, so there it is only necessary to mount the PCB MFC810/05 inside the PM2 – Fig. 3.8

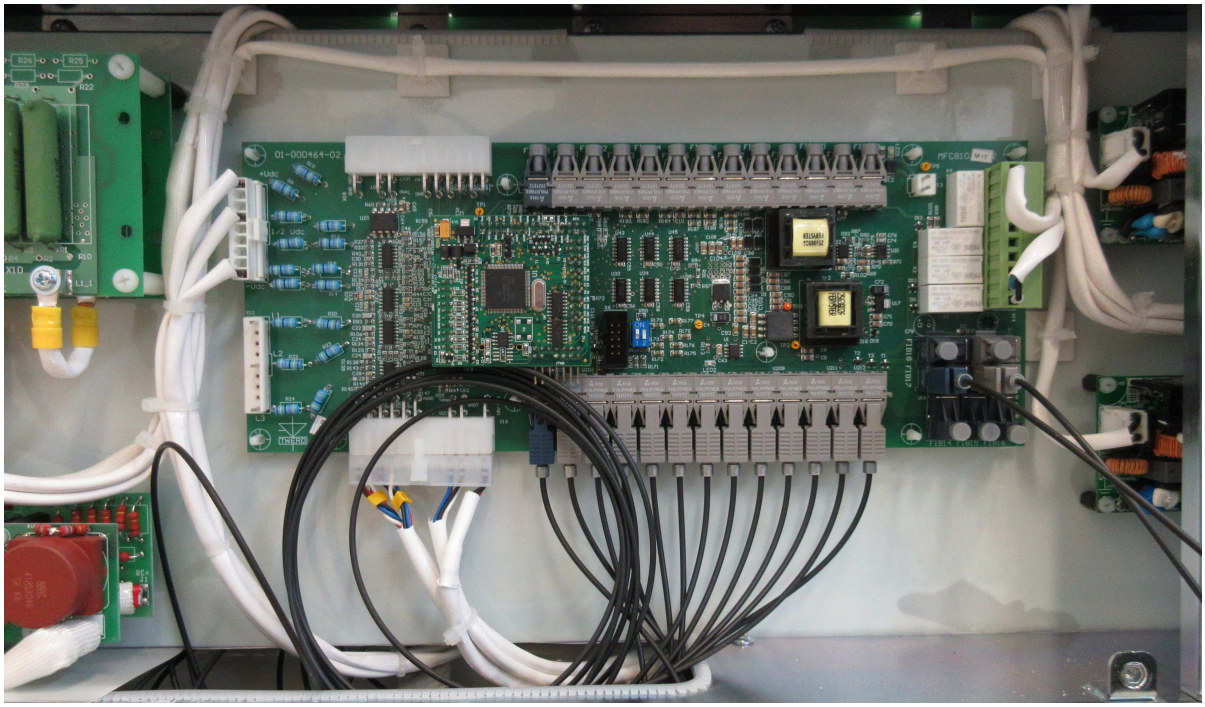

Fig. 3.8: Single module working mode – PCB MFC810/05 placed inside the power module.

(dtr_MFC810-1100V-2x250kW__hrdw_en_v1.2, 2020/01/30)

Appendix A: Configuration Parameters

Software version: 1.98 rev.3
Document version: 1.4

Read-only parameters

Group	Name	The description
GROUP 00 – Electric motor		
00.00	N process	Speed of process. It depends on current rotation speed of the electric motor. It is possible to set up scale, measurement unit and number of decimal places for this parameter using parameters 42.01, 42.02 and 42.03
00.01	Motor n	Current rotation speed of the electric motor in rotations per one minute [rpm]
00.02	Ref. n	Value of the referenced rotation speed [rpm]
00.03	f out	Current output frequency of the converter [Hz]
00.04	f ref.	Referenced frequency [Hz]
00.05	Mot torque	The moment of the drive compared to the nominal moment [%]
00.06	Motor curr.	Average value of current in windings of the motor [A]
00.07	Motor volt.	An output voltage AC of the converter [V] (voltage of the motor) – interfacial voltage
00.08	Motor temp.	Higher of temperatures indicated by parameters 00.28 and 00.48 [%]
00.09	Output power	Current output power of the converter at [kW]
00.10	Power factor	Output power factor
00.11	Energy	Value of energy which has been transferred to the electric motor from the time of first switching on the converter [kWh]
00.12	Psi st.	Stator stream [Wb]
00.13	Ia curr.	RMS current of a phase A of the motor [A]
00.14	Ib curr.	RMS current of a phase B of the motor [A]
00.15	Ic curr.	RMS current of a phase C of the motor [A]
00.16	Encoder n	Encoder speed [rpm]
00.28	Motor temp. 1	Calculated relative temperature of the motor 1 [%]
00.33	Ia 1 curr.	RMS current of a phase A of the motor 1 [A]
00.34	Ib 1 curr.	RMS current of a phase B of the motor 1 [A]
00.35	Ic 1 curr.	RMS current of a phase C of the motor 1 [A]
00.48	Motor temp. 2	Calculated relative temperature of the motor 2 [%]
00.53	Ia 2 curr.	RMS current of a phase A of the motor 2 [A]
00.54	Ib 2 curr.	RMS current of a phase B of the motor 2 [A]
00.55	Ic 2 curr.	RMS current of a phase C of the motor 2 [A]
GROUP 01 – Power circuit		
01.01	DC volt.	Voltage of the DC-link circuit of the converter [V]
01.02	DC volt. 1	Voltage of the first half DC-link circuit of the converter [V] (only three-level inverters)
01.03	DC volt. 2	Voltage of the second half DC-link circuit of the converter [V] (only three-level inverters)
01.04	DC balance	Balance between DC volt 1 and DC volt 2 [%] (only three-level inverters)
01.05	Grid volt.	Power line supply AC voltage [V] – estimated. The calculation is based on the DC-link voltage Udc measurement.
01.06	Grid freq.	Line Voltage frequency [Hz]
01.07	Active pow	Active power
01.08	Reactive pow	Reactive power
01.09	L1 curr.	RMS current of a phase L1 of the line [A]
01.10	L2 curr.	RMS current of a phase L2 of the line [A]
01.11	L3 curr.	RMS current of a phase L3 of the line [A]
GROUP 02 – Temperature		
02.01	VSD temp 1	Temperature of the VSD's IGBT module 1 [°C]
02.02	VSD temp 2	Temperature of the VSD's IGBT module 2 [°C]
02.03	VSD temp 3	Temperature of the VSD's IGBT module 3 [°C]
02.04	VSD inlet	Temperature of the VSD inlet (only in liquid cooled inverter) [°C]

Group	Name	The description
02.05	VSD outlet	Temperature of the VSD outlet (only in liquid cooled inverter) [°C]
02.06	VSD temp 4	Temperature of the VSD's IGBT module 4 [°C]
02.07	VSD temp 5	Temperature of the VSD's IGBT module 5 [°C]
02.08	VSD temp 6	Temperature of the VSD's IGBT module 6 [°C]
02.09	VSD temp 7	Temperature of the VSD's IGBT module 7 [°C]
02.10	VSD temp 8	Temperature of the VSD's IGBT module 8 [°C]
02.11	VSD temp 9	Temperature of the VSD's IGBT module 9 [°C]
02.12	VSD temp 10	Temperature of the VSD's IGBT module 10 [°C]
02.13	VSD temp 11	Temperature of the VSD's IGBT module 11 [°C]
02.14	VSD temp 12	Temperature of the VSD's IGBT module 12 [°C]
02.15	VSD temp max	The highest temperature of “VSD temp 1” .. “VSD temp 12” [°C]
02.23	ACR temp 1	Temperature of the ACR's IGBT module 1 [°C]
02.22	ACR temp 2	Temperature of the ACR's IGBT module 2 [°C]
02.23	ACR temp 3	Temperature of the ACR's IGBT module 3 [°C]
02.24	ACR inlet	Temperature of the ACR inlet (only in liquid cooled inverter) [°C]
02.25	ACR outlet	Temperature of the ACR outlet (only in liquid cooled inverter) [°C]
02.26	ACR temp 4	Temperature of the ACR's IGBT module 4 [°C]
02.27	ACR temp 5	Temperature of the ACR's IGBT module 5 [°C]
02.28	ACR temp 6	Temperature of the ACR's IGBT module 6 [°C]
02.29	ACR temp 7	Temperature of the ACR's IGBT module 7 [°C]
02.30	ACR temp 8	Temperature of the ACR's IGBT module 8 [°C]
02.31	ACR temp 9	Temperature of the ACR's IGBT module 9 [°C]
02.32	ACR temp 10	Temperature of the ACR's IGBT module 10 [°C]
02.33	ACR temp 11	Temperature of the ACR's IGBT module 11 [°C]
02.34	ACR temp 12	Temperature of the ACR's IGBT module 12 [°C]
02.35	ACR temp max	The highest temperature of “ACR temp 1” .. “ACR temp 12” [°C]
02.40	PT 100	Temperature of the PT100 sensor
02.41	Ctrl temp 1	Service parameter
02.42	Ctrl temp 2	Service parameter
02.43	Ctrl temp 3	Service parameter
02.44	Ctrl temp 4	Service parameter
02.45	Ctrl temp 5	Service parameter
02.46	Ctrl temp 6	Service parameter
02.47	Ctrl temp 7	Service parameter
02.48	Ctrl temp 8	Service parameter
02.49	Ctrl temp 9	Service parameter
02.50	Ctrl temp 10	Service parameter
02.51	Ctrl temp 11	Service parameter
02.52	Ctrl temp 12	Service parameter
02.53	Ctrl temp 13	Service parameter
02.54	Ctrl temp 14	Service parameter
02.55	Ctrl temp 15	Service parameter
GROUP 03 – Inputs / outputs		
03.01	DI state 1	Status of digital inputs 1..10
03.02	DI state 2	Status of digital inputs 11..20
03.03	DI state 3	Status of digital inputs 21..30
03.04	DI state 4	Status of digital inputs 31..40
03.05	DI state 5	Status of digital inputs 41..50
03.06	DI state 6	Status of digital inputs 51..60
03.11	DO state 1	Status of digital outputs 1..8
03.12	DO state 2	Status of digital outputs 11..18
03.13	DO state 3	Status of digital outputs 21..28
03.14	DO state 4	Status of digital outputs 31..38
03.15	DO state 5	Status of digital outputs 41..48
03.16	DO state 6	Status of digital outputs 51..58
03.23	In.A0	Value of an analog input 0

Group	Name	The description
03.22	In.A0 Sc	Value of an analog input 0 [%]
03.23	In.A1	Value of an analog input 1
03.24	In.A1 Sc	Value of an analog input 1 [%]
03.25	In.A2	Value of an analog input 2
03.26	In.A2 Sc	Value of an analog input 2 [%]
03.27	In.A3	Value of an analog input 3
03.28	In.A3 Sc	Value of an analog input 3 [%]
03.29	In.A4	Value of an analog input 4
03.30	In.A4 Sc	Value of an analog input 4 [%]
03.31	In.A11	Value of an analog input 11
03.32	In.A11 Sc	Value of an analog input 11 [%]
03.33	In.A12	Value of an analog input 12
03.34	In.A12 Sc	Value of an analog input 12 [%]
03.35	In.A21	Value of an analog input 21
03.36	In.A21 Sc	Value of an analog input 21 [%]
03.37	In.A22	Value of an analog input 22
03.38	In.A22 Sc	Value of an analog input 22 [%]
03.39	In.A31	Value of an analog input 31
03.40	In.A31 Sc	Value of an analog input 31 [%]
03.41	In.A32	Value of an analog input 32
03.42	In.A32 Sc	Value of an analog input 32 [%]
03.43	In.A41	Value of an analog input 41
03.44	In.A41 Sc	Value of an analog input 41 [%]
03.45	In.A42	Value of an analog input 42
03.46	In.A42 Sc	Value of an analog input 42 [%]
03.47	In.A51	Value of an analog input 51
03.48	In.A51 Sc	Value of an analog input 51 [%]
03.49	In.A52	Value of an analog input 52
03.50	In.A52 Sc	Value of an analog input 52 [%]
03.51	Out A1	Value of an analog output 1
03.52	Out A1 Sc	Value of an analog output 1 [%]
03.53	Out A2	Value of an analog output 2
03.54	Out A2 Sc	Value of an analog output 2 [%]
03.55	Out A11	Value of an analog output 11
03.56	Out A11 Sc	Value of an analog output 11 [%]
03.57	Out A12	Value of an analog output 12
03.58	Out A12 Sc	Value of an analog output 12 [%]
03.59	Out A23	Value of an analog output 23
03.60	Out A23 Sc	Value of an analog output 23 [%]
03.61	Out A22	Value of an analog output 22
03.62	Out A22 Sc	Value of an analog output 22 [%]
03.63	Out A31	Value of an analog output 31
03.64	Out A31 Sc	Value of an analog output 31 [%]
03.65	Out A32	Value of an analog output 32
03.66	Out A32 Sc	Value of an analog output 32 [%]
03.67	Out A41	Value of an analog output 41
03.68	Out A41 Sc	Value of an analog output 41 [%]
03.69	Out A42	Value of an analog output 42
03.70	Out A42 Sc	Value of an analog output 42 [%]
03.71	Out A51	Value of an analog output 51
03.72	Out A51 Sc	Value of an analog output 51 [%]
03.73	Out A52	Value of an analog output 52
03.74	Out A52 Sc	Value of an analog output 52 [%]
GROUP 04 - References		
04.00	Ref. status	Service parameter
04.01	Ref. chosen	Value corresponding to chosen Control place

Group	Name	The description
04.02	Ref. act. A1	Ref. value of Control place A1
04.03	Ref. act. A2	Ref. value of Control place A2
04.04	Ref. act. B1	Ref. value of Control place B1
04.05	Ref. act. B2	Ref. value of Control place B2
04.11	PID 1 ref	Value of current referencing-unit of the PID 1 controller [%]
04.12	PID 1 inp.	Current input value of the PID 1 controller [%]
04.13	PID 1 err.	Error of the PID 1 controller [%]
04.14	PID 1 out.	Current output value of the PID 1 controller [%]
04.23	PID 2 ref	Value of current referencing-unit of the PID 2 controller [%]
04.22	PID 2 inp.	Current input value of the PID 2 controller [%]
04.23	PID 2 err.	Error of the PID 2 controller [%]
04.24	PID 2 out.	Current output value of the PID 2 controller [%]
04.31	PID 3 ref	Value of current referencing-unit of the PID 3 controller [%]
04.32	PID 3 inp.	Current input value of the PID 3 controller [%]
04.33	PID 3 err.	Error of the PID 3 controller [%]
04.34	PID 3 out.	Current output value of the PID 3 controller [%]
04.41	PID 4 ref	Value of current referencing-unit of the PID 4 controller [%]
04.42	PID 4 inp.	Current input value of the PID 4 controller [%]
04.43	PID 4 err.	Error of the PID 4 controller [%]
04.44	PID 4 out.	Current output value of the PID 4 controller [%]
04.51	Ref user 1	User 1 reference
04.52	Ref user 2	User 2 reference
04.53	Ref user 3	User 3 reference
04.54	Ref user 4	User 4 reference
04.55	Ref user 5	User 5 reference
04.56	Ref user 6	User 6 reference
04.57	Ref user 7	User 7 reference
04.58	Ref user 8	User 8 reference
04.59	Ref user 9	User 9 reference
04.60	Ref user 10	User 10 reference
GROUP 05 - Status		
05.00	Act. motor	Status of active electric motor
05.01	Run status	Service parameter
05.02	Statusword	Service parameter
05.03	Ref. place	Service parameter
05.11	Encoder 1	Encoder speed [rpm]
05.20	U. par 1	User parameter 1
05.21	U. par 2	User parameter 2
05.22	U. par 3	User parameter 3
05.23	U. par 4	User parameter 4
05.24	U. par 5	User parameter 5
05.25	U. par 6	User parameter 6
05.26	U. par 7	User parameter 7
05.27	U. par 8	User parameter 8
05.28	U. par 9	User parameter 9
05.29	U. par 10	User parameter 10
05.30	U. par 11	User parameter 11
05.31	U. par 12	User parameter 12
05.32	U. par 13	User parameter 13
05.33	U. par 14	User parameter 14
05.34	U. par 15	User parameter 15
05.35	U. par 16	User parameter 16
05.36	U. par 17	User parameter 17
05.37	U. par 18	User parameter 18
05.38	U. par 19	User parameter 19
05.39	U. par 20	User parameter 20

Group	Name	The description
GROUP 06 - Advanced		
06.01	Pump state	State of operation the Control unit of Pumps Group
06.02	Pump 1 time	Pump's 1 operating hours [h]
06.03	Pump 2 time	Pump's 2 operating hours [h]
06.04	Pump 3 time	Pump's 3 operating hours [h]
06.05	Pump 4 time	Pump's 4 operating hours [h]
06.06	Pump 5 time	Pump's 5 operating hours [h]
06.07	Pump 6 time	Pump's 6 operating hours [h]
06.10	Diameter	Service parameter
GROUP 07 - Communication		
07.01	RS refer.	Service parameter
07.02	RS CW	Service parameter
07.03	RS SW	Service parameter
07.11	Recv pack. 1	Number of received packets on channel 1
07.12	Send pack. 1	Number of sent packets on channel 1
07.13	Act. prot. 1	Active protocol on channel 1
07.21	Recv pack. 2	Number of received packets on channel 2
07.22	Send pack. 2	Number of sent packets on channel 2
07.23	Act. prot. 2	Active protocol on channel 2
07.31	Recv pack. 3	Number of received packets on channel 3
07.32	Send pack. 3	Number of sent packets on channel 3
07.33	Act. prot. 3	Active protocol on channel 3
07.40	Eth. IP 1	Ethernet IP address 1
07.41	Eth. IP 2	Ethernet IP address 2
07.42	Eth. IP 3	Ethernet IP address 3
07.43	Eth. IP 4	Ethernet IP address 4
07.44	Eth. MASK 1	Ethernet mask 1
07.45	Eth. MASK 2	Ethernet mask 2
07.46	Eth. MASK 3	Ethernet mask 3
07.47	Eth. MASK 4	Ethernet mask 4
07.48	Eth. GW 1	Ethernet gateway 1
07.49	Eth. GW 2	Ethernet gateway 2
07.50	Eth. GW 3	Ethernet gateway 3
07.51	Eth. GW 4	Ethernet gateway 4
07.52	Eth. state	Status of Ethernet connection
GROUP 09 - Special info		
09.01	Run time	Quantity of hours of converter's operation [h]
09.10	Ctrl version	Version of a main control program
09.11	Ctrl revision	Revision of a main control program
09.12	VSD version	Version of a VSD control program
09.13	VSD revision	Revision of a VSD control program
09.14	ACR version	Version of an AcR control program
09.15	ACR revision	Revision of an AcR control program
09.20	Timer 1 hour	Number of hours elapsed in Timer 1
09.23	Timer 1 minute	Number of minutes elapsed in Timer 1
09.22	Timer 2 hour	Number of hours elapsed in Timer 2
09.23	Timer 2 minute	Number of minutes elapsed in Timer 2
09.24	Timer 3 hour	Number of hours elapsed in Timer 3
09.25	Timer 3 minute	Number of minutes elapsed in Timer 3
09.26	Timer 4 hour	Number of hours elapsed in Timer 4
09.27	Timer 4 minute	Number of minutes elapsed in Timer 4
09.28	Timer 5 hour	Number of hours elapsed in Timer 5
09.29	Timer 5 minute	Number of minutes elapsed in Timer 5

Read-write parameters

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
GROUP 10 – Nominal par. motor.				
10.00 Motor count	Number of connected motors to inverter	1, 2	1	No
10.01 Nom. power	Nominal motor power	0.0 .. 2 x [Nominal power of the freq. converter] kW	Nominal power of the frequency converter	No
10.02 Nom. speed	Nominal motor speed	0 .. 30000 rpm	1450 rpm	No
10.03 Nom. current	Nominal motor current	0.0 .. 2 x [Nominal current of the freq. converter] A	Nominal current of the frequency converter	No
10.04 Nom. voltage	Nominal motor voltage	0 .. 1200 V	Nominal voltage of the frequency converter	No
10.05 Nom. freq.	Nominal motor frequency	0.0 .. 550.0 Hz	50.0 Hz	No
10.06 Nom. PF	Nominal cos φ_n of the motor	0.00 ... 0.99	0.80	No
10.11 Rs	Resistance stator windings	0.00 .. 650.00 Ohm	0.00 Ohm	No
10.12 Rr	Resistance of rotor windings	0.00 ... 650.00 Ohm	0.00 Ohm	No
10.13 Lm	Main inductance Lm	0 .. 65000 mH	0 mH	No
10.14 Ls	Stator inductance Ls	0 .. 65000 mH	0 mH	No
10.15 Lr	Rotor inductance Lr	0 .. 65000 mH	0 mH	No
10.16 L addit.	Additional inductance in stator's circuit (inductance of wires)	0 .. 65000 mH *Service parameter*	0 mH	
10.18 Save motor	Saving present motors parameters	Memory buffers designed for writing: **001 Motor 1** **002 Motor 2** **003 Motor 3** **004 Motor 4**	001 Motor 1	No
10.19 Read motor	Restoring previously saved motors parameters.	Memory buffers designed for reading previously saved motor parameters: **001 Motor 1** **002 Motor 2** **003 Motor 3** **004 Motor 4**	001 Motor 1	No
10.20 ID run	Identification of motor's equivalent circuit parameters	**000 ---** - without any identification **001 Dont run** - identification performed on stopped motor **002 Run fn/2** - identification performed at 25 Hz **003 Run fn** - identification performed at 50 Hz	---	No
GROUP 11 – Motor configuration				
11.02 Oper. mode	Device operating mode	**000 U/f lin.** – operation in scalar mode (linear characteristic) **001 U/f sq.** – as above (square-law characteristic) **002 Vector s. less** – vector mode without sensors **003 Vector sensor** – vector mode with encoder	U/f lin.	No
11.03 Switch. freq.	Switching frequency of the converter's power transistors	0.5 ... 16.0 kHz Note: The setting range depends on the converter's nominal power	5.0 kHz	No
11.20 Stop mode	Stopping by coast or according to characteristic	**000 Ramp** – deceleration to 0 Hz at first, then shutting down **001 Coast** – stopping by running out after STOP command (voltage taken off immediately) **002 BSC** - Backspin mode	000 Ramp	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
11.25 Rotation dir.	Direction of motor rotation	**000 Reverse** – bidirectional **001 Right –** only right rotation **002 Left –** only left rotation	000 Reverse	Yes
11.30 Flyin start	Running the frequency converter when motor is spinning	0 – function disabled 1 – search in one direction, searched frequencies: from Fref or Fmax 2 – search in both directions, searched frequencies: from Fref or Fmax 3 – search in one direction, searched frequencies: from Fmax 4 – search in both directions, searched frequencies: from Fmax	0	Yes
11.40 Reg hi. UDC	Protection against exceeding the high DC voltage	**000 No** **001 Yes** *Service parameter*	000 No	Yes
11.41 Reg lo. UDC		Service parameter	NO	Yes
11.43 Phase loss	Phase loss	**000 No** **001 Yes**	000 No	No
11.50 DC breaking voltage	Voltage of DC braking	0.0 .. 40.0% motor's Un	0.5%	Yes
11.51 DC breaking time	Braking time	0.0 .. 320.0s	2.0s	Yes
11.52 DC breaking enable	Enable DC braking	**000 – Disabled** **531 – Enabled**	000 - Disabled	Yes
11.53 DC breaking current	Current of DC braking	0.0 .. 120.0% of motor’s current	50.0%	Yes
11.60 Br rel. delay	Delay of releasing external brake	0.0 .. 12.0 s	0.0 s	Yes
11.61 Br. close n	Speed above which brake is being closed	0 .. 10000 rpm	0 rpm	Yes
11.62 Br. close t	Device operation time (giving torque) after which command to close the brake is send	0.0 .. 12.0 s	0.0 s	Yes
11.63 Br. curr. lvl.	Minimal motor current for releasing brake	0.0 .. 100.0% of motor’s current	40.0%	Yes
11.68 Min t Stop	Minimal time of stopping	0.00 .. 10.00 s	0.10 s	Yes
GROUP 12 – Encoder				
12.01 Enc. typ	Encoder type	*Service parameter*		No
12.02 Enc .i./o.	Amount of pulses per encoder rotation	1 ... 9999 DEPENDS ON ENCODER TYPE!	1024	No
12.03 Enc. revers	Reverse direction of rotations of encoder	**000 No** - disabled **001 Yes** - enabled It depends on a way of encoder installation on the shaft of the drive. For correct operation of converter in „**003 Vector sensor**” mode, detected direction of rotation must be the same as actual direction.	000 NO	No
GROUP 13 – Dynamic & limit				
13.01 Accel. 1	Acceleration DYNAMICS 1	0.0 ... 600.0 s	5.0	Yes
13.02 Decel. 1	Delay DYNAMICS 1	0.0 ... 600.0 s	5.0	Yes
13.10 Accel. 2	Acceleration DYNAMICS 2	0.0 ... 600.0 s	20 s	Yes
13.11 Decel. 2	Delay DYNAMICS 2	0.0 ... 600.0 s	20 s	Yes
13.20 Stop Delay	Set stopping time of the motor	0.0 ... 600.0 s	15.0 s	Yes
13.30 S curve	S curve	0 ... 300 %	0 %	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
13.35 Dyn. choice	Enabling DYNAMICS 1 or DYNAMICS 2	**000 Disabled** – Dynamics 1 active (accel. and delay 1) **001 DI1 .. 010 DI10** – switching on Dynamics 2 by means of digital input DI1...DI10 **531 Enabled** – Dynamics 2 active (accel. and delay 2)	000 Disabled	Yes
13.40 F max.	Maximum output frequency	0.0 .. 600.0 Hz Exceeding this value results in failure no 270 F>max. NOTE: see also par. 21.02	55.0 Hz	Yes
13.41 I limit M	Current restriction at motor operation	0.0 .. 200.0 % motor In	150.0 %	Yes
13.42 I limit G	Current restriction at generator operation	0.0 .. 200.0 % motor In	150.0 %	Yes
13.43 M limit M	Torque restriction at motor operation	0.0 .. 200.0 % motor Mn	150.0 %	Yes
13.44 M limit G	Torque restriction at generator operation	0.0 .. 200.0 % motor M	150.0 %	Yes
13.50 Limit Mocy S	Limit of active power in motor operating mode (power consumed by the electric motor)	0.0 .. 150.0 % frequency converter Pn	150.0 %	Yes
13.51 Limit Mocy P	Limit of active power in generator operating mode (power produced by the electric motor)	0.0 .. 150.0 % frequency converter Pn	20.0 %	Yes
Group 14 Elimin. freq.				
14.1 f elim1 min	Minimum frequency of frequency elimination range number 1	0.0 .. 550.0 Hz	0.0 Hz	Yes
14.2 f elim1 max	Maximum frequency of frequency elimination range number 1	0.0 .. 550.0 Hz	0.0 Hz	Yes
14.3 f elim2 min	Minimum frequency of frequency elimination range number 2	0.0 .. 550.0 Hz	0.0 Hz	Yes
14.4 f elim2 max	Maximum frequency of frequency elimination range number 2	0.0 .. 550.0 Hz	0.0 Hz	Yes
14.5 f elim3 min	Minimum frequency of frequency elimination range number 3	0.0 .. 550.0 Hz	0.0 Hz	Yes
14.6 f elim3 max	Maximum frequency of frequency elimination range number 3	0.0 .. 550.0 Hz	0.0 Hz	Yes
Group 15 – Scalar operating mode				
15.01 U0	Voltage for output frequency F0 (par. 15.02)	0.0 .. 40.0 % motor Un	2.0 %	Yes
15.02 F0	F0 frequency	0.0 .. 20.0 %	0.0 %	Yes
15.03 U1	Voltage for output frequency F1 (par 15.04)	0.0 .. 100.0 %	50.0 %	Yes
15.04 f1	F1 frequency	0.0 .. 100.0 %	50.0 %	Yes
15.10 dU at In	Compensation of a voltage drop from output current	0.0 .. 40.0 % Un	0.0 %	Yes
15.15 Slip comp.	Slip compensation	**000 No** **001 Yes**	000 No	Yes
15.20 f Start	Start Minimal output frequency for U/f operation modes	0.0 .. 40.0 Hz	0.0 Hz	Yes
Group 16 – Vector operating mode				

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
16.00 Sel. Torque	Direct torque set	**240 Speed reg** – normal operation **xxx PCH** – direct torque from other source (any PCH)	240 Speed reg	Yes
16.01 Amp. reg.n	Speed regulator gain	Service parameter for Vector modes	2.0	Yes
16.02 Ki of reg.n	Integration time of speed regulator	Service parameter for Vector modes	2.00 s	Yes
16.03 Amp. reg.M	Torque regulator gain	Service parameter for Vector modes	0.60	Yes
16.04 Ki reg.M	Integration time of Torque regulator	Service parameter for Vector modes	1.00	Yes
16.05 Amp. reg.S	Motor stream regulator gain	Service parameter for Vector modes	650	Yes
16.06 Ki reg.S	Integration time of motor stream regulator	Service parameter for Vector modes	0.003	Yes
Group 17 - Backspin				
17.01 Enable BS	On/off the control of the backspin	**000 No** **001 Yes**	000 No	Yes
17.02 BS acc.	Backspin acceleration	0.0 .. 320.0 s	20 s	
17.03 BS freq min	Minimal output frequency of backspin controller	1.0 .. 20.0 Hz	2.0 Hz	Yes
17.04 BS freq max	Maximum output frequency of backspin controller	1.0 .. 50.0 Hz	10.0 Hz	Yes
17.05 BS 1	*Service parameter*	-32000 .. 32000	0	
17.06 BS 2	*Service parameter*	-32000 .. 32000	0	
17.07 BS 3	*Service parameter*	-32000 .. 32000	0	
17.08 BS 4	*Service parameter*	-32000 .. 32000	0	
17.09 BS 5	*Service parameter*	-32000 .. 32000	610	
17.10 BS 6	*Service parameter*	-32000 .. 32000	0	
17.11 BS 7	*Service parameter*	-32000 .. 32000	0	
17.12 BS 8	*Service parameter*	-32000 .. 32000	200	
Group 19 - Active Rectifier (AcR)				
19.01 AcR mode	Active Rectifier mode	**0** - AcR off **1** - AcR on when „ready” mode **2** - AcR on when „run” mode **3** - AcR on when „run” mode, motor starts after the AcR started. **4** - Idle mode	0	Yes
19.02 Grid voltage	Grid voltage	0 .. 3800 V	400 V	Yes
19.03 Grid freq.	Grid frequency	45.0 .. 66.0 Hz	50 Hz	Yes
19.04 Grid volt. adj	Grid voltage adjust	0.85 .. 1.15	1.00	Yes
19.05 Switch. freq.	Switching frequency	2.0 .. 10.0 kHz	5.0 kHz	Yes
19.10 UDC refer.	UDC refererence	0 .. 5500 V	665 V	Yes
19.20 Iq refer.	Iq reference	-30.0 .. 30.0 % (100%=In)	0.0 %	Yes
19.30 Absorb. limit	*Service parameter*	0.1 .. 220.0 % (100%=In)	100,0 %	Yes
19.31 Gener. limit	*Service parameter*	0.1 .. 220.0 % (100%=In)	100,0 %	Yes
19.40 Sine fil. induct	Inductance from the electric motor side	0.000 .. 32.767 mH	0.250 mH	Yes
19.41 Grid fil. induct	Inductance from the electrical grid side	0.000 .. 32.767 mH	0.070 mH	Yes
19.50 kp UDC	K of voltage regulator	0 .. 32767 %	160 %	Yes
19.51 Ti UDC	Ti of voltage regulator	0 .. 32767 %	140 %	Yes
19.55 kp Id	K of active current regulator	-3000 .. 32767 %	80 %	Yes
19.56 Ti Id	Ti of active current regulator	0 .. 32767 %	100 %	Yes
19.60 kp Iq	K of reactive current regulator	0 .. 32767 %	80 %	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
19.61 Ti Iq	Ti of reactive current regulator	0 .. 32767	100 %	Yes
19.70 Power feed forw.	Power feed forward	**000 NO** **001 YES**	000 No	Yes
19.71 Active dump.	Active Damping	**000 NO** **001 YES**	000 No	Yes
19.72 Auto UDC	Auto-adjustment of Udc ref.	**000 NO** **001 YES**	000 No	No
Group 20 - Control configuration				
20.01 Ctrl. A/B	Switching ON variant A or B of control	**000 Disabled** – Control A enabled **001 DI1 .. 010 DI10** – A/B choice by using digital inputs DI1 .. DI10 **531 Enabled** – Control B enabled	000 Disabled	Yes
20.02 Ctrl. 1/2	Switching ON variant 1 or 2 of control	**000 Disabled** – Control 1 enabled **001 DI1 .. 010 DI10** – 1/2 choice by using digital inputs DI1 .. DI10 **531 Enabled** – Control 2 enabled	000 Disabled	Yes
20.10 Ref unit A1	Choice of a referencing-unit for Control A1	**300 Keyb. ref. -** frequency ref-unit from the panel **301 .. 304 PID out** – referencing frequency by PID controller **305 .. 308 Motopot 1** – referencing by increase/decrease signals from motopotentiometer **309 Remote ref** – referencing from remote control **310 .. 314 Ref an.** - referencing frequency by signal from analog input AI0 .. AI4 **315 .. 317 Comm chan.** – referencing frequency from communication channel	300 Keyboard ref	Yes
20.11 Start A1	Choice of a source of START / STOP signal for Control A1	**000 Keyboard** **001 RS** **002 Remote 1** **003 Remote 2** **004 Remote 3** **005 Remote 4**	000 Keyboard	Yes
20.12 Ref Torq A1	Torque referencing-unit for Control A1	**310 .. 314 , 320 .. 329 Ref an. -** referencing maximum torque by a signal from analog input **330 100%** - maximum torque 100%	330 100%	Yes
20.20 Ref unit A2	Choice of a referencing-unit for Control A2	Same as **20.10**	300 Keyboard ref	Yes
20.23 Start A2	Choice of a source of START / STOP signal for Control A2	Same as **20.11**	000 Keyboard	Yes
20.22 Ref Torq A2	Torque referencing-unit for Control A2	Same as **20.12**	330 100.0%	Yes
20.30 Ref unit B1	Choice of a referencing-unit for Control B1	Same as **20.10**	309 Remote ref	Yes
20.31 Start B1	Choice of a source of START / STOP signal for Control B1	Same as **20.11**	000 Keyboard	Yes
20.32 Ref Torq B1	Torque referencing-unit for Control B1	Same as **20.12**	330 100%	Yes
20.40 Ref unit B2	Choice of a referencing-unit for Control B2	Same as **20.10**	309 Remote ref	Yes
20.41 Start B2	Choice of a source of START / STOP signal for Control B2	Same as **20.11**	000 Keyboard	Yes
20.42 Ref Torq B2	Torque referencing-unit for Control B2	Same as **20.12**	330 100%	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
20.50 Remote 1 mode	Variant of START/STOP Remote 1 control	**000 ST. L/R** Input 1 - Start/Stop Input 2 - Direction **001 ST. R ST. L** Input 1 – Start right Input 2 – Start left **002 IM ST IM ST STOP** Input 1 – Pulse (0V→24V): Start Input 2 – Pulse (24V→0V): Stop **003 IM ST IM ST LR** Input 1 – Pulse (0V→24V): Start Input 2 – Pulse (24V→0V): Stop Input 3 – Direction **004 ONLY START** Input 1 – Start/Stop	000 ST. L/R	Yes
20.51 Remote 1 Inp.1	Input 1 of Remote 1	**000 Disabled** – disabled **001 .. 010** – digital input **DI1..DI10**	000 DISABLED	Yes
20.52 Remote 1 Inp.2	Input 2 of Remote 1	**000 Disabled** – disabled **001 .. 010** – digital input **DI1..DI10**	000 DISABLED	Yes
20.53 Remote 1 Inp.3	Input 3 of Remote 1	**000 Disabled** – disabled **001 .. 010** – digital input **DI1..DI10**	000 DISABLED	Yes
20.60 Remote 2 mode	Variant of START/STOP Remote 2 control	The same as par. **20.50**	000 ST. L/R	Yes
20.61 Remote 2 Inp.1	Input 1 of Remote 2	The same as par. **20.51**	000 DISABLED	Yes
20.62 Remote 2 Inp.2	Input 2 of Remote 2	The same as par. **20.52**	000 DISABLED	Yes
20.63 Remote 2 Inp.3	Input 3 of Remote 2	The same as par. **20.53**	000 DISABLED	Yes
20.70 Remote 3 mode	Variant of START/STOP Remote 3 control	The same as par. **20.50**	000 ST. L/R	Yes
20.71 Remote 3 Inp.1	Input 1 of Remote 3	The same as par. **20.51**	000 DISABLED	Yes
20.72 Remote 3 Inp.2	Input 2 of Remote 3	The same as par. **20.52**	000 DISABLED	Yes
20.73 Remote 3 Inp.3	Input 3 of Remote 3	The same as par. **20.53**	000 DISABLED	Yes
20.80 Remote 4 mode	Variant of START/STOP Remote 4 control	The same as par. **20.50**	000 ST. L/R	Yes
20.81 Remote 4 Inp.1	Input 1 of Remote 4	The same as par. **20.51**	000 DISABLED	Yes
20.82 Remote 4 Inp.2	Input 2 of Remote 4	The same as par. **20.52**	000 DISABLED	Yes
20.83 Remote 4 Inp.3	Input 3 of Remote 4	The same as par. **20.53**	000 DISABLED	Yes
Group 21 – References				
21.01 Ref. min	Referenced frequency which corresponds to 0% of the referencing-unit	-550.0 .. 550.0 Hz	0.0 Hz	Yes
21.02 Ref. max	Ref. frequency which corresponds to 100% of the referencing-unit	0.0 .. 550.0 Hz Note: see also par. 13.40	50.0 Hz	Yes
21.10 F stop	Minimal absolute value of referenced frequency	0.0 .. 550.0 Hz	0.5 Hz	Yes
21.11 F stop mode	Stopping when f < par. 21.10	Behavior of the frequency converter when referenced frequency is lower then “F stop” determined in par. 21.10: **000 Limit**: the output frequency will stay at value set on par. 21.10 **001 Stop**: frequency converter will stop	000 Limit	Yes
21.16 Ref. delay	Ref-unit switching on delay	0.0 .. 12.0 s	0.0 s	Yes
21.17 Arming time	Delay of power transistors switching after start sequence	Combining with PCH 536 there is possibility to switch on the contactor in power circuit before switching on the power transistors. 0.00 .. 10.00 s	0.00 s	No
21.20 Ref. resol.	Resolution of reference signal	**000 0.1 Hz** **001 0.01 Hz** **002 1 rpm** **003 0.1 rpm**	000 0.1 Hz	No
Group 22 - Motopotencjometer				

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
22.01 Mtp1 adr up	Source of “increase” signal for Motopotentiometer 1 referencing-unit	**000 Disabled** **001 DI1 .. 010 DI10** - increase ref.-unit, when there is a voltage supplied on digital input DI1 .. DI10	000 Disabled	Yes
22.02 Mtp1 adr down	Source of “decrease” signal for Motopotentiometer 1 referencing-unit	**000 Disabled** **001 DI1 .. 010 DI10** - decrease ref.-unit, when there is a voltage supplied on digital input **DI1 .. DI10**	000 Disabled	Yes
22.03 Motopot1 mode	Motopotentiometer 1 mode	**000 –** sending STOP signal (by pushing STOP button, through RS or other possibilities) causes resetting of motopotentiometer settings. **001** – value of motopotentiometer setting is stored in memory. There is no possibility of changing this setting during stoppage. **002** – value of current referencing-unit setting traced by motopotentiometer. Applied for gentle transmission from current ref.-unit to motopotentiometer **003** – value of motopotentiometer setting stored in the memory. There is a possibility of changing this setting during stoppage. Note: **000, 001, 002**: modes applied when current ref.-unit (**par. 20.10, 20.20, 20.30, 20.40**) is set on Motopot 1 .. Motopot 4 **003:** mode independent of current ref.-unit choice	002 Refer. traced	Yes
22.04 Motopot1 time	Time of increase/decrease of Motopotentiometer 1 referencing-unit	0.0 .. 320.0 s	10.0 s	Yes
22.11 Mtp2 adr up	Source of “increase” signal for Motopotentiometer 2 referencing-unit	The same as **par. 22.01** See **par. 22.01**	000 Disabled	Yes
22.12 Mtp2 adr down	Source of “decrease” signal for Motopotentiometer 2 referencing-unit	The same as **par. 22.02** See **par. 22.02**	000 Disabled	Yes
22.13 Motopot2 mode	Motopotentiometer 2 mode	The same as **par. 22.03** See **par. 22.03**	002 Refer. traced	Yes
22.14 Motopot2 time	Time of increase/decrease of Motopotentiometer 2 referencing-unit	The same as par. **22.04** See **par. 22.04**	10.0 s	Yes
22.23 Mtp3 adr up	Source of “increase” signal for Motopotentiometer 3 referencing-unit	The same as **par. 22.01** See **par. 22.01**	000 Disabled	Yes
22.22 Mtp3 adr down	Source of “decrease” signal for Motopotentiometer 3 referencing-unit	The same as **par. 22.02** See **par. 22.02**	000 Disabled	Yes
22.23 Motopot3 mode	Motopotentiometer 3 mode	The same as **par. 22.03** See **par. 22.03**	002 Refer. traced	Yes
22.24 Motopot3 time	Time of increase/decrease of Motopotentiometer 3 referencing-unit	The same as par. **22.04** See **par. 22.04**	10.0 s	Yes
22.31 Mtp4 adr up	Source of “increase” signal for Motopotentiometer 4 referencing-unit	The same as **par. 22.01** See **par. 22.01**	000 Disabled	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
22.32 Mtp4 adr down	Source of “decrease” signal for Motopotentiometer 4 referencing-unit	The same as **par. 22.02** See **par. 22.02**	000 Disabled	Yes
22.33 Motopot4 mode	Motopotentiometer 4 mode	The same as **par. 22.03** See **par. 22.03**	002 Refer. traced	Yes
22.34 Motopot4 time	Time of increase/decrease of Motopotentiometer 4 referencing-unit	The same as par. **22.04** See **par. 22.04**	10.0 s	Yes
Group 23 - Const. speed				
23.01 Adr const 0	Source of signal for referencing Constant 0 speeds	**000 Disabled** - Off **001 DI1 .. 010 DI10** - On when there is a voltage supplied on digital input DI1 .. DI10 **531 Yes –** always On	000 Disabled	Yes
23.02 Adr const 1	Source of signal for referencing Constant 1 speeds	The same as par. **23.01**	000 Disabled	Yes
23.03 Adr const 2	Source of signal for referencing Constant 2 speeds	The same as par. **23.01**	000 Disabled	Yes
23.04 Adr const 3	Source of signal for referencing Constant 3 speeds	The same as par. **23.01**	000 Disabled	Yes
23.06 Const 1	Constant frequency 1	-550.0 .. 500.0 Hz	10.0 Hz	Yes
23.07 Const 2	Constant frequency 2	-550.0 .. 500.0 Hz	20.0 Hz	Yes
23.08 Const 3	Constant frequency 3	-550.0 .. 500.0 Hz	25.0 Hz	Yes
23.09 Const 4	Constant frequency 4	-550.0 .. 500.0 Hz	30.0 Hz	Yes
23.10 Const 5	Constant frequency 5	-550.0 .. 500.0 Hz	40.0 Hz	Yes
23.11 Const 6	Constant frequency 6	-550.0 .. 500.0 Hz	45.0 Hz	Yes
23.12 Const 7	Constant frequency 7	-550.0 .. 500.0 Hz	50.0 Hz	Yes
23.13 Const 8	Constant frequency 8	-550.0 .. 500.0 Hz	50.0 Hz	Yes
23.14 Const 9	Constant frequency 9	-550.0 .. 500.0 Hz	50.0 Hz	Yes
23.15 Const 10	Constant frequency 10	-550.0 .. 500.0 Hz	50.0 Hz	Yes
23.16 Const 11	Constant frequency 11	-550.0 .. 500.0 Hz	50.0 Hz	Yes
23.17 Const 12	Constant frequency 12	-550.0 .. 500.0 Hz	50.0 Hz	Yes
23.18 Const 13	Constant frequency 13	-550.0 .. 500.0 Hz	50.0 Hz	Yes
23.19 Const 14	Constant frequency 14	-550.0 .. 500.0 Hz	50.0 Hz	Yes
23.20 Const 15	Constant frequency 15	-550.0 .. 500.0 Hz	50.0 Hz	Yes
Group 24 - Analog in.				
24.01 Cfg. A0 inp	Configuration of analog input AI0	**000 0-10 V:** 0V=0%, 10V=100% **001 10-0 V:** 10V=100%, 0V=0% **002 2-10 V:** 2V=0%, 10V=100%	000 0-10 V	Yes
24.02 Scale A0 inp	Scale of analog referencing-unit Ref. AI0	-500.0 .. 500.0 %	100.0%	Yes
24.03 Offs. A0 inp	Offset of analog referencing-unit Ref. AI0	-500.0 .. 500.0 %	0.0 %	Yes
24.04 Filter A0 inp	Constant of time of lowpass AI0 filter	0.00 .. 50.00 s	0.10 s	Yes
24.11 Cfg. A1 inp	Configuration of analog input AI1	**000 0-10 V:** 0V=0%, 10V=100% **001 10-0 V:** 10V=100%, 0V=0% **002 2-10 V:** 2V=0%, 10V=100% **003 10-2 V:** 10V=100%, 2V=0% **004 0-20 mA:** 0mA=0%, 20mA=100% **005 20-0 mA:** 20mA=100%, 0mA=0% **006 4-20mA:** 4mA=0%, 20mA=100% **007 20-4 mA:** 20mA=100%, 4mA=0%	000 0-10 V	Yes
24.12 Scale A1 inp	Scale of analog referencing-unit Ref. AI1	-500.0 .. 500.0 %	100.0%	Yes
24.13 Offs. A1 inp	Offset of analog referencing-unit Ref. AI1	-500.0 .. 500.0 %	0.0 %	Yes
24.14 Filter A1 inp	Constant of time of lowpass AI1 filter	0.00 .. 50.00 s	0.10 s	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
24.23 Cfg. A2 inp	Configuration of analog input AI2	The same as par. **24.11**	000 0-10 V	Yes
24.22 Scale A2 inp	Scale of analog referencing-unit Ref. AI2	-500.0 .. 500.0 %	100.0%	Yes
24.23 Offs. A2 inp	Offset of analog referencing-unit Ref. AI2	-500.0..500.0 %	0.0 %	Yes
24.24 Filter A2 inp	Constant of time of lowpass AI2 filter	0.00 .. 50.00 s	0.10 s	Yes
24.31 Cfg. A3 inp	Configuration of analog input AI3	The same as par. **24.11**	000 0-10 V	Yes
24.32 Scale A3 inp	Scale of analog referencing-unit Ref. AI3	-500.0..500.0 %	100.0%	Yes
24.33 Offs. A3 inp	Offset of analog referencing-unit Ref. AI3	-500.0 .. 500.0 %	0.0 %	Yes
24.34 Filter A3 inp	Constant of time of lowpass AI3 filter	0.00 .. 50.00 s	0.10 s	Yes
24.41 Cfg. A4 inp	Configuration of analog input AI4	The same as par. **24.11**	000 0-10 V	Yes
24.42 Scale A4 inp	Scale of analog referencing-unit Ref. AI4	-500.0 .. 500.0 %	100%	Yes
24.43 Offs. A4 inp	Offset of analog referencing-unit Ref. AI4	-500.0 .. 500.0 %	0%	Yes
24.44 Filter A4 inp	Constant of time of lowpass AI4 filter	0.00 .. 50.00 s	0.10 s	Yes
Group 25 - Analog out.				
25.01 Cfg. A1 out	Configuration of analog output AO1	**000 0-10V:** 0V=0%, 10V=100% **001 10-0 V:** 10V=0%, 0V=100% **002 2-10 V:** 2V=0%, 10V=100% **003 10-2 V:** 10V=0%, 2V=100% **004 0-20 mA:** 0mA=0%, 20mA=100% **005 20-0 mA:** 20mA=0%, 0mA=100% **006 4-20 mA:** 4mA=0%, 20mA=100% **007 20-4 mA:** 20mA=0%, 4mA=100%	000 0-10V	Yes
25.02 Src. A1 out	Choice of signal for analog output AO1	**230 Rotation %** speed with a sign 0.0 % = -Nn, 50.0 % = 0, 100.0 % = nn **231 Out freq %** output frequency 100.0 % = fn **232 Ref freq %** reference frequency 100.0 % = fn **233 Curr %** output current 100.0 % = In **234 Torq %** load with a sign 100.0 % = 2Mn, 50.0 % = 0, 0.0 % = -2Mn **235 Power %** Output power % **236 Drive volt %** Output voltage %	230 Rotation %	Yes
25.03 Scale A1 out	Scale of analog output AO1	0.0 .. 500.0 %	100 %	Yes
25.04 Offset A1 out	Offset of analog output AO1	-500.0 .. 500.0	0,0 %	Yes
25.05 Filter A1 out	Constant of time of lowpass AO1 filter	0.00 .. 50.00	0.10	Yes
25.11 Cfg. A2 out	Configuration of analog output AO2	The same as par. **25.01**	000 0-10V	Yes
25.12 Src. A2 out	Choice of signal for analog output AO2	The same as par. **25.02**	232 Ref freq %	Yes
25.13 Scale A2 out	Scale of analog output AO2	0.0 .. 500.0 %	100.0 %	Yes
25.14 Offset A2 out	Offset of analog output AO2	-500.0 .. 500.0	0.0 %	Yes
25.15 Filter A2 out	Constant of time of lowpass AO2 filter	0.00 .. 50.00	0.10 s	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
Group 26 - Digital inputs				
26.01 Op. perm.	External operation permission	**000 Denied** – operation denied **001 Input 1 .. 010 Input 10** – operation allowed when there is a voltage supplied on digital input DI1 .. DI10 **531 Enabled** - operation allowed	531 Allowed	Yes
26.02 Op. block.	External operation blocking	**000 Disabled** - **w**ithout operation blocking **001 Input 1 .. 010 Input 10** - blocking active, when there is voltage supplied on digital inputs DI1 .. DI10	000 Disabled	Yes
26.03 Em. stop	Emergency Stop	**000 Disabled** - no possibility of emergency stopping **001 Input 1 .. 010 Input 10** - emergency stop by one of a digital inputs DI1 .. DI10	000 Disabled	Yes
26.10 Enable ACR	Enable active rectifier AcR	**000 Denied** - Off **001 DI1 .. 010 DI10** - On when there is a voltage supplied on digital inputs DI1 .. DI10 **531 Allowed** - always On	000 Denied	Yes
26.11 Ext. reset	Source of external reset	**000 Disabled** - no possibility of external erasing a fault message **001 Input 1 .. 010 Input 10** - erasing a fault by digital inputs DI1 .. DI10	000 Disabled	Yes
Group 27 - Digital outputs: 1 - 16				
27.01 F thresh. 1	Threshold frequency 1	0.0 .. 550.0 Hz	25.0 Hz	Yes
27.02 F thresh. 2	Threshold frequency 2	0.0 .. 550.0 Hz	45.0 Hz	Yes
27.03 Temp.1 min	Minimum of temperature 1 (PCH 524)	0 .. 120 ^{0}C	50 ^{0}C	Yes
27.04 Temp.1 max	Maximum of temperature 1 (PCH 524)	0 .. 120 ^{0}C	75 ^{0}C	Yes
27.05 Temp.2 min	Minimum of temperature 2 (PCH 525)	0 .. 120 ^{0}C	37 ^{0}C	Yes
27.06 Temp.2 max	Maximum of temperature 2 (PCH 525)	0 .. 120 ^{0}C	40 ^{0}C	Yes
27.10 PT100 1 min	Minimum temperature of PT100 1 (PCH 528)	-200.0 .. 800.0 ^{0}C	0 ^{0}C	Yes
27.11 PT100 1 max	Maximum temperature of PT100 1 (PCH 528)	-200.0 ¨ 800.0 ^{0}C	0 ^{0}C	Yes
27.12 PT100 2 min	Minimum temperature of PT100 2 (PCH 529)	-200.0 ¨ 800.0 ^{0}C	0 ^{0}C	Yes
27.13 PT100 2 max	Maximum temperature of PT100 2 (PCH 529)	-200.0 ¨ 800.0 ^{0}C	0 ^{0}C	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
27.40 Rel. 1 adr	Function of relay 1	**500 Inactive:** relay not active **501 Start keypad:** *000 keyboard* is chosen as Start/Stop **502 Start dig in:** *002 Remote 1 .. 005 Remote 4* is chosen as Start/Stop **503 Start comm:** *001 RS* is chosen as Start/Stop **504 Keypad dir:** direction signal to the left was referenced from the Control Panel **505 Digital dir:** direction signal to the left was referenced from the *Remote* **506 Refer dir:** output frequency sign is negative (-) **507 Under fstop:** f is under fstop **508 Start allow:** Start is allowed (yellow LED is lighted up) **509 Reverse:** reverse is present **510 Control A/B:** Control B is chosen **511 Control 1/2:** Control 2 is chosen **512 Comm allowed:** communication is allowed (par. 40.07) **513 F const:** Fconst is active (par. 23.1 - 23.4) **514 Run:** a voltage is supplied to the motor **515 Ready:** device is ready to work **516 Fault:** a fault has occurred **517 Not fault:** not fault **518 Alarm:** warning/alarm is active **519 Alarm / fault:** warning/alarm or fault is active **520 Blockade:** inverter is blocked, can't start **523 Freq lvl 1:** f threshold 1 exceeded **522 Freq lvl 2:** f threshold 2 exceeded **523 Freq reached:** referenced frequency reached **524 Temp lvl 1:** level 1 programmed temperature of heatsink exceeded **525 Temp lvl 2:** level 2 programmed temperature of heatsink exceeded **526 Curr limit:** current limit exceeded **527 Brake:** external brake control **528 PT100 lvl 1:** PT100 temperature reached threshold 1 **529 PT100 lvl 2:** PT100 temperature reached threshold 2 **530 No/Disabled:** relay not active **531 Yes/Enabled:** relay is always active **532 PID1 sleep:** PID1 is in sleep state **533 PID2 sleep:** PID2 is in sleep state **534 PID3 sleep:** PID3 is in sleep state **535 PID4 sleep:** PID1 is in sleep state **536 Start Output / arming:** Switching On output contactors. The inverter will start a while after of switching on the contactors.	510 Control A/B	Yes
27.41 Rel. 1 time ON	Relay 1 time ON	The delay ON time of relay 1 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.42 Rel. 1 time OFF	Relay 1 time OFF	The delay OFF time of relay 1. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.43 Rel. 1 inv	Relay 1 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.44 Rel. 2 adr	Function of Relay 2	The same as par. 27.40	500 Inactive	Yes
27.45 Rel. 2 time ON	Relay 2 time ON	The delay ON time of relay 2. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.46 Rel. 2 time OFF	Relay 2 time OFF	The delay OFF time of relay 2. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
27.47 Rel. 2 inv	Relay 2 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.48 Rel. 3 adr	Function of Relay 3	The same as par. 27.40	500 Inactive	Yes
27.49 Rel. 3 time ON	Relay 3 time ON	The delay ON time of relay 3. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.50 Rel. 3 time OFF	Relay 3 time OFF	The delay OFF time of relay 3. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.51 Rel. 3 inv	Relay 3 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.52 Rel. 4 adr	Function of Relay 4	The same as par. 27.40	500 Inactive	Yes
27.53 Rel. 4 time ON	Relay 4 time ON	The delay ON time of relay 4. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.54 Rel. 4 time OFF	Relay 4 time OFF	The delay OFF time of relay 4. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.55 Rel. 4 inv	Relay 4 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.56 Rel. 5 adr	Function of Relay 5	The same as par. 27.40	500 Inactive	Yes
27.57 Rel. 5 time ON	Relay 5 time ON	The delay ON time of relay 5. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.58 Rel. 5 time OFF	Relay 5 time OFF	The delay OFF time of relay 5. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.59 Rel. 5 inv	Relay 5 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.60 Rel. 6 adr	Function of Relay 6	The same as par. 27.40	500 Inactive	Yes
27.61 Rel. 6 time ON	Relay 6 time ON	The delay ON time of relay 6. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.62 Rel. 6 time OFF	Relay 6 time OFF	The delay OFF time of relay 6. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.63 Rel. 6 inv	Relay 6 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.64 Rel. 7 adr	Function of Relay 7	The same as par. 27.40	500 Inactive	Yes
27.65 Rel. 7 time ON	Relay 7 time ON	The delay ON time of relay 7. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.66 Rel. 7 time OFF	Relay 7 time OFF	The delay OFF time of relay 7. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.67 Rel. 7 inv	Relay 7 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.68 Rel. 8 adr	Function of Relay 8	The same as par. 27.40	500 Inactive	Yes
27.69 Rel. 8 time ON	Relay 8 time ON	The delay ON time of relay 8. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.70 Rel. 8 time OFF	Relay 8 time OFF	The delay OFF time of relay 8. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.71 Rel. 8 inv	Relay 8 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.75 Rel. 11 adr	Function of Relay 11	The same as par. 27.40	500 Inactive	Yes
27.76 Rel. 11 time ON	Relay 11 time ON	The delay ON time of relay 11. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.77 Rel. 11 time OFF	Relay 11 time OFF	The delay OFF time of relay 11. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.78 Rel. 11 inv	Relay 11 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.79 Rel. 12 adr	Function of Relay 12	The same as par. 27.40	500 Inactive	Yes
27.80 Rel. 12 time ON	Relay 12 time ON	The delay ON time of relay 12. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.81 Rel. 12 time OFF	Relay 12 time OFF	The delay OFF time of relay 12. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.82 Rel. 12 inv	Relay 12 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.83 Rel. 13 adr	Function of Relay 13	The same as par. 27.40	500 Inactive	Yes
27.84 Rel. 13 time ON	Relay 13 time ON	The delay ON time of relay 13. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.85 Rel. 13 time OFF	Relay 13 time OFF	The delay OFF time of relay 13. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
27.86 Rel. 13 inv	Relay 13 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.87 Rel. 14 adr	Function of Relay 14	The same as par. 27.40	500 Inactive	Yes
27.88 Rel. 14 time ON	Relay 14 time ON	The delay ON time of relay 14. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.89 Rel. 14 time OFF	Relay 14 time OFF	The delay OFF time of relay 14. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.90 Rel. 14 inv	Relay 14 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.91 Rel. 15 adr	Function of Relay 15	The same as par. 27.40	500 Inactive	Yes
27.92 Rel. 15 time ON	Relay 15 time ON	The delay ON time of relay 15. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.93 Rel. 15 time OFF	Relay 15 time OFF	The delay OFF time of relay 15. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.94 Rel. 15 inv	Relay 15 signal inversion	**000 No** **001 Yes**	000 No	Yes
27.95 Rel. 16 adr	Function of Relay 16	The same as par. 27.40	500 Inactive	Yes
27.96 Rel. 16 time ON	Relay 16 time ON	The delay ON time of relay 16. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.97 Rel. 16 time OFF	Relay 16 time OFF	The delay OFF time of relay 16. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
27.98 Rel. 16 inv	Relay 16 signal inversion	**000 No** **001 Yes**	000 No	Yes
Group 28 - Digital outputs: 23 - 56				
28.00 Rel. 21 adr	Function of Relay 23	The same as par. 27.40	500 Inactive	Yes
28.01 Rel. 21 time ON	Relay 23 time ON	The delay ON time of relay 23. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.02 Rel. 21 time OFF	Relay 23 time OFF	The delay OFF time of relay 23. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.03 Rel. 21 inv	Relay 23 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.04 Rel. 22 adr	Function of Relay 22	The same as par. 27.40	500 Inactive	Yes
28.05 Rel. 22 time ON	Relay 22 time ON	The delay ON time of relay 22. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.06 Rel. 22 time OFF	Relay 22 time OFF	The delay OFF time of relay 22. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.07 Rel. 22 inv	Relay 22 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.08 Rel. 23 adr	Function of Relay 23	The same as par. 27.40	500 Inactive	Yes
28.09 Rel. 23 time ON	Relay 23 time ON	The delay ON time of relay 23. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.10 Rel. 23 time OFF	Relay 23 time OFF	The delay OFF time of relay 23. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.11 Rel. 23 inv	Relay 23 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.12 Rel. 24 adr	Function of Relay 24	The same as par. 27.40	500 Inactive	Yes
28.13 Rel. 24 time ON	Relay 24 time ON	The delay ON time of relay 24. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.14 Rel. 24 time OFF	Relay 24 time OFF	The delay OFF time of relay 24. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.15 Rel. 24 inv	Relay 24 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.16 Rel. 25 adr	Function of Relay 25	The same as par. 27.40	500 Inactive	Yes
28.17 Rel. 25 time ON	Relay 25 time ON	The delay ON time of relay 25. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.18 Rel. 25 time OFF	Relay 25 time OFF	The delay OFF time of relay 25. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.19 Rel. 25 inv	Relay 25 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.20 Rel. 26 adr	Function of Relay 26	The same as par. 27.40	500 Inactive	Yes
28.23 Rel. 26 time ON	Relay 26 time ON	The delay ON time of relay 26. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
28.22 Rel. 26 time OFF	Relay 26 time OFF	The delay OFF time of relay 26. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.23 Rel. 26 inv	Relay 26 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.25 Rel. 31 adr	Function of Relay 31	The same as par. 27.40	500 Inactive	Yes
28.26 Rel. 31 time ON	Relay 31 time ON	The delay ON time of relay 31. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.27 Rel. 31 time OFF	Relay 31 time OFF	The delay OFF time of relay 31. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.28 Rel. 31 inv	Relay 31 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.29 Rel. 32 adr	Function of Relay 32	The same as par. 27.40	500 Inactive	Yes
28.30 Rel. 32 time ON	Relay 32 time ON	The delay ON time of relay 32. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.31 Rel. 32 time OFF	Relay 32 time OFF	The delay OFF time of relay 32. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.32 Rel. 32 inv	Relay 32 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.33 Rel. 33 adr	Function of Relay 33	The same as par. 27.40	500 Inactive	Yes
28.34 Rel. 33 time ON	Relay 33 time ON	The delay ON time of relay 33. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.35 Rel. 33 time OFF	Relay 33 time OFF	The delay OFF time of relay 33. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.36 Rel. 33 inv	Relay 33 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.37 Rel. 34 adr	Function of Relay 34	The same as par. 27.40	500 Inactive	Yes
28.38 Rel. 34 time ON	Relay 34 time ON	The delay ON time of relay 34. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.39 Rel. 34 time OFF	Relay 34 time OFF	The delay OFF time of relay 34. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.40 Rel. 34 inv	Relay 34 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.41 Rel. 35 adr	Function of Relay 35	The same as par. 27.40	500 Inactive	Yes
28.42 Rel. 35 time ON	Relay 35 time ON	The delay ON time of relay 35. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.43 Rel. 35 time OFF	Relay 35 time OFF	The delay OFF time of relay 35. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.44 Rel. 35 inv	Relay 35 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.45 Rel. 36 adr	Function of Relay 36	The same as par. 27.40	500 Inactive	Yes
28.46 Rel. 36 time ON	Relay 36 time ON	The delay ON time of relay 36. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.47 Rel. 36 time OFF	Relay 36 time OFF	The delay OFF time of relay 36. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.48 Rel. 36 inv	Relay 36 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.50 Rel. 41 adr	Function of Relay 41	The same as par. 27.40	500 Inactive	Yes
28.51 Rel. 41 time ON	Relay 41 time ON	The delay ON time of relay 36. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.52 Rel. 41 time OFF	Relay 41 time OFF	The delay OFF time of relay 36. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.53 Rel. 41 inv	Relay 41 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.54 Rel. 42 adr	Function of Relay 42	The same as par. 27.40	500 Inactive	Yes
28.55 Rel. 42 time ON	Relay 42 time ON	The delay ON time of relay 42. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.56 Rel. 42 time OFF	Relay 42 time OFF	The delay OFF time of relay 42. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.57 Rel. 42 inv	Relay 42 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.58 Rel. 43 adr	Function of Relay 43	The same as par. 27.40	500 Inactive	Yes
28.59 Rel. 43 time ON	Relay 43 time ON	The delay ON time of relay 43. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
28.60 Rel. 43 time OFF	Relay 43 time OFF	The delay OFF time of relay 43. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.61 Rel. 43 inv	Relay 43 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.62 Rel. 44 adr	Function of Relay 44	The same as par. 27.40	500 Inactive	Yes
28.63 Rel. 44 time ON	Relay 44 time ON	The delay ON time of relay 44. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.64 Rel. 44 time OFF	Relay 44 time OFF	The delay OFF time of relay 44. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.65 Rel. 44 inv	Relay 44 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.66 Rel. 45 adr	Function of Relay 45	The same as par. 27.40	500 Inactive	Yes
28.67 Rel. 45 time ON	Relay 45 time ON	The delay ON time of relay 45. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.68 Rel. 45 time OFF	Relay 45 time OFF	The delay OFF time of relay 45. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.69 Rel. 45 inv	Relay 45 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.70 Rel. 46 adr	Function of Relay 46	The same as par. 27.40	500 Inactive	Yes
28.71 Rel. 46 time ON	Relay 46 time ON	The delay ON time of relay 46. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.72 Rel. 46 time OFF	Relay 46 time OFF	The delay OFF time of relay 46. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.73 Rel. 46 inv	Relay 46 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.75 Rel. 51 adr	Function of Relay 51	The same as par. 27.40	500 Inactive	Yes
28.76 Rel. 51 time ON	Relay 51 time ON	The delay ON time of relay 51. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.77 Rel. 51 time OFF	Relay 51 time OFF	The delay OFF time of relay 51. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.78 Rel. 51 inv	Relay 51 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.79 Rel. 52 adr	Function of Relay 52	The same as par. 27.40	500 Inactive	Yes
28.80 Rel. 52 time ON	Relay 52 time ON	The delay ON time of relay 52. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.81 Rel. 52 time OFF	Relay 52 time OFF	The delay OFF time of relay 52. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.82 Rel. 52 inv	Relay 52 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.83 Rel. 53 adr	Function of Relay 53	The same as par. 27.40	500 Inactive	Yes
28.84 Rel. 53 time ON	Relay 53 time ON	The delay ON time of relay 53. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.85 Rel. 53 time OFF	Relay 53 time OFF	The delay OFF time of relay 53. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.86 Rel. 53 inv	Relay 53 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.87 Rel. 54 adr	Function of Relay 54	The same as par. 27.40	500 Inactive	Yes
28.88 Rel. 54 time ON	Relay 54 time ON	The delay ON time of relay 54. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.89 Rel. 54 time OFF	Relay 54 time OFF	The delay OFF time of relay 54. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.90 Rel. 54 inv	Relay 54 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.91 Rel. 55 adr	Function of Relay 55	The same as par. 27.40	500 Inactive	Yes
28.92 Rel. 55 time ON	Relay 55 time ON	The delay ON time of relay 55. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.93 Rel. 55 time OFF	Relay 55 time OFF	The delay OFF time of relay 55. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.94 Rel. 55 inv	Relay 55 signal inversion	**000 No** **001 Yes**	000 No	Yes
28.95 Rel. 56 adr	Function of Relay 56	The same as par. 27.40	500 Inactive	Yes
28.96 Rel. 56 time ON	Relay 56 time ON	The delay ON time of relay 56. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
28.97 Rel. 56 time OFF	Relay 56 time OFF	The delay OFF time of relay 56. 0.00 .. 100.00 s (0.00 = without delay)	0.00s	Yes
28.98 Rel. 56 inv	Relay 56 signal inversion	**000 No** **001 Yes**	000 No	Yes
Group 29 - PID				
29.01 PID 1 ref	Choice of PID 1 controller referencing unit	**310 Ref An. 0** – referencing frequency by signal from analog input AI0 **311 Ref An. 1** – referencing frequency by signal from analog input AI1 **312 Ref An. 2** – referencing frequency by signal from analog input AI2 **313 Ref An. 3** – referencing frequency by signal from analog input AI3 **314 Ref An. 4** – referencing frequency by signal from analog input AI4	310 Ref An. 0	Yes
29.02 PID 1 input	Choice of regulated value of PID controller	**310 Ref An. 0** – regulated value by signal from analog input AI0 **311 Ref An. 1** – regulated value by signal from analog input AI1 **312 Ref An. 2** – regulated value by signal from analog input AI2 **313 Ref An. 3** – regulated value by signal from analog input AI3 **314 Ref An. 4** – regulated value by signal from analog input AI4	311 Ref An. 1	Yes
29.03 PID 1 neg.	Negation of controller's error	**000 No** **001 Yes**	000 No	Yes
29.04 PID 1 kp	Amplification of proportional element	1 .. 3000 %	100 %	Yes
29.05 PID 1 ti	Constant of time I	0.01 .. 320.00 s	1.00 s	Yes
29.06 PID 1 kd	Amplification of differential element D	0 .. 500 %	0 %	Yes
29.07 PID 1 max	Upper limitation of output value	0.0 .. 3200.0 %	100.0 %	Yes
29.08 PID 1 min	Lower limitation of output value	-3200.0 .. 0.0 %	0.0 %	Yes
29.09 PID 1 reset	Resetting PID output when device is stopped	**0** – reset on STOP **1** – PID controller continuously active **2** – when the PID controller is not active PID's output tracks the actual reference frequency (only for the case of direct use of the PID controller) *Note: When the PID controller is used via PLC function blocks, this parameter should be set to 0 or 1*	0	Yes
29.11 PID 1 Sleep	Time before activating sleep function when the output remains on a minimum	0 .. 32000 s	0 s	Yes
29.12 PID 1 wakeup	A threshold of wakening from sleep state	0.0 .. 100.0%	5.0 %	Yes
29.13 PID 1 wake type	Type of wake up on sleep state	**0:** Sleep function is disabled **1:** If PID 1 output value is below min. PID 1 value (par. **29.08**) for time specified in par. **29.11** then sleep mode is activated. **2:** service parameter	0	Yes
29.21 PID 2 ref	Choice of PID controller referencing unit	The same as par. **29.01**	310 Ref An. 0	Yes
29.22 PID 2 input	Choice of regulated value of PID controller	The same as par. **29.02**	311 Ref An. 1	Yes
29.23 PID 2 neg.	Negation of controller's error	**000 No** **001 Yes**	000 No	Yes
29.24 PID 2 kp	Amplification of proportional element	1 .. 3000 %	100 %	Yes
29.25 PID 2 ti	Constant of time I	0.01 .. 320.00 s	1.00 s	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
29.26 PID 2 kd	Amplification of differential element D	0 .. 500 %	0 %	Yes
29.27 PID 2 max	Upper limitation of output value	0.0 .. 3200.0 %	100.0 %	Yes
29.28 PID 2 min	Lower limitation of output value	-3200.0 .. 0.0 %	0.0 %	Yes
29.29 PID 2 reset	Resetting PID output when device is stopped	The same as par. **29.09**	0	Yes
29.31 PID 2 Sleep	Time before activating sleep function when the output remains on a minimum	0 .. 32000 s	0 s	Yes
29.32 PID 2 wakeup	A threshold of wakening from sleep state	0.0 .. 100.0%	5.0 %	Yes
29.33 PID 2 wake type	Type of wake up on sleep state	The same as par. **29.13**	0	Yes
29.41 PID 3 ref	Choice of PID controller referencing unit	The same as par. **29.01**	310 Ref An. 0	Yes
29.42 PID 3 input	Choice of regulated value of PID controller	The same as par. **29.02**	311 Ref An. 1	Yes
29.43 PID 3 neg.	Negation of controller's error	**000 No** **001 Yes**	000 No	Yes
29.44 PID 3 kp	Amplification of proportional element	1 .. 3000 %	100 %	Yes
29.45 PID 3 ti	Constant of time I	0.01 .. 320.00 s	1.00 s	Yes
29.46 PID 3 kd	Amplification of differential element D	0 .. 500 %	0 %	Yes
29.47 PID 3 max	Upper limitation of output value	0.0 .. 3200.0 %	100.0 %	Yes
29.48 PID 3 min	Lower limitation of output value	-3200.0 .. 0.0 %	0.0 %	Yes
29.49 PID 3 reset	Resetting PID output when device is stopped	The same as par. **29.09**	0	Yes
29.51 PID 3 Sleep	Time before activating sleep function when the output remains on a minimum	0 .. 32000 s	0 s	Yes
29.52 PID 3 wakeup	A threshold of wakening from sleep state	0.0 .. 100.0%	5.0 %	Yes
29.53 PID 3 wake type	Type of wake up on sleep state	The same as par. **29.13**	0	Yes
29.61 PID 4 ref	Choice of PID controller referencing unit	The same as par. **29.01**	310 Ref An. 0	Yes
29.62 PID 4 input	Choice of regulated value of PID controller	The same as par. **29.02**	311 Ref An. 1	Yes
29.63 PID 4 neg.	Negation of controller's error	**000 No** **001 Yes**	000 No	Yes
29.64 PID 4 kp	Amplification of proportional element	1 .. 3000 %	100 %	Yes
29.65 PID 4 ti	Constant of time I	0.01 .. 320.00 s	1.00 s	Yes
29.66 PID 4 kd	Amplification of differential element D	0 .. 500 %	0 %	Yes
29.67 PID 4 max	Upper limitation of output value	0.0 .. 3200.0 %	100.0 %	Yes
29.68 PID 4 min	Lower limitation of output value	-3200.0 .. 0.0 %	0.0 %	Yes
29.69 PID 4 reset	Resetting PID output when device is stopped	The same as par. **29.09**	0	Yes
29.71 PID 4 Sleep	Time before activating sleep function when the output remains on a minimum	0 .. 32000 s	0 s	Yes
29.72 PID 4 wakeup	A threshold of wakening from sleep state	0.0 .. 3200.0 %	5.0 %	Yes
29.73 PID 4 wake type	Type of wake up on sleep state	The same as par. **29.13**	0	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
Group 30 - Motor protect.				
30.01 Therm. fault	Response to thermistor fault	**000 None** - no response **001 Warning** - a warning will be displayed **002 Fault** - device will stop and message will be displayed	000 None	Yes
30.02 Therm. source	Thermistor source	**000 Disabled** – disabled **001 Input 1 .. 010 Input 10** – digital signal for thermistor **123 An. Inp 1 .. 124 An. Inp 4** - analog input for thermistor		
30.10 I2T block.	Switching on blocking from thermal overload	**000 No** - disabled **001 Yes** - enabled	001 Yes	Yes
30.11 I therm.	Setting of drive thermal protection current	0.0 .. 200.0 %	100.0 %	Yes
30.12 I therm. 0	Setting of thermorelay for stopped drive	0.0 .. 200.0 %	50.0 %	Yes
30.13 Therm. const.	Constant of el. motor heating	0 .. 200 min	2 min	Yes
30.25 Motor exist	Reaction to motor exist.	If motor current is lower than percentage of nominal motor current during specified time after start, reaction will be applied: **000 None** - no response **001 Warning** - a warning will be displayed **002 Fault** - device will stop and message will be displayed	000 None	Yes
30.26 Motor ex. curr.	Percentage of motor nominal current	10 .. 100 %	10 %	Yes
30.27 Motor ex. time	Motor exist check time	0.1s .. 10.0 s	0.5 s	Yes
30.35 I ground	Value of leakage current at which device will be shut down	10.0 .. 100.0 %	30.0 %	Yes
30.37 Low DC	*Service parameter*	200 .. 1000 V	200 V	Yes
30.40 Re.Sym. lack	Response to asymmetry of the load	**000 None** - no response **001 Warning** - a warning will be displayed **002 Fault** - device will stop and message will be displayed	000 None	Yes
30.45 Re. underload	Response to underload	**000 None** - no response **001 Warning** - a warning will be displayed **002 Fault** - device will stop and message will be displayed	000 None	Yes
30.46 Underl. time	Time of underload	0 .. 1200s	0 s	Yes
30.47 Underl. torque	Torque of underload	0.0 .. 100.0 %	0.0 %	Yes
30.50 Stall re.	Response to stall of the drive	**000 None** - no response **001 Warning** - a warning will be displayed **002 Fault** - device will stop and message will be displayed	000 None	Yes
30.51 Stall freq.	Stall frequency	0.0 .. 30 0 Hz	0.0 Hz	Yes
30.52 Stall time	Stall time	0 .. 600 s	0 s	Yes
30.60 Speed err re.	Response to error of output speed	**000 None** - no response **001 Warning** - a warning will be displayed **002 Fault** - device will stop and message will be displayed	000 None	Yes
30.61 Delta n-nz	Acceptable difference between referenced speed and speed of the el. motor.	0 .. 500 rpm	0 rpm	Yes
30.62 D time max.	Maximum time of acceptable error	0.0 .. 12.0 s	0.0 s	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
30.70 Motor overcurr.	Motor overcurrent additional protection.	After specified time in 30.71 and if motor current is higher than this parameter, fault occurs. 100 .. 250 %	220%	Yes
30.71 Motor overcurr. t	Motor overcurrent time.	0 .. 20 ms If time equals 0, fault is disabled	5ms	Yes
Group 31 - External faults				
31.00 exFault 0 in A	Choice of external fault 1 source	**000 Disabled** - disabled **001 Input 1 .. 010 Input 10** - reporting external fault 1, when there is a voltage supplied on digital input DI1 .. DI10	000 Disabled	Yes
31.01 exFault 0 in B	Fault 1 level	**000 Disabled** - disabled **001 Input 1 .. 010 Input 10** - reporting external fault 1, when there is a voltage supplied on digital input DI1 .. DI10	000 Disabled	Yes
31.02 exFault 0 config	external fault configuration	**0 - disabled** **1- a and b** **2 - a or b** **3 - a xor b**	1.00 s	Yes
31.03 exFault 0 delay	Delay between occurring fault signal and activating fault status	0.00 .. 320.00 s	1.00 s	Yes
31.04 Fault text 1	Fault text (see group 44)	0 .. 49	0	Yes
31.06 .. 31.99	The same as above			
Group 32 - Analog inputs: response to lack of signal				
32.01 Sw.on AI	Reporting failure of lack of signal (<2V) on analog inputs AI0, AI1, …, AI52 when this input doesn't use as referencing-unit	**000 Disabled** - don't report failures **001 Input 1 .. 010 Input 10** - reporting failures, when there is voltage supplied on digital input DI1..DI10 **531 Enabled** - always report failures	000 Disabled	Yes
32.02 Re.4mA err 0	Response to lack of signal on analog input AI0: signal level is lower then 2V or 4mA – depends on settings in group 24	**000 None** - no response **001 Warning** - a warning will be displayed **002 Fault** - device will stop and message will be displayed **003 Last freq.** - a warning will be displayed, frequency will stay on an average level from last 10 seconds **004 Const freq. 15** - device will work with referenced frequency f const. 15	000 None	Yes
32.03 Re.4mA err 1	AI1 - as in par. 32.02	as above	as above	as above
32.04 Re.4mA err 2	AI2 - as in par. 32.02	as above	as above	as above
32.05 Re.4mA err 3	AI3 - as in par. 32.02	as above	as above	as above
32.06 Re.4mA err 4	AI4 - as in par. 32.02	as above	as above	as above
32.10 Re.4mA err 11	AI11 - as in par. 32.02	as above	as above	as above
32.11 Re.4mA err 12	AI12 - as in par. 32.02	as above	as above	as above
32.12 Re.4mA err 21	AI21 - as in par. 32.02	as above	as above	as above
32.13 Re.4mA err 22	AI22 - as in par. 32.02	as above	as xtve	as above
32.14 Re.4mA err 31	AI31 - as in par. 32.02	as above	as above	as above
32.15 Re.4mA err 32	AI32 - as in par. 32.02	as above	as above	as above
32.16 Re.4mA err 41	AI41 - as in par. 32.02	as above	as above	as above
32.17 Re.4mA err 42	AI42 - as in par. 32.02	as above	as above	as above
32.18 Re.4mA err 51	AI51 - as in par. 32.02	as above	as above	as above
32.19 Re.4mA err 52	AI52 - as in par. 32.02	as above	as above	as above
Group 33 - Communic. man.				
33.10 AcR fail. Re	Reaction to lack of communication with AcR module or failure AcR device	**001 Warning** - a warning will be displayed, device keeps working with set frequency **002 Fault** - device will stop and message will be displayed	002 Fault	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
33.11 Re. RS lack	Response to lack of communication through RS link	**000 None** - no response **001 Warning** - a warning will be displayed **002 Fault** - device will stop and message will be displayed **003 Last freq.** - a warning will be displayed, frequency will stay on an average level from last 10s **004 Const freq. 15** - device will work with referenced frequency f const. 15	000 None	Yes
33.12 Rs lack	Acceptable time of lack of communication through RS link	0 .. 600 s	30 s	Yes
33.50 Re. key lack	Response to lack of keyboard (only for referencing from keyboard)	The same as par. 33.11	000 None	Yes
33.51 Key lack time	Acceptable time of lack of keyboard	0 .. 300 s	30 s	Yes
Group 34 - Other man.				
34.01 R breaking t	Maximum operate resistor's time in DC voltage	0.00 .. 650.00 s	5.00 s	Yes
34.02 Re. Rbrake	Reaction to the excess braking time	**000 None** - no response **001 Warning** - a warning will be displayed **002 Fault** - device will stop and message will be displayed	001 Warning	Yes
34.03 R break power	Power of breaking resistors	0.00 - 650.00 kW	0	Yes
34.04 R break resis	Resistance of breaking resistors	0.00 - 650.00 ohm	0	Yes
Group 35 Autorestarts				
35.01 AR. number	Max number of automatic restarts	**0 -** no restarts **1 ... 6 –** number of restarts in time determined by par 35.02	0	YES
35.02 AR. time	Time of restarts	0 ... 1200.0 s	60 s	YES
35.03 AR. delay	Restart delay	0.0 ... 10.0 s	1.0 s	YES
35.04 AR.low Udc	Automatic restart after **Low Udc** failure	**NO -** no restart **YES -** permission	NO	YES
35.05 AR.hi.Udc	Automatic restart after **High Udc** failure	**NO -** no restart **YES -** permission	NO	YES
35.06 AR.hi.I	Automatic restart after **High Current** failure	**NO -** no restart **YES -** permission	NO	YES
35.07 AR.hi.temp.	Automatic restart after **High temperature of the heatsink** failure	**NO -** no restart **YES -** permission	NO	YES
Group 40 Unit control				
40.01 Par. block	Parameters blocking	**000 No** : modification of parameters is unblocked **001 Yes** : modification of parameters is blocked	000 No	Yes
40.03 Language	Language of the Control Panel	**000 English** **001 Polish**	000 English	Yes
40.04 Default param.	Load default parameters	1	1	No
40.05 Enable EEPROM	Access to save changes in EEPROM memory	**000 No :** Switching on blocking of writing to EEPROM memory (parameters can be changed, however they won't be remembered after shut down of power) **001 Yes** : parameters are normally written to EEPROM (the access level Lvl2 is necessary)	001 Yes	Yes
40.06 Full PCH	Full list of Characteristic Points (PCH) are available	**000 No** **001 Yes** : values of parameters which are pointers (e.g. par. 40.07) are possible to change in full range PCH.000...PCH.999	000 No	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
40.07 Enable RS	Permission to control converter through RS communication: e.g. Start/Stop	**000 Denied** **001 Input 1 .. 010 Input 10** **531 Allowed** *Note: without this permission you can connect with the frequency inverter and read/save parameters, but you cannot control the drive*	531 Allowed	Yes
40.11 Unit number	Identification number of device	1 .. 247	12	Yes
Group 41				
41.00 Scr. 1 number	*Service parameter*	1 .. 4	3	Yes
41.01 Scr. 2 number	*Service parameter*	1 .. 4	3	
41.02 Scr. 3 number	*Service parameter*	1 .. 4	3	
41.10 1.1 start type	*Service parameter*	0	0	
41.11 1.1 start	*Service parameter*	All parameters from group *Monitor*	00.03F out	
41.12 1.2 start type	*Service parameter*	0	0	
41.13 1.2 start	*Service parameter*	All parameters from group *Monitor*	00.06Motor curr	
41.14 1.3 start type	*Service parameter*	0	0	
41.15 1.3 start	*Service parameter*	All parameters from group *Monitor*	00.05Mot torque	
41.16 1.4 start type	*Service parameter*	0	0	
41.17 1.4 start	*Service parameter*	All parameters from group *Monitor*	00.00	
41.18 1.1 stop type	*Service parameter*	0	0	
41.19 1.1 stop	*Service parameter*	All parameters from group *Monitor*	000.03F out	
41.20 1.2 stop type	*Service parameter*	0	0	
41.23 1.2 stop	*Service parameter*	All parameters from group *Monitor*	00.06Motor curr	
41.22 1.3 stop type	*Service parameter*	0	0	
41.23 1.3 stop	*Service parameter*	All parameters from group *Monitor*	00.05Mot torque	
41.24 1.4 stop type	*Service parameter*	0	0	
41.25 1.4 stop	*Service parameter*	All parameters from group *Monitor*	00.00	
41.30 2.1 type	*Service parameter*	0	0	
41.31 2.1	*Service parameter*	All parameters from group *Monitor*	00.13Ia curr.	
41.32 2.2 type	*Service parameter*	0	0	
41.33 2.2	*Service parameter*	All parameters from group *Monitor*	00.14Ib curr	
41.34 2.3 type	*Service parameter*	0	0	
41.35 2.3	*Service parameter*	All parameters from group *Monitor*	00.15Ic curr	
41.36 2.4 type	*Service parameter*	0	0	
41.37 2.4	*Service parameter*	All parameters from group *Monitor*	00.00	
41.40 3.1 type	*Service parameter*	0	0	
41.41 3.1	*Service parameter*	All parameters from group *Monitor*	01.01Motor n	
41.42 3.2 type	*Service parameter*	0	0	
41.43 3.2	*Service parameter*	All parameters from group *Monitor*	01.05Mot torque	
41.44 3.3 type	*Service parameter*	0	0	
41.45 3.3	*Service parameter*	All parameters from group *Monitor*	01.09Output power	
41.46 3.4 type	*Service parameter*	0	0	
41.47 3.4	*Service parameter*	All parameters from group *Monitor*	00.00	

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
41.50 Down left	*Service parameter*	All parameters from group *Monitor*	00.03F out	
41.51 Down right	*Service parameter*	All parameters from group *Monitor*	00.05Mot torque	
Group 42 – User param.				
42.01 Nproc scale	Scale of Process N	Multiplier of speed displayed as parameter 00.00 N process 0.0 .. 500.0 %	100 %	Yes
42.02 Nproc unit	Process N unit	**001 V, 002 A, 003 Hz, 004 rpm, 005 %, 006 Ohm, 007 kHz, 008 'C, 009 kW, 010 Nm, 011 kWh, 012 mH, 013 s 014 h, 015 ms, 016 mOhm, 017 m/s 018 pcs, 019 imp, 020 Hpa, 023 Bar 022 m, 023 mm, 024 m/m, 025 Wb 026 MWh, 027 kVar, 028 min, 029 mA**	005 %	Yes
42.03 Nproc decimal	Number of decimal places of Process N	Number of decimal places for par. 00.00 0 ... 3	1	Yes
42.10 Rot scale	Scale of rotation counter	Number of units that correspond to one encoder rotation 0 .. 32000	1	Yes
42.11 Rot reset	Resetting rotation counter	0 .. 999	000 Disabled	Yes
42.20 User par adr 1	User unit 1 source	0 .. 999	000 Disabled	Yes
42.23 User par unit 1	User unit 1	See par. 42.02	005 %	Yes
42.22 User par dec 1	User unit 1 decimal place	0,1,2,3	1	Yes
42.23 User par text 1	User unit 1 text	0 .. 49	0	Yes
42.24 .. 42.99	as above			
Group 43 – User reference				
43.01 Ref user	Service parameter	0 .. 10	0	Yes
43.02 User ref number	Number of user references	0 .. 10	0	Yes
43.10 Reference 1	Reference value	-32000 .. 32000	0	Yes
43.11 Ref min 1	Reference minimum value	-5000 .. 5000	0	Yes
43.12 Ref max 1	Reference maximum value	-5000 .. 5000	1000	Yes
43.13 Ref unit 1	Reference unit	**001 V, 002 A, 003 Hz, 004 rpm, 005 %, 006 Ohm, 007 kHz, 008 'C, 009 kW, 010 Nm, 011 kWh, 012 mH, 013 s 014 h, 015 ms, 016 mOhm, 017 m/s 018 pcs, 019 imp, 020 Hpa, 023 Bar 022 m, 023 mm, 024 m/m, 025 Wb 026 MWh, 027 kVar, 028 min, 029 mA**	005%	Yes
43.14 Ref dec 1	Reference decimal	0 ... 3	1	Yes
43.15 Ref text 1	Reference text (see group 44)	0 ... 49	0	Yes
43.16 .. 43.69	As above			
Group 44 – User text				
44.01 User text 1	User text	Editable text with 20 sings		Yes
44.02 .. 44.50 User text 2 .. 50	As above			
Group 45 - Comm. canal 1				
45.01 Protocol	Protocol selection	**0 Modbus RTU 1 Modbus RTU Master**	0	Yes
45.02 Speed	Transmission speed	**000 2400 001 4800 002 9600 003 19200 004 38400 005 57600 006 115200**	002 9600	Yes
45.03 Parity	Comm. parameter	0, 1	0	Yes
45.04 Stop bits	Comm. parameter	0, 1	0	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
45.05 Terminator	Comm. parameter	0, 1	0	Yes
45.06 Timeout	Comm. parameter	0 .. 600 s	30 s	Yes
45.07 Tout react	Response to lack of communication through RS link	**000 None** - no response **001 Warning** - a warning will be displayed, device will keep working with referenced frequency **002 Fault** - device will stop and message will be displayed **003 Last freq.** - a warning will be displayed, frequency will stay on an average level from last 10s **004 Const freq. 15** - device will work with referenced frequency f const. 15	000 None	Yes
Group 46 - Comm. canal 2				
46.01 Protocol	Protocol selection	**0 Modbus RTU** **1 Modbus RTU Master** **2 CAN**	0	Yes
46.02 Speed	Transmission speed	000 2400 001 4800 002 9600 003 19200 004 38400 005 57600 006 115200	002 9600	Yes
46.03 Parity	Comm. parameter	0, 1	0	Yes
46.04 Stop bits	Comm. parameter	0, 1	0	Yes
46.05 Terminator	Comm. parameter	0, 1	0	Yes
46.06 Timeout	Comm. parameter	0 .. 600 s	30 s	Yes
46.07 Tout react	Response to lack of communication through RS link	**000 None** - no response **001 Warning** - a warning will be displayed, device will keep working with referenced frequency **002 Fault** - device will stop and message will be displayed **003 Last freq.** - a warning will be displayed, frequency will stay on an average level from last 10s **004 Const freq. 15** - device will work with referenced frequency f const. 15	000 None	Yes
46.10	CAN ID	1..127	12	Yes[1)]
46.11	CAN Speed	000 50 kbit 001 100kbit 002 125 kbit 003 250 kbit 004 500 kbit 005 1000 kbit	004 500 kbit	Yes[1)]
46.12	CAN Profile	000 CiA 402 011 USER1	000 CiA 402	Yes[1)]
46.20	Rpdo cobId 1	0 .. 1407 (0x0 .. 0x57F)		Yes[1)]
46.23	Rpdo type 1	0 .. 255	254	Yes[1)]
46.22	Rpdo event time 1	0 .. 65535 ms	100ms	Yes[1)]
46.25	Tpdo cobId 1	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.26	Tpdo type 1	0 .. 255	254	Yes[1)]
46.35	Tpdo cobId 5	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.36	Tpdo type 5	0 .. 255	254	Yes[1)]
46.40	Rpdo cobId 6	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.41	Rpdo type 6	0 .. 255	254	Yes[1)]
46.42	Rpdo event time 6	0 .. 65535 ms	100ms	Yes[1)]
46.45	Tpdo cobId 6	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.46	Tpdo type 6	0 .. 255	254	Yes[1)]
46.50	Rpdo cobId 23	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.51	Rpdo type 23	0 .. 255	254	Yes[1)]
46.52	Rpdo event time 23	0 .. 65535 ms	100ms	Yes[1)]

1) The frequency converter must be restarted

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
46.55	Tpdo cobId 23	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.56	Tpdo type 23	0 .. 255	254	Yes[1)]
46.60	Rpdo cobId 22	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.61	Rpdo type 22	0 .. 255	254	Yes[1)]
46.62	Rpdo event time 22	0 .. 65535 ms	100ms	Yes[1)]
46.65	Tpdo cobId 22	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.66	Tpdo type 22	0 .. 255	254	Yes[1)]
46.70	Rpdo cobId 23	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.71	Rpdo type 23	0 .. 255	254	Yes[1)]
46.72	Rpdo event time 23	0 .. 65535 ms	100ms	Yes[1)]
46.75	Tpdo cobId 23	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.76	Tpdo type 23	0 .. 255	254	Yes[1)]
46.80	Rpdo cobId 24	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.81	Rpdo type 24	0 .. 255	254	Yes[1)]
46.82	Rpdo event time 24	0 .. 65535 ms	100ms	Yes[1)]
46.85	Tpdo cobId 24	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.86	Tpdo type 24	0 .. 255	254	Yes[1)]
46.90	Rpdo cobId 25	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.91	Rpdo type 25	0 .. 255	254	Yes[1)]
46.92	Rpdo event time 25	0 .. 65535 ms	100ms	Yes[1)]
46.95	Tpdo cobId 25	0 .. 1407 (0x0 .. 0x57F)	0	Yes[1)]
46.96	Tpdo type 25	0 .. 255	254	Yes[1)]
Group 47 - Comm. canal 3				
47.01 Protocol	Protocol selection	**0 Modbus RTU** **1 Modbus RTU Master** **2 Modbus TCP**	0	Yes
47.02 Speed	Transmission speed	000 2400 001 4800 002 9600 003 19200 004 38400 005 57600 006 115200	002 9600	Yes
47.03 Parity	Comm. parameter	0, 1	0	Yes
47.04 Stop bits	Comm. parameter	0, 1	0	Yes
47.05 Terminator	Comm. parameter	0, 1	0	Yes
47.06 Timeout	Comm. parameter	0 .. 600 s	30 s	Yes
47.07 Tout react	Response to lack of communication through RS link	**000 None** - no response **001 Warning** - a warning will be displayed, device will keep working with referenced frequency **002 Fault** - device will stop and message will be displayed **003 Last freq.** - a warning will be displayed, frequency will stay on an average level from last 10s **004 Const freq. 15** - device will work with referenced frequency f const. 15	000 None	Yes
47.10 ETH IP 1	First part of IP address	0 .. 255, example: **192**.168.1.50	192	Yes
47.11 ETH IP 2	Second part of IP addr.	0 .. 255, example: 192.**168**.1.50	168	Yes
47.12 ETH IP 3	Third part of IP address	0 .. 255, example: 192.168.**1**.50	1	Yes
47.13 ETH IP 4	Fourth part of IP address	0 .. 255, example: 192.168.1..**2**		Yes
47.14 ETH MASK 1	First part of mask address	0 .. 255, example: **255**.255.255.0	255	Yes
47.15 ETH MASK 2	Second part of mask address	0 .. 255, example: 255.**255**.255.0	255	Yes
47.16 ETH MASK 3	Third part of mask address	0 .. 255, example: 255.255.**255**.0	255	Yes
47.17 ETH MASK 4	Fourth part of mask address	0 .. 255, example: 255.255.255.**0**	0	Yes
47.18 ETH GW 1	First part of gateway address	0 .. 255, example: **192**.168.1.1	192	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
47.19 ETH GW 2	Second part of gateway address	0 .. 255, example: 192.**168**.1.1	168	Yes
47.20 ETH GW 3	Third part of gateway address	0 .. 255, example: 192.168.**1**.1	1	Yes
47.23 ETH GW 4	Fourth part of gateway address	0 .. 255, example: 192.168.1.**1**	1	Yes
47.22 ETH port	Ethernet port	0 .. 65535	502	Yes
47.23 ETH dhcp	Ethernet DHCP	0: No 1: Yes	No	Yes
47.24 ETH timeout	TCP connection timeout	0 .. 600 s	10 s	Yes
Group 49 – Parameter mapping				
49.00 Fast Read1	*Selection of the variable assigned to ACTR1*	All parameters *and PCH*	PCH770	Yes
49.01 Fast Read2	*Selection of the variable assigned to ACTR2*	*All parameters and PCH*	PCH771	Yes
49.02 Fast Read3	*Selection of the variable assigned to ACTR3*	*All parameters and PCH*	PCH772	Yes
49.03 Fast Read4	*Selection of the variable assigned to ACTR4*	*All parameters and PCH*	PCH773	Yes
49.04 Fast Read5	*Selection of the variable assigned to ACTR5*	*All parameters and PCH*	PCH774	Yes
49.05 Fast Read6	*Selection of the variable assigned to ACTR6*	*All parameters and PCH*	PCH775	Yes
49.06 Fast Read7	*Selection of the variable assigned to ACTR7*	*All parameters and PCH*	PCH776	Yes
49.07 Fast Read8	*Selection of the variable assigned to ACTR8*	*All parameters and PCH*	PCH777	Yes
49.08 Fast Read9	*Selection of the variable assigned to ACTR9*	*All parameters and PCH*	PCH778	Yes
49.09 Fast Read10	*Selection of the variable assigned to ACTR10*	*All parameters and PCH*	PCH779	Yes
49.10 Fast Read11	*Selection of the variable assigned to ACTR11*	*All parameters and PCH*	PCH780	Yes
49.11 Fast Read12	*Selection of the variable assigned to ACTR12*	*All parameters and PCH*	PCH781	Yes
49.12 Fast Read13	*Selection of the variable assigned to ACTR13*	*All parameters and PCH*	PCH782	Yes
49.13 Fast Read14	*Selection of the variable assigned to ACTR14*	*All parameters and PCH*	PCH783	Yes
49.14 Fast Read15	*Selection of the variable assigned to ACTR15*	*All parameters and PCH*	PCH784	Yes
49.15 Fast Read16	*Selection of the variable assigned to ACTR16*	*All parameters and PCH*	PCH785	Yes
49.16 Fast Read17	*Selection of the variable assigned to ACTR17*	*All parameters and PCH*	PCH786	Yes
49.15 Fast Read18	*Selection of the variable assigned to ACTR18*	*All parameters and PCH*	PCH787	Yes
49.18 Fast Read19	*Selection of the variable assigned to ACTR19*	*All parameters and PCH*	PCH788	Yes
49.19 Fast Read20	*Selection of the variable assigned to ACTR20*	*All parameters and PCH*	PCH789	Yes
49.20 Fast write1	*Selection of the variable assigned to ACTW01*	*All parameters and PCH*	PCH750	Yes
49.23 Fast write2	*Selection of the variable assigned to ACTW02*	*All parameters and PCH*	PCH751	Yes
49.22 Fast write3	*Selection of the variable assigned to ACTW03*	*All parameters and PCH*	PCH752	Yes
49.23 Fast write4	*Selection of the variable assigned to ACTW04*	*All parameters and PCH*	PCH753	Yes
49.24 Fast write5	*Selection of the variable assigned to ACTW05*	*All parameters and PCH*	PCH754	Yes
49.25 Fast write6	*Selection of the variable assigned to ACTW06*	*All parameters and PCH*	PCH755	Yes

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
49.26 Fast write7	*Selection of the variable assigned to ACTW07*	*All parameters and PCH*	PCH756	Yes
49.27 Fast write8	*Selection of the variable assigned to ACTW08*	*All parameters and PCH*	PCH757	Yes
49.28 Fast write9	*Selection of the variable assigned to ACTW09*	*All parameters and PCH*	PCH758	Yes
49.29 Fast write10	*Selection of the variable assigned to ACTW010*	*All parameters and PCH*	PCH759	Yes
49.30 Fast write11	*Selection of the variable assigned to ACTW011*	*All parameters and PCH*	PCH760	Yes
49.31 Fast write12	*Selection of the variable assigned to ACTW012*	*All parameters and PCH*	PCH761	Yes
49.32 Fast write13	*Selection of the variable assigned to ACTW013*	*All parameters and PCH*	PCH762	Yes
49.33 Fast write14	*Selection of the variable assigned to ACTW014*	*All parameters and PCH*	PCH763	Yes
49.34 Fast write15	*Selection of the variable assigned to ACTW015*	*All parameters and PCH*	PCH764	Yes
49.35 Fast write16	*Selection of the variable assigned to ACTW016*	*All parameters and PCH*	PCH765	Yes
49.36 Fast write17	*Selection of the variable assigned to ACTW017*	*All parameters and PCH*	PCH766	Yes
49.37 Fast write18	*Selection of the variable assigned to ACTW018*	*All parameters and PCH*	PCH767	Yes
49.38 Fast write19	*Selection of the variable assigned to ACTW019*	*All parameters and PCH*	PCH768	Yes
49.39 Fast write20	*Selection of the variable assigned to ACTW020*	*All parameters and PCH*	PCH769	Yes
Group 70 – Timers				
70.00 Timer 1 Enable	Timer 1 enable	When PCH value is different then zero, timer is enabled	000 disabled	Yes
70.01 Timer 1 Reset	Timer 1 Reset	When user set value to YES, timer is reset.	No	Yes
70.02 Timer 2 Enable	Timer 2 enable	The same as par. **70.00**	000 disabled	Yes
70.03 Timer 2 Reset	Timer 2 Reset	The same as par. **70.01**	No	Yes
70.04 Timer 3 Enable	Timer 3 enable	The same as par. **70.00**	000 disabled	Yes
70.05 Timer 3Reset	Timer 3 Reset	The same as par. **70.01**	No	Yes
70.06 Timer 4 Enable	Timer 4 enable	The same as par. **70.00**	000 disabled	Yes
70.07 Timer 4Reset	Timer 4 Reset	The same as par. **70.01**	No	Yes
70.08 Timer 5 Enable	Timer 5 enable	The same as par. **70.00**	000 disabled	Yes
70.09 Timer 5 Reset	Timer 5 Reset	The same as par. **70.01**	No	Yes
Group 71 – PLC: Additional features				
71.01 Sw. Seq ON	Enable Sequencer	Signal of enabling PLC sequencer block PCH.0 .. PCH.999	PCH.0 (SEQ disabled)	YES
71.03 Seq max	Number of sequencer states	2 .. 8	8	YES
71.04 Seq time 1	Time of 1st state duration	PCH.0 .. PCH.999	PCH.570 (Constant 1)	YES
71.05 Seq time 2	Time of 2nd state duration	PCH.0 .. PCH.999	PCH.571 (Constant 2)	YES
71.06 Seq time 3	Time of 3rd state duration	PCH.0 .. PCH.999	PCH.572 (Constant 3)	YES
71.07 Seq time 4	Time of 4th state duration	PCH.0 .. PCH.999	PCH.573 (Constant 4)	YES
71.08 Seq time 5	Time of 5th state duration	PCH.0 .. PCH.999	PCH.574 (Constant 5)	YES
71.09 Seq time 6	Time of 6th state duration	PCH.0 .. PCH.999	PCH.575 (Constant 6)	YES
71.10 Seq time 7	Time of 7th state duration	PCH.0 .. PCH.999	PCH.576 (Constant 7)	YES
71.11 Seq time 8	Time of 8th state duration	PCH.0 .. PCH.999	PCH.577 (Constant 8)	YES

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
71.12 Seq Nxt	Source of “next state” signal	PCH.0 .. PCH.999	PCH.0 (disabled)	YES
71.13 Seq Prv	Source of “previous state” signal	PCH.0 .. PCH.999	PCH.0 (disabled)	YES
71.14 Seq Clr	Source of “sequencer restart” signal	PCH.0 .. PCH.999	PCH.0 (disabled)	YES
71.15 Seq Set	Source of “sequencer setting” signal	PCH.0 .. PCH.999	PCH.0 (disabled)	YES
71.16 Seq SV	Sequence to which sequencer block will be set after “Seq Set” signal	PCH.0 ... PCH.999	PCH.0 (value 0 = sequencer 0)	YES
71.21 En. Mux1	Signal of switching on MUX1 PLC block	PCH.0 .. PCH.999	PCH.0 (MUX1 disabled.)	YES
71.23 Mux1 DV	Value of MUX1 output (PCH.840) when MUX1 is disabled (par 71.23)	-32000 .. 32000	0	YES
71.24 Mux1 Sel	Source of MUX1 input selection	PCH.0 .. PCH.999	PCH.0	YES
71.25 Mux1 In.1	Value of input 1 MUX1	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.26 Mux1 In.2	Value of input 2 MUX1	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.27 Mux1 In.3	Value of input 3 MUX1	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.28 Mux1 In.4	Value of input 4 MUX1	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.29 Mux1 In.5	Value of input 5 MUX1	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.30 Mux1 In.6	Value of input 6 MUX1	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.31 Mux1 In.7	Value of input 7 MUX1	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.32 Mux1 In.8	Value of input 8 MUX1	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.41 En. Mux2	Signal of switching on MUX2 PLC block	PCH.0 .. PCH.999	PCH.0 (MUX2 disabled.)	YES
71.43 Mux2 DV	Value of MUX2 output (PCH.841) when MUX2 is disabled (par 71.41)	-32000 .. 32000	0	YES
71.44 Mux2 Sel	Source of MUX2 input selection	PCH.0 .. PCH.999	PCH.0	YES
71.45 Mux2 In.1	Value of input 1 MUX2	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.46 Mux2 In.2	Value of input 2 MUX2	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.47 Mux2 In.3	Value of input 3 MUX2	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.48 Mux2 In.4	Value of input 4 MUX2	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.49 Mux2 In.5	Value of input 5 MUX2	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.50 Mux2 In.6	Value of input 6 MUX2	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.51 Mux2 In.7	Value of input 7 MUX2	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.52 Mux2 In.8	Value of input 8 MUX2	PCH.0 .. PCH.999	PCH.0 (= 0)	YES
71.62 CSU In.	CSU Input (X)	PCH.0 .. PCH.999 (PCH.0 = disabled)	PCH.0	YES
71.63 CSU X1	Point 1, value X	-32000 .. 32000	0	YES
71.64 CSU Y1	Point 1, value Y	-32000 .. 32000	0	YES
71.65 CSU X2	Point 2, value X	-32000 .. 32000	0	YES
71.66 CSU Y2	Point 2, value Y	-32000 .. 32000	0	YES
71.67 CSU X3	Point 3, value X	-32000 .. 32000	0	YES
71.68 CSU Y3	Point 3, value Y	-32000 .. 32000	0	YES
71.69 CSU X4	Point 4, value X	-32000 .. 32000	0	YES
71.70 CSU Y4	Point 4, value Y	-32000 .. 32000	0	YES
71.71 CSU X5	Point 5, value X	-32000 .. 32000	0	YES
71.72 CSU Y5	Point 5, value Y	-32000 .. 32000	0	YES
Group 75 – PLC: Constants				
75.01 Const 1	CONSTANT 1	-32000 ... 32000. Copied to PCH.570	0	Yes
...				
75.30 Const 30	CONSTANT 30	-32000 ... 32000. Copied to PCH.599	0	Yes
Group 80 – PLC: Control				
80.01 PLC enable	Enable built-in PLC	**000 No** **001 Yes**	000 No	No

Parameter / Name	Function	Available options / measurement unit	Factory setting	Change during operation
80.02 PLC blocks no.	Number of blocks	Number of block executed by PLC 0 .. 48	0	No
Group 81 – PLC: Functional blocks 1 - 20				
81.00 Block no.1	Function of block 1	0 .. 49	0	No
81.01 Inp.A.1	Input A of block 1	All Characteristic Points (PCH)	000 Disabled	No
81.02 Inp.B.1	Input B of block 1	All Characteristic Points (PCH)	000 Disabled	No
81.03 Inp.C.1	Input C of block 1	All Characteristic Points (PCH)	000 Disabled	No
81.04 Inp.D.1	Input D of block 1	All Characteristic Points (PCH)	000 Disabled	No
81.05 Block no.2	Function of block 2	0 .. 49	0	No
81.06 Inp.A.2	Input A of block 2	All Characteristic Points (PCH)	000 Disabled	No
81.07 Inp.B.2	Input B of block 2	All Characteristic Points (PCH)	000 Disabled	No
81.08 Inp.C.2	Input C of block 2	All Characteristic Points (PCH)	000 Disabled	No
81.09 Inp.D.2	Input D of block 2	All Characteristic Points (PCH)	000 Disabled	No
81.10 - 81.99 Blocks no. 3 - 20	as above			
Group 82 – PLC: Functional blocks 23-40				
82.00 - 82.00 Blocks no. 23 - 40	as the previous blocks			
Group 83 – PLC: Functional blocks 41-60				
83.00 - 83.99 Blocks no. 41 - 60	as the previous blocks			
Group 84 – PLC: Functional blocks 61-80				
84.00 - 84.99 Blocks no. 61 - 80	as the previous blocks			
Group 85 – PLC: Functional blocks 81-100				
85.00 - 85.99 Blocks no. 81 - 100	as the previous blocks			
Group 90 - Faults				
90.01 Fault 1	Fault Register 1 (the most current record)	Fault name (read only)		Read only
90.02 Time 1	Register of time of occurrence of fault from Fault register 1	Time (read only)		Read only
...				
90.63 Fault 32	Fault Register 32 (the oldest record)	Fault name (read only)		Read only
90.64 Time 32	Register of time of occurrence of fault from Fault register 32	Time (read only)		Read only

MFC810_1000-Parameters_EN_sv1.98r3_dv1.4

Appendix B: Failures and warnings codes

Software version: 1.98 rev. 3
Document version: 1.1

Failure/ warning code (CANopen)	Displayed name	Description	Possible reason	Counteraction	Status
100...200: control circuits errors					
101 (6200h)	Program error 1	Program error: ST	Corrupted program memory, external electromagnetic disturbance	Turn the power off and on again. Contact service	Failure
102 (6200h)	Program error 2	Program error: VSD			Failure
103 (6200h)	Program error 3	Program error: AcR			Warning
110 (6310h)	EEPROM CRC error	Parameters memory error	Corrupted parameter memory, external electromagnetic disturbance	Turn the power off and on again. Upload factory parameters. Contact service	Warning Failure
111 (6200h)	No VSD data	Missing data from VSD module	Missing/wrong connection between control board and VSD board	Turn the power off and on again. Check connection between boards. Contact service.	Failure
112 (6200h)	No ACR data	Missing data from ACR module	Missing/wrong connection between control board and ACR board	Turn the power off and on again. Check connection between boards. Contact service	Failure
120 (7500h)	No keypad	Failure of the communication with Control panel	Damage of the control panel or connecting cable.	Check connections: wires, plugs	Warning Failure
121 (7500h)	Comm. err. VSD	Lack of communication with VSD module	Failure of the VSD module or internal connection cable	Contact service	Failure
122 (7500h)	Comm. err. ACR	Lack of communication with AcR module	Failure of the AcR module or internal connection cable		Warning
123 (7500h)	Comm. error „1”	Communication canal 1 failure	Failure of a cable, parameters of the transmission are incorrectly set up	Check external connections and validity of communication canals parameters	Warning Failure
124 (7500h)	Comm. error „2”	Communication canal 2 failure	Failure of a cable, parameters of the transmission are incorrectly set up	Check external connections and validity of communication canals parameters	Warning Failure
125	Comm. error „3”	Communication canal 3 failure	Failure of a cable, parameters of the transmission are incorrectly set up	Check external connections and validity of communication canals parameters	Warning Failure

Failure/ warning code (CANopen)	Displayed name	Description	Possible reason	Counteraction	Status
130 (FF80h)	Identification run value wrong	Parameters acquired during motor identification exceeded possible highest value	Wrong motor parameters. Wrong used motor.	Check motor parameters, run identification again	Failure
135 (6320h)	EEPROM save not ok	Control board can't save parameters to eeprom	External electromagnetic disturbance, eeprom damage.	Turn the power off and on again. Set default values. Contact service	Failure
136 (6320h)	EEPROM load not ok	Program can't load parameters from eeprom	External electromagnetic disturbance, eeprom damage.	Turn the power off and on again. Set default values. Contact service.	Failure
141 (FF00h)	Motor lack	Motor isn't connected with inverter		Check connection with inverter. Check parameter 10.03, 30.26	Warning Failure
144 (FF01h)	Curr. sens. missing	Current sensor missing	Connection with current sensor missing/damaged.	Check connection. Contact service	
150 (5111h)	VCC VSD error	Improper supply voltage of the measuring circuit controlling of the motor	Motor controller circuit fault.	Contact service	Failure
155 (5111h)	VCC ACR error	Improper supply voltage of the measuring circuit controlling of the Active Rectifier	Active rectifier controller circuit fault.		Warning
180 (7305h)	Encoder error	Encoder error	Encoder failure or connecting wires.		Warning
200...300: electric motor circuits errors					
201 (4200h)	High Temp.1	Temperature of the IGBT module 1 is higher than 95ºC	Difficult flow of coolant. Overloading. Too high ambient temperature.	Check the cooling efficiency (efficiency of the cooling fan and pollution of a heatsink) Lower the ambient temperature	Warning
202 (4200h)	High Temp.2	Temperature of the IGBT module 2 is higher than 95ºC			Warning
203 (4200h)	High Temp.3	Temperature of the IGBT module 3 is higher than 95ºC			Warning
205 (FF02h)	No temp. sensor	No signal from IGBT module temperature sensor	Failure of the internal IGBT temperature sensor or connection wire	Contact service	Failure
206 (FF03h)	Short circ. temp. sens.	Short circuit in IGBT module temperature sensor			

Failure/ warning code (CANopen)	Displayed name	Description	Possible reason	Counteraction	Status
211 (4200h)	Too high Temp.1	Temperature of the IGBT module 1 is higher than 100ºC	Hindered flow of air of FC. Overloading. Too high ambient temperature.	Check the cooling efficiency (efficiency of the cooling fan and pollution of a heatsink) Lower the ambient temperature	Failure
212 (4200h)	Too high Temp.2	Temperature of the IGBT module 2 is higher than 100ºC			
213 (4200h)	Too high Temp.3	Temperature of the IGBT module 3 is higher than 100ºC			
217 (7520h)	VSD comm. error 2	Communication failure of the VSD module	Failure of the VSD module or connection wire	Contact service	Failure
220 (3211h)	High UDC hardware	High voltage in DC circuit - hardware notification	Too high voltage in the circuit. Too intensive braking of the electric motor	Check the supply voltage. Increase a time of deceleration in(par. 13.02 or 13.11. Deactivate the parameter 13.20 (setting 0.0) or increase its value.	Failure
221 (3212h)	High UDC software 1	High voltage in DC circuit - software notification			Failure
222 (3212h)	High UDC software 2	High voltage in DC circuit - software notification			Failure
223 (3212h)	High UDC software 3	High voltage in DC circuit - software notification			Failure
230 (4310h)	High temp. Motor	Electric motor temperature reached I or II threshold	Hindered flow of air of an electric motor. Too high ambient temperature. Working on an overloaded engine or long operating time at heavy load and low speed.	Check loading of the motor - current of the motor. Additional cooling fan may be required at low speeds of the electric motor	Warning
231 (4310h)	Too high motor temp.	Electric motor temperature reached III threshold			Failure
240 (2300h)	High current 1	The output current of the FC is to high - hardware notification	Too high intensity of acceleration of an electric motor. A sudden change of electric motor loading.	Increase an acceleration time of the electric motor.	Failure
241 (2300h)	High current 2	The output current of the FC is to high - software notification			
244 (2311h)	Inverter overload	Thermal i^2t overload of the converter	The inverter is overloaded - output current is to high (Iout>1.5In@60sec)	Reduce the inverter load.	Failure
245 (2300h)	High current motor	Overload of the electric motor	Electric motor is overloaded - to high current.	Reduce the electric motor load	Failure

Failure/ warning code (CANopen)	Displayed name	Description	Possible reason	Counteraction	Status
248 (2330h)	Earthing	The sum of el. motor currents is not equal to null	Defective insulation of windings of the el. motor or connecting wires	Check isolation resistance of the wires connecting the el. motor and the converter and isolation resistance of windings of the el. motor.	Failure
250 (2320h)	VSD IGBT driver fault	Short circuit on output of the converter or failure of VSD IGBT module	Short circuit in the el. motor or in the wires feeding the el. motor.	Disconnect the el. motor and test presence of a short circuit, if present call service to repair FC, and if is not present test isolation of wires and windings of the el. motor	Failure
251	VSD IGBT supply				Failure
252	VSD IGBT 1", "driver fault"	Short circuit on output of the converter or failure of VSD IGBT module	Short circuit in the el. motor or in the wires feeding the el. motor.	Disconnect the el. motor and test presence of a short circuit, if present call service to repair FC, and if is not present test isolation of wires and windings of the el. motor	Failure
253	"VSD IGBT 1", "supply"				Failure
254	"VSD IGBT 2", "driver fault"	Short circuit on output of the converter or failure of VSD IGBT module	Short circuit in the el. motor or in the wires feeding the el. motor.	Disconnect the el. motor and test presence of a short circuit, if present call service to repair FC, and if is not present test isolation of wires and windings of the el. motor	Failure
255	VSD IGBT 2", "supply"				Failure
256	VSD IGBT U", "driver fault"	Short circuit on output of the converter or failure of VSD IGBT module	Short circuit in the el. motor or in the wires feeding the el. motor.	Disconnect the el. motor and test presence of a short circuit, if present call service to repair FC, and if is not present test isolation of wires and windings of the el. motor	Failure
257	"VSD IGBT V", "driver fault"	Short circuit on output of the converter or failure of VSD IGBT module	Short circuit in the el. motor or in the wires feeding the el. motor.	Disconnect the el. motor and test presence of a short circuit, if present call service to repair FC, and if is not present test isolation of wires and windings of the el. motor	Failure

Failure/ warning code (CANopen)	Displayed name	Description	Possible reason	Counteraction	Status
258	"VSD IGBT W", "driver fault"	Short circuit on output of the converter or failure of VSD IGBT module	Short circuit in the el. motor or in the wires feeding the el. motor.	Disconnect the el. motor and test presence of a short circuit, if present call service to repair FC, and if is not present test isolation of wires and windings of the el. motor	Failure
259	"VSD IGBT BR", "driver fault"	Short circuit on output of the converter or failure of VSD IGBT module	Short circuit in the el. motor or in the wires feeding the el. motor.	Disconnect the el. motor and test presence of a short circuit, if present call service to repair FC, and if is not present test isolation of wires and windings of the el. motor	Failure
260 (FF04h)	Output asymmetry	Asymmetrical loading	The el. motor failure or absence of output phase (damage of a wire)	Check connections of the FC - el. motor, check resistance of el. motor windings, replace the el. motor.	Warning
265 (3230h)	Underload	Operation with loading which is much lower than nominal	Parameters of a underload are incorrectly determined	Check and correct parameter settings which refer to underload of the converter	Warning
268 (7121h)	Stall	The el. motor has stopped under act of too high loading.	Too high anti-torque, failure of the operating device, to low power of the converter	Check operating device (jam). Increase boost U0 voltage (par. 15.01) of the frequency converter - only in scalar mode. Reduce the load on the electric motor	Failure
270 (FF05h)	F>MAX	Output frequency of the frequency converter is higher than the maximum frequency	Operation device rolls the motor up or there is a big readjustment of the speed regulator	Modify the speed regulator settings	Failure
275 (FF06h)	Speed control	Error of output speed - difference between reference and output speed exceed acceptable difference (par. 30.61) or time (par. 30.62).	Incorrect setting the dynamics of the drive; output values of frequency converter reached operational limits of: current, torque and/or voltage	Check the drive system, the drive load. Change the parameters settings 30.60, 30.61, 30.62	Warning

Failure/ warning code (CANopen)	Displayed name	Description	Possible reason	Counteraction	Status
277 (2310h)	I2T motor 1	Overheating of the el. motor 1	Overheating of the motor or operation with high loading at small speeds	Check loading of the motor (current of the motor); check parameters of thermal el. motor model	Failure
278 (2310h)	I2T motor 2	Overheating of the el. motor 2	Overheating of the motor or operation with high loading at small speeds	Check loading of the el. motor (current of the el. motor); check parameters of thermal el. motor model	Failure
280 (FF0Ah)	Ext. block VSD	Internal failure	-	Contact service	-
285 (FF07h)	Motor param. error	Wrong motor parameters	Parameters 10.01÷ 10.06 defined in group 10 are incorrect.	Check motor parameters entered in group 10.	Failure
290 (FF08h)	Current test	Inverter current test	Current time exceeded value from parameter 38.02		Failure
291	VSD fan failure				Failure
295 (7112h)	Chopper Overload	Chopper temperature overloaded	Improper brake resistor. Improper brake resistor parameters.	Choose the right braking resistors. Check parameters 34.01 - 34.04	Warning Failure
296 (7111h)	Chopper Error	Chopper IGBT driver failure		Contact service	Failure
300...400: line circuits errors					
301 (4200h)	High Temp.ACR1	Temperature of the IGBT module 1 is higher than 100ºC	Difficult flow of coolant. Overloading. Too high ambient temperature.	Check the cooling efficiency (efficiency of the cooling fan and pollution of a heatsink) Lower the ambient temperature	Warning
302 (4200h)	High Temp.ACR2	Temperature of the IGBT module 2 is higher than 100ºC			
303 (4200h)	High Temp.ACR3	Temperature of the IGBT module 3 is higher than 100ºC			
305 (FF42h)	No temp. sensor	No signal from IGBT module temperature sensor	Failure of the internal IGBT temperature sensor or connection wire	Contact service	Warning
306 (FF43h)	Short cric. temp. sens.	Short circuit in IGBT module temperature sensor			
311 (4200h)	Too high temp. ACR1	Temperature of the IGBT module 1 is higher than 110ºC	Difficult flow of coolant. Overloading. Too high ambient temperature.	Check the cooling efficiency (efficiency of the cooling fan and	Warning + Stop AcR

Failure/ warning code (CANopen)	Displayed name	Description	Possible reason	Counteraction	Status
312 (4200h)	Too high temp. ACR2	Temperature of the AcR IGBT module 1 is higher than 110ºC		pollution of a heatsink) Lower the ambient temperature	
313 (4200h)	Too high temp. ACR3	Temperature of the AcR IGBT module 1 is higher than 110ºC			
317 (7520h)	ACR comm. error 2	Communication failure of the VSD module	Failure of the VSD module or connection wire	Contact service	Warning
320 (3221h)	Low DC	Low voltage in DC circuit	Low supply voltage, absence of one phase of a supply voltage.	Check a connecting cables and a supply voltage on a mains terminals	Warning + Stop AcR
321 (3130h)	Phase missing	No one phase in the supply voltage	Absence of one phase of a supply voltage. Disconnected or damaged power supply cable.		
325 (FF44h)	Load circ. error 1	Pre-charging circuit isn't switched on	Failure in pre-charging circuit.	Check the pre-charge circuit.	Failure
326 (FF45h)	Load circ. error 2	Too long pre-charging time			Failure
330 (3211h)	High UDC hardware	High voltage in DC circuit - hardware notification	Too high voltage in the circuit. Too intensive braking of the electric motor	Check grid voltage. Increase breaking time (delay) par 13.02 or 13.11	Failure
331 (3212h)	High UDC software	High voltage in DC circuit - software notification			Failure
332	High UDC hardware	High voltage in half DC circuit (3lvl inverter)		Contact service.	Failure
333	High UDC hardware	Too much difference between capacitors (3lvl inverter)		Contact service.	Failure
340 (2100h)	High curr. grid	The input current of the FC is to high - hardware notification	Too high intensity of acceleration of an electric motor A sudden change of electric motor loading.	Increase an acceleration time of the electric motor	Warning + Stop AcR
341 (2100h)	High curr. grid	The input current of the FC is to high - software notification			Warning + Stop AcR

Failure/ warning code (CANopen)	Displayed name	Description	Possible reason	Counteraction	Status
350 (2130h)	ACR IGBT driver fault	Short circuit in AcR module or incorrect work of LCL filter	Fault of the AcR module. Wrong electric circuit connection of LCL filter or fault of LCL filter	Disconnect the electric motor and test presence of an error. Check connection of LCL filter. Contact service	Failure
360 (FF46h)	High temp. LCL filter	Internal failure	-	Contact service.	-
361 (FF47h)	Too high temp. LCL filter	Internal failure	-	Contact service.	-
365 (FF48h)	Capacitor LCL error	Internal failure	-	Contact service.	-
370 (3142h)	Grid par. fault	f<f.min	Incorrect power supply parameters	Check a connecting cables and a supply voltage on a mains terminals	Warning + Stop AcR
371 (3141h)	Grid par. fault	f>f.max	Incorrect power supply parameters		
372 (3120h)	Grid par. fault	U<Umin	Incorrect power supply parameters		
373 (3110h)	Grid par. fault	U>Umax	Incorrect power supply parameters		
374 (FF49h)	Grid par. fault	Asymmetry	Incorrect power supply parameters		
380 (FF4Ah)	Ext. block ACR	Internal failure	-	Contact service	-
390 (FF4Bh)	Contactor	Internal failure	-	Contact service	-
391	ACR fan failure	AcR's fan failure			Failure
392	ACR LCL error	AcR's LCL filter failure			Failure
395	Wrong phase rotation	Wrong phase rotation	Phase connection to inverter is not in correct order.	Check grid connection to inverter.	Failure
396	Wrong board configuration	Wrong board configure	Wrong jumper configuration on ACR board.	Set corrent configuration. Contact service.	Failure
400...500: input/output failures					
402 (FF80h)	A1 input damaged	Damage of the analog input AI1	At input option with „living zero" (2-10V or 4-20mA) value of a signal is lower than 1V	Check a configuration of analog inputs, check connection circuit (damage of a cable, etc.)	Warning
403 (FF81h)	A2 input damaged	Damage of the analog input AI2			
404 (FF82h)	A3 input damaged	Damage of the analog input AI3			
405 (FF83h)	A4 input damaged	Damage of the analog input AI4			
450 – 469 (FF85h-FF98h)	External 1-20	The signal of external failure is active	On the digital input specified in the parameters of group 31 has been given a voltage signal	Check the cause of the external failure. Check the parameter settings in group 31	Failure

Failure/ warning code (CANopen)	Displayed name	Description	Possible reason	Counteraction	Status
470	No temp. cab. sensor	Lack of cabinet's temperature sensor	Sensor is damaged or unconnected	Check if the sensor is working correctly. Check the sensor's wiring.	Warning
471	High temp. cabinet	The temperature inside cabinet is too high	Cabinet fans failure or hindered flow of air	Check fans, check the cabinet air filter clogging.	Warning
480 (FF84h)	Emergency stop	Active emergency stop	The emergency stop has been activated	Check and remove the cause of emergency stop activation. Check parameter 26.03	Failure
490 (4220h)	Too low temperature	Temperature of the heatsink is lower than -10^{0}C	Temperature of converter's environment it too low	Check efficiency of heating	Failure

Appendix C: Characteristic Points PCH

Software version: 1.98 rev. 3
Document version: 1.1

PCH	PCH name	Function / value / note
000	DISABLED	Value always = L (logical 0)
001	Input 1	State of digital input 1; L = 0V, H = 24V
002	Input 2	State of digital input 2; L = 0V, H = 24V
003	Input 3	State of digital input 3; L = 0V, H = 24V
004	Input 4	State of digital input 4; L = 0V, H = 24V
005	Input 5	State of digital input 5; L = 0V, H = 24V
006	Input 6	State of digital input 6; L = 0V, H = 24V
007	Input 7	State of digital input 7; L = 0V, H = 24V
008	Input 8	State of digital input 8; L = 0V, H = 24V
009	Input 9	State of digital input 9; L = 0V, H = 24V
010	Input 10	State of digital input 10; L = 0V, H = 24V
011..018	Input 11 .. Input 18	State of additional digital inputs 11..18 on SLOT 0; L = 0V, H = 24V
021..026	Input 21 .. Input 26	State of additional digital inputs 21..26 on SLOT 1; L = 0V, H = 24V
031..036	Input 31 .. Input 36	State of additional digital inputs 31..36 on SLOT 2; L = 0V, H = 24V
041..046	Input 41 .. Input 46	State of additional digital inputs 41..46 on SLOT 3; L = 0V, H = 24V
051..056	Input 51 .. Input 56	State of additional digital inputs 51..56 on SLOT 4; L = 0V, H = 24V
061..068	Output 1 .. Output 8	State of relay outputs K1..K8. H = it is switched ON
071..076	Output 11 .. Output 16	State of additional relay outputs K11..K16 on SLOT 0. H = it is switched ON
081..086	Output 21 .. Output 26	State of additional relay outputs K21..K26 on SLOT 1. H = it is switched ON
091..096	Output 31 .. Output 36	State of additional relay outputs K31..K36 on SLOT 2. H = it is switched ON
101..106	Output 41 .. Output 46	State of additional relay outputs K41..K46 on SLOT 3. H = it is switched ON
111..116	Output 51 .. Output 56	State of additional relay outputs K51..K56 on SLOT 4. H = it is switched ON
120	An. inp 0	Value corresponding to voltage of analog input 0. Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
121	An. inp 1	Value corresponding to voltage or current of analog input 1. Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
122	An. inp 2	Value corresponding to voltage or current of analog input 2. Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
123	An. inp 3	Value corresponding to voltage or current of analog input 3. Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
124	An. inp 4	Value corresponding to voltage or current of analog input 4. Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
130	An. inp 11	Value corresponding to voltage of additional analog input 11 on SLOT 0 Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.

PCH	PCH name	Function / value / note
131	An. inp 12	Value corresponding to voltage or current of additional analog input 12 on SLOT 0 Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
132	An. inp 21	Value corresponding to voltage or current of additional analog input 21 on SLOT 1 Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
133	An. inp 22	Value corresponding to voltage or current of additional analog input 22 on SLOT 1 Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
134	An. inp 31	Value corresponding to voltage or current of additional analog input 31 on SLOT 2 Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
135	An. inp 32	Value corresponding to voltage or current of additional analog input 32 on SLOT 2 Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
136	An. inp 41	Value corresponding to voltage or current of additional analog input 41 on SLOT 3 Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
137	An. inp 42	Value corresponding to voltage or current of additional analog input 42 on SLOT 3 Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
138	An. inp 51	Value corresponding to voltage or current of additional analog input 51 on SLOT 4 Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
139	An. inp 52	Value corresponding to voltage or current of additional analog input 52 on SLOT 4 Resolution 0.1 %, range 0..1000 = 0.0..100.0 %.
140	Freq DI1	Value corresponds to the frequency on the Digital Input DI1
141	Freq DI2	Value corresponds to the frequency on the Digital Input DI2
142	Freq DI3	Value corresponds to the frequency on the Digital Input DI3
143	Freq DI4	Value corresponds to the frequency on the Digital Input DI4
144	Freq DI5	Value corresponds to the frequency on the Digital Input DI5
145	Freq DI6	Value corresponds to the frequency on the Digital Input DI6
146	Freq DI7	Value corresponds to the frequency on the Digital Input DI7
147	Freq DI8	Value corresponds to the frequency on the Digital Input DI8
148	Freq DI9	Value corresponds to the frequency on the Digital Input DI9
149	Freq DI10	Value corresponds to the frequency on the Digital Input DI10
200	Out rpm	Current rotation speed of the electric motor [rpm] - a copy of the value from the par. 0.01
201	Ref rpm	Value of the referenced rotation speed [rpm] - a copy of the value from the par. 0.02
202	Out freq	Current output frequency of the converter [Hz] - a copy of the value from the par. 0.03
203	Ref freq	Referenced frequency [Hz] - a copy of the value from the par. 0.04
210	Motor IA	RMS current of a phase A of the motor [A]. A copy of the value from the par. 0.13

PCH	PCH name	Function / value / note
211	Motor IB	RMS current of a phase B of the motor [A]. A copy of the value from the par. 0.14
212	Motor IC	RMS current of a phase C of the motor [A]. A copy of the value from the par. 0.15
213	Motor curr	Average RMS current of the motor [A]. A copy of the value from the par. 0.06
220	DC voltage	Voltage of the DC-link circuit of the converter [V]. A copy of the value from the par. 01.01
221	Grid voltage	Power line supply AC voltage [V] (estimated). A copy of the value from the par. 01.05
222	Grid freq	Line Voltage frequency [Hz]. A copy of the value from the par. 01.06
223	Grid curr L1	RMS current of a phase L1 - the power line side [A]. A copy of the value from the par. 01.09
224	Grid curr L2	RMS current of a phase L2 - the power line side [A]. A copy of the value from the par. 01.10
225	Grid curr L3	RMS current of a phase L3 - the power line side [A]. A copy of the value from the par. 01.11
230	Rotation %	Relative value which corresponds to current rotational motor speed compared to the rated motor rotation speed. Resolution 0.1 %. Value with a sign depending on direction of rotation: -1000 = -Nn, 0 = 0 rpm, 1000 = Nn
231	Out freq %	Relative value which corresponds to current output frequency of the converter compared to the rated frequency. Resolution 0.1 %. Value without a sign, it doesn't depend on direction of rotation.
232	Ref freq %	Relative value which corresponds to referred motor speed compared to rated speed.
233	Curr %	Relative value which corresponds to current output electric current compared to motor rated current. Resolution 0.1 %
234	Torq %	Relative value which corresponds to current torque of the motor compared to rated torque. Resolution 0.1 %. Value with positive sign means that the frequency converter powers the motor, negative - the frequency converter brakes the motor.
235	Power %	Relative value which corresponds to current output power of the converter compared to rated power of the drive. Resolution 0.1 %. Value with positive sign means that the frequency converter powers the drive, negative - the frequency converter breaks the motor.
236	Drive volt %	Relative value which corresponds to current output voltage of the motor compared to rated voltage. Resolution 0.1 %.
237	ACR act pow	Current reactive power of Active Rectifier block of the frequency converter compared to the active power [%]
238	ACR reac pow	Service parameter
240	Speed reg	Value of the speed regulator output
250	Temp max. VSD	The highest of the measured temperatures of VSD

PCH	PCH name	Function / value / note
251	Temp max. AcR	The highest of the measured temperatures of AcR
252	Temp. Pt100	The temperature of the Pt100 output on MFC1000/11 board
290	Temp. motor	Estimated motor temperature in %, resolution 0.1 %.
300	Keyboard ref.	Value of the local referencing-unit (keyboard). Resolution 0.1 Hz. e.g. 500 = 50.0 Hz, range is determined by parameters 2.11 and 2.12
301	PID out 1	Output of PID 1 controller. resolution 0.1 %, range is determined by parameters 29.07 and 29.08
302	PID out 2	Output of PID 2 controller. resolution 0.1 %, range is determined by parameters 29.27 and 29.28
303	PID out 3	Output of PID 3 controller. resolution 0.1 %, range is determined by parameters 29.47 and 29.48
304	PID out 4	Output of PID 4 controller. resolution 0.1 %, range is determined by parameters 29.67 and 29.68
305	Motopot 1	Ref.-unit of the motopotentiometer 1. Resolution 0.1 %, range 0...1000 = 0.0...100.0 %
306	Motopot 2	Ref.-unit of the motopotentiometer 2. Resolution 0.1 %, range 0...1000 = 0.0...100.0 %
307	Motopot 3	Ref.-unit of the motopotentiometer 3. Resolution 0.1 %, range 0...1000 = 0.0...100.0 %
308	Motopot 4	Ref.-unit of the motopotentiometer 4. Resolution 0.1 %, range 0...1000 = 0.0...100.0 %
309	Remote ref.	Value of the frequency ref.-unit which is transmitted through RS connection. Resolution 0.1 Hz. Sign determines direction of the electric motor rotation
310	Ref An. 0	Value of analog input 0 multiplied by parameter of scale 24.02 and added offset – par. 24.03
311	Ref An. 1	Value of analog input 1 multiplied by parameter of scale 24.12 and added offset – par. 24.13
312	Ref An. 2	Value of analog input 2 multiplied by parameter of scale 24.22 and added offset – par. 24.23
313	Ref An. 3	Value of analog input 3 multiplied by parameter of scale 24.32 and added offset – par. 24.33
314	Ref An. 4	Value of analog input 4 multiplied by parameter of scale 24.42 and added offset – par. 24.43
315	Comm chan. 1	Reference from active communication protocol on channel 1 (par 45.01)
316	Comm chan. 2	Reference from active communication protocol on channel 2 (par 46.01)
317	Comm chan. 3	Reference from active communication protocol on channel 3 (par 47.01)
320	Ref An. 11	Value of analog input 11 multiplied by parameter of scale 24.51 and added offset – par. 24.52
321	Ref An. 12	Value of analog input 12 multiplied by parameter of scale 24.56 and added offset – par. 24.57
322	Ref An. 21	Value of analog input 21 multiplied by parameter of scale 24.61 and added offset – par. 24.62
323	Ref An. 22	Value of analog input 22 multiplied by parameter of scale 24.66 and added offset – par. 24.67

PCH	PCH name	Function / value / note
324	Ref An. 31	Value of analog input 31 multiplied by parameter of scale 24.71 and added offset – par. 24.72
325	Ref An. 32	Value of analog input 32 multiplied by parameter of scale 24.76 and added offset – par. 24.77
326	Ref An. 41	Value of analog input 41 multiplied by parameter of scale 24.81 and added offset – par. 24.82
327	Ref An. 42	Value of analog input 42 multiplied by parameter of scale 24.86 and added offset – par. 24.87
328	Ref An. 51	Value of analog input 51 multiplied by parameter of scale 24.91 and added offset – par. 24.92
329	Ref An. 52	Value of analog input 52 multiplied by parameter of scale 24.96 and added offset – par. 24.97
330	100%	In all cases value 1000 corresponds to 100.0 % of referencing-units
340	Pid err 1	Value of present error of PID 1 controller (error = PID input – PID ref.-unit). Resolution 0.1 %
341	PID ref 1	Value of the PID 1 controller referencing-unit. Configured by par. 29.01
342	PID inp 1	Value of PID 1 controller input. Configured by par. 29.02
345	Pid err 2	Value of present error of PID 2 controller (error = PID input – PID ref.-unit). Resolution 0.1 %
346	PID ref 2	Value of the PID 2 controller referencing-unit. Configured by par. 29.21
347	PID inp 2	Value of PID 2 controller input. Configured by par. 29.22
350	PID err 3	Value of present error of PID 3 controller (error = PID input – PID ref.-unit). Resolution 0.1 %
351	PID ref 3	Value of the PID 3 controller referencing-unit. Configured by par. 29.41
352	PID inp 3	Value of PID 3 controller input. Configured by par. 29.42
355	PID err 4	Value of present error of PID 4 controller (error = PID input – PID ref.-unit). Resolution 0.1 %
356	PID ref 4	Value of the PID 4 controller referencing-unit. Configured by par. 29.61
357	PID inp 4	Value of PID 4 controller input. Configured by par. 29.62
360		*Service parameter*
361		*Service parameter*
362		*Service parameter*
370	Torque ref u	Value of the torque referencing-unit. Copy of PCH determined by parameters 20.12, 20.22, 20.32, 20.42. Resolution 0.1 %, range 0.0...100.0 %.
380	Refer. A1	Value of ref.-unit A1 chosen by parameter 20.10. Resolution 0.1 Hz, value with sign.
381	Refer. A2	Value of ref.-unit A2 chosen by parameter 20.20. Resolution 0.1 Hz, value with sign.
382	Refer. B1	Value of ref.-unit B1 chosen by parameter 20.30. Resolution 0.1 Hz, value with sign.
383	Refer. B2	Value of ref.-unit B2 chosen by parameter 20.20. Resolution 0.1 Hz, value with sign.

PCH	PCH name	Function / value / note
385	Refer. unit	Output of control unit – the final value of the referencing unit, value with a sign determining the direction of rotation (plus = to the right, minus = to the left). Resolution 0.1 Hz.
390	F. const 1	Constant frequency number 1, Copy of parameter 23.06
391	F. const 2	Constant frequency number 2, Copy of parameter 23.07
392	F. const 3	Constant frequency number 3, Copy of parameter 23.08
393	F. const 4	Constant frequency number 4, Copy of parameter 23.09
394	F. const 5	Constant frequency number 5, Copy of parameter 23.10
395	F. const 6	Constant frequency number 6, Copy of parameter 23.11
396	F. const 7	Constant frequency number 7, Copy of parameter 23.12
397	F. const 8	Constant frequency number 8, Copy of parameter 23.13
398	F. const 9	Constant frequency number 9, Copy of parameter 23.14
399	F. const 10	Constant frequency number 10, Copy of parameter 23.15
400	F. const 11	Constant frequency number 11, Copy of parameter 23.16
401	F. const 12	Constant frequency number 12, Copy of parameter 23.17
402	F. const 13	Constant frequency number 13, Copy of parameter 23.18
403	F. const 14	Constant frequency number 14, Copy of parameter 23.19
404	F. const 15	Constant frequency number 15, Copy of parameter 23.20
410	Freq last	Average frequency
411		*Service parameter*
412		*Service parameter*
420	Ref. user 1	Value of the user referencing-unit number 1
421	Ref. user 2	Value of the user referencing-unit number 2
422	Ref. user 3	Value of the user referencing-unit number 3
423	Ref. user 4	Value of the user referencing-unit number 4
424	Ref. user 5	Value of the user referencing-unit number 5
425	Ref. user 6	Value of the user referencing-unit number 6
426	Ref. user 7	Value of the user referencing-unit number 7
427	Ref. user 8	Value of the user referencing-unit number 8
428	Ref. user 9	Value of the user referencing-unit number 9
429	Ref. user 10	Value of the user referencing-unit number 10
430	Ref. A1 %	Value corresponds to PCH.380 (referencing-unit A1) converted to relative value (compared to rated motor frequency). Value without a sign, resolution 0.1 %.
431	Ref. A2%	Value corresponds to PCH.381 (referencing-unit A2) converted to relative value (compared to rated motor frequency). Value without a sign, resolution 0.1 %.
432	Ref. B1 %	Value corresponds to PCH.382 (referencing-unit B1) converted to relative value (compared to rated motor frequency). Value without a sign, resolution 0.1 %.

PCH	PCH name	Function / value / note
433	Ref. B2 %	Value corresponds to PCH.383 (referencing-unit B2) converted to relative value (compared to rated motor frequency). Value without a sign, resolution 0.1 %.
434	Freq nom %	Value corresponds to PCH.384 (referencing-unit) converted to relative value (compared to rated motor frequency). Value without a sign, resolution 0.1 %.
435		*Service parameter*
436		*Service parameter*
440	Process n	Speed of the process. Value of this PCH is a result of current rotation speed of the motor and scale factor determined with parameter 42.01. It serves for converting rotation speed to output value (e.g. m/s).
460		*Service parameter*
461		*Service parameter*
462		*Service parameter*
500	Inactive	Value always = L (logical 0)
501	Start local	H = Local Control (control panel) permits START Active when *000 Keyboard* is chosen as Start/Stop for active *Control place (A1/A2/B1/B2)*
502	Start remote	H = Remote Control (digital inputs) permits START Active when 002 Remote 1 .. Remote 005 is chosen as Start/Stop for active *Control place (A1/A2/B1/B2)* *Note: This PCH do not determine rotation direction and only allows to start from digital inputs (remote 1..4) for active Control place (A1/A2/B1/B2)*
503	Start comm	H = Control through the connection RS allows START. Active when *001 Comm* is chosen as Start/Stop for active *Control place (A1/A2/B1/B2)*
504	Keyboard dir	Direction of operation with Local Control. 0 = determined with sign of referencing-unit, H = opposite (depends on pressing the key “Left” or “Right” on the control panel).
505	Digital dir	Direction of operation with Remote Control. L = determined with sign of referencing-unit, H = opposite (depends on state of digital inputs and mode of Remote Start *002 Remote 1 .. 005 Remote* 4).
506	Refer dir	Ref.-unit sign (L = positive ref.-unit, H = negative ref.-unit)
507	Under fstop	H = the converter is blocked because frequency referencing-unit is lower then STOP frequency determined by par. 21.10. This function will be switched on only in case of par. 21.11 = 001 Stop
508	Start allow	L = general lack of permission to work, H = permission to work (yellow LED on Control Panel is lighted up)
509	Rewers	Operating direction at currently chosen control. L = is determined with a sign of referencing-unit, H = opposite. Equal to PCH.505 for remote control, PCH.504 for local control, L for RS control.
510	Control A/B	Active when Control B is chosen

PCH	PCH name	Function / value / note
511	Control 1/2	Active when Control 2 is chosen
512	Comm allowed	L = general absence of permission to control the converter with RS, H = permission to control the converter with RS. Value of PCH is a copy of PCH which is set by parameter/pointer 40.07. If control through RS is selected (20.11, 20.21 or 20.31, 20.41) and PCH.512 = L, then the referencing-unit (value - PCH.385) and also PCH.508 and PCH.509 are set on value zero. If control is chosen by par. 20.11, 20.21 or 20.31, 20.41 and it differs from RS and PCH.512 = H, in this case it is possible to force externally control through RS. Active when communication is allowed - par. 40.07 *Enable RS* = 531 *Allowed*.
513	F const	H when referencing-unit of constant frequency is switched on. Depends from PCH, defined in the parameters 23.01 - 23.04.
514	Run	H when there is a voltage supplied to the electric motor
515	Ready	H when device is ready to work (no fault occurred)
516	Fault	H when a fault has occurred
517	Not fault	H when no fault occured
518	Alarm	H when alarm is active
519	Alarm / fault	H when fault or alarm occurred
520	Blockade	Frequency converter is blocked (can't start), inverse of PCH 508 state
521	Freq lvl 1	H = The frequency level 1 defined in parameter 27.01 is exceeded
522	Freq lvl 2	H = The frequency level 2 defined in parameter 27.02 is exceeded
523	Freq reached	H when the electric motor reached the referenced frequency
524	Temp lvl 1	H = The temperature of the frequency converter heatsink has exceeded a threshold defined by parameter 27.04. Par. 27.03 specifies the hysteresis width
525	Temp lvl 2	H = The temperature of the frequency converter heatsink has exceeded a threshold defined by parameter 27.06. Par. 27.05 specifies the hysteresis width
526	Curr limit	H = The electric drive is in a mode of the output current limitation
527	Brake	H = mechanical brake released
528	PT100 lvl 1	H = The temperature of the Pt100 sensor has exceeded a threshold defined by parameter 27.11. Par. 27.10 specifies the hysteresis width
529	PT100 lvl 2	H = The temperature of the Pt100 sensor has exceeded a threshold defined by parameter 27.13. Par. 27.12 specifies the hysteresis width
530	NO/Disabled	Value always = L (logical 0)
531	YES/Enabled	Value always = H (logical 1)
532	PID1 sleep	H= PID1 is in sleep state
533	PID2 sleep	H= PID2 is in sleep state
534	PID3 sleep	H= PID3 is in sleep state
535	PID4 sleep	H= PID4 is in sleep state

<table>
<tr><th>PCH</th><th>PCH name</th><th>Function / value / note</th></tr>
<tr><td>536</td><td>Outlet 1</td><td>The PCH is switched on earlier to be able to switch on the output contactors. The output power circuit transistors are triggered with the delay specified in par. 21.17.</td></tr>
<tr><td>537</td><td></td><td>Service parameter</td></tr>
<tr><td>538</td><td>ACR run</td><td>H when ACR is running</td></tr>
<tr><td>539</td><td>ACR ready</td><td>H when ACR is ready</td></tr>
<tr><td>540</td><td>ACR fault</td><td>H when ACR has fault</td></tr>
<tr><td>541</td><td>ACR/VSD run</td><td>H when VSD and ACR is running</td></tr>
<tr><td>542</td><td>ACR grid ok</td><td>Service parameter</td></tr>
<tr><td>570
…
599</td><td>Constant 1
…
Constant 30</td><td>Constant number 1..30. Can be used as a factor in calculations made with help of Universal Block. It is a copy of parameters 75.01..75.30</td></tr>
<tr><td>600</td><td>VSD fault status</td><td>The 16 most significant failures were encoded in a 16 bits register:
0 = no failure, 1 = active failure.
Meaning of individual bits:
<table>
<tr><th>Bit nr</th><th>Failure nr</th><th>Bit nr</th><th>Failure nr</th><th>Bit nr</th><th>Failure nr</th></tr>
<tr><td>0</td><td>240, 241</td><td>6</td><td>320 LOW DC (VSD, ACR)</td><td>12</td><td>285</td></tr>
<tr><td>1</td><td>244</td><td>7</td><td>reserved</td><td>13</td><td>277, 278</td></tr>
<tr><td>2</td><td>250</td><td>8</td><td>268</td><td>14</td><td>other hardware</td></tr>
<tr><td>3</td><td>220, 221, 222, 223</td><td>9</td><td>260</td><td>15</td><td>other than all above</td></tr>
<tr><td>4</td><td>211, 212, 213</td><td>10</td><td>265</td><td>-</td><td>-</td></tr>
<tr><td>5</td><td>reserved</td><td>11</td><td>270</td><td>-</td><td>-</td></tr>
</table>
Example:
The value of PCH 600 = 0001 0000 0100 0010 means:
↑ ↑ ↑
Bit nr: 12 6 1
Failure nr: 285 320 244</td></tr>
</table>

<table>
<tr><th>PCH</th><th>PCH name</th><th>Function / value / note</th></tr>
<tr><td>601</td><td>AcR fault status</td><td>The 16 most significant failures were encoded in a 16 bit register:
0 = no failure, 1 = active failure.
Meaning of individual bits:
<table>
<tr><th>Bit nr</th><th>Failure nr</th><th>Bit nr</th><th>Failure nr</th><th>Bit nr</th><th>Failure nr</th></tr>
<tr><td>0</td><td>340, 341</td><td>6</td><td>rezerwa</td><td>12</td><td>296</td></tr>
<tr><td>1</td><td>344</td><td>7</td><td>rezerwa</td><td>13</td><td>295</td></tr>
<tr><td>2</td><td>350</td><td>8</td><td>372</td><td>14</td><td>other hardware</td></tr>
<tr><td>3</td><td>330, 331</td><td>9</td><td>373</td><td>15</td><td>other than all above</td></tr>
<tr><td>4</td><td>311, 312, 313</td><td>10</td><td>321</td><td>-</td><td>-</td></tr>
<tr><td>5</td><td>325, 326</td><td>11</td><td>370, 371</td><td>-</td><td>-</td></tr>
</table>
Example:
The value of PCH 601 = 0001 0001 0000 0010 means:
↑ ↑ ↑
Bit no: 12 8 1
Failure no: 296 372 344</td></tr>
<tr><td>630</td><td>AI0 fault</td><td>H = lack of “living zero” on Analog input 0 (modes: 2...10V, 4...20mA)</td></tr>
<tr><td>632</td><td>Warning. Lack of the "living zero"</td><td>H = a warning about the absence of a signal on analog inputs (1..4) in mode 2...10V and 4...20mA is active</td></tr>
<tr><td>650</td><td>Timeout 1</td><td>H when timeout on communication channel 1</td></tr>
<tr><td>651</td><td>Timeout 2</td><td>H when timeout on communication channel 2</td></tr>
<tr><td>652</td><td>Timeout 3</td><td>H when timeout on communication channel 3</td></tr>
<tr><td>700 .. 749</td><td>PCH RS 1...50</td><td>Characteristic Points available do write thought RS. Therefore, it is possible to control the process that takes data from these PCHs</td></tr>
<tr><td>750 .. 769</td><td>PCH PD write</td><td>After saving the value (eg via RS), the value is copied to a fixed parameter or PCH. Set by parameters 49.20-49.49.
The value is not saved in the permanent memory of the inverter (eeprom)</td></tr>
<tr><td>770 .. 789</td><td>PCH PD read</td><td>Possibility of coping to a specific PCH a value from any parameter or other PCH. Set by parameters 49.0-49.19.</td></tr>
<tr><td>830</td><td>Seq state 1 .. 8</td><td>PLC controller. Sequencer system. Value H = active mode 1 .. 8
(only one of the PCH.304...311 can assume value H at the same time and only if the sequencer is switched on)</td></tr>
<tr><td>838</td><td>SEKW NUMER SEQ</td><td>PLC controller. Sequencer system. Number of active mode. Value of this PCH can assume
value 0...7.(0 = STATE 1...7 = STATE 8)</td></tr>
<tr><td>840</td><td>Multiplex 1</td><td>PLC controller. Output of Multiplexer 1. Value = L, when Multiplexer 1 is switched off.</td></tr>
<tr><td>841</td><td>Multiplex 2</td><td>PLC controller. Output of Multiplexer 2. Value = L, when Multiplexer 2 is switched off.</td></tr>
<tr><td>850</td><td>Output CSU</td><td>PLC controller. Output Y of Curve Shaping Unit (CSU) X→Y</td></tr>
<tr><td>890</td><td>Timer 50 ms</td><td>Signal of timer with 50ms period and 50% filling</td></tr>
</table>

PCH	PCH name	Function / value / note
891	Timer 1s	Signal of timer with 1s period and 50% filling
892	Timer 1min	Signal of timer with 1min period and 50% filling
893	Timer 1 hour (t.1hour)	Signal of timer with 1 hour period and 50% filling
894	Timer 1ms	Signal of timer with 1ms period and 50% filling
900..999	PLC out 1 .. 100	PLC controller. Output of the universal unit number 1..100. Depends on unit function. Value may be in the range from 0 to 65535.

MFC810_1000_PCH_EN_sv1.98r3_dv1.1.odt

EU DECLARATION OF CONFORMITY CE

We:

Manufacturer's name:	**Zakład Energoelektroniki TWERD Michał Twerd**
Manufacturer's address:	**Aleksandrowska 28-30 87-100 Toruń, Poland**
Phone:	**+48 56 654-60-91, +48 515-152-382**
WWW, e-mail:	**www.twerd.pl twerd@twerd.pl**

Declare at our own responsibility, that product:

Product name:	**Frequency converter, model MFC**
Type:	**MFC810**
Power:	**2x250 kW**

installed and used according to *User's Manual* recommendations meets the requirements of Polish Standards:

Safety:	**PN-EN 50178:2003 PN-EN 60204-1:2010 PN-EN 61800-5-1:2007**
EMC:	**PN-EN 61800-3:2008**

which are equivalent to European Standards, harmonized with directives:

2014/35/EU Low Voltage Devices (LVD)
2014/30/EU Electromagnetic Compatibility (EMC)

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Date: 2019.10.09