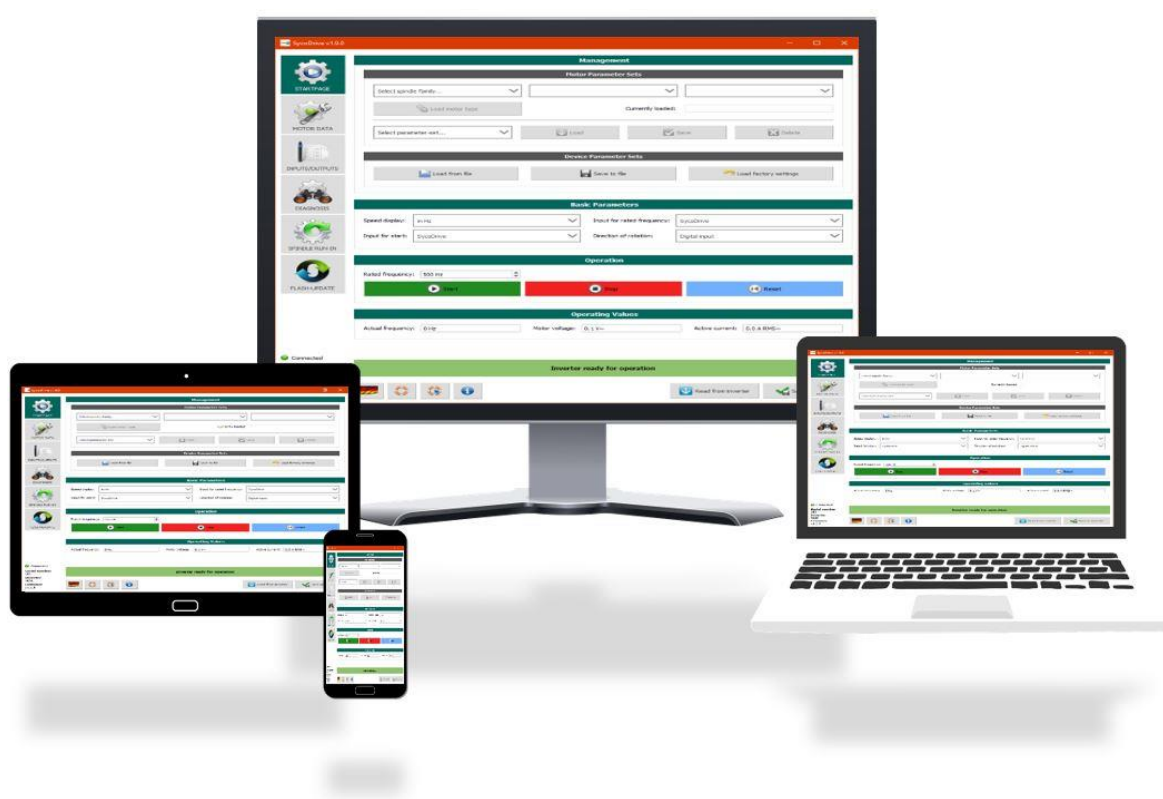


Operating Manual

Operating Software SycoDrive

for HF Inverter e@syDrive 4624, 4625, 4626

EN



INDUSTRIAL DRIVES



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1.0 User Information

1.1 Symbols Used

Operating manual

 DANGER	Indicates a hazardous situation that can directly cause death or serious injury.
 ATTENTION	Indicates a hazardous situation that can cause damage to property or mild to moderate injuries.
	Important information for operator and engineer

1.2 Important Information

Target group: This document is intended for machine manufacturers and persons responsible for putting into service and operation of the frequency inverter.



ATTENTION

The operating manual must be read by the user/operator before starting up the unit for the first time in order to avoid incorrect operation and other damage. Duplication and distribution of the operating manual require SycoTec's prior consent.

All specifications, information and properties of the product described in the operating manual correspond to the status on going to press.

Modifications and improvements to the product as a result of new technical developments are possible. This does not imply any right to retrofitting of existing units.

SycoTec assumes no responsibility for damage arising through:

- use of incorrect information
- improper use

This manual will give you basic knowledge of the functions and how to use the operating software SycoDrive for the frequency inverters e@syDrive 4624, 4625, 4626.

The software serves for entering and modifying the performance parameters of the frequency inverter systematically and clearly. Besides, the functions for error diagnosis and application are described. Any settings that are adjusted will directly affect the operation of the frequency inverter. Further information concerning the hardware of the frequency inverter can be found in the technical manual of the respective device.



The Safety Instruction and Application Advice in the hardware description of the frequency inverter must be observed strictly!

First, the steps that are necessary to install and to start the software for the first time are described.

In the following chapter, you will learn how to enter, modify or administer performance parameters.

Finally, in the last chapters, you will learn how to activate the frequency inverter and how to interpret the various status messages.



The software and firmware version must be compatible with each other!

1.3 Intended Use

The SycoDrive Operating Software is used for commissioning and operating SycoTec frequency inverters e@syDrive 4624, 4625, 4626.

1.4 Abbreviations

A	Current (ampere)
AIN	Analog input
ASM 3-phase	3-phase asynchronous motor
°C	Degrees Celsius
CAN	Bus system (Controller Area Network)
DC	Direct current
DIN	Digital input
E	Error message
EEPROM	Electrically erasable programmable read-only memory
EMF	Electromotive force
f	Frequency
FF	Fixed frequency
GUI	Graphical user interface
h	Time (hour)
HF	High frequency
Hz	Frequency (hertz)
I	Current
ID	Identification
INV	Inverter
LED	Light-emitting diode
mA	Milliampere
min ⁻¹	Rotational speed
ms	Millisecond
μs	Microsecond
Mx	Motor parameter set x
n	Rotational speed
NTC	Negative temperature coefficient
Ω	Resistance (ohm)
OTG	On-The-Go
p	Number of pairs of poles
PAM	Pulse-amplitude modulation
PC	Personal computer
pdf	Portable document format
PDO	Process data object
PI	Proportional-integral controller
PID	Proportional-integral-derivative controller
PLC	Programable logic controller
PMSM	Permanent-magnet synchronous motor
PTC	Positive temperature coefficient
Px	Parameter number x
RTC	Real-time clock
s	Time (second)
SD card	Secure digital memory card
SDO	Service data object
STO	Safe torque off
U	Voltage
USB	Universal serial bus
UTC	Coordinated Universal Time
V	Voltage (volt)
V/Hz	Voltage-frequency ratio
W	Power (watt)
W	Warning message

2.0 Scope of Supply

Operating Manual SycoDrive Operating Software

Material no. 2.002.2669



Check that all parts are present.

3.0 Safety Instructions and Warnings

3.1 Safety Measures

Safe operation and protection of the device can only be assured if the device is used as intended, in accordance with the instructions for use, and using only approved tools. The following must also be observed:

- The occupational health and safety regulations
- The accident prevention regulations



DANGER

- *The frequency inverters e@syDrive 4624, 4625, 4626 control dangerously rotating mechanical parts. If the instructions provided in these instructions for use are not followed, this could result in serious damage to property, personal injury and even death.*
- *Hazard-free operation of this device is dependent on the proper installation, handling and operation of the device.*
- *Only properly qualified personnel must commission, service and work on this device. Only specialist personnel are permitted to connect up and commission the device and to rectify faults.*
- *The device does not have a power switch. The device must be completely disconnected from the power supply before work is carried out on the opened device. The device has no power input fuses.*
- *Under certain influencing conditions, this device could start up automatically after a mains failure.*
- ***This device must not be used as an "emergency stop mechanism" (see EN 60204).***
- *The device must be used only for the purpose intended by the manufacturer. Unauthorized alterations and the use of auxiliary equipment that is not recommended by the manufacturer could cause fires, electric shocks and injuries.*



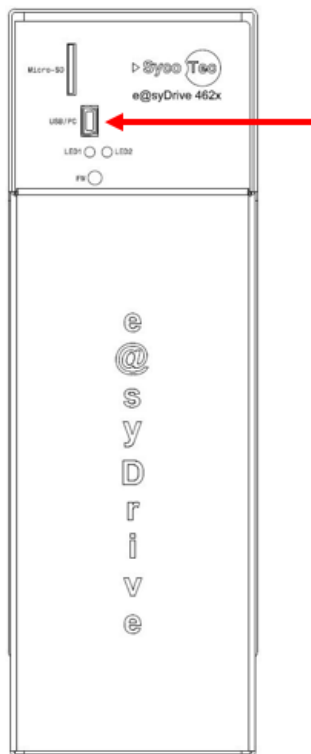
ATTENTION

Before installing and operating the frequency inverter, please read through these safety instructions and warnings and the safety instructions and warnings of the operating manual of the HF Inverter e@syDrive 4624, 4625, 4626 (material no. 2.002.1912) carefully and pay attention to all of the warning signs on the device!

4.0 Connecting the Devices to the PC/Tablet

Connect the e@syDrive 4624, 4625, 4626 frequency inverter to the PC/tablet:

- Use the mini USB cable to connect the mini USB port on the frequency inverter to a USB port on the PC/tablet.



- The virtual COM port is shown in the device manager as "USB Serial Port".
- During the installation process of the SycoDrive Operating software, the driver is also installed if required.
- The SycoDrive Operating Software finds the COM port automatically and creates a connection between the PC and the frequency inverter.



In order to control the frequency inverter via a tablet, you will need an OTG compatible device and an OTG compatible connection cable.

*A tablet / smartphone without additional power supply is not suitable for permanent display of the operating values, as no power supply is provided by the inverter.
Suitable devices must be used.*

USB On-The-Go (OTG):

Direct communication between USB devices, i.e. without involving the central host controller, was not provided for in the original USB standard; this was subsequently made possible, to a limited extent, with the **USB On-The-Go** expansion.

USB On-The-Go (OTG) allows suitably equipped devices to communicate with one another, whereby one of the devices acts as a host to a limited extent.

USB-OTG products are labeled with the USB logo that is underlined with a green arrow bearing the text "On-The-Go" in white lettering.

5.0 Installation

5.1 Hardware Requirements

SycoDrive Operating Software can run on all systems operated with Microsoft Windows 7 or later versions. A free USB port is required, of course, to which the frequency inverter can be connected. A SycoDrive app is available for Android devices.


5.2 Installation of the SycoDrive Operating Software

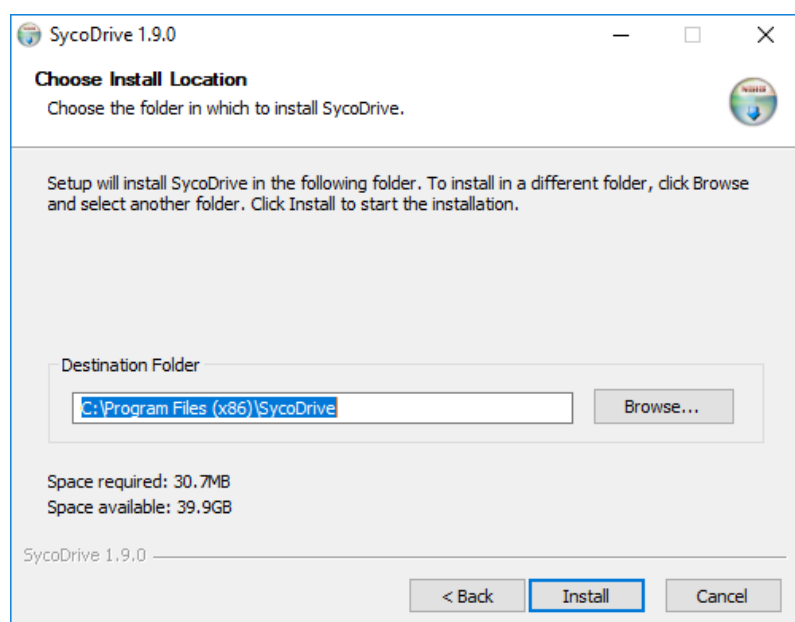
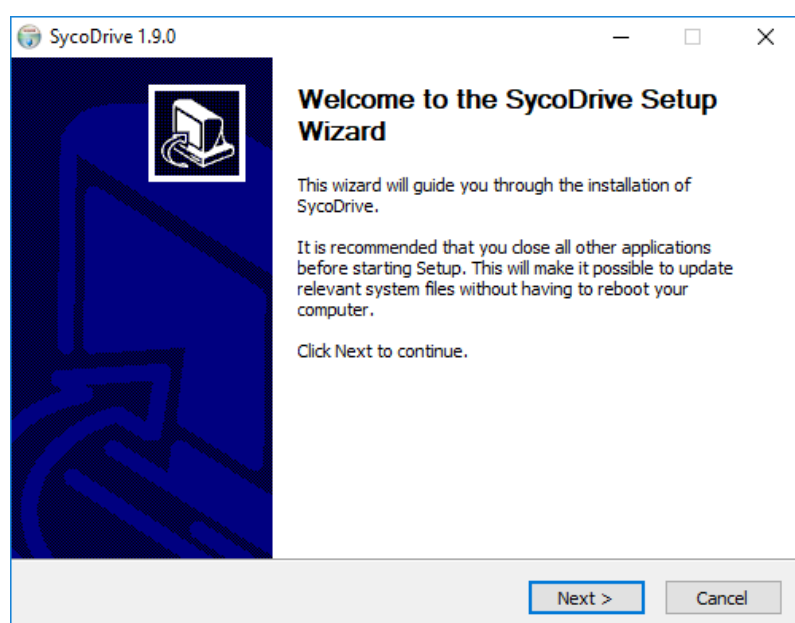
5.2.1 Installing the Operating Software

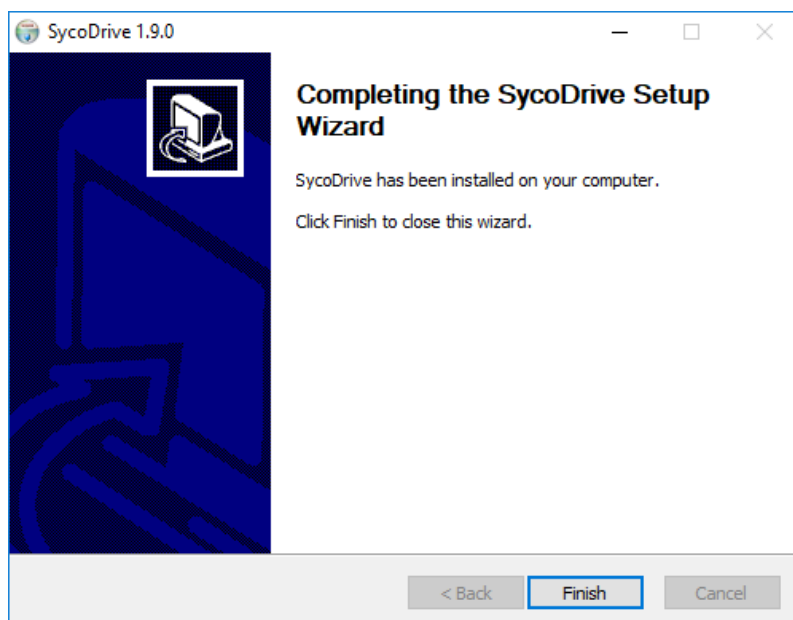
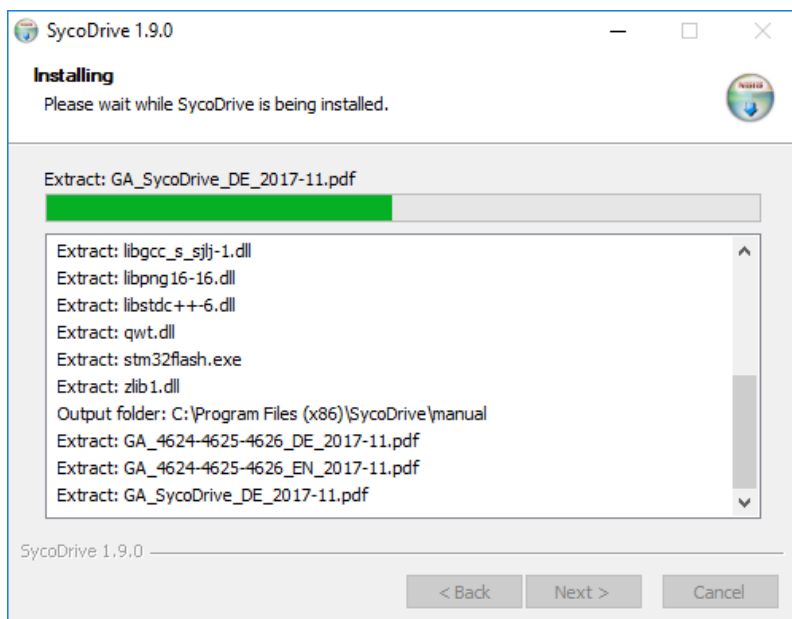
Download the SycoDrive Operating Software from the website www.sycotec.eu.

When installing the operating software, old files of an already existing SycoDrive installation are deleted.

Installing of the SycoDrive Operating Software on the PC:

 SycoDrive-1.9.0-setup



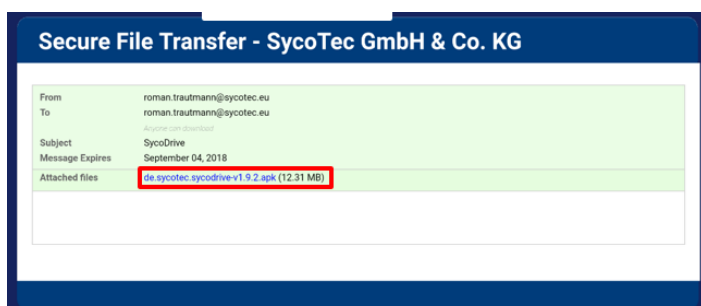


5.2.2 Installing the App

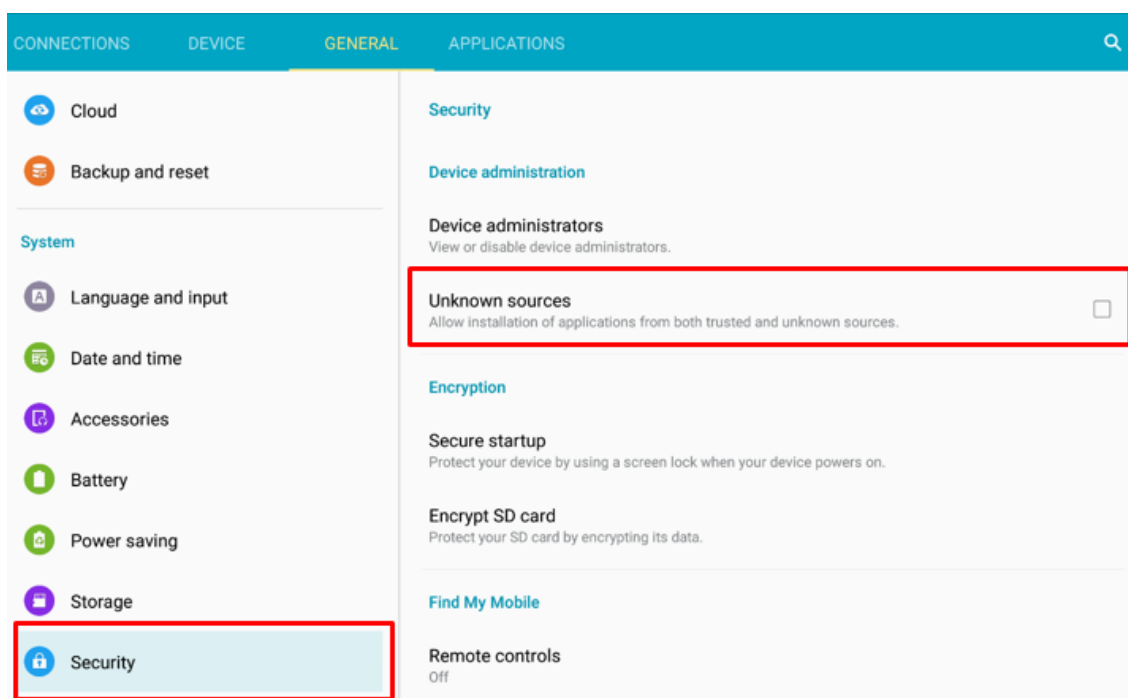
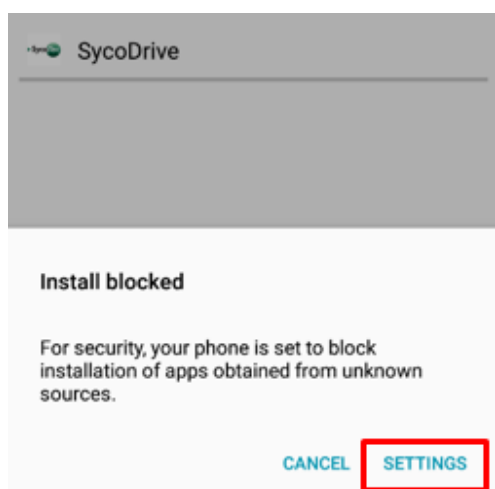


SycoDrive is not available in the Google Play Store. The SycoDrive app is only available on request from SycoTec.

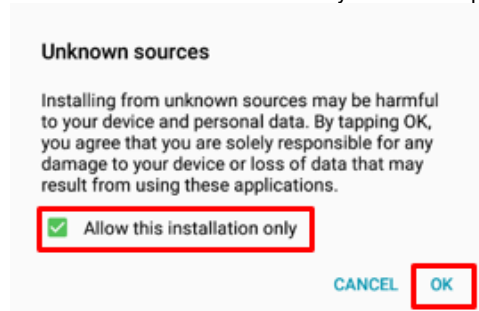
Download the Apk file from the Secure File Transfer Server of SycoTec and open the file.



If necessary, allow the installation of apps from unknown sources in the security settings of the device.



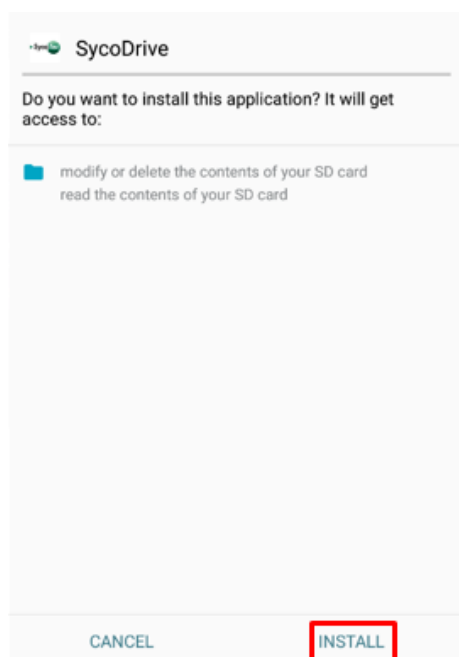
Allow the installation for only this one app from unknown sources.



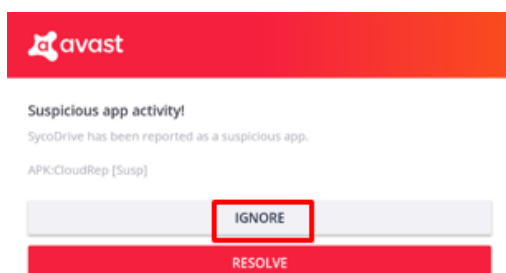
ATTENTION

After the installation of SycoDrive has been completed, the permission to install from unknown sources should be deactivated again.

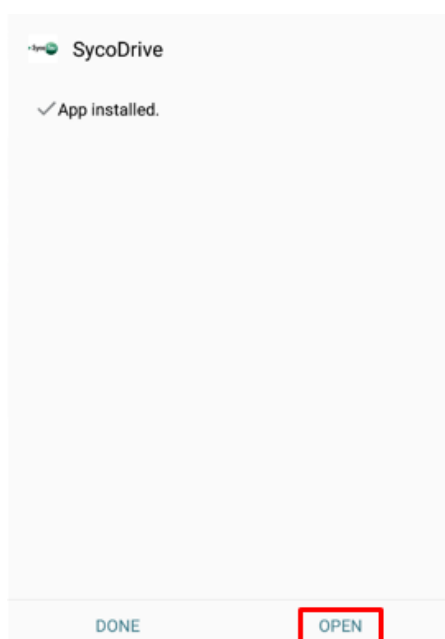
Start installing the SycoDrive App.



Anti-virus programs (e.g. avast) can refuse to run SycoDrive because SycoDrive is unknown to the program and is considered a threat. This message can be ignored.



After installation, the SycoDrive app can be opened and used.



The proper representation of SycoDrive depends on the operating system installed.

6.0 Description of the User Interface

The SycoDrive Operating Software can be operated using a PC or tablet.

6.1 General Operating Instructions

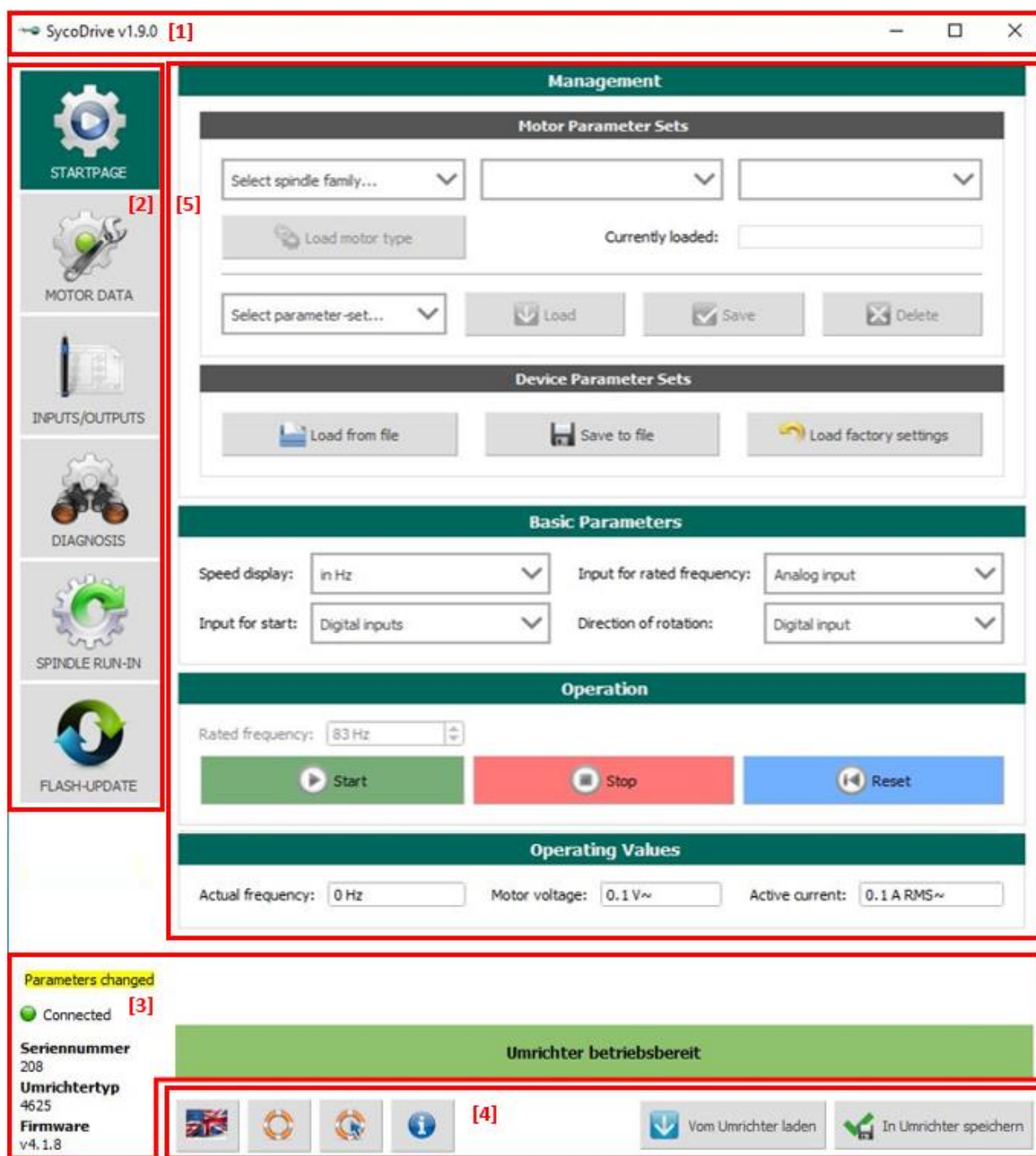
6.1.1 PC

- ▶ When you move the mouse over an entry field, a so-called tool tip appears showing the parameter number and the minimum and maximum values. In the case of non-adjustable parameters and combo boxes, only the parameter number is shown.
- ▶ Status messages show whether the transmission of parameters to the frequency inverter and the saving and loading of parameter sets in files was successful or not.
- ▶ The minimum and maximum input values of the parameters can be exceeded during insertion process. When confirming the input value with the Enter key, the parameter value automatically takes the closest permissible value.

6.1.2 Tablet


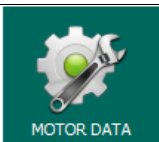
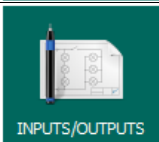
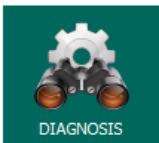
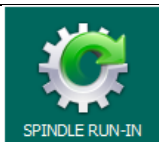






- ▶ In order to control the frequency inverter via a tablet, you will need an OTG compatible device and an OTG compatible connection cable.
- ▶ There is no option of a Flash update with a tablet.

6.2 Screen Structure



- [1] Title bar The program name and the software version are shown in the title bar.
- [2] Menu bar The menu bar shows the operating functions of the software, ordered thematically.
- [3] Status area The connection and inverter state, serial number, type of frequency inverter, firmware version and changed parameters are shown here.
- [4] Toolbar The toolbar provides access to frequently used functions (load parameters from frequency inverter or save parameters to frequency inverter) and to the language selector, instructions for use of the frequency inverter and license information.
- [5] Display area The selected menu page is displayed here.

6.3 Menu and Toolbar Description

	Startpage	The start page is where the parameter sets are managed. This is also where programming of inverter actuation takes place and (if set accordingly) from where the frequency inverter is operated. In addition, three operating values (actual frequency, motor voltage and Active current) are displayed here.
	Motor data	Here, the motor data, V/Hz table and control parameters are configured. The displayed parameters change depending on the type of connected motor selected (ASM 3-phase, PMSM).
	Inputs/outputs	The settings for the digital inputs, relays, analog input, fixed frequencies and CAN are programmed here.
	Diagnosis	When a frequency inverter is connected, the most important operating values, running times and error messages are displayed under Diagnostics. An actuator/sensor test option is also available.
	Spindle run-in	Run-in programs are available here for the different motor types.
	Flash-update	The firmware of the frequency inverter can be updated on the Flash update page.
	Language selection	Here, you can set the language (German or English).
	Instructions for use	The first Button opens the instructions for use for the frequency inverters e@syDrive 4624, 4625, 4626. The second Button opens the instructions for use for the SycoDrive Operating Software. In order to be able to open the instructions for use, a pdf reader must be installed on the PC or tablet and linked to the file extension *.pdf.
	License information	Shows information on the software version, the contact address of SycoTec GmbH & Co. KG and the license information.
	Read from inverter	Click on this button to load the active data from the frequency inverter.
	Save on inverter	Click on this button to transmit the data from the software to the frequency inverter. A reset is automatically triggered when saving the parameters to the frequency inverter.

6.4 Connected / Not Connected

Connected

If there is a connection between the software (PC/tablet) and the frequency inverter, then the state "Connected" will be displayed. Parameters that have been changed can be loaded into the frequency inverter by clicking on the "Save on inverter" button. Also, information on the relevant operating values, running times and error messages and the actuator/sensor test option are available in online mode under Diagnosis. The configuration of the frequency inverters via the software is possible from a supply voltage of 10 V DC.

● Not connected

If there is no connection between the software (PC/tablet) and the frequency inverter, then the state "Not connected" will be displayed. It is also possible to create or adjust parameter sets and save them to the hard drive.

6.5 Display "Parameter Changed"

If SycoDrive is not connected to an inverter, the message "Parameter changed" is not displayed. If a connection to an inverter is established, the message "Parameter changed" is displayed.

The "Parameters changed" display disappears when:

- ▶ the current parameter values are loaded from the inverter via "Read from inverter",
- ▶ the parameter values set in the user interface are transferred successfully to the inverter via "Save on inverter",
- ▶ the factory settings are loaded,
- ▶ a spindle run-in is performed.

The "Parameters changed" display is displayed when:

- ▶ a parameter value has been changed in the GUI,
- ▶ a Motor Parameter Set is loaded via "Load motor type" or a Device Parameter Set is loaded via "Load from file", and at least one parameter is changed against the current parameter values in the user interface or in the frequency inverter,
- ▶ a Motor Parameter Set is loaded from one of the inverter-internal memory locations M1...M16,
- ▶ a firmware update is performed.

Changes to parameter P1 – Rated frequency have no effect on the "Parameter changed" display.

6.6 Inverter State

If there is a connection between the software and the frequency inverter, the inverter state is visible above the toolbar. A total of five different states are displayed.

Inverter ready for operation

As soon as there is a connection between the frequency inverter and the SycoDrive and neither warnings nor errors are present, the status "Inverter ready for operation" is displayed.

Motor runs

As soon as the motor is started via SycoDrive, a digital input or CAN and neither warnings nor errors are present, the status "Motor runs" is displayed.

Holding operation

When a Holding current is applied to the motor, the status "Holding operation" is displayed.

Warning 17 - Motor connection broken

When a Warning is triggered, the warning number is displayed with the corresponding short description, e.g. "Warning 17 – Motor connection broken". The warning message can only be removed by a reset.

Error 2 - STO deactivated

When an error occurs, the motor is stopped and the error number is displayed with the corresponding short description, e.g. "Error 2 – STO deactivated". An error can only be removed by a reset.

7.0 Description of Parameters

All of the buttons and displayable and adjustable parameters are described here.

The maximum input values depend on the relevant hardware version.

7.1 Parameter List

In the "Motor/Adjustable" column, the following abbreviations are used:

A = displayed and adjustable with ASM 3-phase

D = displayed and adjustable with PMSM

N = not adjustable

S = adjustable only when motor is not running

I = always adjustable, even with motor running

Param.- No.	Description	Range of values, selection	Unit	Preset	Motor / adjustable
36	Inverter	0...65535	-	-	A, D / N
39	Serial number	0...65535	-	-	A, D / N
	Firmware	-	-	-	A, D / N
STARTPAGE					
Basic Parameters					
8	Speed display	in Hz, in rpm	-	in Hz	A, D / I
140	Input for start	CAN, Digital inputs, SycoDrive	-	Digital inputs	A, D / I
141	Input for rated frequency	Analog input, CAN, Digital inputs, SycoDrive	-	Analog input	A, D / I
146	Direction of rotation	Clockwise, Counter- clockwise, Digital input	-	Digital input	A, D / I
Operation					
1	Rated frequency	0...4000	Hz, rpm	83	A, D / I
Operating Values					
13	Actual frequency	0...4000	Hz, rpm	-	A, D / N
15	Motor voltage	0...65	V~	-	A, D / N
18	Active current	-25...25	A RMS~	-	A, D / N
MOTOR DATA					
Motor Parameters					
41	Minimum frequency	5...100	Hz, rpm	50	A, D / S
42	Maximum frequency	100...4000	Hz, rpm	100	A, D / S
44	Motor peak current	0.5...100	A RMS~	1.5	A, D / S
46	Acceleration ramp	0.5...400	s	5	A, D / I
47	Deceleration ramp	0.5...400	s	5	A, D / I
51	Startup time	without ramp, 0.5...100	s	Without ramp	D / I
52	Startup current	0.1...16	A~	0.1	D / I
53	Startup frequency	1...30	Hz, rpm	8	D / S
54	Switchoff time	200...1000	µs	330	D / S
55	DC brake time	Off, 0.1...120	s	Off	A / I
56	DC brake current	0...16	A-	1	A / I
57	Holding current	Off, 0.1...3	A-	Off	A, D / I
85	Temperature monitoring	Off, KTY84, NTC, PT1000, PTC	-	Off	A, D / I
86	Resistance value	500...4000	Ohm	1330	A, D / I
90	Motor type	no motor, ASM 3-phase, PMSM	-	No motor	A, D / S
91	Rated frequency	5...4000	Hz, rpm	100	D / S
92	Rated voltage	0...65	V~	6	D / S
93	Rated current	0.5...16	A RMS~	1	A, D / S
94	cos phi	20...100	%	85	A, D / S
96	Number of pole pairs	1...4	-	1	A, D / S

Param.- No.	Description	Range of values, selection	Unit	Preset	Motor / adjustable
I²t Monitoring					
75	I ² t threshold	0...100	%	100	A, D / S
76	I ² t time	1...22374	s	10	A, D / S
77	Function I ² t monitoring	Deactivated, Motor stop, Warning	-	Deactivated	A, D / S
V/Hz Table					
60	Voltage 0	1...65	V~	1	A / I
61	Frequency 1	5...4000	Hz	100	A / I
62	Voltage 1	1...65	V~	6	A / I
63	Frequency 2	5...4000	Hz	100	A / I
64	Voltage 2	1...65	V~	6	A / I
65	Frequency 3	5...4000	Hz	100	A / I
66	Voltage 3	1...65	V~	6	A / I
Control Parameters					
	Speed control	V/Hz table, I*R and load comp.	-	V/Hz table	A / I
71	I*R factor	Off, 0.1...10	V/A	Off	A / I
72	Load comp. factor	Off, 0.1...40	%/A~	Off	A / I
73	Filter time	1...1000	ms	20	A / I
79	V Control KP	5...100	%	20	A, D / I
80	V Control TN	without I-part, 1...999	ms	2	A, D / I
81	Speed control KP	5...200	%	50	A, D / I
82	Speed control TN	without I-part, 1...999	ms	250	A, D / I
83	Speed control TV	without D-part, 1...300	ms	30	A, D / I
84	Speed control TF	1...300	ms	200	A, D / I
INPUTS/OUTPUTS					
Digital Inputs					
110	DIN 1	Off, Start/Stop, Stop	-	Start/Stop	A, D / S
111	DIN 2	Off, Speed direction, Reset, Start impulse	-	Reset	A, D / S
112	DIN 3	Off, Speed direction, Motor code bit 0, Reset	-	Speed direction	A, D / S
113	DIN 4	Off, Speed direction, Motor code bit 1, Reset	-	Off	A, D / S
114	DIN 5	Off, Speed direction, Fixed frequency bit 1, Motor code bit 2, Parameter import, Reset	-	Parameter import	A, D / S
115	DIN 6	Off, Speed direction, Fixed frequency bit 0, Motor code bit 3, Parameter export, Reset	-	Parameter export	A, D / S
116	PLC input	Start/Stop, Off	-	Off	A, D / S
Relays					
120	Relay 1	Off, Holding operation, I ² t warning,	-	Motor runs	A, D / I
121	Relay 2	Motor runs, Motor downtime, Motor temperature, Nominal speed reached, Operation, Failure, Overload, Warning, Current limit	-	Failure	A, D / I
125	Warning current	0.4...12	A~	0.4	A, D / I

Param.- No.	Description	Range of values, selection	Unit	Preset	Motor / adjustable
Analog Input					
129	AIN	U (0...10 V), I (0...20 mA)	-	U (0...10 V)	A, D / S
135	Minimum frequency	0...4000	Hz, rpm	50	A, D / I
136	Maximum frequency	0...4000	Hz, rpm	100	A, D / I
137	Maximum voltage	1...10	V	10	A, D / I
138	Maximum current	4...20	mA	20	A, D / I
Fixed Frequencies					
104	Fixed frequency 1	5...4000	Hz	100	A, D / I
105	Fixed frequency 2	5...4000	Hz	100	A, D / I
106	Fixed frequency 3	5...4000	Hz	100	A, D / I
107	Fixed frequency 4	5...4000	Hz	100	A, D / I
CAN					
130	CAN node ID	1...127	-	1	A, D / I
DIAGNOSIS					
Operating Values					
10	Rated frequency	0...4000	Hz, rpm	-	A, D / N
11	Peak current	0.5...24	A RMS~	-	A, D / N
13	Actual frequency	0...4000	Hz, rpm	-	A, D / N
15	Motor voltage	0...65	V~	-	A, D / N
16	DC link voltage (motor)	0...75	V-	-	A, D / N
18	Active current	-25...25	A RMS~	-	A, D / N
19	Active power	0...1000	W	-	A, D / N
20	Motor code	1...16	-	-	A, D / N
21	I ² t load	0...200	%	-	A, D / N
Runtimes					
25	Inverter	0...65000	h	-	A, D / N
26	Motor	0...65000	h	-	A, D / N
Error Messages					
30	1st Error	-	-	-	A, D / N
31	2nd Error	-	-	-	A, D / N
32	3rd Error	-	-	-	A, D / N
33	4th Error	-	-	-	A, D / N
34	5th Error	-	-	-	A, D / N
Actuator/Sensor Test					
97	Input current	-	mA	-	A, D / N
98	Input voltage	-	V	-	A, D / N
99	Temperature at heat sink	-	°C	-	A, D / N
100	DC link voltage (input)	-	V	-	A, D / N
101	Relay 1	0...65535	bit field	-	A, D / S
	Relay 2				
	LED Fault				
	LED Operation				
102	DIN 1	0...65535	bit field	-	A, D / N
	DIN 2				
	DIN 3				
	DIN 4				
	DIN 5				
	DIN 6				
	PLC input				
	Temperature monitoring (motor)				

7.2 Startpage

7.2.1 Management

The screenshot shows a software interface titled "Management". It is divided into two main sections: "Motor Parameter Sets" and "Device Parameter Sets".

Motor Parameter Sets: This section contains three drop-down menus at the top for selecting spindle family (4025), spindle type (AC), and maximum speed (60000 rpm). Below these is a "Load motor type" button with a gear icon. To the right, there is a "Currently loaded:" label followed by an empty text field. At the bottom of this section is a drop-down menu showing "M1", and three buttons: "Load M1" (blue arrow icon), "Save to M1" (green checkmark icon), and "Delete M1" (red X icon).

Device Parameter Sets: This section contains three buttons: "Load from file" (blue folder icon), "Save to file" (black floppy disk icon), and "Load factory settings" (yellow circular arrow icon).

7.2.2 Motor Parameter Sets

You can select a specific type of spindle here.

There is also the option of saving up to 16 motor parameter sets (M1...M16) in the frequency inverter. These can then be selected via the digital inputs.

Load motor type

The motor spindle can be selected from the three drop-down lists (spindle family, spindle type and maximum speed) and then displayed in the software using the "Load motor type" button.

Load Mx

Load motor parameter set Mx (x: 1...16; select in drop-down list) from the frequency inverter.

Save to Mx

Save motor parameter set Mx (x: 1...16; select in drop-down list) in the frequency inverter.

Delete Mx

Delete motor parameter set Mx (x: 1...16; select in drop-down list) from the frequency inverter.



- The current motor type is displayed.
- The motor parameter sets contain only the parameters on the motor data page (motor data, V/Hz table and controller parameters).
- The motor type parameters in the drop-down list are stored in the software.

7.2.3 Device Parameter Sets

Here, device parameter sets can be loaded from a file or saved to a file. The factory settings can also be loaded.

Load from file

Load a device parameter set from a file from the PC.

Save to file

Save the current device parameter set to a file on the PC.

Load factory settings

This function resets all of the parameters to the original factory settings. As a safety precaution, you must first confirm the request with [OK] before the reset is carried out.



- Saved motor parameters in the M1...M16 memory slots are deleted.
Loading the factory settings is only possible when the motor is stopped.
- The device parameter set contains both motor data and the settings of the inputs and outputs.

7.2.3 Basic Parameters

Basic Parameters			
Speed display:	in Hz	Input for rated frequency:	Analog input
Input for start:	Digital inputs	Direction of rotation:	Digital input

P8 Speed display

Selection of the display for rated and actual motor speeds, in Hz or in min⁻¹; the rotational speed is calculated from the frequency according to the following formula:

$$n = \frac{f * 60}{p}$$

n = Rotational speed
f = Frequency
p = Number of pairs of poles

Values: in Hz
in rpm
Factory setting: in Hz

P140 Input for start

Selection of the source from which the frequency inverter is to receive the start/stop command. The digital and analog output values are always displayed, regardless of this setting.

Values: CAN
Digital inputs
SycoDrive
Factory setting: Digital inputs

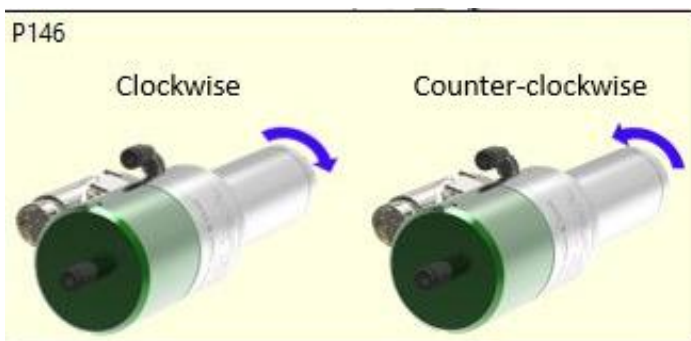
P141 Input for rated frequency

Selection of the source from which a target value setting is to be transferred to the frequency inverter. The digital and analog output values are always displayed, regardless of this setting.

Values: Analog input
CAN
Digital inputs
SycoDrive
Factory setting: Analog input

P146 Direction of rotation

Selection of the source from which the rotational direction is to be transferred to the frequency inverter. The digital and analog output values are always displayed, regardless of this setting. In ToolTip for this parameter examples of the directions of rotation are displayed.



Values: Digital input
Counter-clockwise
Clockwise
Factory setting: Digital input

7.2.4 Operation



P1 Rated frequency

Rated frequency value for the motor (input via control panel). Using the *speed display* parameter, this parameter can be converted to display rotational speed instead of frequency; the number of poles of the motor is taken into account. Only values that lie between the *minimum frequency* and *maximum frequencies* of the motor may be set here.

Minimum value: 0 Hz
Maximum value: 4,000 Hz
Factory setting: 83 Hz

Start

If *Input for start* is set to "SycoDrive", then the connected motor can be operated using the "Start" button.

Stop

If *Input for start* is set to "SycoDrive", then the connected motor can be operated using the "Stop" button.

Reset

The "Reset" button can be used to clear an error.

7.2.5 Operating Values



P13 Actual frequency (display value)

The actual frequency is the current motor frequency, which is equivalent to the output frequency of the inverter. Using the *speed display* parameter, this parameter can be converted to display rotational speed instead of frequency; the number of poles of the motor is taken into account.

P15 Motor voltage (display value)

The motor voltage is the current motor voltage between two phases.

P18 Active current (display value)

The active current is the current real motor current in a phase.

7.3 Motor Data

7.3.1 Motor Parameters

These parameter values are shown, depending on the chosen type of motor. Allocation to the different motor types is indicated in square brackets.

Motor Parameters			
Motor type:	ASM 3-phase	Temperature monitoring:	Off
cos phi:	92 %	Resistance value:	1330 Ohm
Rated current:	3.7 A RMS~	Motor peak current:	8.0 A RMS~
Minimum speed:	4980 rpm	Maximum speed:	60000 rpm
Acceleration ramp:	2.0 s	Deceleration ramp:	2.0 s
Number of pole pairs:	1	Holding current:	Off
DC brake time:	Off	DC brake current:	2.0 A-

Motor Parameters			
Motor type:	PMSM	Temperature monitoring:	Off
cos phi:	92 %	Resistance value:	1330 Ohm
Rated voltage:	24.0 V~	Rated speed:	60000 rpm
Rated current:	3.7 A RMS~	Motor peak current:	8.0 A RMS~
Minimum speed:	4980 rpm	Maximum speed:	60000 rpm
Acceleration ramp:	2.0 s	Deceleration ramp:	2.0 s
Number of pole pairs:	1	Holding current:	Off
Startup time:	without ramp	Switchoff time:	330 µs
Startup speed:	480 rpm	Startup current:	0.1 A~

P41 Minimum frequency [ASM 3-phase, PMSM]

Absolute minimum inverter frequency; is set internally to "0" for PMSM motors. With ASM 3-phase motors, it serves as a lower limit for the inverter frequency.

Minimum value: 5 Hz

Maximum value: 100 Hz

Factory setting: 50 Hz

P42 Maximum frequency [ASM 3-phase, PMSM]

Absolute maximum inverter frequency. The output frequency of the frequency inverter is limited to this value in order to protect the motor.

For ASM 3-PHASE motors, this value is set to the maximum rated frequency; for PMSM motors, this value should be set approximately 10% higher than the maximum target value. Also, this parameter must be set to a value higher than the minimum frequency.

Minimum value: 100 Hz

Maximum value: 4,000 Hz

Factory setting: 100 Hz

P44 Motor peak current [ASM 3-phase, PMSM]

The value specified by the motor manufacturer must be entered.

The DC brake current and, in the case of a PMSM motor, the Startup current remain unaffected by this.

The *Motor peak current* (RMS) may flow for *I²t time* (P76) when the motor is cold.

The value may exceed the maximum possible inverter output current.

The current limit for phase current for normal running of a motor is effected by the output current of the frequency inverter. The nominal current indicated on the type plate has an overload capacity of Rated current up to 150 % for t = 5 s.

Minimum value: 0.5 A RMS~

Maximum value: 100 A RMS~

Factory setting: 1.5 A RMS~

P46 Acceleration ramp [ASM 3-phase, PMSM]

Rise time of frequency 0 to maximum frequency.

The acceleration ramp becomes effective at motor start and when changes are made to the nominal frequency. If the rise time is set too short, the motor current increases to the peak current, which results in the rise time being extended automatically.

Minimum value: 0.5 s

Maximum value: 400 s

Factory setting: 5 s

P47 Deceleration ramp [ASM 3-phase, PMSM]

Delay time from maximum frequency to frequency 0. The frequency inverter reduces its frequency according to the preset ramp. The motor operates as a generator. The rotational energy is converted to heat in the braking resistor. Subsequently, direct current braking also takes place (see DC brake time and DC brake current).

If the ramp is set too short, then the frequency inverter limits the generator current to the peak current value; as a result, the actual stopping time of the motor increases automatically, but vibration may occur during braking.

Minimum value: 0.5 s

Maximum value: 400 s

Factory setting: 5 s

P51 Startup time [PMSM]

Start-up time for micro step start-up with PMSM motors from 0 Hz to Startup frequency.

With a Startup time > 0.5 s, both Startup current and Startup frequency must also be entered.

With a micro step start-up, the PMSM motor is operated as a synchronous motor with constant current (Startup current). In this case, the output frequency is slowly increased from 0 to the startup frequency, after which the system switches to controlled motor running with EMF recording. With smaller centrifugal masses, the start ramp can be switched off or shorter times can be set. With larger centrifugal masses, longer times must be set.

Special values: without ramp – micro step start-up ramp switched off

Minimum value: 0.5 s

Maximum value: 100 s

Factory setting: without ramp

P52 Startup current [PMSM]

Start-up current for micro step start-up; only adjustable if Startup time > 0. Low currents should be set for a soft and quiet start; higher currents should be set for larger centrifugal masses and a fast start.

The adjustable maximum value of the Startup current depends on the nominal current indicated on the type plate.

Minimum value: 0.1 A~

Maximum value: 16 A~

Factory setting: 0.1 A~

P53 Startup frequency [PMSM]

Start-up frequency for micro step start-up.

If the Startup time is set to "Without ramp", the motor starts up at the Startup frequency. If a ramp time has been set under Startup time, then the system starts at Frequency 0 and slowly increases to the Startup frequency. Once the Start-up frequency has been reached, the micro step start-up ends. If the motor does not start up reliably, the Startup frequency should be increased.

Minimum value: 1 Hz

Maximum value: 30 Hz

Factory setting: 8 Hz

P54 Switchoff time [PMSM]

Switch-off time of the inverter.

During the micro step start-up, the inverter is switched off briefly at regular intervals in order to record the EMF voltage of the PMSM motor. This is used to determine the position of the rotor at slower rotation speeds. If the motor winding inductances are large, longer times should be set.

Setting rule: If the PMSM motor does not start easily or is poorly synchronized with the motor, then longer times should be set. It may also be necessary to increase the startup frequency.

Minimum value: 200 µs

Maximum value: 1,000 µs

Factory setting: 330 µs

P55 DC brake time [ASM 3-phase]

Time for direct current braking with ASM 3-phase motor,

0 = no direct current braking. If this parameter is set to the value > 0, then the DC braking current must also be set.

Special values: Off - No direct current braking takes place

Minimum value: 0.1 s

Maximum value: 120 s

Factory setting: Off

P56 DC brake current [ASM 3-phase]

Current for direct current braking with a ASM 3-phase motor; only displayed if DC brake time is not set to Off.

Minimum value: 0 A-

Maximum value: 16 A-

Factory setting: 1 A-

P57 Holding current [ASM 3-phase, PMSM]

Stop holding current; this current flows through two phases when the motor is stopped, whereby the third motor phase has no current. This results in braking of the motor (ASM 3-phase motor) or the motor being held in a defined position (PMSM motor).

Special values: Off - No holding current when the motor is at rest.

Minimum value: 0.1 A-

Maximum value: 3 A-

Factory setting: Off

**ATTENTION**

To store parameters, the holding operation is interrupted briefly.

During a firmware update, the holding operation is interrupted.

P85 Temperature monitoring [ASM 3-phase, PMSM]

The temperature of the motor can be monitored by various types of sensor. The type of sensor used must be set here.

Values: Off - No temperature monitoring of the motor takes place

KTY84

NTC

PTC

PT1000

Factory setting: Off

P86 Resistance value [ASM 3-phase, PMSM]

Resistance value of the temperature sensor at shut-off point is only adjustable if the temperature monitoring is not set to Off.

Minimum value: 500 Ω
 Maximum value: 4,000 Ω
 Factory setting: 1,330 Ω

P90 Motor type [ASM 3-phase, PMSM, No motor]

Input of motor type.

Value:	No motor	no motor defined
	ASM 3-phase	3-phase asynchronous motor
	PMSM	Permanent-magnet synchronous motor
Factory setting:	No motor	

P91 Rated frequency [ASM 3-phase, PMSM]

Nominal frequency of motor in hertz, according to rating plate.

Minimum value: 5 Hz
 Maximum value: 4,000 Hz
 Factory setting: 100 Hz

P92 Rated voltage [ASM 3-phase, PMSM]

Nominal voltage of motor, according to rating plate.

Minimum value: 0 V~
 Maximum value: 65 V~
 Factory setting: 6 V~

P93 Rated current [ASM 3-phase, PMSM]

The value specified by the motor manufacturer must be entered.

The *Rated current* can flow indefinitely without exceeding the permissible motor temperature.

It applies to the motor coolant specified by the motor manufacturer.

The value may exceed the maximum possible inverter output current.

Minimum value: 0.5 A RMS~
 Maximum value: 16 A RMS~
 Factory setting: 1.0 A RMS~

P94 cos phi [ASM 3-phase, PMSM]

Power factor of motor, Cos Phi, according to rating plate.

Minimum value: 20 %
 Maximum value: 100 %
 Factory setting: 85 %

P96 Number of pole pairs [ASM 3-phase, PMSM]

The number of pole pairs in the motor. This parameter is used to display the rotational speed in min^{-1} .

**ATTENTION**

The number of pairs of poles must be entered here.

Minimum value: 1
 Maximum value: 4
 Factory setting: 1

7.3.2 I²t Monitoring

Aim:

Motors without temperature sensor that are operated above the rated power range can be monitored during operation.

Function description:

Current heat losses are caused by an ohmic resistance through which currents flow. They are for all motors in the stator – for asynchronous motors also in the rotor. When operating a motor with or above rated power, current heat losses make up a large part of the overall motor power loss.

Accordingly, the flowing current has a considerable influence on the motor losses, since the current

heat losses increase quadratically with the current. A doubling of the current thus leads to a quadrupling of the current heat losses.

If the current heat losses are multiplied by the time in which the current flows, the thermal energy which is caused by current heat losses is obtained. The name " I^2t " reflects this calculation method. Via the motor current, the inverter can calculate the load of the motor. In this case, load means: a thermal load on the motor.

With a cold motor, a motor current can flow for a short time, which is above the *Rated current*. The motor does not exceed the permissible motor temperature. The reason for this is the heat capacity of the motor itself, because it is thermally inert.

If a motor has already been operated for some time with *Rated current*, it has reached the permissible temperature and there is no more room to operate it above the Rated current and thus above the rated power.

The load of the motor is calculated continuously depending on the actual flowing motor current.

Thus it can be said: With a cold motor, the *Motor peak current* (P44) can flow for *I^2t time* (P76).

Parameter:

Common engine cooling types are water cooling and convection cooling.

If the motor coolant changes, the parameters *I^2t threshold* (P75), *Motor peak current* (P44) and *I^2t time* (P76) have to be adjusted.

The following parameters affect the I^2t calculation and are valid for a particular method of motor cooling:

- P93 Rated current
- P75 I^2t threshold
- P44 Motor peak current
- P76 - I^2t time

I^2t Monitoring		
Function I^2t monitoring:	<div>Deactivated</div>	
I^2t threshold:	<div>100.0 %</div>	I^2t time: <div>10 s</div>

P75 I^2t threshold [ASM 3-phase, PMSM]

If the motor cooling system is less favorable than the motor cooling specified by the motor manufacturer, the current threshold must be adjusted as follows: *Rated current* (P93) * *I^2t threshold* (P75) = current that can flow indefinitely with the cooling method used, without exceeding the permissible motor temperature.

The current relevant for the I^2t function can be limited by the parameter *I^2t threshold* without having to change the parameter *Rated current* (P93). A change in the parameter *Rated current* would affect the parameters *I^*R factor* (P71) and *Load comp. factor* (P72) for the ASM 3-phase motor.

Minimum value: 0 %
 Maximum value: 100 %
 Factory setting: 100 %

P76 I^2t time [ASM 3-phase, PMSM]

The value specified by the motor manufacturer must be entered.

The *Motor peak current* (RMS) may flow for *I^2t time* (P76) when the motor is cold.

The minimum value and the maximum value of the I^2t time are dependent on the parameters *Rated current* (P93), *I^2t threshold* (P75) and *Motor peak current* (P44) and are calculated as follows:

- $P76_{\min} = 1s * (-\ln(1 - (P93 * P75)^2 / (P44)^2))$
- $P76_{\max} = 3600s * (-\ln(1 - (P93 * P75)^2 / (P44)^2))$

Minimum value: 1 s
 Maximum value: 22374 s
 Factory setting: 10 s

P77 Function I^2t monitoring [ASM 3-phase, PMSM]

The parameter *Function I^2t monitoring* (P77) can be used to select, which action the inverter should perform, when I^2t load has reached 100%.

When selecting "Warning" ensure that Relay 1 (P129) or Relay 2 (P121) are set accordingly to " I^2t warning".

Values: Deactivated - No I^2t monitoring.
 Motor stop - When the limit is exceeded, the motor is stopped.
 Warning - A warning is issued when the I^2t limit is exceeded.

Factory setting: Deactivated

7.3.3 V/Hz Table

The voltage/frequency table provides key data of the motor voltage at certain frequencies for ASM 3-phase motors.

With the factory setting, characteristic points are set to the nominal frequency and the nominal voltage of the motor.



The following must be observed when inputting the table:

- The frequencies in the sequence 1, 2 and 3 must be the same or higher.
- For frequencies that are the same, the voltage must also be the same.
- If you fail to comply with one of the above-mentioned conditions, then the value will not be accepted and will be limited to the limit value.
- For target frequencies that are higher than the highest frequency in the table, Voltage 3 will be set as the voltage.
- If you have difficulty entering the data, then start at the end and work back to the beginning.

V/Hz Table					
Voltage 0:	3.4 V~				
Frequency 1:	83 Hz	Frequency 2:	167 Hz	Frequency 3:	1000 Hz
Voltage 1:	3.5 V~	Voltage 2:	5.6 V~	Voltage 3:	24.0 V~


P60 Voltage 0 [ASM 3-phase]

V/Hz characteristic: Start-up voltage at Frequency zero.

The minimum frequency to be output from the frequency inverter is specified under "*Minimum frequency*", and the output voltage at this frequency is calculated according to the V/Hz characteristic.

Minimum value: 1 V~
 Maximum value: 65 V~
 Factory setting: 1 V~

P61 Frequency 1 [ASM 3-phase]

V/Hz characteristic: Frequency of characteristic point 1

Minimum value: 5 Hz
 Maximum value: 4,000 Hz
 Factory setting: 100 Hz

P62 Voltage 1 [ASM 3-phase]

V/Hz characteristic: Voltage of characteristic point 1

Minimum value: 1 V~
 Maximum value: 65 V~
 Factory setting: 6 V~

P63 Frequency 2 [ASM 3-PHASE]

V/Hz characteristic: Frequency of characteristic point 2

Minimum value: 5 Hz
 Maximum value: 4,000 Hz
 Factory setting: 100 Hz

P64 Voltage 2 [ASM 3-PHASE]

V/Hz characteristic: Voltage of characteristic point 2

Minimum value: 1 V~

Maximum value: 65 V~

Factory setting: 6 V~

P65 Frequency 3 [ASM 3-PHASE]

V/Hz characteristic: Frequency of characteristic point 3

Minimum value: 5 Hz

Maximum value: 4,000 Hz

Factory setting: 100 Hz

P66 Voltage 3 [ASM 3-PHASE]

V/Hz characteristic: Voltage of characteristic point 3

Minimum value: 1 V~

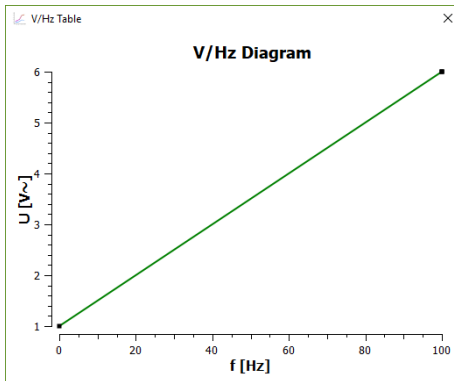
Maximum value: 65 V~

Factory setting: 6 V~

V/Hz table button

The V/Hz table button is used to display a graph showing the V/Hz characteristic.

This graph can be used to check that your data was entered correctly.



7.3.4 Control Parameters

Control Parameters					
Speed control: V/Hz table, I*R and load comp.					
I*R factor:	0.3 V/A	Load comp. factor:	8.0 %/A~	Filter time:	20 ms
V control KP:	50 %	Speed control KP:	50 %	Speed control TF:	50 ms
V control TN:	152 ms	Speed control TN:	62 ms	Speed control TV:	8 ms

Control Parameters					
V control KP:	50 %	Speed control KP:	50 %	Speed control TF:	50 ms
V control TN:	152 ms	Speed control TN:	62 ms	Speed control TV:	8 ms

P70 Speed control [ASM 3-PHASE]

Selection of the speed controller for ASM 3-PHASE motors

Values: V/Hz table - Voltage control via V/Hz table; no rise

I*R

Load comp. factor - The motor voltage is adjusted according to the load.

The parameters *I*R factor*, *Load comp.* and *Filter time* should be set.

Factory setting: V/Hz table

P71 I*R factor [ASM 3-PHASE]

Factor for I*R compensation; the frequency inverter output voltage is adjusted according to the motor load.

The purpose of I*R compensation is to keep the magnetic flux in the motor constant. I*R compensation is particularly effective for low rotational speeds or low voltages; the rotational speeds decrease less sharply under load. The I*R factor corresponds to the ohmic resistance of the motor, measured between two motor phases.

$$\Delta U = I^*R \text{ factor} * (\text{motor current} - (\text{rated current} * \cos_phi))$$

$$U_{\text{mot}} = U_{\text{table}} + \Delta U$$

U_table corresponds to the V/Hz table voltage

Special values: Off - I*R compensation is switched off

Minimum value: 0.1 V/A (small increase)

Maximum value: 10 V/A

Factory setting: Off

P72 Load comp. factor [ASM 3-PHASE]

Factor for load compensation; the frequency inverter output voltage is adjusted according to the motor load.

With load compensation, it is possible to ensure that the motor consumes only little current during idling (minimal heat generation), although the magnetizing current is correspondingly increased under load. A reduction in heating of the motor can be achieved in this way. The drop in rotational speed under load is reduced. Load compensation is used primarily for medium to high rotational speeds or voltages and complements the I*R compensation.

$$\Delta U = U_{\text{table}} * \text{Load comp. factor} * (\text{Motor current} - (\text{rated current} * \cos_phi))$$

$$U_{\text{mot}} = U_{\text{table}} + \Delta U$$

U_table corresponds to the V/Hz table voltage

Special values: Off - Load compensation is switched off

Minimum value: 0.1 %/A~ (small increase)

Maximum value: 40 %/A~ (extremely high increase)

Factory setting: Off

P73 Filter time [ASM 3-PHASE]

Filter time of the I*R compensation and load compensation.

This can be used to influence the speed of the I*R compensation and load compensation. If the motor is susceptible to load fluctuations, then higher values should be set.

Minimum value: 1 ms

Maximum value: 1,000 ms

Factory setting: 20 ms

P79 V control KP [ASM 3-PHASE, PMSM]

This parameter should only be changed from the factory setting in special cases. *V-control KP* influences the controller (PI) for the internal intermediate circuit voltage; the amplification (proportional part) can be set here. The motor voltage is generated from the intermediate circuit voltage by the inverter.

Minimum value: 5 %

Maximum value: 100 %

Factory setting: 20 %

P80 V control TN [ASM 3-PHASE, PMSM]

This parameter should only be changed from the factory setting in special cases.

V-control TN influences the controller (PI) for the internal intermediate circuit voltage; the reset time (integral part) can be set here. Longer times make the controller slower.

Special values: Without I-part - I-part is switched off

Minimum value: 1 ms

Maximum value: 999 ms

Factory setting: 2 ms

P81 Speed control KP [ASM 3-PHASE, PMSM]

Minimum value: 5%
 Maximum value: 200%
 Factory setting: 50%

P82 Speed control TN [ASM 3-PHASE, PMSM]

This parameter influences the controller (PID) for the rotational speed of the motor; the reset time (integral part) can be set here. Shorter times make the controller faster; longer times slow it down.

Special values: Without I-part - I-part is switched off
 Minimum value: 1 ms
 Maximum value: 999 ms
 Factory setting: 250 ms

P83 Speed control TV [ASM 3-PHASE, PMSM]

This parameter influences the controller (PID) for the rotational speed of the motor; the derivative time (D-part) can be set here. Longer times make the controller faster; shorter times make it slower.

Special values: Without D-part - D-part is switched off
 Minimum value: 1 ms
 Maximum value: 300 ms
 Factory setting: 30 ms

P84 Speed control TF [ASM 3-PHASE, PMSM]

This parameter influences the controller (PID) for the rotational speed of the motor; the filter before the D-part is set here. The filter makes the D-part calmer and slightly slower. With longer times, the fluctuation tendency of the D-part is dampened.

Minimum value: 1 ms
 Maximum value: 300 ms
 Factory setting: 200 ms

7.4 Inputs/Outputs

7.4.1 Digital Inputs

Digital Inputs			
DIN 1:	Start/Stop	DIN 3:	Speed direction
DIN 2:	Reset	DIN 4:	Off
PLC input:	Off	DIN 5:	Parameter import
		DIN 6:	Parameter export

P110 DIN 1

Function of digital input DIN1

Value:	Description:
Off	Input has no function
Start/Stop	24 V = Start, 0 V = Stop
Stop	[24 V = Start enabled, 0 V = Stop; for Start <i>DIN2</i> must be set to Start pulse]
Factory setting:	Start/Stop

P111 DIN 2

Function of digital input DIN2

Value:	Description:
Off	Input has no function
Speed direction	24 V = Counter-clockwise, 0 V = Clockwise
Reset	Resetting (Pulse at 24 V = Trigger reset process)
Start impulse	An impulse at +24 V starts the frequency inverter; the input can then return to 0 V, whereby the frequency inverter remains started. To stop it, Input DIN1 must be set to Stop and brought to 0 V.
Factory setting:	Reset

P112 DIN 3

Function of digital input DIN3

Value:	Description:
Off	Input has no function
Speed direction	24 V = Counter-clockwise, 0 V = Clockwise
Motor code bit 0	Releases the input for motor coding; the input has the value Bit 0
Reset	Resetting (Pulse at 24 V = Trigger reset process)
Factory setting:	Speed direction

P113 DIN 4

Function of digital input DIN4

Value:	Description:
Off	Input has no function
Speed direction	24 V = Counter-clockwise, 0 V = Clockwise
Motor code bit 1	Releases the input for motor coding; the input has the value Bit 1
Reset	Resetting (Pulse at 24 V = Trigger reset process)
Factory setting:	Off

P114 DIN 5

Function of digital input DIN5

Value:	Description:
Off	Input has no function
Speed direction	24 V = Counter-clockwise, 0 V = Clockwise
Fixed frequency bit 1	Releases the input for selection of the fixed frequencies; the input has the value Bit 1
Motor code bit 2	Releases the input for motor coding; the input has the value Bit 2
Parameter import	Parameter import from SD card to frequency inverter (see 8.5).
Reset	Resetting (Pulse at 24 V = Trigger reset process)
Factory setting:	Parameter import

P115 DIN 6

Function of digital input DIN6

Value:	Description:
Off	Input has no function
Speed direction	24 V = Counter-clockwise, 0 V = Clockwise
Fixed frequency bit 0	Releases the input for selection of the fixed frequencies; the input has the value Bit 0
Motor code bit 3	Releases the input for motor coding; the input has the value Bit 3
Parameter export	Parameter export to SD card (see 8.5).
Reset	Resetting (Pulse at 24 V = Trigger reset process)
Factory setting:	Parameter export

P116 PLC input

Function of the PLC input

Value:	Description:
Off	Input has no function
Start/Stop	24 V = Start, 0 V = Stop
Factory setting:	Off

**ATTENTION**

The following points must be observed when assigning the digital inputs:

- Set each function only once.
- If a function (such as rotational direction) is set more than once, then the digital output with the lowest DIN number takes priority.

7.4.2 Relays

Relays	
Warning current:	4.0 A~
Relay 1:	Motor runs
Relay 2:	Failure

P120 Relay 1

Output value of Relay 1

Value:

Off:

Current limit:

Holding operation:

Failure:

I²t warning:

Motor downtime:

Motor runs:

Motor temperature:

Nominal speed reached:

Operation:

Overload:

Warning:

Factory setting:

Description:

No function, Relay is open.

The effective current of the motor is higher than the warning current threshold (motor current \geq relay warning current, 10 % hysteresis).

The frequency inverter is in the holding operation, a holding current is applied.

The frequency inverter is in failure state; the motor cannot be started.

A reset is required.

The I²t load is too high.

The motor is at rest, depending on the type of motor.

ASM 3-PHASE motor: If a rotary sensor is present, this signal becomes active after completion of the braking process, comprising generator braking and direct current braking (deceleration ramp and DC brake time).

After the frequency inverter has switched on or after a reset, the "motor downtime" signal is inactive. PMSM motor: The signal becomes active when the actual "motor downtime" state is recognized via the EMF voltage.

Is the inverted signal motor at rest.

The temperature sensor in the motor indicates too high a temperature (see temperature monitoring and sensor value).

The actual rotational speed of the motor has reached its target speed (actual frequency = rated frequency \pm 20 % hysteresis).

The frequency inverter is ready for operation; the motor can be started.

The motor current has reached the current limit value (peak current, - 10 % hysteresis).

The frequency inverter is in warning state; the motor can be started.

If the warning condition is no longer present, the warning is automatically reset after one minute.

Motor runs

P121 Relay 2

Output value of Relay 2

Values:

See under Parameter *Relay 1*

Factory setting:

State: Failure

P125 Warning current

Value of the variable current limit for a relay output. This can be used to recognize a specific motor load; in this case, a relay output (*Relay 1 / Relay 2*) must be configured with the Current limit function. This value has no effect on the current limitation.

Minimum value:

0.4 A~

Maximum value:

12 A~

Factory setting:

0.4 A~

7.4.3 Analog Input

Analog Input			
AIN:	U (0 ... 10 V) ▼		
Maximum voltage:	10.0 V	Maximum current:	20.0 mA
Minimum frequency:	83 Hz	Maximum frequency:	1000 Hz

P129 AIN

Selection of the source for AIN. The scaling of the analog input is based on the minimum frequency and maximum frequency.

Values: U (0...10 V) - PLC compatible 0 - 10 V
I (0...20 mA) - PLC compatible 0 - 20 mA

Factory setting: U (0 - 10 V)

P135 Minimum frequency

Minimum target frequency for analog target frequency setting AIN with $U_e = 0$ V or $I_e = 0$ mA. This parameter is only evaluated if *Input for rated frequency* is set to Analog input. The minimum value can not be set less than the *minimum frequency* of the motor. Using the *speed display* parameter, this parameter can be converted to display rotational speed instead of frequency; the number of pole pairs is taken into account.

Minimum value: 0 Hz
Maximum value: 4,000 Hz
Factory setting: 50 Hz

P136 Maximum frequency

Maximum target frequency for analog Target frequency setting AIN with $U_e = 10$ V or $I_e = 20$ mA. This parameter is only evaluated if *Input for rated frequency* is set to Analog input. The minimum value can not be set less than the *minimum frequency* of the analog input. Using the *speed display* parameter, this parameter can be converted to display rotational speed instead of frequency; the number of pole pairs is taken into account.

Minimum value: 0 Hz
Maximum value: 4,000 Hz
Factory setting: 100 Hz

P137 Maximum voltage

This parameter and the parameter P136 - *Maximum frequency* allow the analog input to be scaled. They specify the ratio of the maximum voltage to the maximum frequency.

Minimum value: 1 V
Maximum value: 10 V
Factory setting: 10 V

P138 Maximum current

This parameter and the parameter P136 - *Maximum frequency* allow the analog input to be scaled. They specify the ratio of the maximum current to the maximum frequency.

Minimum value: 4 mA
Maximum value: 20 mA
Factory setting: 20 mA

7.4.4 Fixed Frequencies

Fixed Frequencies			
Fixed frequency 1:	<input type="text" value="100 Hz"/>	Fixed frequency 3:	<input type="text" value="100 Hz"/>
Fixed frequency 2:	<input type="text" value="100 Hz"/>	Fixed frequency 4:	<input type="text" value="100 Hz"/>

P104 Fixed frequency 1

Value of Fixed frequency 1, which can be selected via remote control. The minimum value can not be set less than the *minimum frequency* of the motor.

Minimum value: 5 Hz
 Maximum value: 4,000 Hz
 Factory setting: 100 Hz

P105 Fixed frequency 2

Value of Fixed frequency 2, which can be selected via remote control. The minimum value can not be set less than the *minimum frequency* of the motor.

Minimum value: 5 Hz
 Maximum value: 4,000 Hz
 Factory setting: 100 Hz

P106 Fixed frequency 3

Value of Fixed frequency 3, which can be selected via remote control. The minimum value can not be set less than the *minimum frequency* of the motor.

Minimum value: 5 Hz
 Maximum value: 4,000 Hz
 Factory setting: 100 Hz

P107 Fixed frequency 4

Value of Fixed frequency 4, which can be selected via remote control. The minimum value can not be set less than the *minimum frequency* of the motor.

Minimum value: 5 Hz
 Maximum value: 4,000 Hz
 Factory setting: 100 Hz

7.4.5 CAN

CAN	
CAN node ID:	<input type="text" value="1"/>

P130 CAN node ID

Description:

- ▶ CANopen communication protocol with device profile "CiA 402 electrical drives"
- ▶ Electronic data sheet with communication objects in EDS file
- ▶ Access to inverter parameters with CANopen service data objects (SDO)
- ▶ CAN fieldbus controls with CANopen process data objects (PDO)

Minimum value: 1
 Maximum value: 127
 Factory setting: 1



See also Object description CANopen HF inverter e @syDrive 4624, 4625, 4626.

7.5 Diagnosis

7.5.1 Operating Values

Operating Values			
Motor code:	<input type="text" value="0"/>	Active power:	<input type="text" value="0 W"/>
Peak current:	<input type="text" value="0.5 A RMS~"/>	I ² t load	<input type="text" value="0.0 %"/>
Rated frequency:	<input type="text" value="0 Hz"/>	Active current:	<input type="text" value="0.0 A RMS~"/>
		Motor voltage:	<input type="text" value="0.0 V~"/>
		Actual frequency:	<input type="text" value="0 Hz"/>
		DC link voltage (motor):	<input type="text" value="0.0 V-"/>

P10 Rated frequency (display value)

The valid rated rotational speed can come from various sources depending on the configuration (PC, remote control of analog input or remote control of fixed frequency input). Via the parameter *Rated frequency*, the user sees the currently valid value displayed, i.e. the value that was transferred to the motor controls.

Using the *speed display* parameter, this parameter can be converted to display rotational speed instead of frequency; the number of pole pairs is taken into account.

P11 Peak current (display value)

Actual limit value of the current controller. If parameter P44 - *Motor peak current* is lower than the maximum inverter current, the value of P44 is displayed, otherwise the maximum inverter current..

P13 Actual frequency (display value)

Actual frequency is the current frequency of the motor. For an asynchronous motor, the *Actual frequency* is identical to the *Rated frequency*.

P15 Motor voltage (display value)

Motor voltage is the voltage per phase averaged over 100 ms

P16 DC link voltage (motor) (display value)

The *DC link voltage (motor)* is the current intermediate circuit voltage, averaged over 100 ms

P18 Active current (display value)

The *Active current of the motor* is the current motor current per motor phase, averaged over 100 ms

P19 Active power (display value)

The *Active power* is the current output power of the frequency inverter, averaged over 100 ms, which corresponds to the effective power consumed by the motor.

P20 Motor code (display value)

The currently used motor parameter memory M0...M15 is displayed.

The motor code is displayed only if parameters are stored on the activated memory location.

P21 I²t load (display value)

The current motor load is displayed in %.

If a load of 100% is reached, the corresponding action set for the parameter *Function I²t monitoring* (P77) is performed.

7.5.2 Runtimes

Runtimes	
Inverter:	<input type="text" value="11 h"/>
Motor:	<input type="text" value="5 h"/>

P25 Inverter (display value)

Inverter shows the total operating time of the device in hours.
The value is taken from the EEPROM.

P26 Motor (display value)

Motor shows the operating hours of the connected motor.
The value is taken from the EEPROM.

7.5.3 Error Messages

Error Messages

1st Error:

2nd Error:

3rd Error:

4th Error:

5th Error:

Reset

P30 1st Error (display value)

1st Error shows the error number of the error that occurred with the highest priority.

P31 2nd Error (display value)

2nd Error shows the error number of the error that occurred with the second highest priority.

P32 3rd Error (display value)

3rd Error shows the error number of the error that occurred with the third-highest priority.

P33 4th Error (display value)

4th Error shows the error number of the error that occurred with the fourth-highest priority.

P34 5th Error (display value)

5th Error shows the error number of the error that occurred with the fifth-highest priority.

Reset

The "Reset" button can be used to clear an error.

7.5.4 Actuator/Sensor Test

These functions allow you to check that the remote control and internal signals are functioning properly. Sensors for the heat sink temperature and INV input voltage provide additional information on the condition of the frequency inverter.

Actuator/Sensor Test

Input current:

0.0 mA

Input voltage:

3.9 V

Temperature at heat sink:

29.8 °C

DC link voltage (input):

70.4 V

Relay 1

Relay 2

LED Fault

LED Operation

Invert

Invert

Invert

Invert

DIN 1

DIN 2

DIN 3

DIN 4

DIN 5

DIN 6

PLC input

Temperature monitoring (motor)

P97 Input current (display value)

Actual current of the analog input for rated frequency.

P98 Input voltage (display value)

Actual voltage of the analog input for rated frequency.

P99 Temperature at heat sink (display value)

Shows the temperature of the heat sink, averaged over 0.5 s.

P100 DC link voltage (input) (display value)

Displays the input voltage of the DC link of the inverter, averaged over 100 ms

P101 Relay LED control

Control of the current switching state and verification of the functions of the relays (relay 1 and relay 2) and LEDs (LED fault (orange) and LED operation (green)).

By clicking on the corresponding button, the respective relay (relay 1 or relay 2) or the corresponding LED (LED fault (orange) or LED operation (green)) is switched.

P102 DIN and motor temperature control

Used to check and display the functions and current states of the digital inputs (DIN1...DIN6), the PLC input and the motor temperature monitoring.

If 24 V is present at the corresponding input (DIN1...6 or PLC), or if the temperature sensor stored in the frequency inverter is connected correctly, the respective area turns green.

7.6 Spindle Run-in

7.6.1 Spindle run-in control

The upper three drop-down lists allow you to select the desired spindle (spindle family, spindle type and maximum speed).

The appropriate run-in program (Initial operation or Downtime > 3 month) can be selected in the bottom drop-down list.

With the Start button the spindle run-in program is started.

The Stop button stops the spindle run-in program can be interrupted.



ATTENTION

The previously active parameterization of the motor is lost during the spindle run-in and the digital inputs and relays are deactivated! This is the only way to ensure that the process of the run-in program cannot be disturbed.

Saving the parameterization of the inverter before the spindle run-in is recommended.

7.6.2 Status spindle run-in

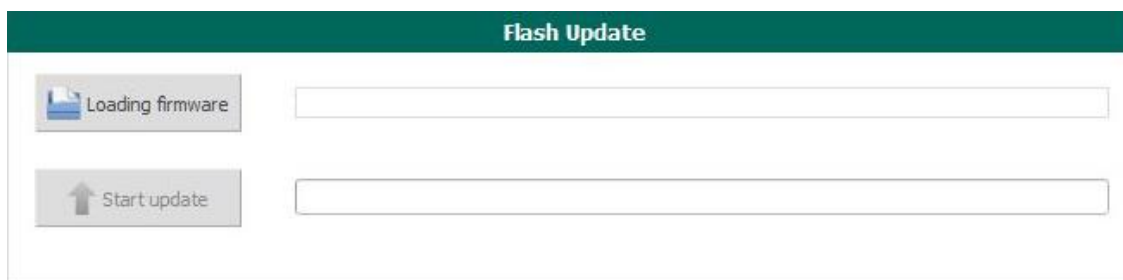
The status of the spindle run-in program is shown here. These include the Step, Step time, Current frequency and the Total runtime. In addition, the progress of the spindle run-in is displayed in %.



During the running-in process, access to other menu pages is not possible.

7.7 Flash-Update

The firmware of the inverter can be updated here.



The 'Flash Update' window contains two main sections. The top section has a 'Loading firmware' button and an empty text input field. The bottom section has a 'Start update' button and another empty text input field.



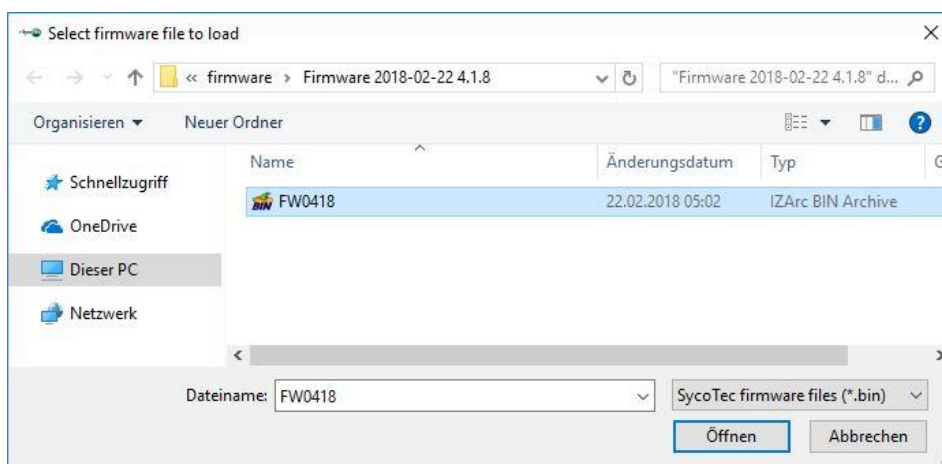
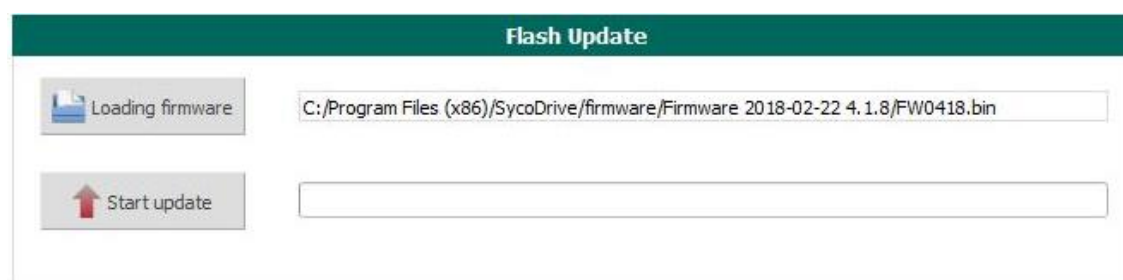
ATTENTION

A firmware update must only be executed if the STO is not connected!

The STO may only be reconnected after the parametrization of the frequency inverter.

7.7.1 Loading firmware

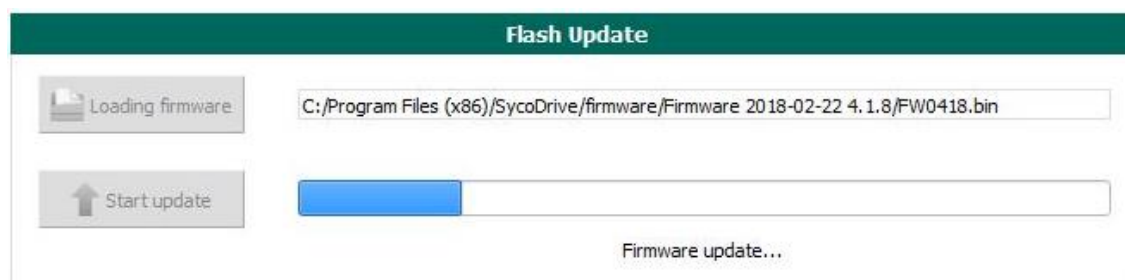
Click on the "Loading firmware" button to load the relevant firmware from a file.

The 'Flash Update' window now shows the path 'C:/Program Files (x86)/SycotecDrive/firmware/Firmware 2018-02-22 4.1.8/FW0418.bin' entered in the 'Loading firmware' input field. The 'Start update' button remains in the empty input field below it.

7.7.2 Start update

Click on the "Start update" button to start updating the frequency inverter firmware.



Attention: The firmware update must not be disturbed or canceled under any circumstances! SycoDrive must not be terminated, the USB connection to the inverter not be interrupted and the computer not be switched off! The power supply of the inverter must not be interrupted under any circumstances, too!



- During the update, access to other menu pages is not possible.
This process can take several minutes – please do not interrupt it!
- The set parameters remain on the frequency inverter.

8.0 Description of Functions

The analog and digital inputs and outputs offer numerous programmable functions.



- Please note that each function may be selected only once.
- If the parameters are not transferred to the frequency inverter, then the settings will not take effect.

8.1 Start/Stop

8.1.1 SycoDrive

In order to control the Start/Stop command using the software on the PC, go to the "STARTPAGE", "Basic Parameters", then "Input for start" and select "SycoDrive". Then transfer the setting to the frequency inverter with "Save on inverter". This deactivates the digital inputs. The motor can be operated using the "Start", "Stop" and "Reset" buttons.

8.1.2 Digital Inputs

Alternatively, "Input for start:" can be set to "Digital inputs". This activates the digital inputs and the "Start", "Stop" and "Reset" buttons in the GUI are deactivated. The relevant inputs must be set under "Digital inputs" on the "INPUTS/OUTPUTS" page ("Start" and "Stop" (DIN1), "Reset" (DIN2...DIN6)).

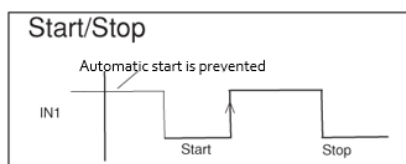
8.1.3 PLC Input Signal

If the "Input for start:" is set to "Digital inputs", then starting is also possible via the PLC input. In this case, on the "INPUTS/OUTPUTS" page under "Digital inputs", the "SPS input" must be set to "Start/Stop".



ATTENTION

Automatic start-up after a mains failure where a start signal is present at DIN1 or at the PLC input is prevented. A flank is required at the start input.



8.1.4 CAN

The "Input for start" can also be set to CAN. The CAN node ID can then be configured in the "INPUTS/OUTPUTS" category under "CAN".



Please check the value to which the "Input for start" parameter is set.

8.2 Target Value Setting

8.2.1 SycoDrive

In order to control the target value using the software on the PC, go to the "STARTPAGE", "Basic parameters", then "Input for rated frequency" and select "SycoDrive". Then transfer the setting to the frequency inverter with "Save on inverter". This deactivates the analog input. The rotational speed of the motor can be set by entering the "Rated frequency".

8.2.2 Analog Inputs

Alternatively, the "Input for rated frequency" can be set to "Analog input". The analog input can then be configured in the "INPUTS/OUTPUTS" category under "Analog Input". Here, you can specify whether the analog input is to be evaluated by means of a voltage between 0 and 10 V or a current between 0 and 20 mA. According to the evaluated voltage or current, the "Minimum frequency" and "Maximum frequency" can be scaled.



Please make sure that the scaled "Maximum frequency" at the analog input does not exceed the maximum frequency set in the "MOTOR DATA".

8.2.3 Digital Inputs / Fixed Frequencies

Alternatively, the "Input for rated frequency" can be set to "Digital inputs". The digital inputs can then be configured in the "INPUTS/OUTPUTS" category under "Digital inputs".

The selection is made with control inputs DIN5 and DIN6. Up to four fixed frequencies can be used. The following table shows the assignment of the input combinations to the fixed frequencies.

DIN5	DIN6	Active target value
0	0	FF1
0	1	FF2
1	0	FF3
1	1	FF4

0 = low voltage (0 V), 1 = high voltage (24 V)

8.2.4 CAN

The "Input for rated frequency" can also be set to CAN. The CAN node ID can then be configured in the "INPUTS/OUTPUTS" category under "CAN".

Description:

- ▶ CANopen communication protocol with device profile "CiA 402 electrical drives"
- ▶ Electronic data sheet with communication objects in EDS file
- ▶ Access to inverter parameters with CANopen service data objects (SDO)
- ▶ CAN fieldbus controls with CANopen process data objects (PDO)



Please check the value to which the "Input for start:" parameter is set.

8.3 Direction of Rotation

8.3.1 SycoDrive Operating Software

In order to control the rotational direction using the software on the PC, go to the "STARTPAGE", "Basic parameters", then "Direction of rotation" and select either "Clockwise" or "Counter-clockwise". Then transfer the setting to the frequency inverter with "Save on inverter".

8.3.2 Digital Inputs

Alternatively, "Direction of rotation" can be set to "Digital input". This activates the digital inputs (DIN2...DIN6).

8.3.3 CAN

The "Direction of rotation" can also be set to CAN. The CAN node ID can then be configured in the "INPUTS/OUTPUTS" category under "CAN".



Please check the value to which the "Direction of rotation" parameter is set.

8.4 Motor Coding

On the "STARTPAGE" under "Motor Parameter Sets", 16 motor parameter sets (M1...M16) can be saved in the memory of the inverter. In order to use motor coding, the necessary "Digital inputs" DIN3...DIN6 must be set to motor encoding under "INPUTS/OUTPUTS".

Bit3 DIN6	Bit2 DIN5	Bit1 DIN4	Bit0 DIN3	Coding value in motor code	Motor parameter set
0	0	0	0	0	M1
0	0	0	1	1	M2
0	0	1	0	2	M3
0	0	1	1	3	M4
0	1	0	0	4	M5
0	1	0	1	5	M6
0	1	1	0	6	M7
0	1	1	1	7	M8
1	0	0	0	8	M9
1	0	0	1	9	M10
1	0	1	0	10	M11
1	0	1	1	11	M12
1	1	0	0	12	M13
1	1	0	1	13	M14
1	1	1	0	14	M15
1	1	1	1	15	M16

0 = low voltage 0...5 V (contact open), 1 = high voltage 24 V (contact closed)

8.5 Micro SD Card



Only use the micro SD card provided, as a different micro SD card may not be readable by the inverter.

8.5.1 Error Log

With a micro SD card, it is possible to read out the frequency inverter's error log with associated timestamp, from the time that the micro SD card was connected.

The internal RTC of the inverter runs with UTC time.

8.5.2 Loading the Parameters

Parameters can be saved to a micro SD card and then be read out again from the card. This makes it possible to copy an existing configuration to another frequency inverter, for example.

For parameter import from the SD card to the frequency inverter, DIN 5 has to be configured for Parameter import and 24 V must be connected to DIN 5. A parameter import can be triggered in two ways:

- When the frequency inverter is restarted.
- After triggering the external reset via a digital input (only when the motor is stopped).

After a successful parameter import, the green LED flashes twice. If an error occurs during parameter import (no or faulty SD card), the red LED flashes twice.

The values of the parameters are limited to the valid values during the import.

For parameter export to the SD card, DIN 6 has to be configured for Parameter export and 24 V must be connected to DIN 6. A parameter export can also be triggered in two ways:

- When the frequency inverter is restarted.
- After triggering the external reset via a digital input.

Successful parameter export is signaled by three flashes of the green LED, an export error with three flashes of the red LED.

The SD card must be formatted with a FAT file system. The motor parameters for import and export are in the "MPARAM.INI" file. If this file does not exist, it is generated on the first export.



Only the motor parameter set is saved on the micro SD card; the settings for the inputs and outputs remain as they were.

8.5.3 Firmware Update

On delivery, the SD card has the same firmware version as the inverter itself.

A firmware update is always executed if the firmware on the inverter corresponds to an older version than the firmware on the SD card.

If an update is to be carried out with a more recent version of the firmware, the SD card must be prepared accordingly.

9.0 Status Report / Malfunctions / Error Correction

9.1 Status Report

If the inverter is supplied with a voltage, then the Status LED (green) lights up continuously, the inverter is ready for operation.

When the motor starts, the Status LED (green) starts to flash. As soon as the motor stops again, the Status LED (green) lights up continuously again.

If a warning occurs, then the Warning LED (red) flashes or lights. The motor can continue to run; the status LED (green) indicates the behavior of the motor.

If an error is identified, then the Warning LED (red) flashes or lights and the motor is stopped.

The following applies for both types of error:



The number of flashing cycles corresponds to the warning number or error number.

(This applies only for warnings/errors up to number 6.)

In order to clear an error status, a reset must be initiated (via SycoDrive or digital input). A reset will trigger a complete initialization of the device. If the error still persists, then the error message will appear again immediately.

Up to five warning and error messages are displayed in the SycoDrive operating software under Diagnostics -> Error messages, in parameters Fault 1 to Fault 5. If the warning condition is no longer present, the warning is automatically reset after one minute.

With a micro SD card, you can transfer a motor parameter set to the inverter. The Status LED (green) will flash two times to show that the parameter set has been successfully transferred. The Status LED (green) and the Warning LED (red) will flash simultaneously two times to show that a fault occurred during the parameter transfer.

Another option is to transfer a motor parameter set to the micro SD card. The Status LED (green) will flash three times to show that the parameter set has been successfully transferred. The Status LED (green) and the Warning LED (red) will flash simultaneously three times to show that a fault occurred during the parameter transfer.

9.2 Description of LEDs

The LEDs indicate the current status of the inverter:

Green – LED 2	Red – LED 1	Meaning
OFF	OFF	Frequency inverter is switched off
ON	OFF	Inverter ready for operation
Flashing	OFF	Motor runs
ON / flashing	Flashing	Warning, warning code < 6 (flashes with the number of the warning code)
ON / flashing	ON	Warning, warning code > 6
OFF	Flashing	Error, error code < 6 (flashes with the number of the error code)
OFF	ON	Error, error code > 6
Flashes 2 times	OFF	Parameters transferred successfully from micro SD card
Flashes 2 times	Flashes 2 times	Fault when transferring parameters from micro SD card
Flashes 3 times	OFF	Parameters transferred successfully to micro SD card
Flashes 3 times	Flashes 3 times	Fault when transferring parameters to micro SD card

9.3 Warnings

With a warning message the frequency inverter is still ready for operation. The warning message can be reset during operation via a reset.

Warning	Fault	Cause	Correction
1	Motor current has exceeded the current limit	Motor too highly loaded, parameters "Acceleration ramp" too short and/or "Startup current" too large.	Reduce load, adapt parameters, if possible.
8	I ² t threshold exceeded	I ² t load too high	Reduce load, check the parameters "I ² t time" and "I ² t threshold".
18	Nominal speed limit active	Parameter "Rated speed" or rated value of analogue input too high.	Check Parameter value "Rated speed", limits for rated value for remote control ("Minimum speed" and "Maximum speed" AIN) and Fixed frequencies 1 to 4; for checking use the current Rated speed.
22	10 V Output voltage out of range	The 10V output voltage for AIN is not in an acceptable range ($\pm 3\%$).	Check wiring; maybe there is a short circuit.
23	Short circuit at 24 V output	Short circuit at the 24 V output	Check wiring.
24	Error at parameter import or export	No/bad SD card or parameter file on SD card is incomplete or does not exist.	Use a complete parameter file (parameter import) and an intact SD card.
26	Unused motor parameter memory for motor coding	Value at motor coding input (DIN3 to DIN6) indicates an empty parameter memory M1...M16.	Check signal values at DIN3 to DIN6 (also see parameter "Motor code") or store a parameter set for the corresponding motor.
27	Generator operation	Motor runs at inverter stop.	Wait until motor stands still.
28	Comparator error in self-test	Internal failure	If the fault still exists after switching off and on again, send in frequency inverter for repair. An ASM 3-phase motor can still be operated, but not a PMSM motor.
45	Watchdog reset on motor control	Strong EMC interference on motor control board.	Restart motor.
54	Brake-chopper defective, or braking resistance interrupted during self-test	Performance-component failure.	Switch on and off several times. If the fault still exists, send in frequency inverter for repair. Motor can still be operated.
55	Offset in current measuring circuit too large in self-test	Internal failure.	Switch on and off several times. If the fault still exists, send the frequency inverter for repair.
57	Actual motor speed too high	Actual speed is 10 % over nominal speed. Motor cannot follow the nominal speed. Motor externally driven.	Set the nominal speed at a lower level.

9.4 Errors

With an error message / serious fault the frequency inverter is **not** ready for operation; a reset must be initiated.

Error	Fault	Cause	Correction
2	STO interrupted	STO port is open.	Check the STO port.
3	Earth leakage in motor	Short circuit in motor or supply wire.	Change or repair the motor. Check supply wire.
4	Heat sink temperature too high (inverter)	Frequency inverter overloaded, cooling insufficient.	Reduce load, check output currents.
5	Fault in inverter during self-test	Performance-component failure.	Switch on and off several times. If the fault still exists, send in frequency inverter for repair.
6	Overcurrent detection in inverter	Performance-component failure. Fault in motor or motor supply wire.	Exchange motor or supply wire. Switch on and off several times. If the fault still exists, send in frequency inverter for repair
7	I ² t shutdown	I ² t load too high, therefore motor was switched off.	Cool motor, reduce load. Check the parameters "I ² t time" and "I ² t threshold".
9	No motor type specified	Parameter "Motor type" is set to "no motor".	Check parameter "Motor type"
11	Temperature monitoring (motor)	Motor too hot, possibly sensor cable broken.	Cool motor, reduce load. Test sensor and check the parameters "Temperature monitoring" and "Resistance value".
14	Monitoring - Mains undervoltage	Mains voltage too low.	Test mains voltage, test mains connection.
15	DC-link voltage too high	Mains voltage too high or motor deceleration ramp too low.	Test mains voltage and mains connection, check parameter "Deceleration ramp".
17	Motor connection broken	No motor connected or a motor phase is interrupted.	Check motor connection, adapt parameter "Motor type".
29	Error during parameter import and/or export	Misconfigured digital inputs DIN5 and DIN6.	Check signal values at DIN5 and DIN6 as well as their configuration.
53	Short circuit or earth leakage in the DC-converter	Performance-component failure.	Check wiring. Switch on and off several times. If the fault still exists, send in frequency inverter for repair.
58	PMSM motor does not start	Despite several attempts, the motor does not start.	Check motor and supply lines. Adjust parameters "Acceleration ramp", "Startup time" and "Startup current", if possible.

Warranty Conditions

Under current SycoTec delivery and payment conditions, SycoTec undertakes warranty for satisfactory function and freedom from faults in material and manufacture for a period of 12 months from the date of sale certified by the vendor.

In the event of justifiable complaints, SycoTec shall supply spare parts or carry out repairs free of charge under warranty. SycoTec accepts no liability for defects and their consequences which have arisen or could have arisen as a result of natural wear and tear, improper handling, cleaning or maintenance, non-compliance with the maintenance, operating or connecting instructions, corrosion, impurities in the air supply or chemical or electrical influences which are unusual or not admissible in accordance with SycoTec's standards. The warranty claims shall become null and void if defects or their consequences can be attributed to interventions in or modifications to the product. Warranty claims can only be validated if they are notified immediately in writing to SycoTec.

A copy invoice or delivery note clearly showing the manufacture number shall be attached if products are returned.

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(DE = original)

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