Documentation

This document contains important product information related to health and safety which must always be observed. This document does **not** replace the manual (SD6).

For sustainability reasons, we have purposefully not enclosed a printed manual.

You can find the manual online at the following address: https://id.stober.com.
In the search field there, enter the serial number, delivery note number or invoice number of the product.

Alternatively, you can use a suitable mobile device to scan in the QR code on the front of the device to directly access the manual. If you cannot access the electronic version of the manual while working with the product, print out all relevant content in the language appropriate for you. The manual and this document must be available and in readable form at all times when working with the product. In case of transfer or sale of the product to a third party, pass on this document as well.

If needed, we will gladly send you a printed version of the manual free of charge:

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WARNING! Serious bodily injury or death may result from disregarding the instructions and technical data in the manual or from improper use.

Intended use

As defined by EN 50178, the product is an electrical device operating as power electronics to control the flow of energy in high-voltage systems. STOBER drive controllers are intended solely for the operation of motors that meet the requirements of EN 60034-1.

The connection of other electronic loads or operation outside applicable technical specifications constitutes improper use.

When installing the product in a machine, the product may not be commissioned (i.e. commence intended operation) until it has been determined that the machine is in compliance with local laws and directives.

Safety regulations

To be able to perform the tasks described in the manual, the persons instructed to perform them must be able to assess risks and residual hazards when handling the product. For this reason, all work on the product, as well as its operation and disposal. may be performed only by professionally qualified personnel. Qualified personnel are persons who have acquired the authorization to perform these activities either through training to become a specialist and/or instruction by specialists. Furthermore, they must observe the valid regulations, legal requirements, applicable basic rules and the manual.

Warranty or liability claims are invalidated in case of technical change to the product, improper use or project configuration and operation by unqualified personnel.

Installation and connection

WARNING! Electrical voltage! Risk of fatal injury due to electric shock!

Switch off all supply voltages before any assembly and wiring work on the product and ascertain that the machine is de-energized.

- Observe the discharge time specified in the manual or on the nameplate of the DC link capacitors
- Make sure that the machine is de-energized with a suitable measuring device
- Ensure electrostatic discharge before touching product parts
- Use the product only in the environment prescribed in the manual
- Mount the product in a control cabinet, if required by the protection class
- Connect the grounding conductor as described in the manual for protection class I
- Ensure an EMC-compliant system design

Commissioning

Perform a function test for safety-related functions.

Operation

STOBER drive controllers have a configurable restart. If the drive controller is designed for an automatic restart after energy shutdown, this must be clearly specified on the system in accordance with EN 61800-5-1.

STOBER drive controllers have the option of a Safe Torque Off safety function (STO) in accordance with EN 61800-5-2 for safely disconnecting the energy supply to the motor. Measures for protection against unexpected startup that are based on this are described in EN ISO 12100 and EN ISO 14118, for example.

UL-compliant use

This chapter contains relevant information for use under UL conditions (UL – Underwriters Laboratories).

Surrounding air temperature and pollution degree

The maximum surrounding air temperature for UL-compliant operation is 45°C. Use in an environment up to pollution degree 2 is permitted.

Supply grid

All device types supplied with 480 V_{AC} are intended solely for operation with grounded wye sources at 480/277 V_{AC}.

For all device types – with 240 V_{AC} or 480 V_{AC} supply – the supply grid must not deliver a symmetrical short-circuit current above the specification in the following table.

Size of the drive controller	Max. differential short-circuit current
Size 0 – size 2	5000 A
Size 3	10000 A

Tab. 1: Short-circuit current rating (SCCR)

Overvoltage protection

In accordance with CSA-C22.2 No. 14-13, the following applies for use in Canada:

Depending on the device type, additional overvoltage protection must be installed in the network upstream of the device and must fulfill the following conditions.

- 1-phase drive controller:
  - Overvoltage category 3
  - Phase-ground = 240 V_{AC} (peak permitted rated surge voltage = 4 kV)
  - Phase-phase (or N) = 240 V_{AC} (peak permitted rated surge voltage = 4 kV)
- 3-phase drive controller:
  - Overvoltage category 3
  - Phase-ground = 277 V_{AC} (peak permitted rated surge voltage = 4 kV)
  - Phase-phase (or N) = 480 V_{AC} (peak permitted rated surge voltage = 6 kV)

Overload capacity

The overload capacity of the power unit depends on the size and clock frequency and – in relation to the nominal current $I_{2N,PU}$ – cannot exceed the following values:

Size of the drive controller	$f_{PWM,PU}$ = 4 kHz	$f_{PWM,PU}$ = 8 kHz
Size 0 – size 2	180% for 5 s; 150% for 30 s	250% for 2 s; 200% for 5 s
Size 3	200% for 3 s	

Tab. 2: Overload capacity of the drive controller

Branch circuit protection

Integral solid state short-circuit protection does not provide branch circuit protection (line fuse) upstream of the drive controller. Branch circuit protection must be provided in accordance with the manufacturer instructions, the National Electrical Code, the Canadian Electrical Code, part I, and any additional local codes.

Motor protection

The drive controller has a certified i²t model of the motor, a computational model for thermal monitoring of the motor. This fulfills the requirements for solid state motor overload protection in accordance with the amendment to UL 508C from May 2013. In order to activate it and start the protective function, set the parameters as follows (deviating from the default values): U10 = 2: Warning and U11 = 1.00 s. This model can be used instead of or in addition to a motor temperature monitoring.

Motor temperature sensor

The drive controller features connections for PTC thermistors (NAT 145°C), KTY temperature sensors (KTY84-130) or Pt temperature sensors (Pt1000). For a proper connection, follow the terminal description for X2.

Information

STOBER recommends the use of PTC thermistors as thermal winding protection.

Braking resistor

Separate overheat protection is required for an externally mounted braking resistor. The drive controller has an i²t model, a computational model for thermal monitoring of the braking resistor. This can be used for temperature monitoring of the externally mounted braking resistor. To activate it, parameterize the technical data of the braking resistor in A21, A22 and A23.

Make sure to observe the following output values of the drive controller when selecting the braking resistor (size 0 to 2: X30, size 3: X20):

Cat. No.	Minimum resistance	Maximum voltage
SD6A02	100 Ω	420 V_{DC}
SD6A04	100 Ω	830 V_{DC}
SD6A06	100 Ω	830 V_{DC}
SD6A14	47 Ω	830 V_{DC}
SD6A16	47 Ω	830 V_{DC}
SD6A24	22 Ω	830 V_{DC}
SD6A26	22 Ω	830 V_{DC}
SD6A34	15 Ω	830 V_{DC}
SD6A36	15 Ω	830 V_{DC}
SD6A38	15 Ω	830 V_{DC}

Terminals

The terminals are labeled accordingly for correct connection. Observe the connection overviews and terminal descriptions for the connection.

Power terminals

Size 0 to 2: Use only copper conductors for a surrounding temperature of 60/75 °C.

Size 3: Use only copper conductors for a surrounding temperature of 75 °C.

24 V supply and fuses

Low-voltage circuits must be supplied by an isolated source with a maximum output voltage that does not exceed 30 V_{DC}.

Fuses for 24 V_{DC} supplies must be approved for DC voltage in accordance with UL 248.

- Use a 1 A fuse (time delay) upstream of relay 1. Follow the terminal description for X1, pin 1 (NO contact).
- Protect the 24 V_{DC} supply of the control unit with a 10 A fuse (time delay) for size 0 to 2 and with a 4 A fuse (time delay) for size 3. Follow the terminal description for X11, pin 1 or 2 (+).
- Protect the 24 V_{DC} supply for the brake with a 4 A fuse (time delay). Follow the terminal description for X6, pin 3 (+) for option ST6 or the terminal description for X7, pin 1 (+) for option SE6.
- The following applies to the STO safety function via terminal X12 (option ST6): Protect the supply voltage of the status signal with a 3.15 A fuse (time delay). Follow the terminal description for X12, pin 8 ($U_{1status}$).
- The following applies to the optional interface extensions with terminal module XI6, RI6 or IO6: Protect the 24 V_{DC} supply with a 1 A fuse (time delay). Follow the terminal description for X101, pin 18 or 19 (+24 V_{DC}).

Tightening torques

Observe the following tightening torques:

Connection		Tightening torque
Size 0 – size 2: Grounding conductor connection on drive controller (ground bolt)		4.0 Nm (35 Lb.inch)
Size 3: Connecting wiring for X10 and X20	Conductor cross-sections ≤ 25.0 mm²	2.5 Nm (22 Lb.inch)
	Conductor cross-sections > 25.0 mm²	4.5 Nm (40 Lb.inch)

Tab. 3: Tightening torques

UL test

Only the risks of electric shock and the risk of fire have been examined during UL acceptance. Functional safety aspects have not been assessed during the UL approval process. These are assessed for STOBER by bodies such as the TÜV SÜD certification service.

UL-compliant line fuses

For UL-compliance, use the following fuses for the powered drive controller:

- Fuses of class RK1 (e.g. Bussmann KTS-R-xxA/600 V), CF, J, T or G
- For drive controllers of sizes 0 and 1, you can alternatively use fuses of class CC
- For drive controllers of sizes 0 to 2, you can alternatively use type E motor starters, which consist of a circuit breaker and supply terminal

More detailed specifications about the appropriate fuses can be found in the following table:

Size	Type	Class CC [A]	Class RK1, CF, J, T or G [A]	Type E motor starter
0	SD6A02	10	10	EATON PKZM0-10/SP + BK25/3-PKZ0-E
	SD6A04	10	10	EATON PKZM0-10/SP + BK25/3-PKZ0-E
	SD6A06	10	10	EATON PKZM0-10/SP + BK25/3-PKZ0-E
1	SD6A14	15	15	EATON PKZM0-16/SP + BK25/3-PKZ0-E
	SD6A16	20	20	EATON PKZM0-25/SP + BK25/3-PKZ0-E
2	SD6A24	—	35	EATON PKZM0-32/SP + BK25/3-PKZ0-E
	SD6A26	—	50	EATON PKZM4-50 + BK50/3-PKZ4-E
3	SD6A34	—	50	—
	SD6A36	—	80	—
	SD6A38	—	80	—

Tab. 4: UL-compliant line fuses

The pre-configured Type E motor starters can be assembled as an alternative from the individual components in accordance with the following table:

Type E motor starter	Circuit breakers		Supply terminal		Lockable knob	
	Type	Item No.	Type	Item No.	Type	Item No.
PKZM0-10/SP + BK25/3-PKZ0-E	PKZM0-10	72739	BK25/3-PKZ0-E	262518	AK-PKZ0	30851
PKZM0-16/SP + BK25/3-PKZ0-E	PKZM0-16	46938				
PKZM0-25/SP + BK25/3-PKZ0-E	PKZM0-25	46989				
PKZM0-32/SP + BK25/3-PKZ0-E	PKZM0-32	278489				
PKZM4-50 + BK50/3-PKZ4-E	PKZM4-50	222355	BK50/3-PKZ4-E	272165		

Tab. 5: Individual components of Type E motor starters

Information

To ensure problem-free operation, always comply with the recommended trigger limits and trigger characteristics of the fuse elements.