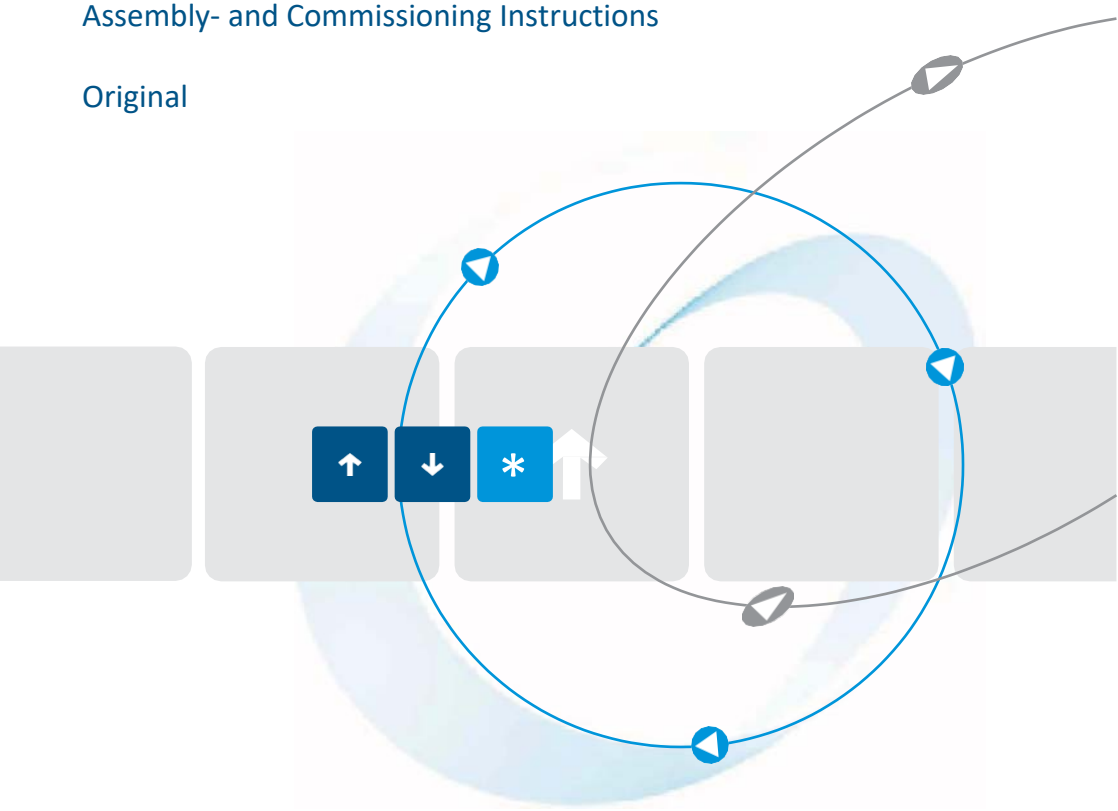
Braking Device
VersiBrake Safe LP 480-60 Plc
Assembly- and Commissioning Instructions

Original



Quality is our Drive.

As per 01/24 1B600.10001

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These instructions must be read and understood before installation, operation or servicing of the appliance muss.

These commissioning instructions were prepared with great care. Nevertheless, PETER electronic GmbH & Co. KG does not assume liability for damage resulting from mistakes possibly contained in this manual. Technical changes that serve to improve the product are subject to change without notice.

Installation notice

Electro-technical specialist knowledge is required for installation and commissioning.

Disposal Instructions

Equipment containing electrical components may not be disposed of together with domestic waste. It must be collected separately as electrical and electronic waste according to local and currently valid legislation.

Notes and symbols used in these instructions

Note: Notes explain the advantages of certain adjustments or settings and help you to make use of the device in the best possible way.

Warning notices: Read them carefully and follow them strictly

Warning notices are indicated in order to protect you against danger or to help you to prevent the device from being damaged.

Caution: Danger to life through electric shock!

When you see this sign, always make sure that the device is de-energized and secured against unintentional energizing.

1. Safety information

1.1 Notes on safety

The appliance may only be used for the purposes stated in the applicable fitting and commissioning instructions. The notices in the accompanying documents must be followed. The permissible environmental conditions must be adhered to.

Fit the appliance in a switch cabinet with IP 54 or better. Dust and moisture could otherwise lead to negative effects on the function.

The described devices are operating resources which are used in industrial power installations. Inadmissible removal of coverings during operation can cause serious damage to health, since live parts with high voltages are present in these devices.

Installation, maintenance and adjustment work, as well as the operation, may be carried out only by instructed personnel in accordance with the safety regulations. Installation work may be implemented in the de-energised status only.

Note proper grounding of all drive components.

Before you put the device into operation, please read this start-up instruction carefully.

The user has to furthermore ensure that the devices and the relevant components are mounted and connected according to public, legal and technical specifications. The VDE Specifications VDE 0100, VDE 0110 (EN 60664), VDE 0160 (EN 50178), VDE 0113 (EN 60204, EN 61310) and VDE 0660 (EN 50274), as well as corresponding specifications of TUEV and Trades Social Insurance against Occupational Accidents, apply for Germany.

It must be ensured by the user that after a failure of the device, in case of faulty operation, in case of failure of the control unit and so forth, the drive is brought into a secure operating state.

1.2 Warning note

- The safety functions of the VB S LP (see point 3. General description) are only applicable in connection with further measures, e.g. protective door interlock
- In the case of an error it can not be excluded that the engine will start to turn. This must be observed especially when the safety door is open. This can be prevented if it is constructively ensured on the drive side that the motor does not start up with 2 mains phases (two-pole motor or heavy motor start).
- The unbraked run down of the motor to a standstill must not exceed 300s. Here the highest possible rotational speed and the largest possible centrifugal mass must be taken into account.
- The VB S LP complies with the safety-relevant EMC Regulations (see 14.2 EMC information). In the event of interference levels greater than the limits unsafe operating conditions may occur.
- Even if the motor is stopped and the motor standstill message indicates a motor standstill, the device terminals 2T1, 4T2 and 6T3 as well as all connected cables and motor terminals are not galvanically isolated from the mains voltage.
  For all work on the motor circuit and on the associated wiring, the VB S LP must be disconnected from the mains voltage with a revision switch, motor protection switch or similar disconnecting elements.
- Strong electromagnetic fields can occur in the area near to machines and appliances in which these devices are installed. This could possible affect the operation of active implantations (e.g. heart pacemakers or defibrillators).

The PETER electronic company GmbH & Co. KG does not assume any responsibility for effects of the designated points.

2. Conformity

The described appliances were developed to take over safety functions as part of a whole installation or machine. A complete safety-related system generally contains several components and concepts for safe shutdowns. It is the responsibility of the manufacturer of a machine or appliance to ensure the correct overall function. PETER is not able to guarantee all characteristics of a complete appliance or machine not designed by PETER.

The agreement of the construction of the user with the existing legal provisions is in the area of responsibility of the user.

Operational start-up is prohibited until the conformity of the finished product with the Directives 2006/42/EG (Machine Directive) and 2006/95/EG (Low-Voltage Directive) has been determined.

The intended operation of the devices requires power supply networks in accordance with DIN EN 50160 (IEC38).

3. General description

The appliances of the Type VB S LP enable the shutdown of alternating current motors of efficiency classes IE1 to IE3 (IE4 in preparation). Appliances of the type VersiBrake Safe are used for drives that must be reliably shut down for safety-technical and/or economic reasons.

After switching on the 24VDC control supply voltage and the mains supply, the device is initialized and carries out a test braking. During this time the locking contact is open and starting the engine is not possible. If the test braking has been successfully completed, the device switches to the “Standby” operating state. In this state the locking contact and the star relay are closed. As soon as there is a low level at the “braking” input, the motor starts. The VB S LP switches to the “Motor running” operating mode.

When using the VB S LP, no additional brake contactor is required. Braking is triggered by a change from low to high at the “braking” input. Due to the locking contact on the VersiBrake Safe LP, it is not possible to switch on the motor contactor during the braking phase. A regulated direct current is fed into the motor, which creates a stationary magnetic field and thus a braking torque. An integrated evaluation circuit detects the motor standstill. The braking current is then switched off.

The VersiBrake Safe LP detects a wide variety of faults. All faults that no longer enable safe motor operation lead to a switch-on lock. Safety-relevant faults can only be reset by switching off the control voltage.

Device parameters and messages can be exchanged with a higher-level controller via a CAN interface with CAN-Open protocol.

4. Utilisation according to specification

The devices in the VersiBrake Safe LP series are electrical equipment for use in industrial high-voltage systems. They are designed for use in machines for braking flywheels on drives with three-phase motors in efficiency classes IE1 to IE3.

Preferred areas of application

- Shaker
- Wood processing machines
- Centrifuges
- Drives with large centrifugal masses
- Belt drives

4.1 Foreseeable incorrect usages

The appliances of the series VB S LP may not be used for the following applications:

- For the function of a stopping brake (permanent brake).
- for braking alternating current motors with an oscillating weight with a stopping time exceeding 25s.
- to operate alternating current motors with an oscillating weight with an unbraked run-down time exceeding 300s.
- for operation on a supply network generated by a static transformer, (frequency transformer).

5. EU Declaration of Conformity

EU Declaration of Conformity CE

The manufacturer / marketing agency
(authorised agent of the manufacturer / marketing agency established in the community)

Name / Address: PETER electronic GmbH & Co. KG
Bruckäcker 9
92348 Berg

herewith declares that the following product (device, component, component part), in the implementation as supplied,

Product designation:	**Braking Device**
Series / Type designation:	VB S LP 480-25... /-60...
Article number:	2B60..
Year of constructiobn	2022

corresponds to the determinations in accordance with EU Directive:

2004/108/EG	EC EMC directive
2011/65/EU	EC RoHS directive
2006/42/EG	EC Machinery Directive

The following harmonised standards were employed:

DIN EN 60947-1:2015-09	Low voltage switchgear General provisions
DIN EN 60947-4-2:2013-5	Low voltage switchgear Contactors and motor starters - Solid-state motor control devices and starters for alternating voltages
DIN EN ISO 13849-1:2016-06	security of machines
DIN EN 62061:2016-05	security of machines

This product has been designed as a Class A device. Use in Class B environments (such as residential areas) may cause radio interference. In case of malfunctions, appropriate measures are to be taken.

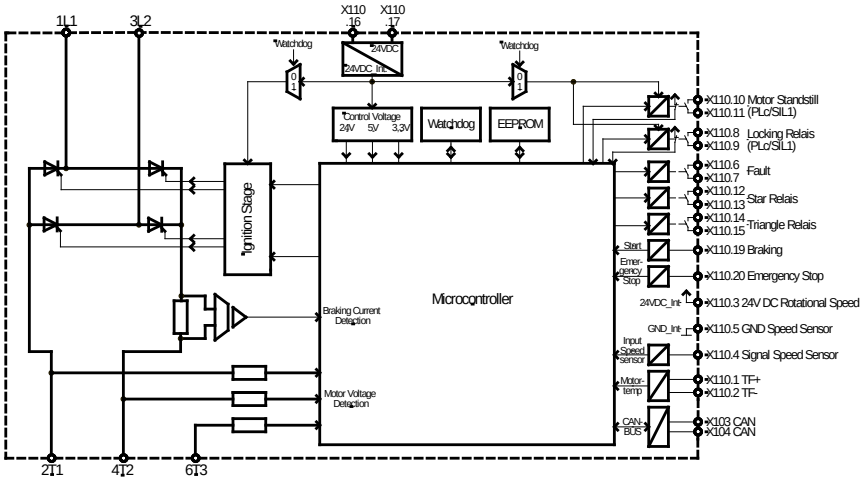
This EC Declaration of Conformity loses its validity if the product is altered or changed without approval. The undersigned bears sole responsibility for the presentation of this declaration.

Berg, 26.04.2022 (Location, Date)

Dr. Thomas Stiller, Managing Director (Undersigned and function of the undersigned)

(Signature)

6. Block diagram



7. Commissioning

Installation notice

Electro-technical specialist knowledge is required for installation and commissioning.

The operational start-up is implemented in 4 steps:

1. Installation — see chapter 7.1 Installation information
2. Connection and — see chapter 7.2 Connection
3. Parameter setting — see chapter 7.3 Parameter adjustments
4. Test of safety function

Commissioning must end with a test of the efficiency of the safety functions!

It must be absolutely ensured that no-one is in the safety zone of the machine or near the drive motors.

• if the motor is switched off, a braking must be initiated and by the third braking at the latest, the motor must come to a complete standstill within 8s.

Warning note

Consider the maximum admissible starting and braking currents (see Chapter Technical Data)

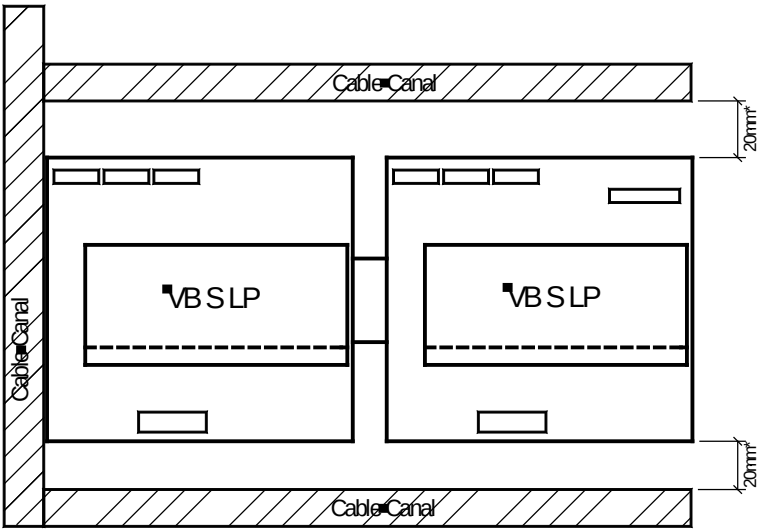
7.1 Installation information

Attention: Electric shocks can be fatal!

The following conditions are to be adhered to for a proper operation of the VersiBrake Safe LP:

1. The VB S LP is to be used under overvoltage conditions of Category III or higher.
2. The device may be used only in an environment with degree of pollution 2 or better, in accordance with DIN EN 60644-1/IEC664.
3. The device is to be installed in a housing (protection type at least IP54). Attention is to be paid that the waste heat generated by the braking device can be removed via the housing.
4. The device must be operated free from contamination by water, oil, carbon, dust etc.
5. With the connection of the devices, it is to be noted that the network and motor lines are stripped of insulation for 12-14 mm. If lines are stripped of insulation too short, or with too short end sleeves and are used for the connection, this leads to a high contact resistance and to ultimate destruction.

Set the device vertically on a vertical installation surface. The motor terminals are to be mounted below. The installation is implemented by screwed connection of the four fastening plates. The devices can be set in a row near each other without separation distance. If the devices are arranged above each other, a separation distance of 100 mm must be kept between the heatsinks. No additional large heat sources may be arranged below the devices, such as e.g. devices with high power dissipation, heat resistors or similar.



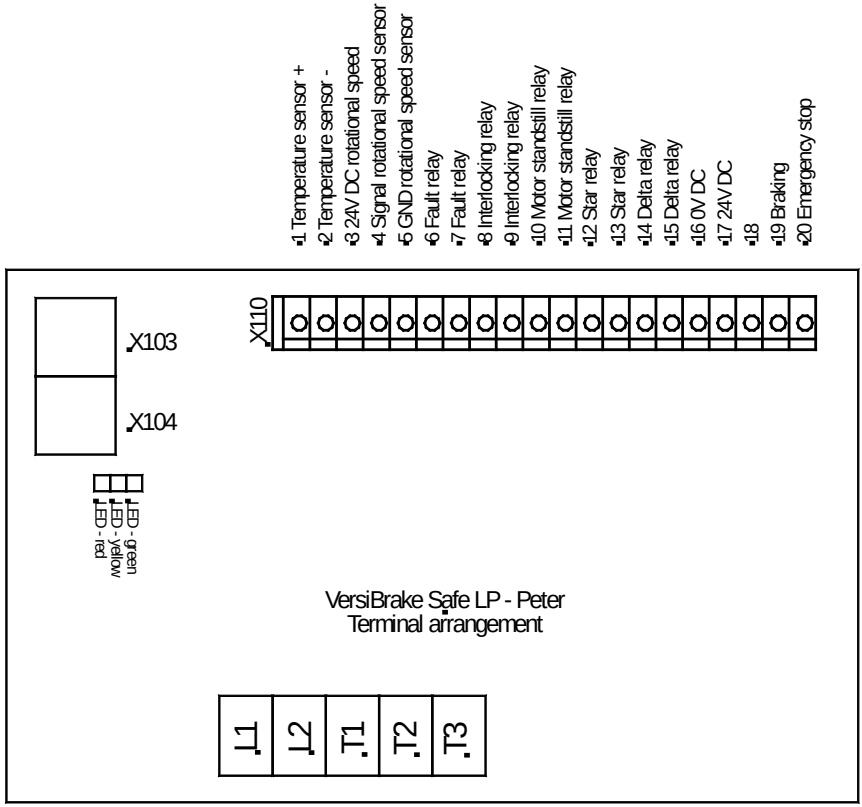
*For UL compliant installation, greater clearance may be required to meet appropriate wirebanding space.

Warning note

To avoid heat build-up, a distance of at least 20mm must be maintained between the wiring duct and the device.

The back of the circuit board has mains voltage potential! Appropriate safety distances must be maintained and, if necessary, contact protection must be provided. For UL-compliant installation, a distance of at least 12.7 mm must be maintained on the side and back of the circuit board from conductive housing parts or other devices

7.2 Connection



Attention! Electric shocks can be fatal!

Even if the motor stops, it is **not** isolated galvanically from the network.

7.3 Parameter adjustments

The devices are delivered with a default parameter set.

Motors with a power rating which is in the range of the motor power rating are adjusted to an optimal braking time after a maximum of 3 braking operations.

The default value for the braking time is 8 sec.

If a parameter adaptation is necessary, this can be carried out over CAN bus, according to the parameter list.

7.4 System reset

A reset to factory default setting, setting all parameters into the default status, can be implemented in two ways.

1. The VB S LP 480-... can be set to the delivery state by briefly closing (approx. 1 second) the reset jumper X602. If the device has been reset to its delivery state, the yellow LED lights up briefly. All settings are now set to the default value.
2. Over CAN bus, the CAN parameter 0x3000 is set to "1". All adjustments are then set to the default value.

7.5 Operating Elements

If DIP switches 1-3 are set to "Off", the automatic braking ramp adjustment is set. In this case the potentiometers have no function.

1. Dip switch 1: "ON": Device brakes with learned braking current. No changes to the braking current possible.
2. Dip switch 2: "ON": Braking current (5-60A) must be set via potentiometer P602.
3. Dip switch 3: "ON": Braking current must be set via CAN bus.
4. Dip switch 4: "ON": Star - delta start-up time (3s-15s) must be set via potentiometer P601.
5. Dip switch 5: no function yet, for special applications

8. Star-delta start-up

This function can be used to control the power contactors when star-delta starting is desired. The star-delta starting can be parameterized with the CAN parameters 0x4201 to 0x4202.

The start time of the star contactor can be parameterized with the CAN parameter 0x4201. The default setting is 5s. The factory-set switching time from star contactor to delta contactor is 100ms. This switching time can be changed with the CAN parameter 0x4202. When the VersiBrake Safe LP is initialized, the star contactor is closed and test braking is carried out. The star contactor is closed from the start. After successful test braking, the device switches to the “Stanby” state. In this state the locking contact and the star relay are closed. As soon as a low level is present at the “braking” input, the motor contactor closes and the motor starts up. When the motor contactor closes, the adjustable pull-in time of the star contactor starts. After the pick-up time has elapsed, the star contactor opens and a configurable switching time is waited until the delta contactor closes.

If braking is to be carried out during the energization time for the star contactor or during the changeover time, then the star contactor remains energized and the motor begins to brake.

If braking is to take place when the star-delta starting is completed, the delta contactor is opened and the star contactor is only closed after a fixed delay time has elapsed. As soon as the star contactor is closed, braking begins.

Warning note

It is important to ensure that the specified maximum switching frequency, see technical data (usage category), is not exceeded. In the “Standby” and “Motor running” operating modes, the power semiconductors cool down.

Attention! Electric shocks can be fatal!

Even when the motor is stopped, it is **not** galvanically isolated from the mains.

9. Braking

9.1 Standstill-dependent braking with braking time optimisation

The motor is braked at the set current limit with 5-60A. Initial braking is carried out with 30A, but a maximum of 60A. Depending on the inertia of the motor and the tool attached to the motor, the braking current regulates itself within three braking processes such that the drive comes to a standstill in the required time desired. In the factory, a required braking time of 8s is parameterised (CAN-Param. 0x3006). The regulation range within which the braking current can vary lies in the range of 5-60A. the braking current is optimized after every braking procedure. The last braking parameters remain stored even if the mains voltage fails.

After a tool change or adjustment of the required braking time, a setting of the braking current is again reached after a maximum of 3 braking procedures with which the drive is stopped in the required braking time desired.

The braking time optimisation can only function correctly if the drive has reached its full revolution speed before braking. However, since the attainment of the nominal rotation speed of the drive cannot be monitored with the VersiBrake Safe LP, it is assumed that the start-up time of the drive corresponds approximately to the specified required braking time in (CAN-Param. 0x3006). That means, the braking time optimisation is not active until the set required braking time has elapsed after the motor is started, as it cannot be assumed that the drive has reached its full nominal revolution speed.

All parameters related to "Braking" can be adapted over the CAN bus.

9.2 Braking time monitoring

When braking occurs, the time until the motor comes to a standstill is monitored. If the motor does not come to a standstill within 10s or if no motor standstill is detected within 10s, a non-safety-relevant fault is triggered. This fault will be reset the next time the motor is started. If this error occurs three times in a row, a safety-critical fault is triggered, which can only be canceled by resetting the control voltage.

9.3 Safety time

If no standstill is identified after a braking procedure, the safety time, or unbraked runout time elapses. The standstill notification output contact remains open until the end of the safety time (which prevents e. g. opening of a safety door). The unbraked runout time is the time until the free running drive safely reaches a standstill.

9.4 Emergency Stop

If this function is requested from the "Motor running" operating mode via the separate emergency stop input, the VB S LP switches to the "Emergency stop" operating mode. The yellow LED switches off. The locking and delta relay opens. The motor standstill and star relay are already open and the fault relay remains closed. After a waiting period has elapsed, the star relay is closed. This waiting time for the star relay to switch on is set to the shortest time that is technically feasible. The braking current for the emergency stop can now be initiated. A very high braking current is fed into the motor winding for a maximum of one second in order to achieve standstill times of less than 500ms. This braking current is not regulated but only controlled. The level of this braking current must be adapted to each drive separately. This

adjustment is made by setting a fixed thyristor conduction time via the CAN-open interface.

If the motor standstill is detected by the VB S LP before the maximum braking time of one second has expired, the braking current for the emergency stop is switched off. When the drive is at a standstill and shortly before, the braking current for the emergency stop is reduced in order to prevent the drive belt from running and the driven tool from overshooting. The flow of the braking current for the emergency stop is indicated by a quick, short flashing (....) of the yellow LED.

After the braking current is switched off, all relays are opened and the device switches to the safety-critical fault operating mode.

10. Thermal overload protection

The device series VB S LP monitors the motor and device temperature.

10.1 Motor temperature monitoring

The type of the motor temperature probe is set via the system parameter "Motor temperature monitoring" (CAN-Parameter 0x4012).

A motor temperature switch, a motor PTC, a motor KTY84 or a PT1000 can be connected. Over CAN bus, a prior warning can be output as soon as the motor has reached the set-adjusted pre-warning temperature. The device enters the fault mode Collective fault if the motor exceeds the set shutdown temperature. This can be set with the system parameter "Switch off motor °C" (CAN-Param 0x4022).

If the motor temperature does not have to be monitored, a motor sensor can be dispensed with. TF- and TF+ must then be bridge-connected and a thermoswitch must be programmed over the parameterisation. Alternatively, a 1100 Ohm resistance can be connected between TF+ and TF-.

With the "Deactivation motor protection " function activated, (CAN-Param. 0x4033), no error message is issued if the set switch-off temperature is exceeded. However, the current motor temperature can be read via CAN-Bus and a warning is given if the pre-warning temperature is exceeded.

10.2 Device temperature monitoring

10.2.1 thermal device image

A thermal overload protection for the appliance is integrated in the VB S LP. Operating currents are recorded with a current sensor and a thermal image of the appliance is calculated. The trigger value for the appliance has a fixed setting and corresponds to the heat capacity of the appliance. The thermal image can be considered simply as a buffer store which fills with appropriately high current flow and empties with appropriately low current flow. If the buffer store is full, it means that the appliance is thermally overloaded and the collective error "max. appliance temperature" is issued. Braking is still carried out, after which the restart is interlocked.

If the thermal capacity is reached (the buffer memory is full) and the non-safety-relevant fault "max device temperature" has been triggered, the buffer memory (thermal capacity) must be reduced to 80% before this non-safety-relevant fault can be reset. However, before restarting the engine, it is recommended to allow the device to cool down for at least 5 minutes. The buffer storage (thermal capacity) is then reduced to approx. 50%. If the motor is started and braked again before this recommended cooling time has expired, there is a risk that the buffer will be filled again immediately and the non-safety-relevant fault "max. device temperature" will be triggered again during the braking process.

The VB S LP 480-... has a thermal memory. When the 24V control voltage is switched off, the current value of the reached thermal capacity is saved. When the 24V control voltage is reapplied, this value is loaded again. It is therefore not possible to reset the thermal image by switching off the 24V control voltage.

10.2.2 device temperature

The internal device temperature is monitored with temperature sensors. When the set device warning temperature is reached, which can be set with the system parameter "Warning temperature device °C" (CAN param 0x4026), a warning is issued via the CAN bus.

11. Extended, optional operation functions

11.1 Power failure monitoring

The specified operating voltage range of the VB S LP is 200…480VAC ±10% 50/60Hz. Power failure monitoring is integrated into the VB S LP. The mains voltage is checked at terminals L1 and L2 of the VB S LP /. If the mains voltage fails in all operating states for a certain measuring period, a safety-relevant fault is triggered. In order to ensure high availability of the VB S LP brake board, the measurement duration is factory set to 500ms. The measurement duration can be set via the CAN-open interface.
Exception: After applying the control voltage, 5 seconds remain until a non-safety-related fault is triggered if the mains voltage is not applied.

11.2 Checking the connected motor size

In the device test operating mode, it is checked whether the resulting braking current through the connected motor is within the permissible limits of the braking device.
In the event of an error (e.g. motor that is too large), the motor start is not enabled and a safety-critical fault is triggered.

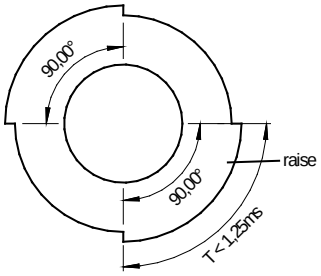
11.3 Recording tool speed

The rotational speed of the tool can be monitored by recording the tool rotational speed with the input "n Wz". The input can be used for identifying too large a deviation in the rotational speed and for identifying a belt tear.

An inductive proximity switch 3-wire PNP, suitable for 24V DC, must be connected to the VB S LP according to the recommended wiring.

The sensor disc must be designed such that at maximum tool rotation speed the run time of a recording is 1.25ms.

Tool rotation speeds up to 12,000 rpm can be recorded with the following recommended sensor discs. All setting parameters for the tool rotation speed are coordinated to these sensor discs. If other sensor discs are used, it must be noted that the run time of the recording is not less than 1.25 ms and the actual minimum tool rotation speed set with ale CAN parameter 4078 must be divided by the factor in table 1.



$$f = \text{Tool Speed} / 60 = 12000\ \text{min}^{-1} / 60 = 200\ \text{Hz}$$

$$T = \frac{1}{\text{Number of segments} * f} = \frac{1}{4 * 200\ \text{Hz}} = 0{,}00125\ \text{s} = 1{,}25\ \text{ms}$$

Table 1 – Various sensor discs

Number of segments	**Max. tool speed (min^{-1})**	**Factor** for actual min. Tool speed
4 *	12000	1
6	8000	1,5
8	6000	2
10	4800	2,5
12	4000	3
16	3000	4
20	2400	5
24	2000	6
32	1500	8

*recommended sensor discs

Parameters involved:

"extern. tool rotation speed sensor", CAN parameter 4035
Default value = 0 to activate external recording of the tool rotational speed, value must be set to "1".
"minim. tool rotation speed", CAN parameter 4078, unit min-1 (revolutions per minute).
Default value = 2,500
If the toll is below the set "minim. tool rotation speed" in Bypass operation, the collective error "tool rotation speed" is triggered.
The parameter value only corresponds to the actual tool rotation speed if the sensor disc with 4 segments is used. If other sensor discs are used, the actual tool rotation speed corresponds to the set "minim. tool rotation speed " divided by the "Factor" in Table 1
"tool rotation speed tolerance", CAN parameter 4076, unit %.
Default value = 80 (%)
If the tool reaches its nominal rotation speed, this rotation speed is assumed as the required value. If the rotation speed deviates by more than the permitted "tool rotation speed tolerance" in bypass operation, the collective fault "tool rotation speed" is triggered. The parameter value 80 (%) means that the tool rotation speed may not fall below 80% of the nominal rotation speed.

12. Operational signals

There are three LEDs on the VB S LP, green, yellow and red, to indicate operational readiness, operating modes and faults.
LED green - ready for operation:

- off - not ready for operation
- Continuously lit - ready for operation - Control voltage connected

12.1 Error messages

12.1.1 Non-safety-relevant error messages

LED red	LED yellow flashes	Non-safety-relevant error messages	Cause of the error
flashes	1x	Mains voltage failure	Failure of mains voltage L1 and L2
flashes	2x	No engine standstill during monitoring time	No motor standstill was detected within 10s
flashes	3x	Max. motor temperature	Max. motor temperature exceeded
flashes	4x	Device overtemperature	The thermal device image has a device overload detected
flashes	5x	Tool speed	See tool speed monitoring
flashes	6x	Belt break	A tool speed is still being recorded even though the motor standstill has already been detected.
flashes	7x	rotating field	Incorrect rotating field connected to the motor

12.1.2 safety-relevant error messages

LED red	LED yellow flashes	Device malfunction	Cause of the error
shines	1x	Motor size	Connected too big motor
shines	2x	Start input	There is no start contact connected
shines	3x	No engine standstill 3 times in a row	Motor standstill was not reached/detected 3 times in a row within the monitoring time of 10s
shines	4x	No engine standstill 3 times in a row during device testing	No motor standstill was detected 3 times in a row during the device test.
shines	5x	Internal safety-related device malfunction	Internal device fault in the safety circuit
shines	6x	Emergency stop	Emergency stop was triggered.

12.2 Reset fault

In the event of an error, proceed as follows:

Non-safety-relevant fault messages are automatically reset the next time the engine is started, with the exception of the non-safety-relevant fault messages "Max. motor temperature" and "Device overtemperature", which reset themselves as soon as the motor or device has cooled down enough. Safety-relevant fault messages can only be reset by resetting the control voltage.

Warning note:

In every case the fault cause must be determined and remedied by instructed personnel. Only after that may the device be put into operation again.

13. Communication

13.1 CAN-BUS

All CAN signals are isolated galvanically from device-internal voltages. The connection is made via pin connectors (X103, X104 or X112). When delivered, a baud rate of 250 kBaud is set.

For a trouble-free transfer of the CAN data, it is absolutely necessary that the following be considered:

- If only one CAN subscriber is plugged on a device, and the CAN plug for this subscriber is removed and plugged in again, a short switch-off of the 24 V control voltage is required (reset).

If you require the device description file (EDS file) and detailed documentation on the available CAN parameters of the VB S LP devices, please contact us.

Only for VB S LP 480-60 Plc, F:
By plugging in jumper X11, a 120Ohm terminating resistor can be switched between CAN-H and CAN-L.

14. Technical data

14.1 General specifications

Type designation	Versibrake Safe LP 480-60 Plc
Rated device current Ie	60A
Rated operating voltage Ue	200...480VAC ±10% 50/60Hz
Control supply voltage Us	24VDC ±10% / 1,0A
Motor rated power at Ue 400V	4,0 … 15kW
Switching cycles per hour t_{on}/t_{br} = 10s with $I_{Max\ (device)}$ 60A $_{RMS}$	20
Usage category	AC-53b 1-10:170
max. power loss - Max. start frequency during operation - Standby	 ca. 25W ca. 8W
I^2t(125°) (A^2s) - thyristors	1800
Braking time	self-optimizing (Default 8s)
Readiness to repeat	200ms
Control voltage Uc	24VDC ±10%
Input resistance control inputs	5kOhm
Switching capacity relay outputs	3A / 250VAC / 30VDC
Installation class	3
Overvoltage category / pollution level: Control and auxiliary circuits Main circuit	 II / 2 III (TT / TN / TI-Netze) / 2
Rated impulse withstand voltage Uimp: Control and auxiliary circuits Main circuit	 2,5kV 4kV
Rated insulation voltage Ui: Control and auxiliary circuits Main circuit	 24V 480V
Max. connection cross section rigid/flexible: Control terminals Control terminal with wire end sleeve Power terminals	 0,2 - 1,5mm² / 0,2 - 1,5mm2 0,25- 0,75mm² / 0,25- 0,75mm² 0,2…6mm² / 0,2…6mm²
Max. cable length control cables Max. cable length between motor contactor and VB S LP	30m 2,0m
Dimensions (WxHxD)	130x140x65
Weight	505g

14.2 EMC Information

Emission of interference	DIN EN 55011;2022-05 – Klasse A
Installation class (according to EN 61000-4-5:2019-03)	3
Behavioral criteria in accordance with DIN EN 60947-4-2:2018-12 with an increased test level for “Functional Safety” (SIL1) in accordance with DIN EN 61326-3-1.	3 (If failure, then only in a safe direction)
DIN EN 61000-4-2:2009-12;ESD	6kV contact / 8kV air
DIN EN 61000-4-3:2011-04;EMF	0.08-1GHz 20V/m, 1.4-2GHz 10V/m, 2GHz to 6GHz Test sharpness: 3V/m
DIN EN 61000-4-4:2013-04;BURST	Mains/motor 4kV, I/O signal 4kV, CAN-BUS 2kV
DIN EN 61000-4-5:2019-03;SURGE	Mains/motor connections 2kV line-to-line, 4kV line-to-earth
DIN EN 61000-4-6:2014-08;HF Field	0,15-80MHz 10V
DIN EN 61000-4-11:2005-02;Voltage dips	Residual voltage: Cycles: 0% 1 40% 10/12b 70% 25/30b 80% 250/300b b "x/y cycles" means "x cycles for testing at 50Hz" and "y cycles for testing at 60Hz"

14.3 Environmental conditions

Ambient temperature	-15°C ... 45°C to 1000 m height
Storage temperature	-25°C … 75°C
Power reduction	Up to 45°C: 20 braking operations/h (60Arms/10s) 45-60°C: 2%/°C derating (corresponds to 10 braking operations/h at 60°C)
Protection type	IP 00

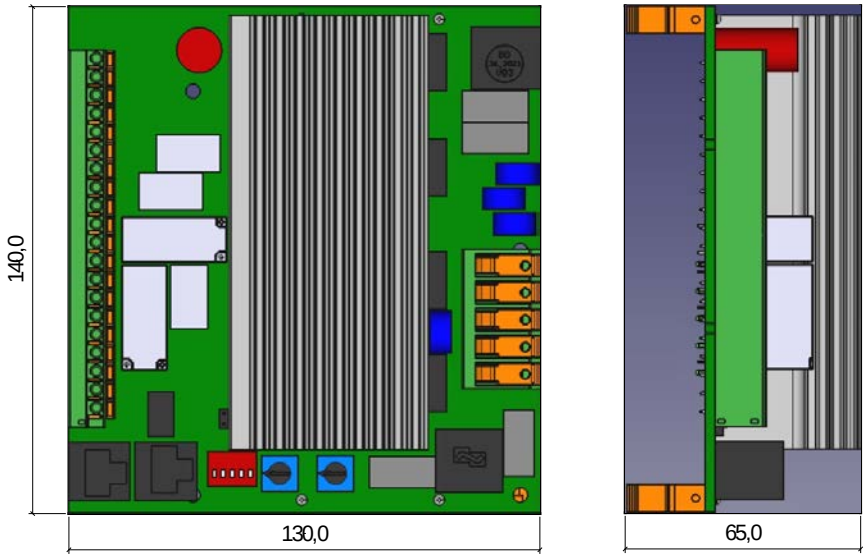
14.4 Safety specifications

Functional safety according to DIN EN 61508	SIL 1
Safety of machines according to DIN EN 13849	PL c

14.5 Safety figures

Parameter	Value
PFH	1.74E-07 h-1
$MTTF_D$	71 a
DC_{avg}	>89,2%

14.6 Dimensions



15. Dimensioning rules

15.1 Dimensioning of fuses for device protection

The pre-fuses can be dimensioned based on the following instruction:

With a fusing according to allocation type "1" to DIN EN 60947-4-2, the VB S LP may be inoperative after a short-circuit. After an overload or after an output-sided short-circuit, maintenance work is possible.

The following dimensioning rules refer to the following operating conditions:

- Utilisation of asynchronous motors IE1, IE2 and IE3 (IE4 in preparation)
- Braking times according to datasheet
- Switching frequency not higher than as indicated in the datasheet

Fusing according to allocation type "1"

Line protection fuses (operating class gL) or circuit breakers with tripping characteristics B, C, D or K are recommended as back-up fuses.

Taking into account the maximum braking currents that occur (usually the rated device current), the fuse values are recommended in accordance with the following table.

Note: Wiring cross section according to DIN VDE 0100-430, DIN EN 57100-430.

Short-circuit protection according to EN 60947-4-2

Device rated current (Technical data)	Device type	**Fuse rating with allocation type 1**	Fuse type (recommendation)
60A	VB S LP 480-60 Plc	35A	gG / gL

Fusing according to coordination type "2"

The power semiconductors are to be protected by semiconductor protection fuses of the utilization category aR or gR. However, since these fuses do not ensure line protection, it is necessary to use additionally line protection fuses (utilization category gG).

To protect the semiconductors it is necessary to select fuses having cut-off-I^2t-values which are approx. 10-15% below the threshold-I^2t-value of the power semiconductor (see technical data). In this connection, the fuse rating of the selected fuse should not be smaller than the starting current to be expected.

Notes:

1. PETER electronic does not prescribe the use of semiconductor protection fuses. However, for some UL- or CSA-listed devices there are exceptions which are indicated in the relevant commissioning instructions.
2. On the basis of the I^2t-value of the power semiconductors, the braking time and possibly the max. braking current, the fuse supplier is able to select a suitable type. Due to the great variety of producers, sizes and types, PETER electronic does not recommend any particular fuses.
3. If the value of the fuse or the cutoff-I^2t-value is selected too small, it may happen that the semiconductor fuse reacts during the soft stop.

16. Installation guideline

The devices are to be installed into a switchbox or switchgear cabinet according to point 8. It must be ensured that the switchbox/switchgear cabinet is capable of dissipating the occurring power loss (see techn. data).

16.1 Connection

The device is to be installed according to the attached connection diagram. For other connections please consult PETER electronic GmbH & Co. KG..

Caution!

A cover for the circuit board to protect against contact with dangerous high voltage must be provided during installation!

16.2 Cabling

To avoid EMI couplings into the electronics and the disturbances they involve, it must be ensured that the control cables are laid separately in separate cable ducts and as far as possible away from the power cables. If control cables need to cross power cables, they have to be laid at an angle of 90° (Figure 1).

When connecting shielded cables, make sure that the unshielded cable ends are as short as possible. The large-surface shield bonding must necessarily be located at the end of the shielding but may also be established in a suitable place - at a distance of some centimeters (Figure 2).

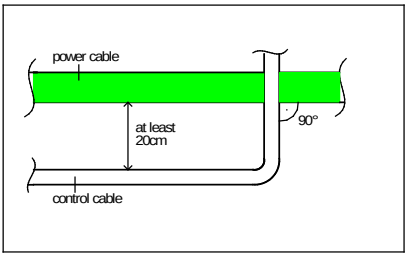


Figure 1

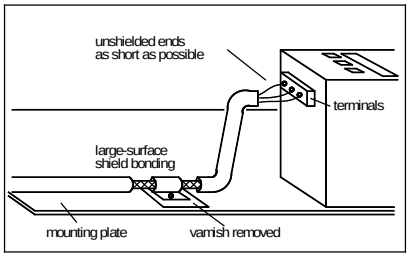


Figure 2

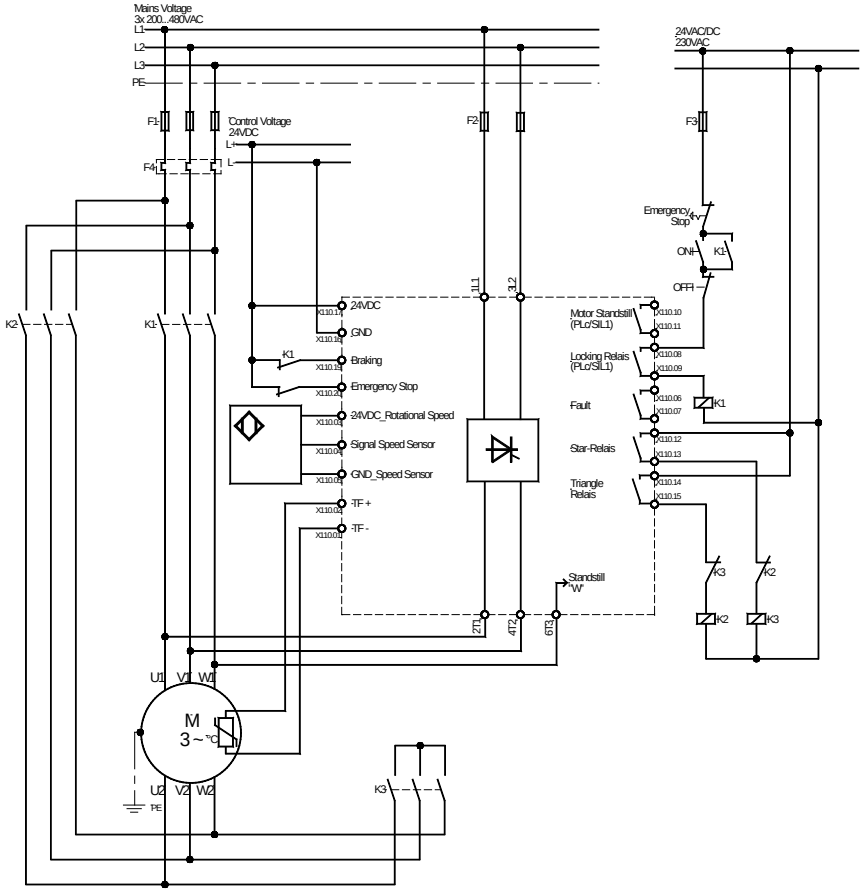
Caution!

The protective conductor connection to the motor must not be laid in shielded motor cables, but is to be separately laid with an appropriate crosssectional area. The individual earthing systems, power earth, protective earth, digital earth, and analog earth conductors should be laid separately by using a suitable star-point wiring.

Note: Further connection diagrams for special circuit arrangements are available on our homepage at **www.peter-electronic.com**.

Note: Prior to putting the VersiBrake S LP into operation, the wiring is to be checked.

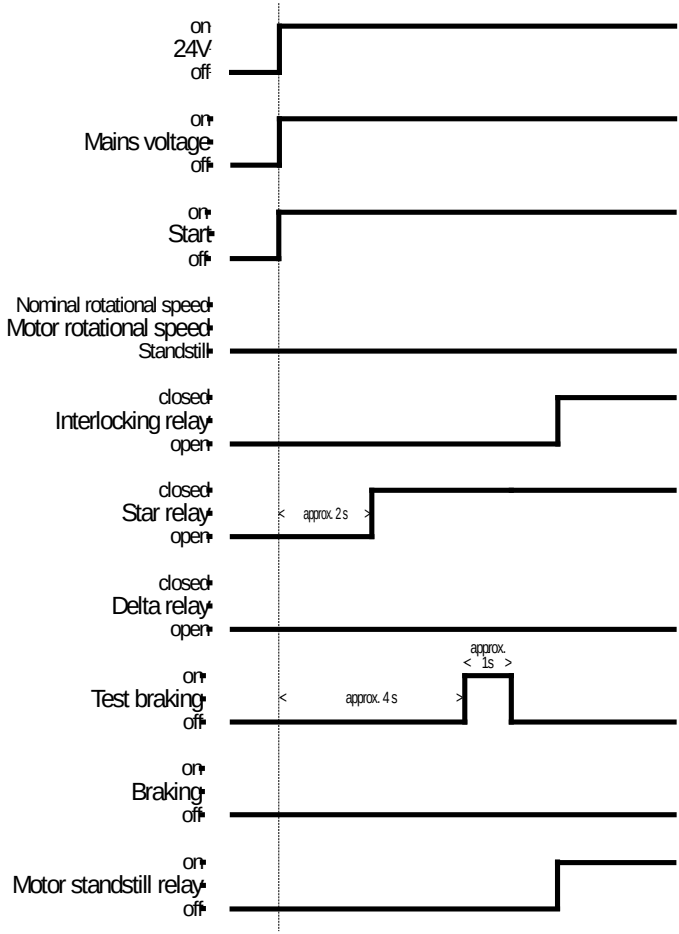
17. Connection proposal



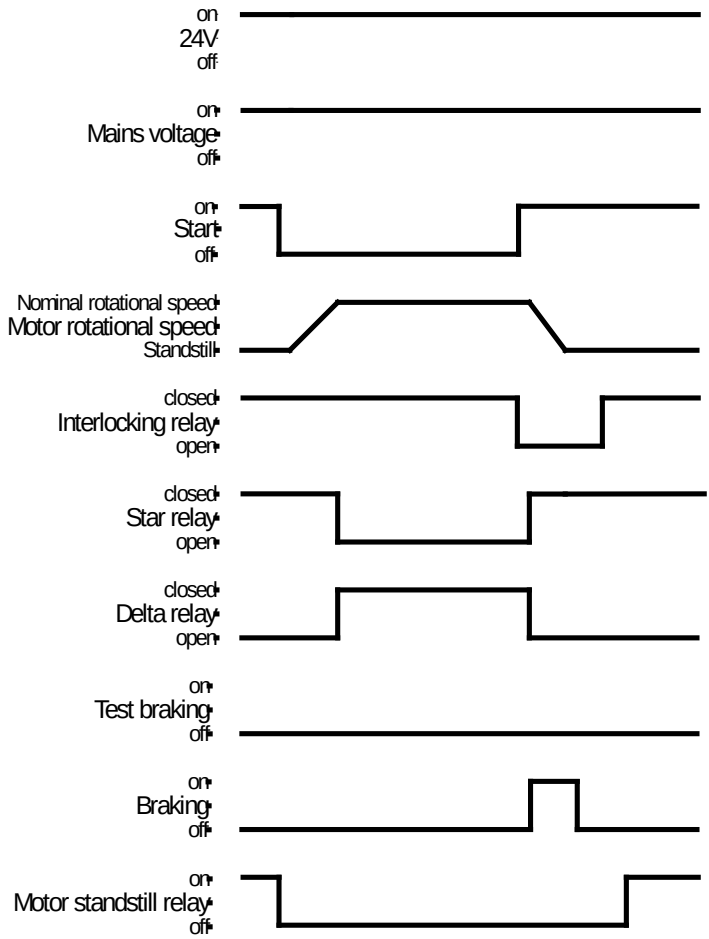
Note: Further connection suggestions on our homepage at **www.peter-electronic.com**.

18. Timing diagram

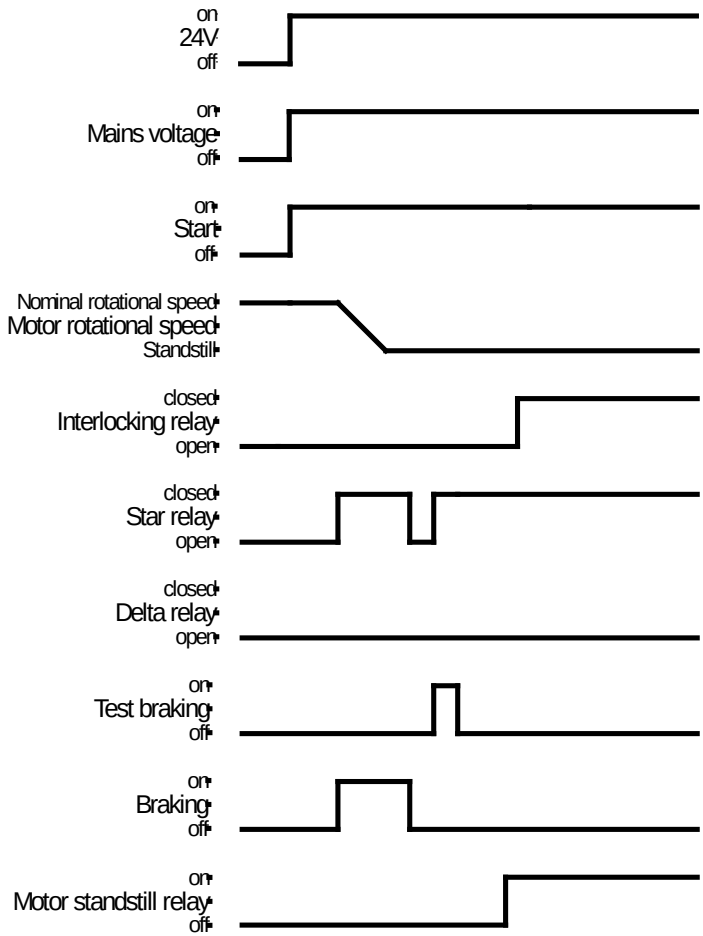
18.1 Switch-on of the control voltage 24 V DC and the mains voltage



18.2 Start/Stop procedure



18.3 Switch-on of the voltages if motor rotates



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