

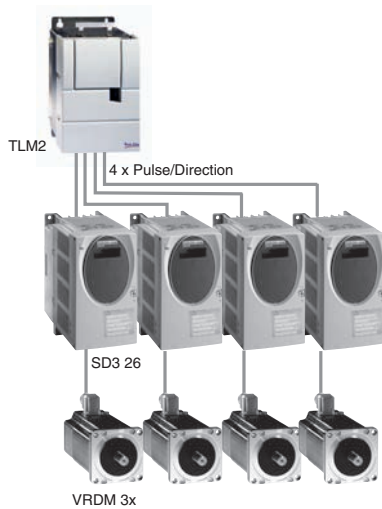
BERGER LAHR

Catalogue

Stepper Motor Drives SD3



Product overview	2
Stepper drive SD3 26	
Product Description	4
Functions	5
Wiring example	10
Technical Data	11
Dimensional drawings	12
Type code	13
Stepper drive SD3 28	
Product Description	14
Functions	16
Wiring examples	25
Technical Data	28
Dimensional drawings	31
Type code	32
Mounting and installation	33
Stepper motors	
Product Description	37
Product quotation	38
Technical Data	39
Dimensional drawings	42
Options	
Holding brake	45
Encoder	46
Gearbox	47
Type code	51
Accessories	
EMC mains filter	54
CANopen fieldbus	56
Modbus fieldbus	57
Pulse/direction interface (SD3 28)	58
Signal interface (SD3 26)	59
Remote terminal	60
BLCT commissioning software	61
Adapter plate	62
Reference Value Adapter RVA	63
RS422 interface adapter USIC	64
Order data – general overview	65
Appendix	
Conversion tables	67



Product overview

The SD3 is a universally applicable stepper drive.

Reference values are typically preset and monitored by a higher level PLC or a Berger Lahr motion controller (TLM2).

A very compact and high-performance drive system has been created in combination with the VRDM 3 3-phase stepper motors by Berger Lahr.

Special features

Compactness

With its compact dimensions (H x W x D: 145 mm x 72 mm x 140 mm) the SD3 stepper drive requires little space in the switching cabinet.

Simplicity

The simple cabling and parameterisation of the SD3 26 makes it easy to commission quickly. Commissioning software is not required.

The SD3 28 can be easily configured with the integrated control panel (HMI), via fieldbus or with the "BLCT" commissioning software.

Flexibility

SD3 is available in two power classes: 2.5 A and 6.8 A. Depending on the device type the SD3 includes the following components:

- an opto-isolated signal interface for 5-V and 24-V input signals (SD3 26 only)
- an RS422 interface for pulse/direction signals or A/B encoder signals (SD3 28)
- a fieldbus interface for SD3 28*: CANopen and Modbus (SD3 28A) or Profibus (SD3 28B)
- analogue reference input ± 10 V (SD3 28)
- a power supply unit for single-phase mains voltages of 115 V_{AC} and 230 V_{AC}
- integrated mains filter

The SD3 26 can optionally be delivered with an electronic system for rotation monitoring and brake control.

Application options

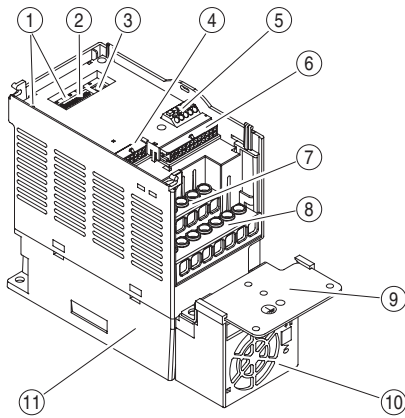
The SD3 stepper motor drive has very good synchronisation characteristics, which are necessary for scanning or exposure, for example.

Due to the high torque at low speeds, the stepper motor drive is particularly suited for short-distance position movements.

Another advantage is its high holding torque at standstill. This allows automated tasks such as "pick and place" to be implemented very economically

Assignment of stepper motors and SD3 stepper motor drives			
3-phase stepper motors	SD3 26•U25	SD3 28•U25	SD3 26•U68 SD3 28•U68
	115 V / 230 V; 2.5 A; including mains filter		115 V / 230 V; 6.8 A; including mains filter and fan
			
VRDM 368 / 50L W	1.7 Nm / 1.5 Nm ¹⁾		
VRDM 397 / 50L W	2.3 Nm / 2.0 Nm		
VRDM 3910 / 50L W	4.5 Nm / 4.0 Nm		
VRDM 3913 / 50L W	6.8 Nm / 6.0 Nm		
VRDM 31117 / 50L W			13.5 Nm / 12.0 Nm
VRDM 31122 / 50L W			19.7 Nm / 16.5 Nm

¹⁾ The 1st value is the holding torque M_H at standstill of the stepper motor, the 2nd value is the nominal torque M_N during operation of the motor.



Product Description

Device overview

- (1) LEDs for status display
- (2) Parameter switch for configuration of the device
- (3) Rotary switch for adjustment of the motor current
- (4) CN2 rotation monitoring (12-p in female connector, optional)
- (5) 24V CN3 interface (spring loaded terminals, optional)
 - 24V controller supply voltage
 - 24V outputs (holding brake and encoder errors)
- (6) CN1 signal interface (24-pin female connector)
 - Inputs 5V, opto-isolated
 - Inputs 24V, opto-isolated
 - Output Readiness
- (7) Screw terminals for connecting the mains supply
- (8) Screw terminals for connecting the motor
- (9) EMC mounting plate (included with the servo drive)
- (10) Fan (in scope of supply for SD326•U68)
- (11) Heat sink

Signal interface CN1

The setpoint position of the stepper motor is preset as a pulse signal by a controller via the CN1 signal interface. A pulse corresponds to one step of the motor. In addition, the following functions can be activated via input signals:

- Activate/deactivate power amplifier or pulses
- Direction of rotation left/right
- Increase/decrease step count by a factor of 10
- Change motor current

An electronic relay contact reports operating readiness. All input signals can be sent as 5-V or 24-V signals via optocouplers.

CN2 rotation monitoring (optional)

If the SD3 26 includes electronics for rotation monitoring and the stepper motor has an encoder, the encoder on the CN2 interface can be connected for position monitoring. If the actual position of the motor deviates from the setpoint position, the SD3 26 reports an encoder error via a 24-V output on the CN3 interface. The power for the encoder is supplied via the CN2 interface.

An input signal of the CN2 interface is used to monitor the temperature of the motor.

Holding brake output on CN3 (optional)

If the SD3 26 is equipped with electronics for rotation monitoring, a holding brake on the stepper motor can be controlled via a 24-V output.

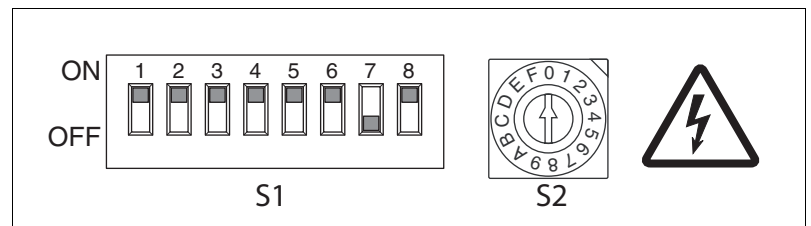
The SD3 26 is optionally available in the combination of holding brake output and rotation monitoring. Rotation monitoring can be activated by a parameter switch.

Functions

Parameter setting

The following functions can be activated via the parameter switch of the SD3 26:

- Motor phase current
- Number of steps
- Current reduction when idle
- "Softstep"
- Rotation monitoring (only for device versions with rotation monitoring SD3 26R...)
- Function of the signal inputs "ENABLE/GATE" and "PULSE/DIR or CW/CCW"



Parameter switches

Setting motor phase current

The motor phase current is set on the rotary switch S2. The motor phase current should not exceed the nominal current of the motor because otherwise there is a danger that the motor can overheat. A low motor phase current produces a low torque.

Setting options with rotary switches

Switch position S2	Motor phase current [A]	
	SD3 26•U25	SD3 26•U68
0 (factory setting)	0.6	1.7
1	0.8	2.0
2	0.9	2.4
3	1.0	2.7
4	1.1	3.1
5	1.3	3.4
6	1.4	3.7
7	1.5	4.1
8	1.6	4.4
9	1.8	4.8
A	1.9	5.1
B	2.0	5.4
C	2.1	5.8
D	2.3	6.1
E	2.4	6.5
F	2.5	6.8

Setting number of steps

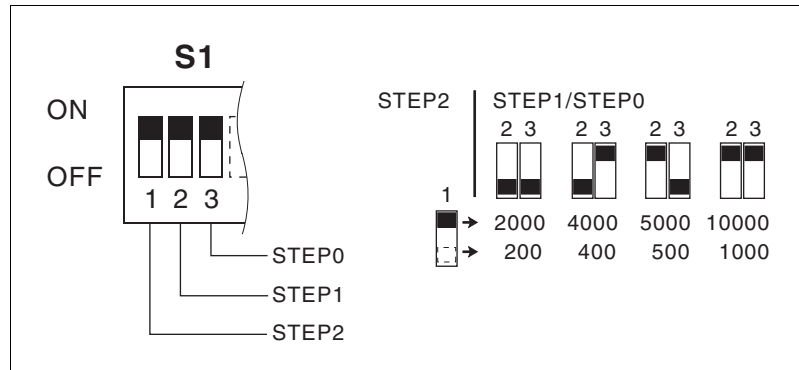
The resolution of the stepper motor drive is set via the step number.

Example:

With a step number of 1000, the stepper motor drive performs exactly one revolution for 1000 pulses. With a pulse frequency of 1 kHz, the result is therefore a speed of rotation of 60 1/min.

Setting options via parameter switches

Step number: 200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000 per revolution



Setting number of steps

The switch setting S1.1 "STEP2" can be inverted via the input signal STEP2_INV. As a result, the step number is increased or decreased by a factor of 10.

Activate motor phase current reduction when idle

When the full holding torque is not required when idle, it is possible to use the "Motor phase current reduction" function in order to reduce the holding torque. As a result, there is less heating up of the motor and electronics and efficiency is increased.

The motor phase current is reduced to approximately 60% of the set current value 100 ms after receiving the last pulse edge.

Setting options via parameter switches

Activate/deactivate motor phase current reduction

Activate "Softstep" function

In the "Softstep" function, reference value is set internally with a higher resolution. The result is a significantly quieter running motor, particularly at low speeds of rotation or an erratic change in the reference value.

The motor accelerates and delays virtually jerk-free. The transitions are smoothed out, i. e. the motor can follow the set reference value significantly better with rapid changes in the frequency.

Setting options via parameter switches

Activate/deactivate "Softstep" function

Activate "rotation monitoring" function (only for SD3 26R... with rotation monitoring)

The "rotation monitoring" function compares the setpoint and actual position of the motor and reports errors if the setpoint position deviates from the actual position. A prerequisite for this is that the SD3 be equipped with electronics for rotation monitoring and the stepper motor has an encoder with a resolution of 1000 increments/rotation.

Setting options via parameter switches

Activate/deactivate "Rotation monitoring" function

Signal inputs

All signal inputs are available as a 5-V- or 24-V optocoupler inputs.

The reference value is set via the signal input "PULSE/DIR or CW/CCW"

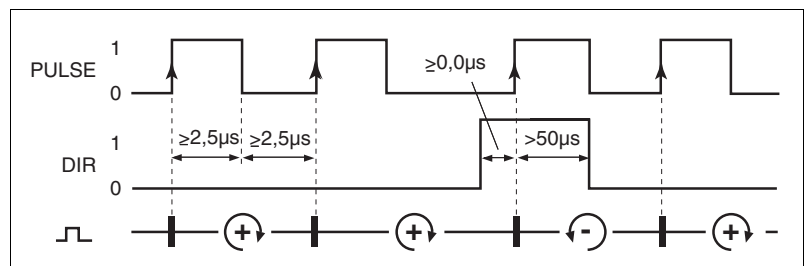
The reference value can alternatively be set via one of the two following interface modes:

- PULSE/DIR
- CW/CCW

The pulse frequency is 200 kHz.

"PULSE/DIR" interface mode

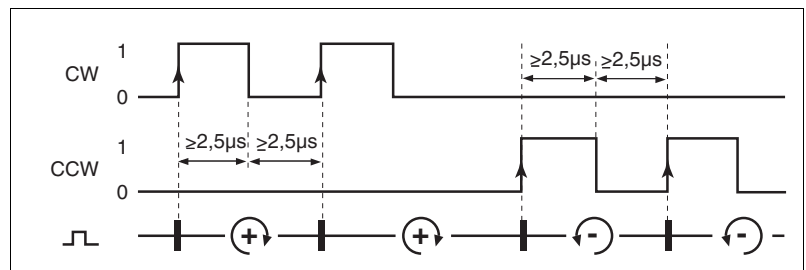
With the rising edge of the signal **PULSE**, the motor executes an angular step. The direction of rotation is controlled with the signal **DIR**.



"PULSE/DIR" interface mode

"CW/CCW" interface mode

With the rising edge of the signal **CW**, the motor executes a positive angular step. With the rising edge of the signal **CCW**, the motor executes a negative angular step.



"CW/CCW" interface mode

Setting options via parameter switches

Set the function of the signal input "PULSE/DIR or CW/CCW"

Setting function of the "ENABLE/GATE" signal input

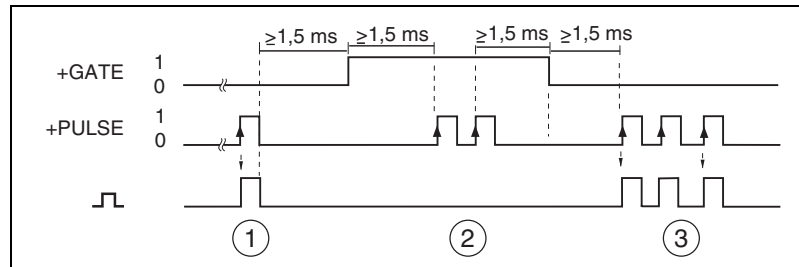
The signal input "ENABLE/GATE" can take over two functions:

"ENABLE" function: release/enable power amplifier

The "ENABLE" function enables the power amplifier to allow control of the motor.

"GATE" function: Release/disable the pulse input

The "GATE" function disables the pulses on the reference value input without shutting off operating readiness. In a multiple-axle system, you can select the "GATE" function for individual axes.



Signal results when activating via the "GATE" function

- (1) Motor step
- (2) No motor steps
- (3) Motor steps

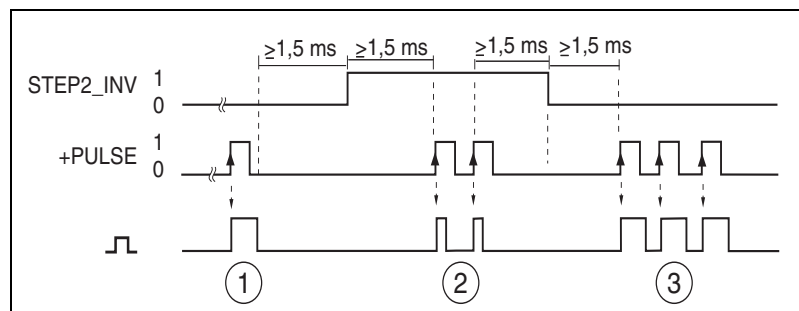
Setting options via parameter switches

Set the function of the signal input "ENABLE/GATE"

Changing the step with signal input "STEP2_INV"

The signal input "STEP2_INV" can be used if a high positioning precision is required but the output frequency of the master controller is limited.

The number of steps can be increased or reduced by a factor of 10 with the signal input "STEP2_INV".



Signal sequences as with switching the signal STEP2_INV

- (1) Large motor step
- (2) Motor steps lower by a factor of 10
- (3) Large motor steps

Control the motor phase current via the signal input "PWM"

Through the pulse-width ratio of a rectangular signal on the signal input "PWM" (PWM: pulse width modulation), you can change the motor phase current between 0% and 100% of the maximum current set on the rotary switch. The frequency of the rectangular signal must be between 6 kHz and 25 kHz.

At constant 1-level no motor phase current flows (current reset to zero).

At constant 0-level the motor operates at the specified maximum motor phase current.

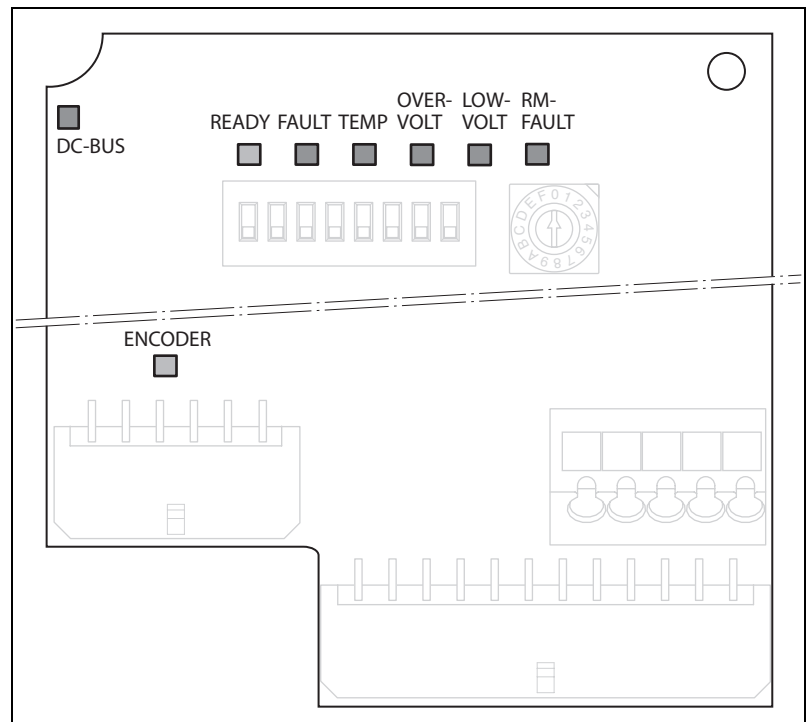
Signal outputs

The following signal outputs are available:

- electronic "ACTIVE_OUT" relay contact to display operating readiness
- 24-V signal output "+BRAKE_OUT" to control a motor holding brake (optional only for SD3 26R...)
- 24-V signal output "RM-FAULT_OUT" to display an error during rotation monitoring (optional only for SD3 26R...)

Status display

The LEDs display the current operating status.

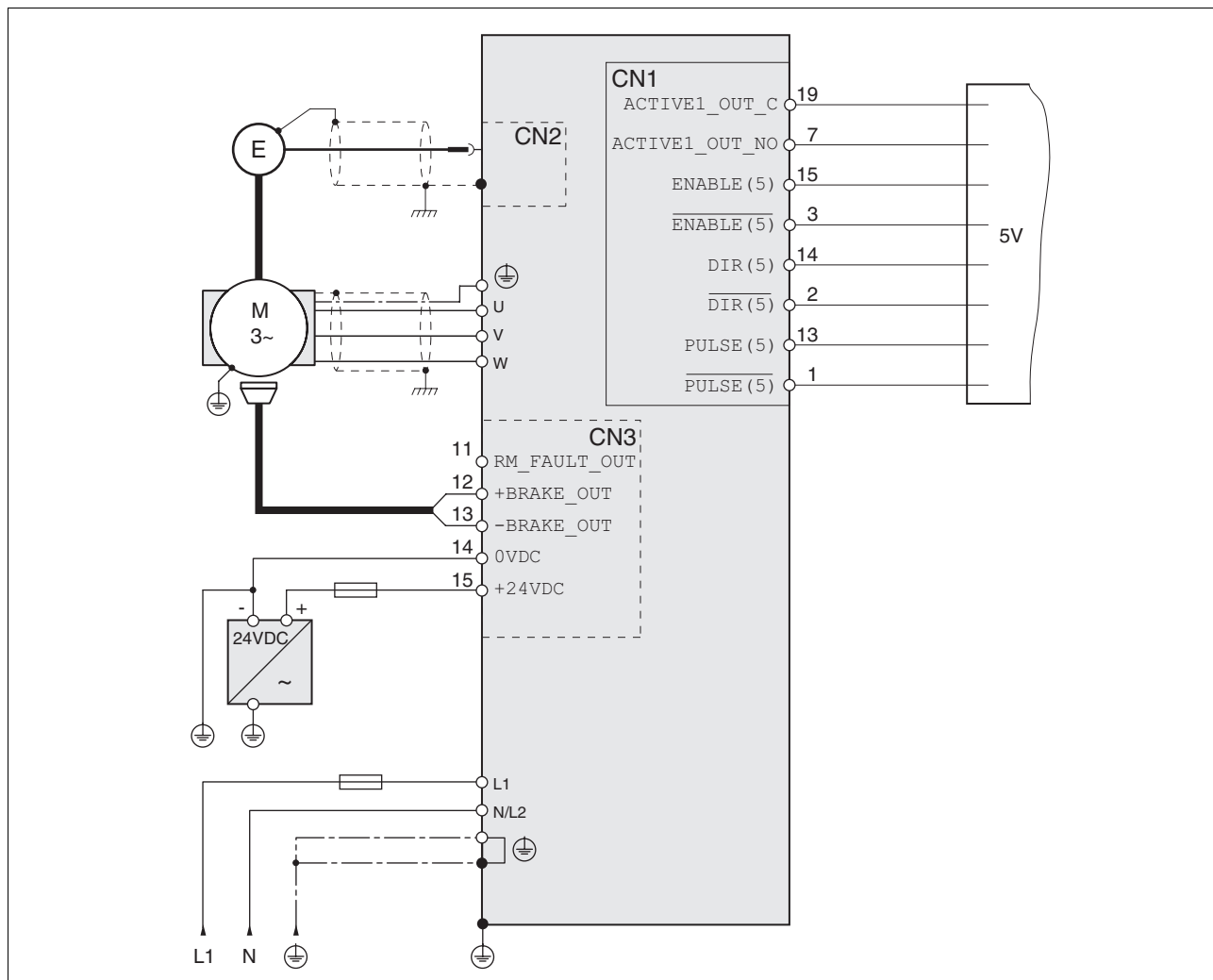


Status display

LED	Description
READY	Ready, power amplifier activated, motor receiving current (1-level on input signal <i>ENABLE</i>)
FAULT	Short circuit between two motor phases or between motor phase against PE
TEMP (static) TEMP (flashing ¹⁾)	Overtemperature power amplifier Overtemperature motor
OVER-VOLT	Overvoltage (>410%)
LOW-VOLT	Undervoltage (<200%)
RM-FAULT ¹⁾	Error message by rotation monitoring
OVER-VOLT, LOW-VOLT	Power amplifier deactivated, motor current-free (0-level on input signal <i>ENABLE</i>)
FAULT, TEMP, OVER-VOLT, LOW-VOLT	Frequency at signal interface too high

¹⁾ Only for SD3 26R...

Wiring example



Wiring example

Technical Data**Mechanical data**

		SD3 26•U25	SD3 26•U68
Dimensions (W x H x D)	mm	72 x 145 x 140	
Weight	kg	1.1	1.2
Type of cooling		Convection	Fan
Max. motor speed	1/min	3000	

Electrical Data

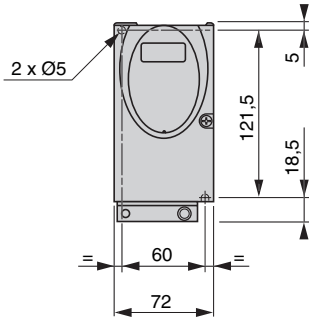
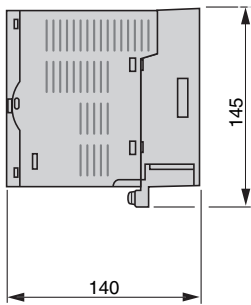
Mains supply		SD3 26•U25	SD3 26•U68
Nominal voltage (switching)	V	115 / 230 (1~)	
Max. rated motor current	A	2.5	6.8
Nominal power (115 V / 230 V)	W	180 / 270	280 / 420
Max. permissible mains short circuit current	kA	0.5	0.5
Line-side fuse (115V/230V)	A	6 / 6	10 / 6
Voltage range and tolerance			
• 115 V _{AC}	V	100 - 15% ... 120 + 10%	
• 230 V _{AC}	V	200 - 15% ... 240 + 10%	
Frequency	Hz	47...63	
Transient overvoltage		Overvoltage category III	
Inrush current	A	< 60	
Leakage current (as per IEC 60990, Figure 3)	mA	<30	
Signal interface CN1			
5-V optocoupler input signals			
• Logic 1 (U _{high})	V	+2.5 ... +5.25	
• Logic 0 (U _{low})	V	≤0.5	
• Input current	mA	≤25	
• Max. input frequency	kHz	≤200	
24-V optocoupler input signals			
• Logic 1 (U _{high})	V	+15...+30	
• Logic 0 (U _{low})	V	≤5	
• Input current	mA	≤7	
• Max. input frequency	kHz	≤200	
"Readiness" signal output		Electronic relay	
• Max. switching voltage	V _{DC}	≤30	
• Max. switching current	mA	≤200	
• Voltage drop at 50 mA load	V	≤1	
Rotation monitoring interface CN2 (optional)			
"ENC+5V_OUT" signal output		Sense-regulated, short-circuit-proof, overload-proof	
• Supply voltage	V	4.75 ... 5.25	
• Max. output current	mA	≤100	
• Voltage drop at 50 mA	V	≤1	
"ENC_A/ENC_B" signal input			
• Voltage symmetrical	V	conforming to RS422	
• Input frequency	kHz	≤ 400	
24-V interface CN3 (optional)			
24-V control voltage		As per IEC 61131-2	
• Input voltage	V	24 -15% / +20%	
• Current consumption	A	≤0.2	
• Ripple voltage	%	< 5	
24V output signals		As per IEC 61131-2	
• Output voltage	V	≤30	
• Max. switching current $\overline{\text{RM-FAULT_OUT}}$	V	≤50	
• Max. switching current +BRAKE_OUT	A	≤1.7	
• Voltage drop at 50 mA load	V	≤1	

Ambient conditions		
Ambient temperature ¹⁾	°C	0...+50
Transport and storage temperature	°C	-25 ... +70
Pollution degree		Step 2
Relative humidity	%	5 ... 85, no condensation permissible
Installation height above mean sea level for 100% power	m	< 1000
Installation height	m	<2000; with max. ambient temperature 40 °C, without protective film and a lateral distance >50 mm
Oscillation and vibration		as per IEC/EN 60068-2-6 3 ... 13 Hz: 1.5 mm peak 13 ... 150 Hz: 1g
Shock loading		as per IEC/EN 60068-2-27 15 g for 11 ms
Degree of protection		IP 20
		IP 40 restricted: from above only, without distance to protective cover

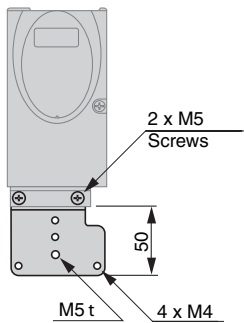
¹⁾ no icing

Dimensional drawings

SD3 26

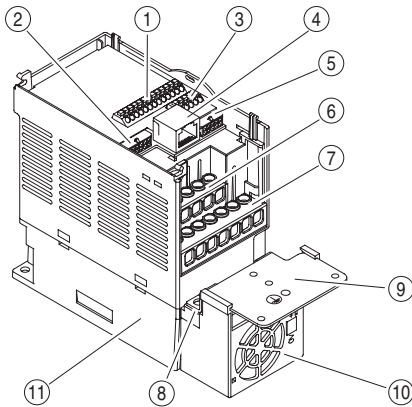


EMC mounting plate (included in scope of supply)



Type code					
Example	SD3	26	D	U25	S2
Product designation SD3 = stepper drive 3-phase	SD3	26	D	U25	S2
Product type 26 = standard stepper drive	SD3	26	D	U25	S2
Interfaces D = pulse direction without rotation monitoring R = pulse-direction with rotation monitoring and holding brake connection	SD3	26	D	U25	S2
Max. rated motor current U25 = 2.5 A U68 = 6.8 A	SD3	26	D	U25	S2
Power amplifier supply voltage S2 = 1~, 115 V _{AC} / 230 V _{AC} (switching)	SD3	26	D	U25	S2

Possible order numbers	
Type	Order number
SD3 26D U25 S2	063711110100
SD3 26D U68 S2	063711110101
SD3 26R U25 S2	063711110200
SD3 26R U68 S2	063711110201



Product Description

Device overview

Components and interfaces

- (1) CN1, I/O signal connection (spring loaded terminals)
 - Analogue reference value input $\pm 10\text{V}$ in oscillator operating mode (SD3 28A only)
 - CANopen for fieldbus control (SD3 28A only)
 - Profibus for fieldbus control (SD3 28B only)
 - Eight digital inputs/outputs. The assignment depends on the selected operating mode.
- (2) 12-pin CN2 female connector for motor encoder
- (3) CN3 connection for 24-V power supply and holding brake terminal
- (4) CN4, RJ45 female connector for connecting
 - Fieldbus: Modbus or CANopen (SD3 28A only)
 - PC with BLCT commissioning software
 - Remote terminal
- (5) 10-pin CN5 female connector for
 - Feed of pulse/direction of A/B encoder signals in electronic gear operating mode
- (6) Screw terminals for connecting the mains supply
- (7) Screw terminals for connecting the motor and external braking resistors
- (8) Base for attachment of the EMC mounting plate
- (9) EMC mounting plate
- (10) Fan (SD3 28•U68 only)
- (11) Heat sink

Drive system

The SD3 28 is a universally applicable stepper drive.

Reference values are typically preset and monitored by a higher level PLC or a Berger Lahr motion controller, e.g. TLM2.

It offers a very compact and powerful drive system in combination with selected stepper motors from Berger Lahr.

Control

The setpoint value can be specified via:

- Fieldbus for profile position mode, profile velocity and oscillator mode (SD3 28A only). The SD3 28A can be controlled by Modbus and CANopen, the SD3 28B by Profibus.
- a $\pm 10\text{-V}$ analogue signal in oscillator mode (SD3 28A only)
- Pulse/direction signals or A/B encoder signals for implementing electronic gear.

Rotation monitoring / motor monitoring

If a stepper motor is connected to an integrated encoder, the following functions can be enabled:

- Rotation monitoring:
the calculated setpoint position and the actual position of the motor are compared. If a permanently defined variation is exceeded a rotation monitoring error is reported.
- Line monitoring:
the encoder cable is monitored by a line monitor; a cable error is reported if a faulty or missing cable is detected.
- Motor temperature monitoring:
the device shuts off if the motor temperature is too high.

Local communication

Overview

The SD3 28 stepper drive can be operated locally as follows:

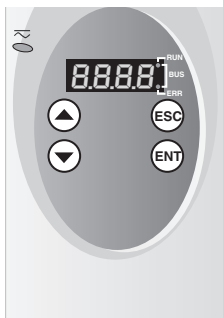
- Integrated control panel (HMI) on the SD3 28 with keys and display
- Remote terminal
- "BLCT" PC commissioning software

Integrated control panel (HMI)

The SD3 28 can be used to edit parameters with the integrated control panel (HMI – Human Machine Interface). Displays for diagnosis are also possible.

The integrated control panel includes the following options:

- Initial settings:
 - Motor selection
 - Fieldbus address and baud rate
 - Logic type of digital inputs and outputs (SD3 28A only)
- Device settings:
 - Special gear ratios
 - Phase current components for standstill, acceleration and constant movement
- Device configuration:
 - Processing the motor encoder position
 - Signal selection at position interface
 - Definition of direction of rotation
 - Time delay for opening and closing/releasing the holding brake
- Traverse motor manually
- Error display
- Status information:
 - Status of digital inputs and outputs
 - Actual speed and position of the motor
 - DC bus voltage of power amplifier supply voltage
 - Temperature of stepper drive and motor
 - Saved warnings and monitoring signals
 - Operating hours counter



Integrated control panel (HMI)



Remote terminal

Remote terminal

A remote terminal can be connected to the SD3 28, which can be attached to a switching cabinet door with an IP 65 seal.

The remote terminal has a display and enables access to the same functions as the control panel integrated into the stepper drive (HMI).

"BLCT" PC commissioning software

The Windows-based "BLCT" commissioning software is used for easy commissioning, parameterisation, simulations and diagnostics of the SD3 28.

The BLCT software includes the options of loading and saving controller parameters and motor data.

Compared to the integrated control panel the "BLCT" commissioning software offers further options such as:

- Graphic interface for parameterisation and status display
- Extensive diagnostic tools for optimisation and maintenance
- Long-term recording as an aid to assessing operating behaviour
- Testing input and output signals
- Tracking signal sequences on the monitor
- Archiving all device settings and recordings with export functions for data processing



"BLCT" PC commissioning software

Functions

Commissioning functions

Commissioning can be run with the following tools:

- Integrated control panel (HMI)
- Remote terminal
- "BLCT" PC commissioning software
- Fieldbus

Two important commissioning functions of the SD3 28A are explained below. A detailed description of the commissioning functions is given in the device documentation.

Control over fieldbus or locally (SD3 28A only)

When a device is started for the first time, the setup menu must be used to specify whether access and parameterisation will be via local controller or via fieldbus. This specification can only be modified by restoring the factory setting. The operating modes available for the device also depend on this setting.

With local control the integrated control panel (HMI), the remote terminal (functionally equivalent to the integrated control panel) or the "BLCT" PC commissioning software is used. The movement is then preset with a ± 10 V analogue signal or with RS422 signals (pulse/direction signals). Limit switches or reference switches cannot be connected with the local control.

In fieldbus control mode all communications are made via fieldbus commands.

Determining logic type of signals (SD3 28A only)

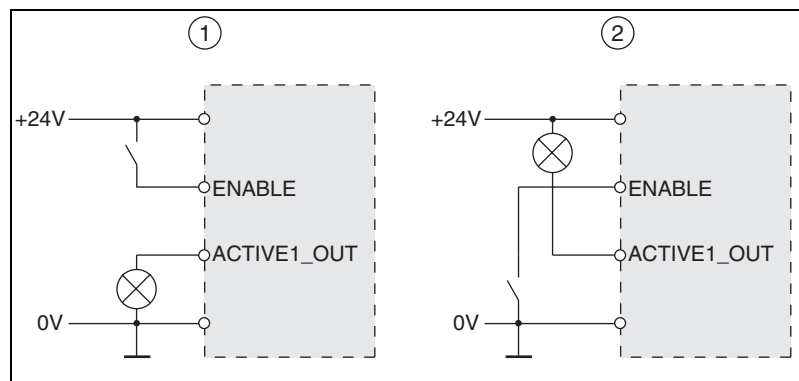
At commissioning the signal logic (positive or negative) of the 24 V inputs and outputs can be specified.

This setting affects the wiring and the control of sensors and must be thoroughly clarified during engineering with regard to the application.

The SD3 28A can switch the 24-V inputs and outputs as follows:

- "Source" logic type:
output supplies current, current flows to the input
- "Sink" logic type:
output draws current, current flows from the input

By default the device is set to the "Source" logic type. The inputs for the "Power Removal" safety function are independent of the setting **always** executed in the "Source" logic type!



Logic type

- (1) "Source"
(2) "Sink"

Operating modes

Overview of operating modes

Operating mode	with SD3..		Controller via		Reference value preset by
	28 A	28B	Fieldbus	local	
Jog	x	x	x	x	Fieldbus, "BLCT" commissioning software or integrated control panel (HMI)
Oscillator	x		x	x	Fieldbus, "BLCT" commissioning software or ± 10 -V analogue signals
Electronic gear	x	x	x	x	Pulse/direction or A/B encoder signals
Profile position mode	x	x	x		Fieldbus or "BLCT" commissioning software
Profile velocity	x	x	x		Fieldbus or "BLCT" commissioning software
Homing	x	x	x		Fieldbus or "BLCT" commissioning software

Jog

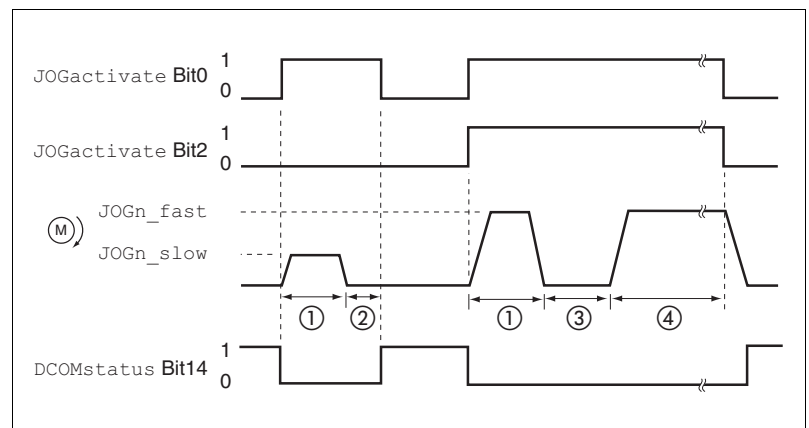
The motor traverses by one traverse unit or at constant speed in continuous operation. The length of the traverse unit, the speed steps and the change-over time in continuous operation can be adjusted.

Reference value default

The reference values are set via fieldbus, with the "BLCT" PC commissioning software or the integrated control panel (HMI).

Application example

Setting up the machine during commissioning



Jog, slow and fast

- (1) JOGstepusr
- (2) $t < JOGtime$
- (3) $t > JOGtime$
- (4) Continuous operation

Inching distance, wait time and manual movement speeds can be set. If the inching distance is zero, jog starts directly with continuous movement irrespective of the wait time.

Oscillator (SD3 28A only)

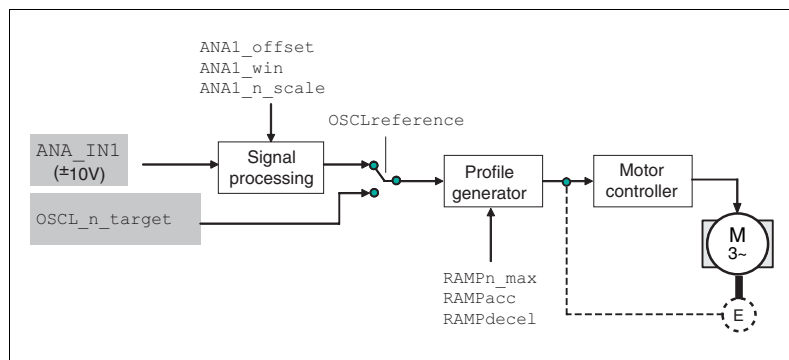
In "Oscillator" operating mode the speed of rotation of the motor is set by a ± 10 -V analogue signal or by fieldbus parameters.

Reference value default

The reference values are set via fieldbus, with the "BLCT" PC commissioning software or ± 10 -V analogue signals.

Application example

Roller control in roller conveyors.



Overview operating mode "Oscillator"

Electronic gear

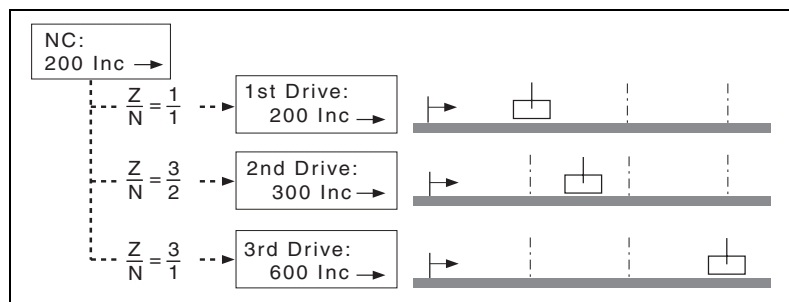
In "electronic gear" operating mode the reference signal from an encoder (A/B signals) or a controller (pulse/direction signals) are fed in and a new position setpoint is calculated with an adjustable gear ratio.

Reference value default

The reference value is set via pulse/direction or A/B encoder signals.

Example of application

Synchronisation of motion sequences, e.g. cutting material on a conveyor.



"Electronic gear" operating mode

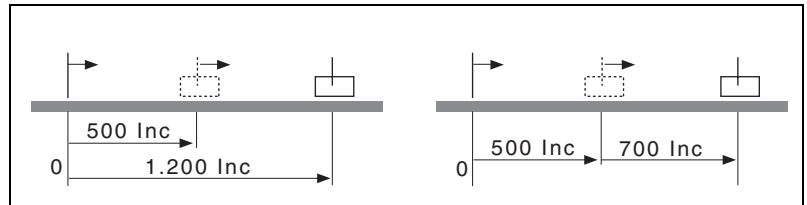
Profile position mode

In "profile position" operating mode the motor is positioned from a point A to a point B with a positioning command.

Setting options

The positioning path can be input in two ways:

- Absolute positioning, reference point is the zero point of the axis
- Relative positioning, reference point is the current position of the motor



"Profile position" operating mode, absolute and relative

Reference value default

The reference values are set via fieldbus or with the "BLCT" PC commissioning software.

Application example

Pick-and-place with a linear robot

Profile velocity

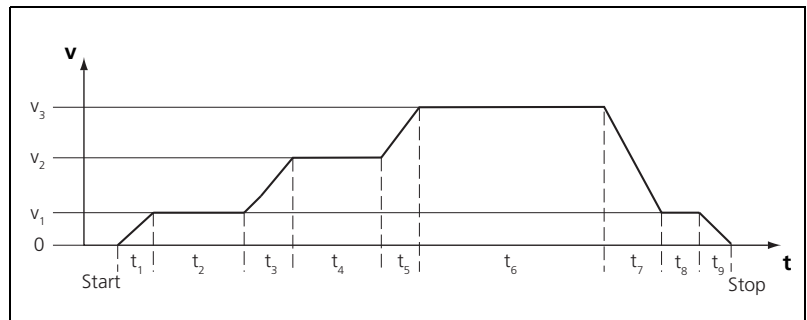
In "profile velocity" operating mode a set speed for the motor is set and a movement without a target position is started. This speed is maintained until a different set speed is input or the operating mode is changed.

Reference value default

The reference values are set via fieldbus or with the "BLCT" PC commissioning software.

Example of application

Coating application in CD manufacture



Operating mode "profile velocity"

- t_1, t_3, t_5 = acceleration
- t_2, t_4, t_6, t_8 = constant movement
- t_7, t_9 = braking

Homing

There are two types of homing:

- Reference movement Specifying the dimension reference by approach to a limit or reference switch
- Set dimensions Specifying the dimension reference relative to the current motor position

Reference movement

In the reference movement a defined position on the axis is approached. The defined position is specified by a mechanical switch:

- Limit switch
- Reference switch \overline{REF}

Types of reference movements

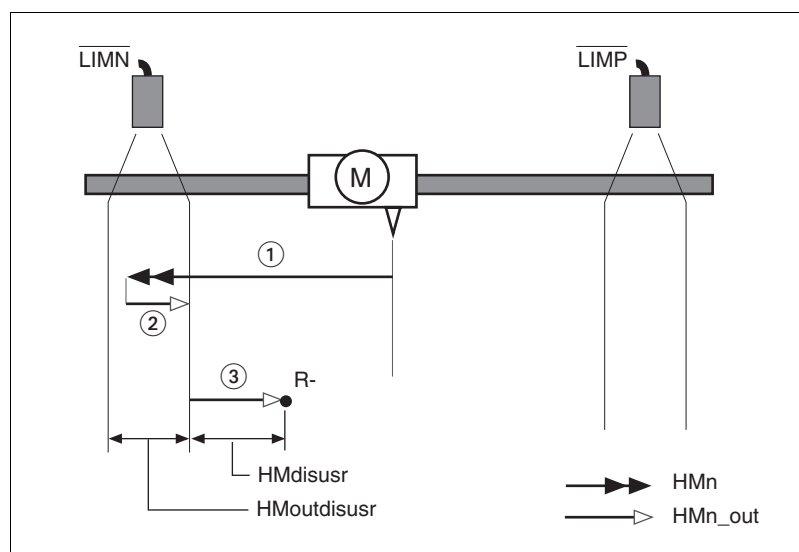
4 standard reference movements are available

- Movement to negative limit switch \overline{LIMN}
- Movement to positive limit switch \overline{LIMP}
- Movement to reference switch \overline{REF} with counterclockwise rotation movement
- Movement to reference switch \overline{REF} with clockwise rotation movement

A reference movement can be conducted with or without index pulse.

- Reference movement without index pulse
Movement from the edge of the switch to a distance set by parameters from the edge of the switch.
- Reference movement with index pulse
movement from switching edge to the physical index pulse of the motor.

Example 1: Reference movement towards limit switch

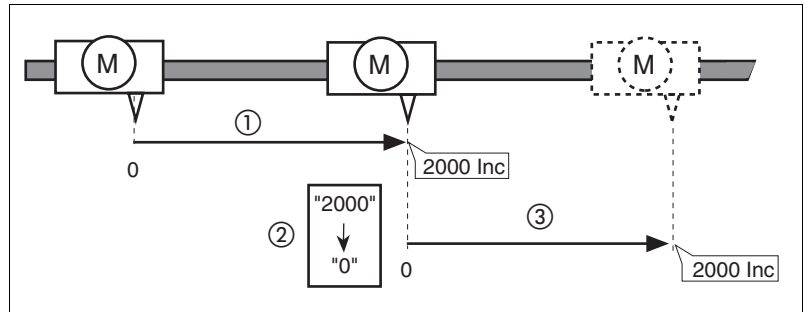


"homing" operating mode, reference movement to the negative limit switch

- (1) Movement to limit switch at search speed
- (2) Movement to switching edge with clearance speed
- (3) Movement at the distance to switching edge with clearance speed

Example 2: Dimension setting

Dimension setting can be used to carry out a continuous motor movement without exceeding positioning limits.



Positioning by 4000 increments with set dimensions

- (1) The motor is positioned by 2000 Inc.
- (2) By setting dimensions to 0 the current motor position is set to position value 0 and the new zero point is simultaneously defined.
- (3) After triggering a new travel command by 2000 Inc the new target position is 2000 Inc.

This method avoids crossing absolute position limits during a positioning operation because the zero point is continuously tracked.

Reference value default

The reference values are set via fieldbus or with the "BLCT" PC commissioning software.

Application example

Before absolute positioning in profile position mode.

Safety function**Definition****Power Removal**

The "Power Removal" safety function shuts off the motor torque safely. The supply voltage must not be interrupted. There is no monitoring at standstill.

Category 0 stop (EN60204-1)

Standstill by immediate power shutdown to the machine drive elements (i.e. an uncontrolled stop).

Category 1 stop (EN60204-1)

A controlled stop in which the machine drive elements are retained to effect the standstill. Power feed is only interrupted when everything has come to a standstill.

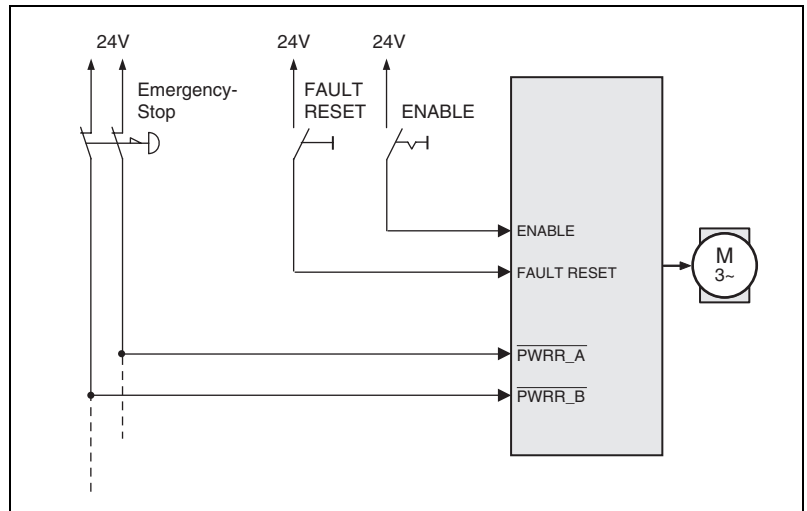
Description

The "Power Removal" safety function integrated into the product can be used to implement the "Emergency Stop" control function (EN 60204-1) for Category 0 Stop and Category 1 Stop. This safety function also prevents the compact drive from unexpected restart.

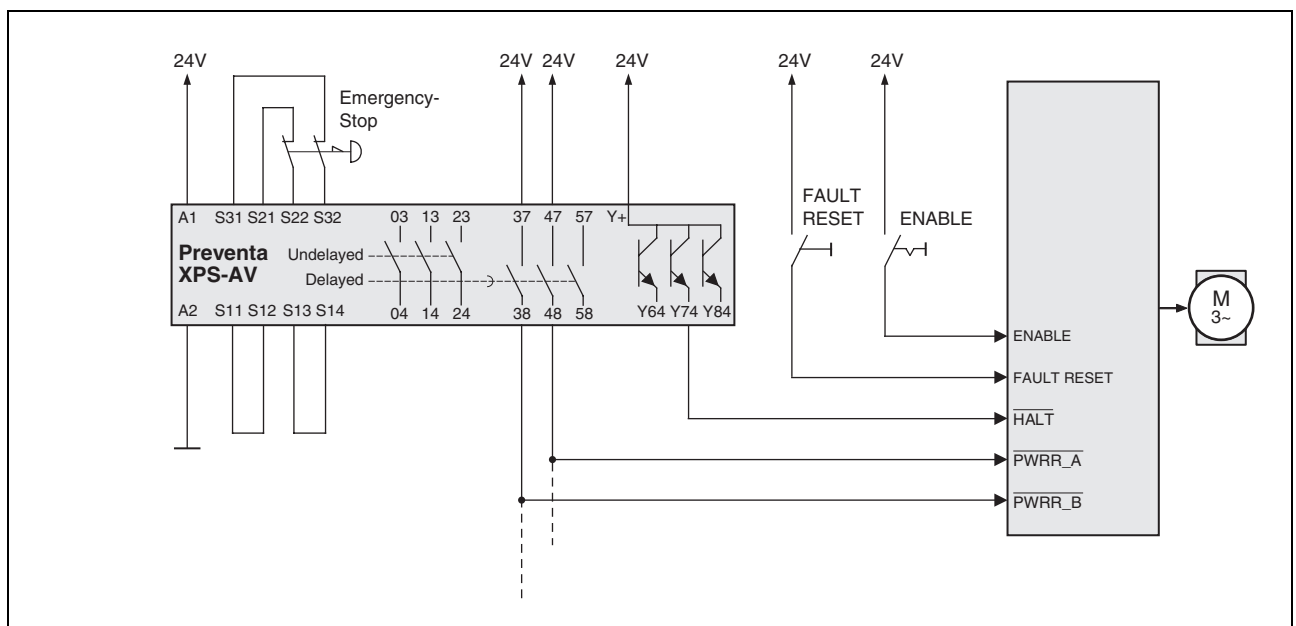
The following safety levels are implemented in accordance with the standards for functional safety:

- IEC 61508, SIL 2: functional safety of electrical/electronic programmable safety-related systems
- pr IEC 62061, SIL 2: Safety of machinery - Functional safety of electrical, electronic and programmable controllers of machines
- EN 954-1, Category 3: Safety of machinery, Safety of components of control devices, Part 1: General design requirements
- pr EN 13849-1, Category 3: Safety of machines, Safety of components of control devices, Part 1: General design requirements

Examples of applications for the safety function



Example category 0 stop



Example category 1 stop

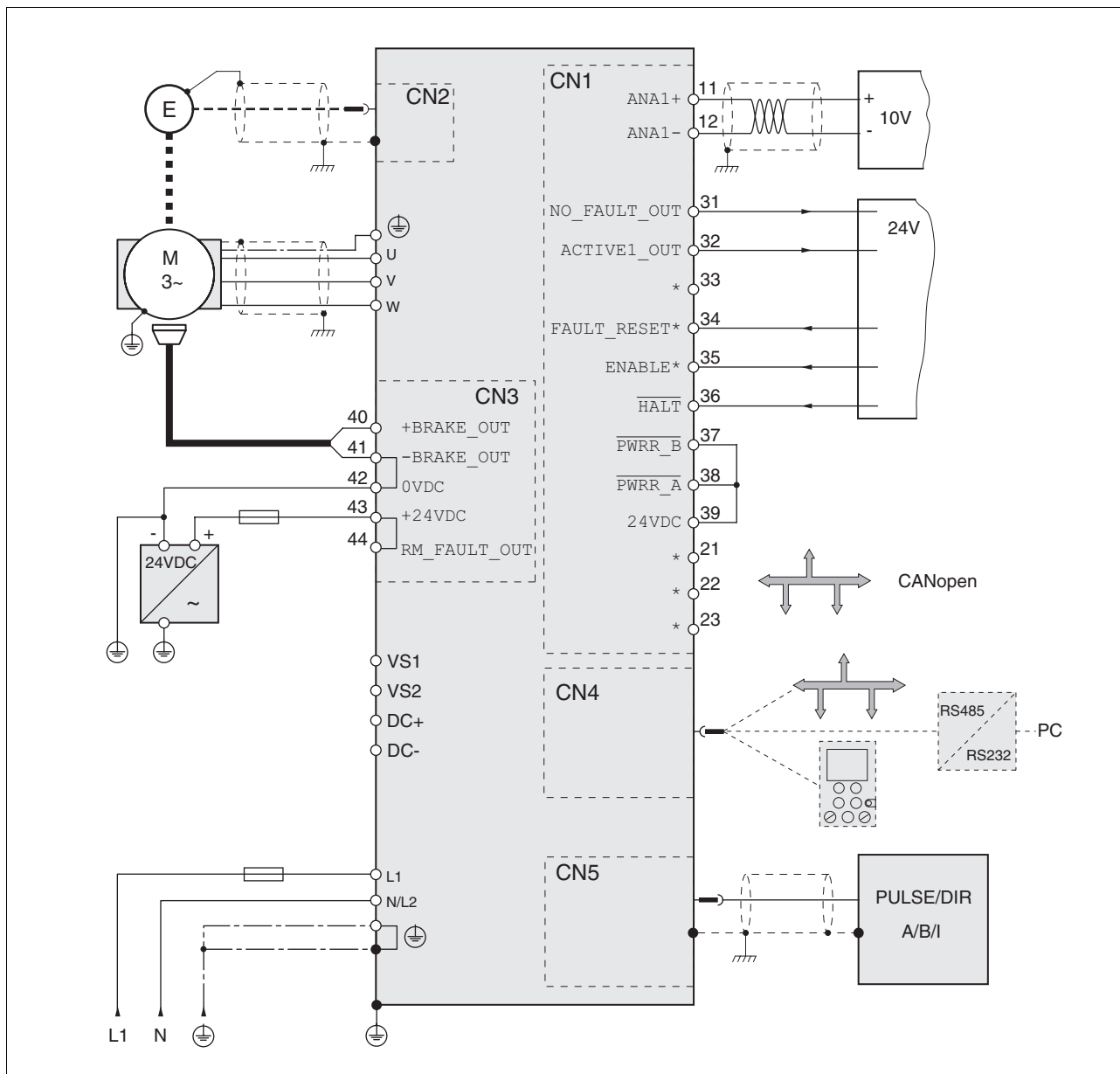
Operating functions

Additional monitoring and operating functions can be activated via fieldbus, the "BLCT" PC commissioning software or the integrated control panel (HMI):

- Setting motor phase current
- Monitoring functions
- Status monitoring in movement mode
- Monitoring of axis signals
- Monitoring internal signals
 - Earth fault and short-circuit monitoring
- Scaling for conversion of user-defined units to internal units
- Setting travel profile via profile generator
- Triggering Quick Stop function
- Setting STOP signal
- Fast position capture
- Velocity window
- Triggering brake functions on motor with holding brake
- Reversing direction of rotation of motor

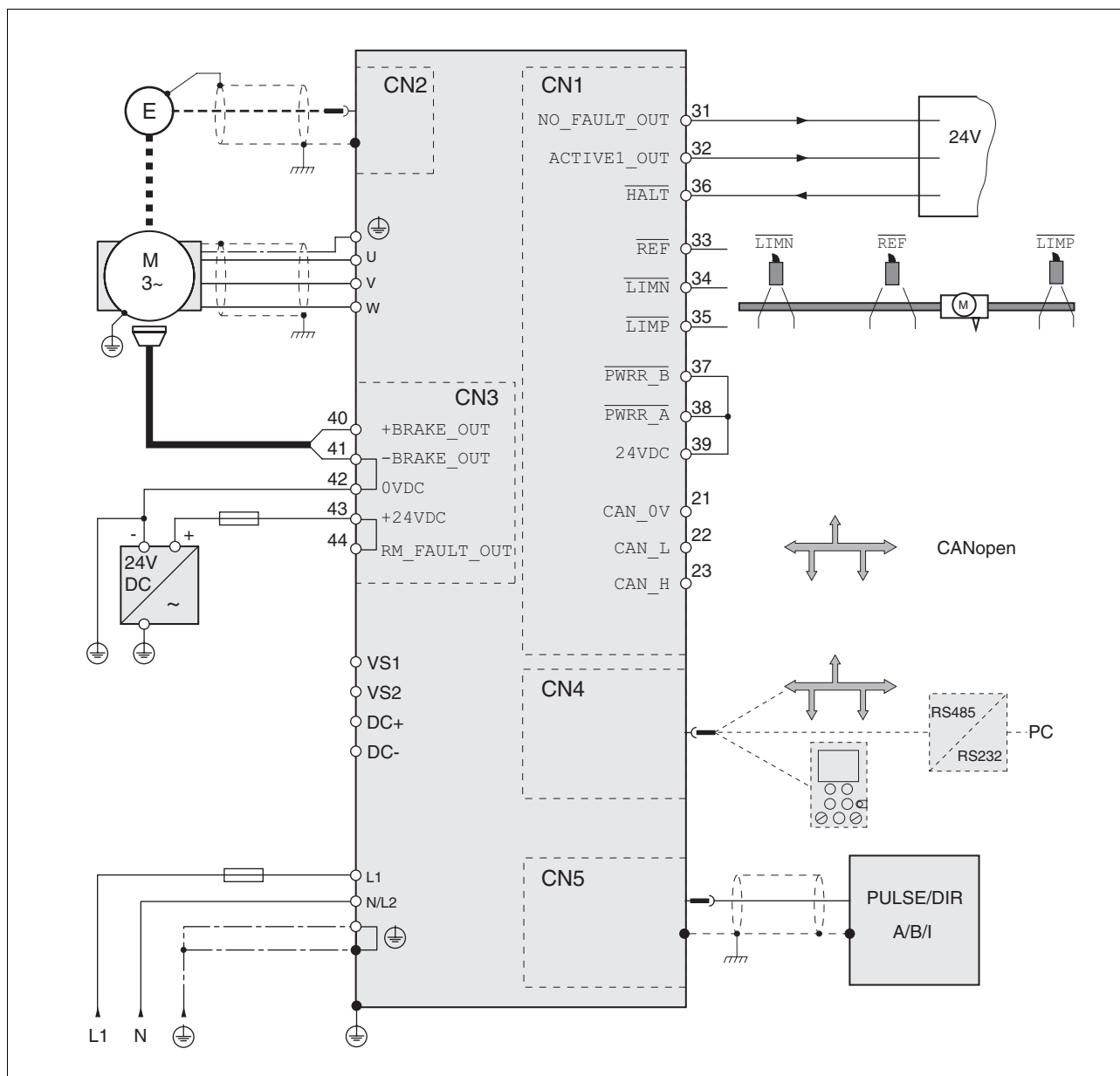
Wiring examples

Wiring example for SD3 28A



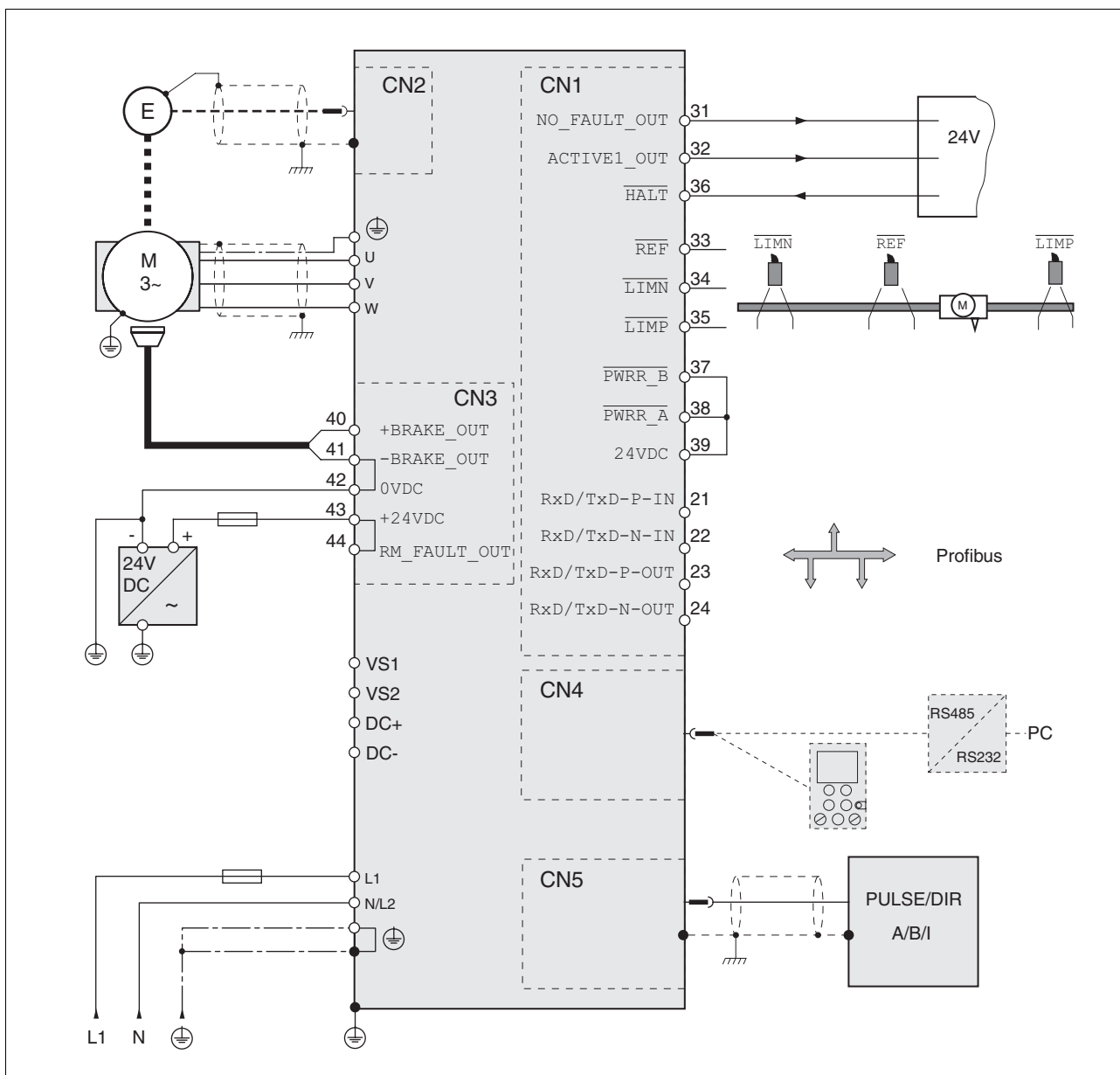
Wiring example for SD3 28A, local controllers

Wiring example for SD3 28A



Wiring example for SD3 28A, fieldbus controller

Wiring example for SD3 28B



Wiring example for SD3 28B, fieldbus controller

Technical Data

Mechanical data

		SD3 28•U25	SD3 28•U68
Dimensions (W x H x D)	mm	72 x 145 x 140	
Weight	kg	1.1	1.2
Type of cooling		Convection	Fan
Max. motor speed	1/min	3000	

Electrical Data

		SD3 28•U25	SD3 28•U68
Mains supply			
Nominal voltage (switching)	V	115 / 230 (1~)	115 / 230 (1~)
Current consumption (115 V/230 V)	A	4 / 3	7 / 5
Max. rated motor current	A	2.5	6.8
Max. motor speed	1/min	3000	3000
Nominal power (115 V / 230 V)	W	180 / 270	280 / 420
Max. permissible mains short circuit current	kA	0.5	0.5
power loss	W	≤26	≤65
Line-side fuse (115V/230V) ¹⁾	A	6 / 6	10 / 6
Voltage range and tolerance			
• 115 V _{AC}	V	100 - 15% ... 120 + 10%	
• 230V _{AC}	V	200 - 15% ... 240 + 10%	
Frequency	Hz	50 - 5% ... 60 + 5%	
Transient overvoltage		overvoltage category III	
Inrush current	A	< 60	
Leakage current (as per IEC 60990, Figure 3; motor cable length <10 m)	mA	<30	
Fan			
Input voltage	V _{DC}	-	24
Current consumption	mA	-	130
Signal interface CN1			
Analogue input signals (SD3 28A only)			
• Differential input voltage range	V	-10 - +10	
• Resistance	kΩ	≥≥10	
• Resolution _{ANA1}	Bit	14	
• Sampling time _{ANA1}	ms	0.25	
Rotation monitoring interface CN2			
"ENC+5V_OUT" signal output		sense-regulated, short-circuit-proof, overload-proof	
• Supply voltage	V	4.75 ... 5.25	
• Max. output current	mA	≤100	
"ENC_A", "ENC_B", "ENC_I" signal inputs			
• Voltage	V	conforming to RS422	
• Input frequency	kHz	≤400	
CN3 24-V signal interface			
24-V control voltage		as per IEC 61131-2	
• Input voltage	V	24 -15% / +20%	
• Current consumption ²⁾	A	≤0.2	
• Ripple voltage	%	< 5	
24-V input signals			
• Logic 1 (U _{high})	V	+15 ... +30	
• Logic 0 (U _{low})	V	-3 ... +5	
• Input current (typical)	mA	≤10	
• Debounce time ³⁾	ms	1 ... 1.5	
• Debounce time $\overline{\text{PWRR_A}}$ and $\overline{\text{PWRR_B}}$	ms	1 - 5	
• Max. skew until detection of signal differences between $\overline{\text{PWRR_A}}$ and $\overline{\text{PWRR_B}}$	s	≤1	
• Debounce time CAP1 and CAP2	μs	1 - 10	
24-V output signals		as per IEC 61131-2	
• Output voltage	V	≤30	
• Max. switching current	mA	≤50	
• Voltage drop at 50 mA load	V	≤1	

¹⁾ Fuses: fusible links of class CC or as per UL 248-4, alternatively miniature circuit-breakers with B or C-characteristic

²⁾ Without loading the outputs

³⁾ Except for $\overline{\text{PWRR_A}}$, $\overline{\text{PWRR_B}}$, CAP1 and CAP2

Electrical Data**CN5 pulse/direction interface**

Symmetrical		as per RS 422
Resistance	kΩ	5
Pulse/direction frequency	kHz	≤200
A/B frequency	kHz	< 400
CN1 or CN4 CANopen interface (SD3 28A only)		
Terminals		RJ45 connector (CN4); spring-loaded terminals (CN1)
Network management		Slave
Baud rate	kbps	125 / 250 / 500 / 1024
Address (node ID)		1 ... 127; configurable with the integrated control panel (HMI) or the "BLCT" commissioning software
Max. number of connected stepper drives		127
Polarisation		A switching line terminal resistor is integrated into the stepper drives.
Services		
• PDO (Process Data Objects)		Implicit exchange of PDOs (Process Data Objects) <ul style="list-style-type: none"> • 3 PDOs as per DSP 402 ("profile position" and "profile velocity" operating modes) • 1 PDO with freely configurable assignment
• PDO operating modes		Event triggering, time triggering, remotely requested; sync, cyclic and acyclic
• PDO mapping		1 PDO configurable
• SDO		Explicit exchange of SDOs (Service Data Objects) <ul style="list-style-type: none"> • 2 SDO receive • 2 SDO send
• Emergency		Yes
• Profile		CiA DSP 402: CANopen "device profile drives and axis control", "profile position" and "profile velocity" operating modes
• Communication monitoring		Node guarding, heartbeat
Diagnostics		2 LEDs "RUN" (operation) and "ERR" (error) on integrated HMI; errors are displayed by the 7-segment display on the integrated control panel (HMI); complete diagnostic data with "BLCT" commissioning software
Description file		The EDS file is supplied on the CD-ROM, which also contains the technical documentation for the SD3 28.
CN4 Modbus interface (SD3 28A only)		
Terminals		RJ45 connector (CN4)
Physical interface		2-wire, multipoint RS485
Transmission mode		RTU
Baud rate	bps	9600 / 19200 / 38400
Address (node ID)		1 ... 247; configurable with the integrated HMI or the "BLCT" commissioning software
Max. number of connected stepper drives		31
Polarisation		No polarisation impedance. They must be supplied by the wiring system, e.g. in master.
Format		Configurable via the integrated HMI or the "BLCT" software <ul style="list-style-type: none"> • 8 bit, odd parity, 1 stop bit • 8 bit, even parity, 1 stop bit • 8 bit, no parity, 1 stop bit • 8 bit, no parity, 2 stop bits
Services		
• Message administration		<ul style="list-style-type: none"> • Read holding register (03), max. 63 words • Write single register (06) • Write multiple registers (16), max. 61 words • Read/write multiple registers (23), max. 63/59 words • Read device ID (43) • Diagnostics (08)
• Communication monitoring		Monitoring function (node monitoring) can be activated. "Timeout" can be set between 0.1 s and 10 s.
Diagnostics		Errors are displayed by the 7-segment display on the integrated HMI.

Electrical Data

CN1 Profibus DP interface (SD3 28B only)		
Terminals		Spring-loaded terminals (CN1)
Physical interface		2-wire, multipoint RS485
Baud rate	kbps	9.6 / 19.2 / 45.45 / 93.75 / 187 / 500
	mbps	1.5 / 3 / 6 / 12
Address (node ID)		1 ... 126; configurable with the integrated HMI or the "BLCT" commissioning software
Services		
• Periodic variables		PPO type 2; 8 PKW bytes; 12 process data bytes
• Communication monitoring		Can be blocked. "Timeout" can be set with the configurator of the Profibus DP network.
Diagnostics		2 LEDs "RUN" (operation) and "ERR" (error) on integrated HMI; errors are displayed by the 7-segment display on the integrated control panel (HMI); complete diagnostic data with "BLCT" commissioning software
Description file		The GSD file is supplied on the CD-ROM, which also contains the technical documentation for the SD3 28. The GSD file does not contain a description of the drive parameters.

Safety functions

Life time corresponding to safety life cycle (IEC 61508)	years	20
SFF (Safe Failure Fraction, IEC 61508)	%	66
Probability of failure (PFH, IEC 61508)	1/h	1.092×10^{-9}
Response time until activation of power amplifier	ms	< 10

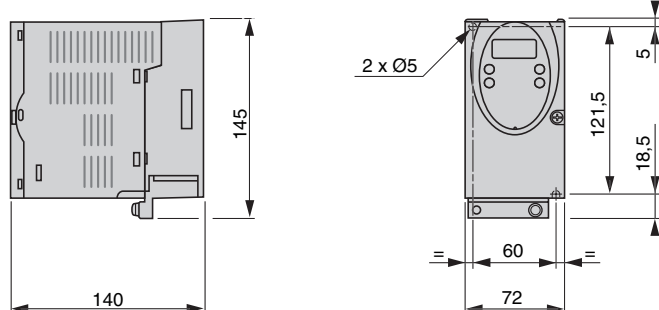
Ambient conditions

Operating temperature ¹⁾	°C	0...+50
Operating temperature when used in accordance with UL ¹⁾	°C	0 ... +40
Transport and storage temperature	°C	-25 ... +70
Pollution degree		Step 2
Relative humidity	%	5 ... 85, no condensation permissible
Installation height above mean sea level for 100% power	m	< 1000
Installation height with max ambient temperature 40 °C, without protective film and with a side distance >50 mm	m	< 2000
Oscillation and vibration		as per IEC/EN 60068-2-6 3 ... 13 Hz: 1.5 mm peak 13 ... 150 Hz: 1g
Shock loading		as per IEC/EN 60068-2-27 15 g for 11 ms
Degree of protection		IP 20 IP 40 restricted: from above only, without distance to protective cover

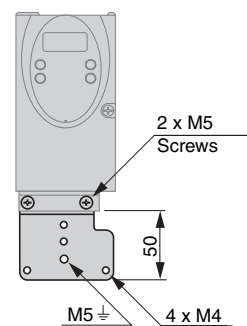
¹⁾ no icing

Dimensional drawings

SD3 28



EMC mounting plate (included in scope of supply)



Type code

Example:	SD3	28	A	U25	S2
Product designation SD3 = stepper drive 3-phase	SD3	28	A	U25	S2
Product type 28 = stepper drive for fieldbus	SD3	28	A	U25	S2
Interfaces A = CANopen fieldbus, Modbus fieldbus and analogue input B = Profibus fieldbus	SD3	28	A	U25	S2
Max. motor phase current U25 = 2.5 A U68 = 6.8 A	SD3	28	A	U25	S2
Power amplifier supply voltage S2 = 1~, 115 V _{AC} / 230 V _{AC} (switching)	SD3	28	A	U25	S2

Possible order numbers

Type	Order number
SD3 28A U25 S2	063711140100
SD3 28A U68 S2	063711140101
SD3 28B U25 S2	063711140200
SD3 28B U68 S2	063711140201

Mounting and installation

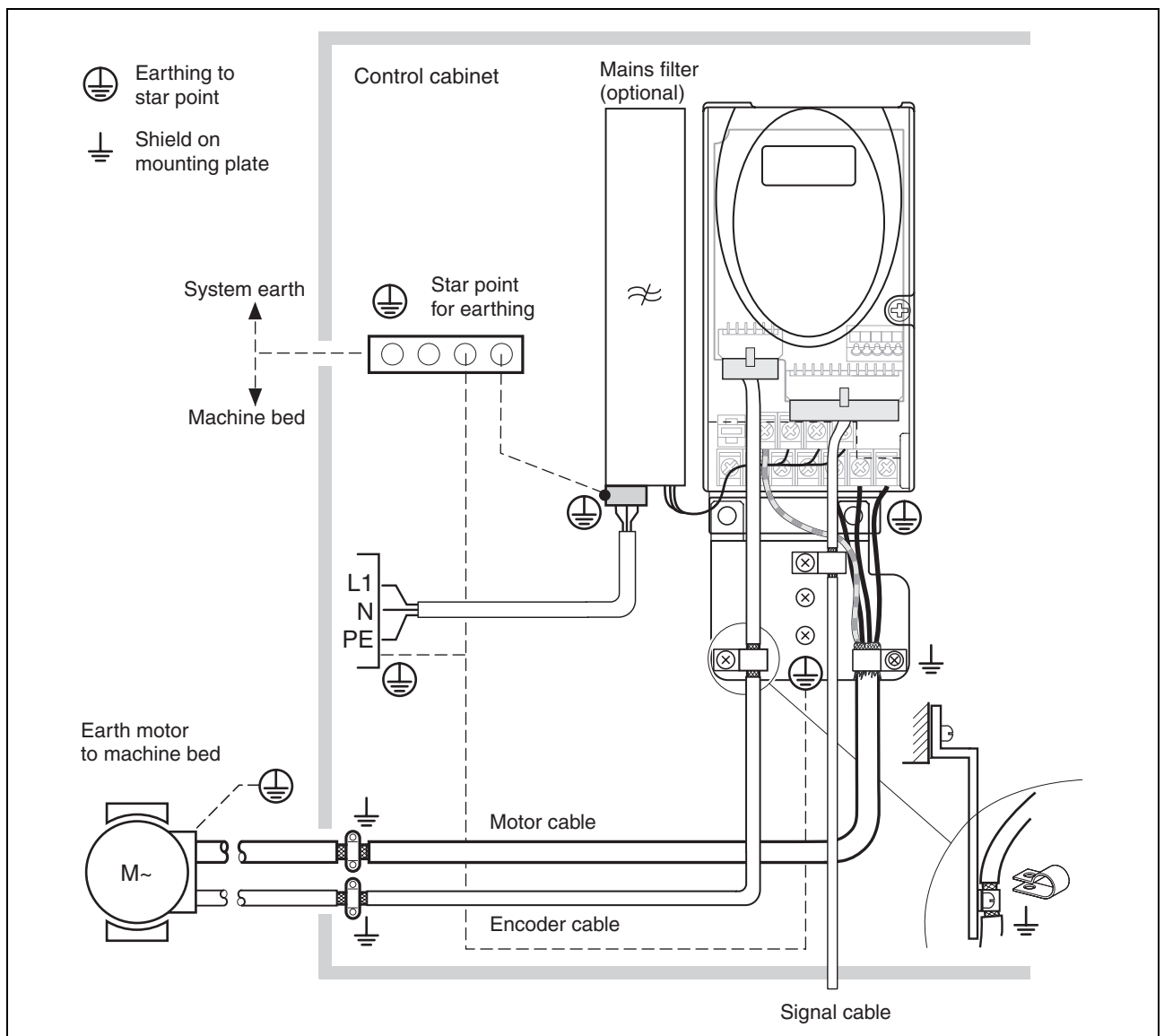
EMC-compliant installation

The SD3 stepper drive meets the EMC requirements for the second environment as per IEC 61800-3.

An EMC-compliant design is required to maintain the specified limit values. Depending in the case better results can be achieved with the following measures:

- Upstream mains reactors. Information on current distortions can be obtained on request.
- Upstream external mains filters, particularly to maintain limit values for the first environment (living area, category C2)
- Particularly EMC-compliant design, e.g. in an enclosed switching cabinet with 15 dB damping of radiated interference

EMC measures for SD3 stepper motor drive



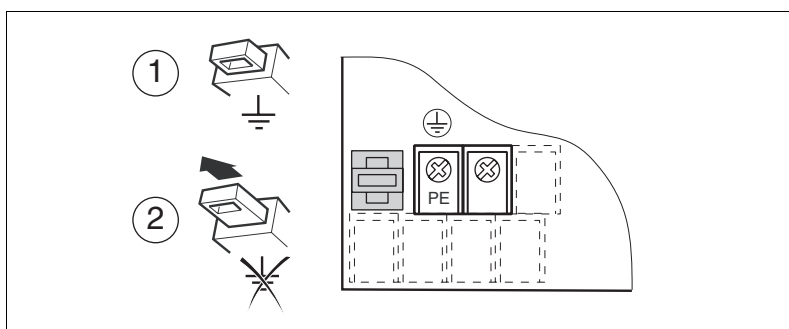
EMC measures

Operation in IT mains

An IT mains sets itself apart through an insulated or a high impedance grounded neutral conductor. If you use permanent insulation monitoring, it must be suitable for non-linear loads (e. g. type XM200 by Merlin Gerin). If an error is still reported despite proper wiring, you can separate the earthing connection of Y-capacitors (deactivate Y-capacitors) for products with a built-in mains filter.

With all other networks except for IT mains the earth connection via the Y-capacitors must be maintained.

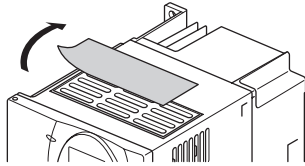
When the earthing connection of the Y-capacitors is disconnected, the information on the transmission of electrical magnetic malfunctions is no longer followed! Compliance with national regulations and standards should be safeguarded by other measures.



Operation in an IT mains

Insulation monitoring error

- (1) Y-capacitors of the internal filter effective (standard)
- (2) Y-capacitors of the internal filter disabled (IT mains)

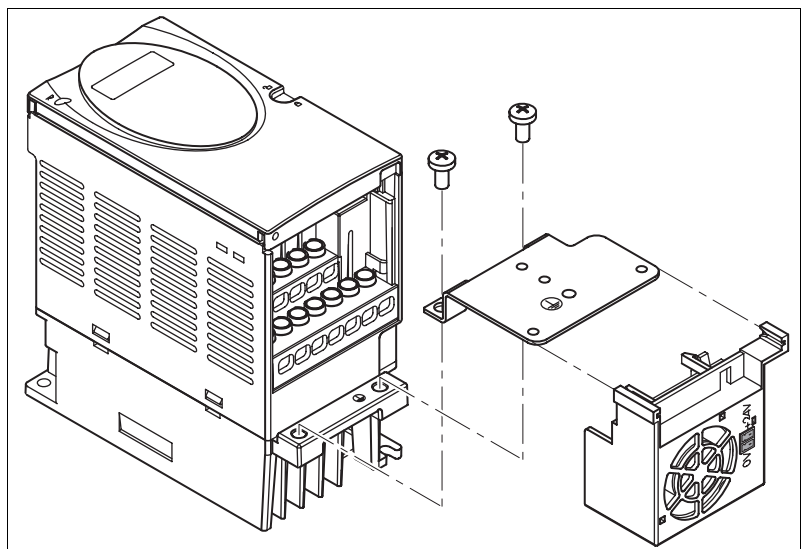


Mounting distances and ventilation

SD3 2••U25 stepper drives are ventilated from bottom to top by air circulation. The SD3 2••U68 stepper drives include a fan, which must be mounted at the bottom of the device.

When selecting the position of the device in the switching cabinet, note the following instructions:

- The device must be adequately cooled by compliance with the minimum installation distances. Avoid heat accumulation.
- The device must not be installed close to heat sources or mounted on flammable materials.
- The warm airflow from other devices and components must not heat the air used for cooling the device.
- The drive will switch off as a result of overtemperature when operated above the thermal limits.



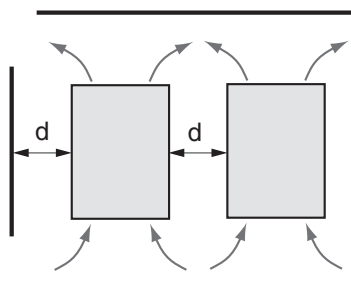
Mounting fans

Ambient temperature	Mounting distances ¹⁾	Measures without protective film ²⁾	Measures with protective film
0 °C ... +40 °C	d > 50 mm	None	None
	d < 50 mm	None	d > 10 mm
+40 °C ... +50 °C	d > 50 mm	None	Reduce nominal current and constant current ³⁾
	d < 50 mm	Reduce nominal current and constant current	Operation not possible

¹⁾ Distance in front of the device: 10 mm, above: 50 mm, below: 200 mm

²⁾ Recommendation: remove protective foil on completion of the installation

³⁾ by 2.2% for each °C above 40 °C

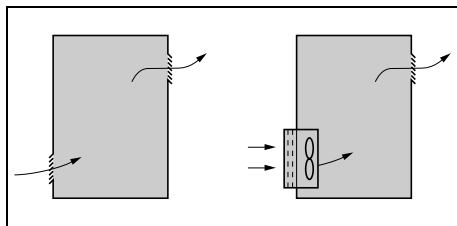


At least 10 mm of free space is required in front of the device.

At least 50 mm of free space is required above the device.

The connector cables come out of the bottom of the housing. At least 200 mm free space under the device is required to ensure that wiring can be installed without excessive bending.

An alternative to fastening the unit directly to the switching cabinet mounting plate is adapter plates for snap-mounting to top-hat rails. In this case mains filters cannot be attached directly beside or behind the device.



Mounting in housing or switching cabinet

Please read the instructions on mounting in the section "Mounting distances and ventilation".

Proceed as follows to ensure adequate device ventilation:

- Provide air inlet vent on the housing.
- The air inlet vent must have an air throughput of at least 0.3 m³/min (SD3 2••U25S2) or 0.55 m³/min (SD3 2••U68S2) per device. If the air throughput is less, external ventilation must be installed.
- Use IP 54 special filter.
- Remove the top cover on the device.
- The throughput of the fan should be at least 0.3 m³/min.

Sheet metal housing and switching cabinet (degree of protection IP 54)

The SD3 stepper drive must be installed in a sealed housing under the following ambient conditions: dust, corrosive gases, high humidity with the danger of condensation and surface water accumulation, ...

In this cases the SD3 can be installed in a housing with an internal temperature of up to 50 °C.

Calculation of housing dimensions

Maximum heat resistance R_{th} in °C/W

$$R_{th} = (q - q_e) / P$$

q = maximum temperature (°C) in interior of housing

q_e = maximum outside temperature (°C)

P = Total power loss (W) in the housing

Power loss in the stepper motor drive, see chapter "Technical data".

Consider the power loss of the other components.

Usable heat dissipation area of housing A in m²

(with wall mounting: sides + top + front)

$$A = K / R_{th}$$

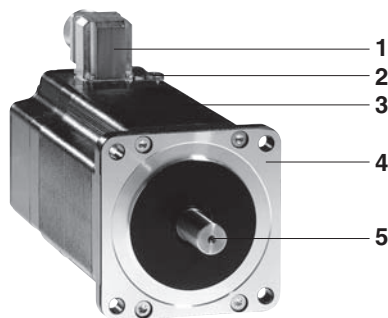
K = heat resistance, based on the housing area

Sheet metal housing: $K = 0.12$ with fan, $K = 0.15$ without fan

Note: Because of the poor heat dissipation insulating material housing must not be used..



Stepper motor drive system



Product Description

The 3-phase stepper motors from Berger Lahr are extremely robust, maintenance-free motors. They carry out precise stepper movements that are controlled by a stepper drive. A stepper motor drive consists of a stepper motor and the matching stepper drive. The maximum power can be reached only if motor and electronics are optimally matched.

The 3-phase stepper motors can be operated at very high resolutions depending on the stepper motor controller.

Options such as rotation monitoring and holding brake with robust, low-play planetary gears extend the application options.

There are also 3-phase stepper motors by Berger Lahr in normal and explosion-proof types (explosion degree of protection EEx d IIC T4).

Special features

Quiet

Due to the sinus-commutation of the drive and the special mechanical construction of the motors, the result is a very quiet stepper motor that runs virtually resonance-free.

Strong

The optimised internal geometry of the motor offers a high power density; i.e. up to 50% greater torque compared to conventional stepper motors of comparable size.


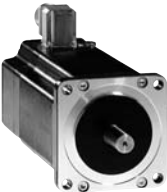
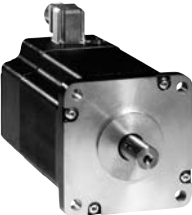
Flexible

It is possible to manufacture and supply a wide variety of motor types due to their flexible modular system and modern version management.

Design

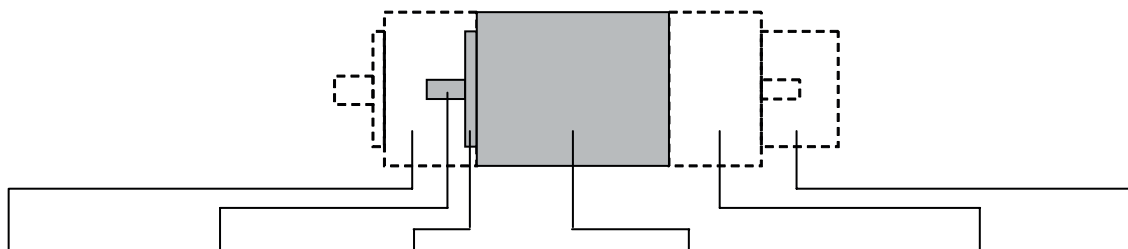
- (1) Motor connection, here versions with an offset connector
- (2) Additional terminal for protective conductor
- (3) Housing, with black protective coating
- (4) Axial flange with four mounting points as per DIN 42918
- (5) Smooth shaft end as per DIN 42918

Product quotation

3-phase stepper motors		VRDM 36x	VRDM 39x	VRDM 311x
				
Size		6	9	11
Max. torque M_{\max}	Nm	1.50	2.0...6.0	12.0...16.5
Holding torque M_H	Nm	1.70	2.26 ... 6.78	13.5 ... 19.7
Steps per revolution $z^{1)}$		200 / 500 / 1000 / 2000 / 4000 / 5000 / 10000		
Step angle $\alpha^{1)}$	°	1.8 / 0.9 / 0.72 / 0.36 / 0.18 / 0.09 / 0.072 / 0.036		

¹⁾ with suitable control

Motor types



Gearing ¹⁾	Shaft model		Centring collar	Size (Flange dimension)	Length (Dimension without shaft)	Winding	Motor connection	Options ²⁾
VRDM 36x PLE 60 PLS 70	Smooth shaft	Ø 8 mm	Ø 38.1 mm	6 (57.2 mm)	8 (79 mm)	W	Terminal box Plug	2nd shaft end Holding brake Encoders
VRDM 39x PLE 80 PLS 90	Smooth shaft with slide spring	Ø 9.5 mm ³⁾ Ø 12 mm Ø 14 mm	Ø 60 mm Ø 73 mm	9 (85 mm)	7 (68 mm) 10 (98 mm) 13 (128 mm)	W	Terminal box Plug	2. Shaft end Holding brake Encoders
VRDM 311x PLE 120 PLS 115	with parallel key	Ø 19 mm	Ø 56 mm	11 (110 mm)	17 (180 mm) 22 (228 mm)	W	Terminal box Plug	2nd shaft end Holding brake Encoders

¹⁾ Planetary gear each available in the gear ratios 3:1, 5:1 and 8:1.

²⁾ The optional 2nd shaft end and holding brake cannot be selected together. An encoder can only be used with motors with "connector" motor connection.

³⁾ Ø 9.5 mm and Ø 12 mm at VRDM 397 and VRDM 3910; Ø 14 mm at VRDM 3913

Technical Data**Electrical and mechanical data**

Motor type VRDM ...		368	397	3910	3913	31117	31122
Max. supply voltage U_{\max}	V_{AC}	230					
Nominal voltage DC bus U_N	V_{DC}	325					
Nominal torque M_N	Nm	1.50	2	4	6	12	16.5
Holding torque M_H	Nm	1.70	2.26	4.52	6.78	13.5	19.7
Rotor inertia J_R	kgcm ²	0.38	1.1	2.2	3.3	10.5	16
Steps per revolution z		200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000					
Step angle α	°	1.8 / 0.9 / 0.72 / 0.36 / 0.18 / 0.09 / 0.072 / 0.036					
Systematic angular tolerance $\Delta\alpha_s$ ¹⁾	'	±6					
Max. starting frequency f_{Aom}	kHz	8.5	5.3			4.7	
Phase current I_N	A_{rms}	0.9	1.75	2	2.25	4.1	4.75
Winding resistance R_W	Ω	25	6.5	5.8	6.5	1.8	1.9
current rise time constant τ	ms	4.6	~7	~9	~10	~22	~22
Mass m ²⁾	kg	2.0	2.1	3.2	4.3	8.2	11.2
Shaft load ³⁾							
• Max. radial force 1st shaft end ⁴⁾	N	50	100		110	300	
• Max. radial force 2nd shaft end (optional) ⁴⁾	N	25	50			150	
• Max. axial force pull	N	100	175			330	
• Max. axial force compression	N	8.4	30			60	
• Bearing lifetime L_{10h} ⁵⁾	h	20000	20000			20000	

1) Measured at 1000 steps/revolution, unit: angular minutes

2) Mass of the motor version with cable retaining screws and connector

3) Conditions for the shaft load: speed of rotation 600 1/min, 100% duty cycle at nominal torque, ambient temperature 40 °C (storage temperature ≈80 °C)

4) Point of attack of radial force: in the middle of the shaft end

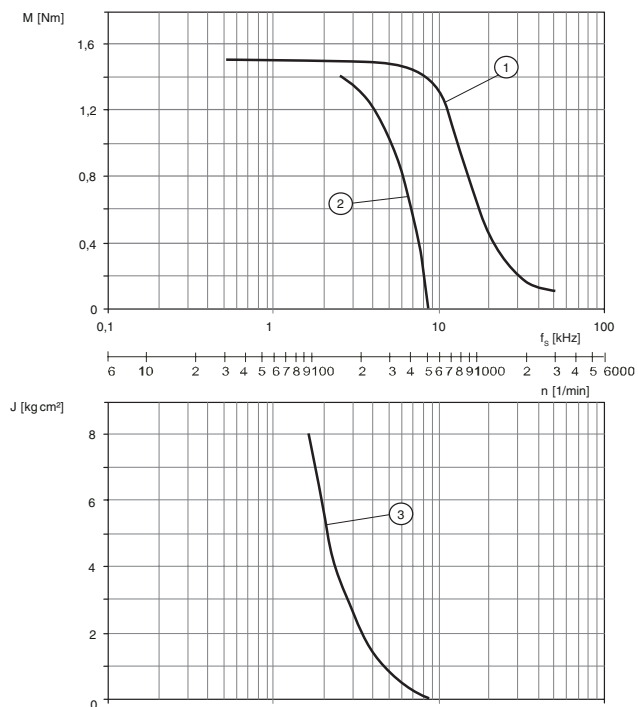
5) Operating hours at a probability of failure of 10%

Ambient conditions

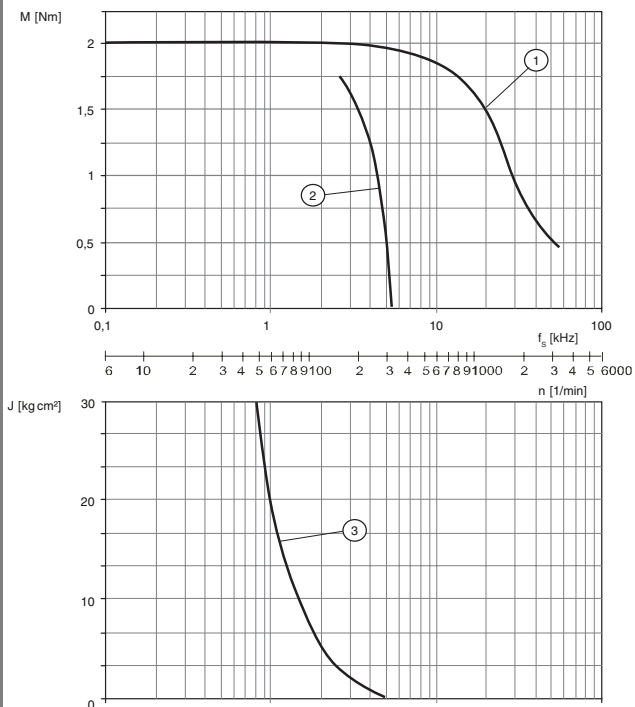
Ambient temperature	°C	-25 ... +40
Installation height without power reduction	m above MSL	< 1000
Transport and storage temperature	°C	-25 ... +70
Relative humidity	%	5 ... 85, no condensation permissible
Vibration severity in operation as per DIN EN 60034-14		A
Max. vibration load	m/s ²	20
Degree of protection as per DIN EN 60034-5		
• Total except shaft bushing		IP 56
• Shaft bushing		IP 41
Thermal class		155 (F)
Shaft wobble and run-out accuracy		DIN EN 50 347 (IEC 60072-1)
Max. rotary acceleration	Wheel/s ²	200000

Characteristic curves

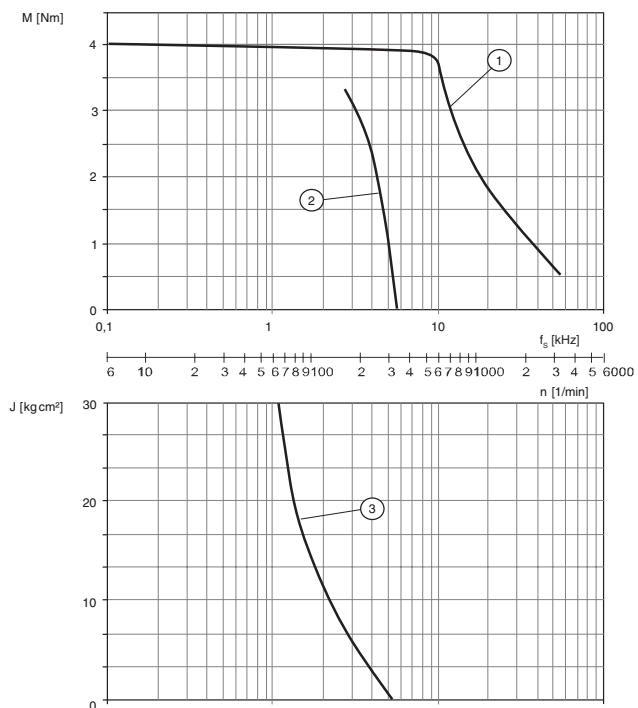
VRDM 368 / 50L W



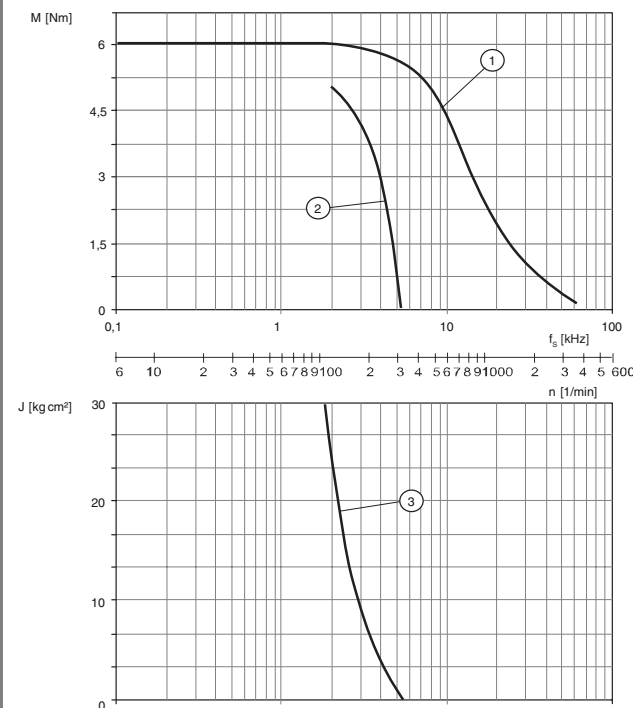
VRDM 397 / 50L W



VRDM 3910 / 50L W



VRDM 3913 / 50L W

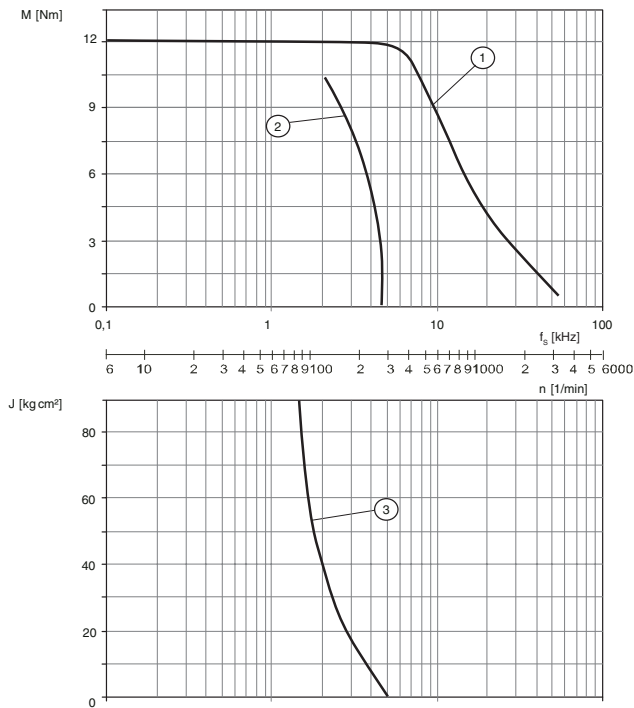


Measurement at 1000 steps/revolution, nominal voltage DC bus U_N and phase current I_N

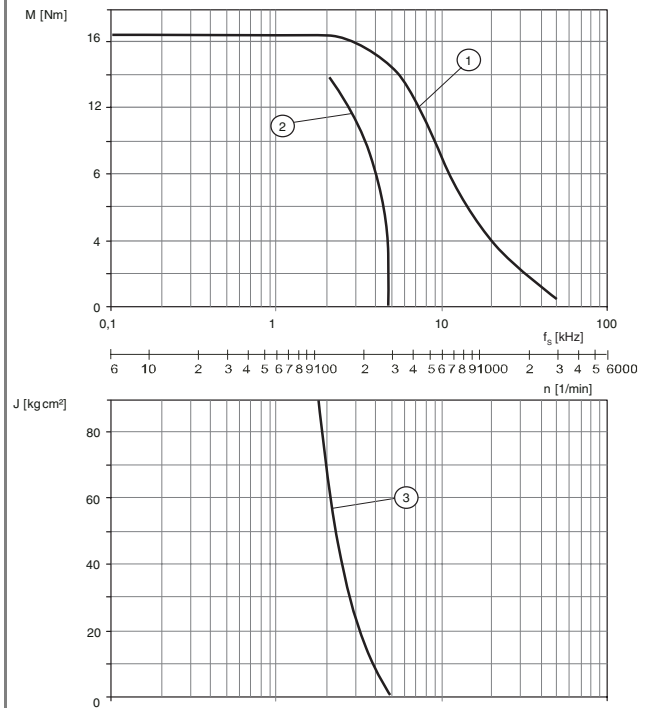
- (1) Pull-out torque
- (2) Pull-in torque
- (3) Maximum load inertia

Characteristic curves

VRDM 31117 / 50L W



VRDM 31122 / 50L W

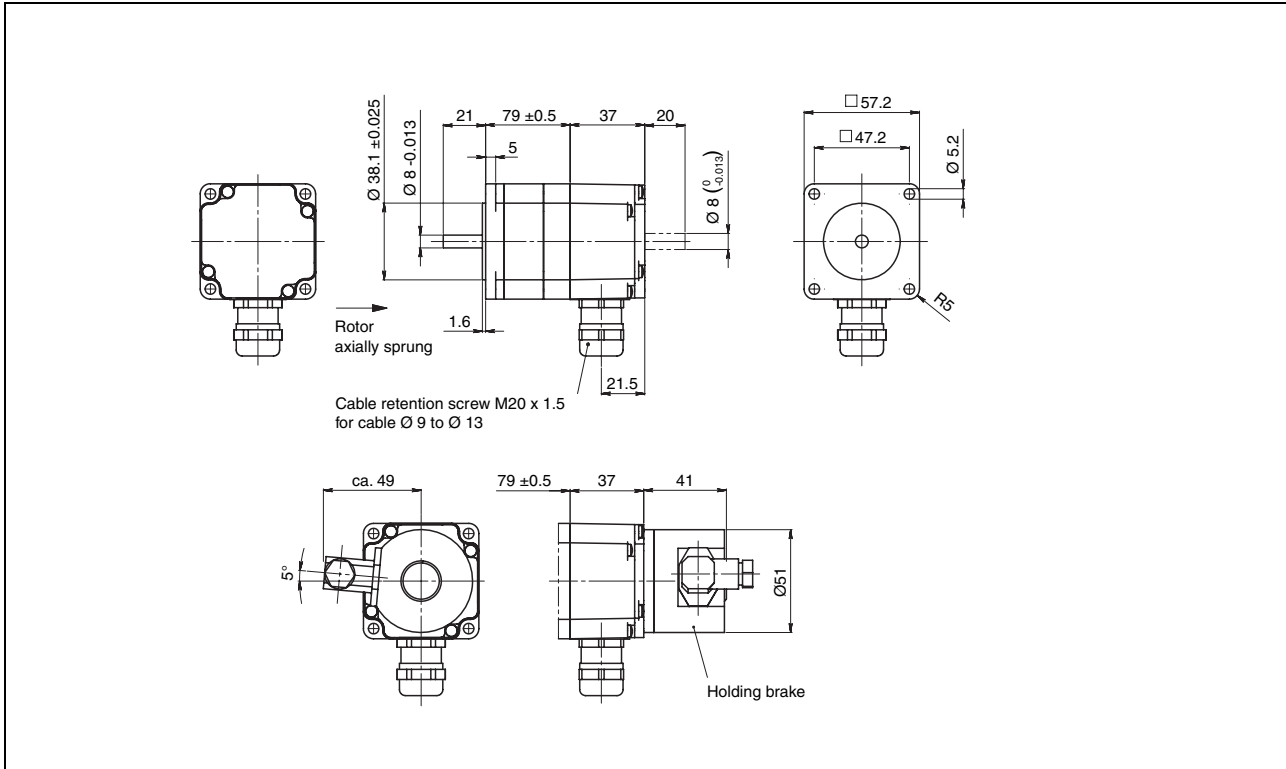


Measurement at 1000 steps/revolution, nominal voltage DC bus U_N and phase current I_N

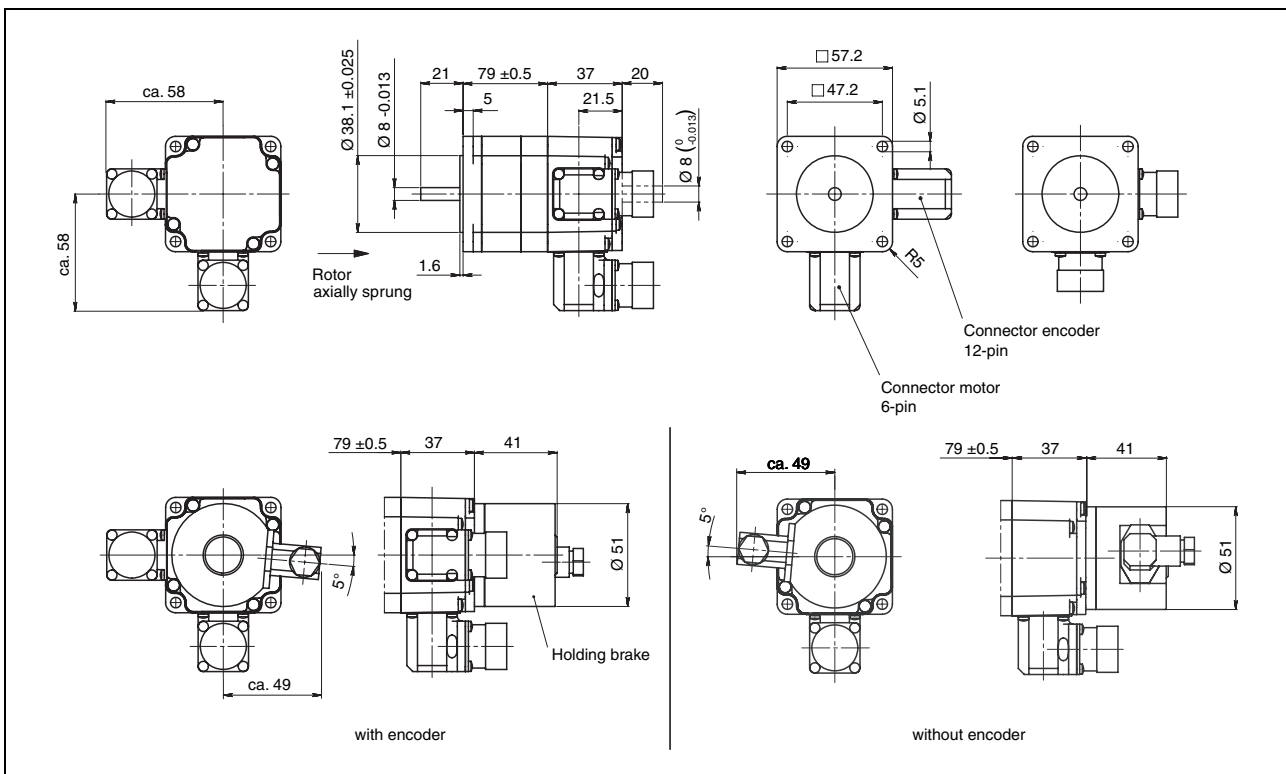
- (1) Pull-out torque
- (2) Pull-in torque
- (3) Maximum load inertia

Dimensional drawings

VRDM 368

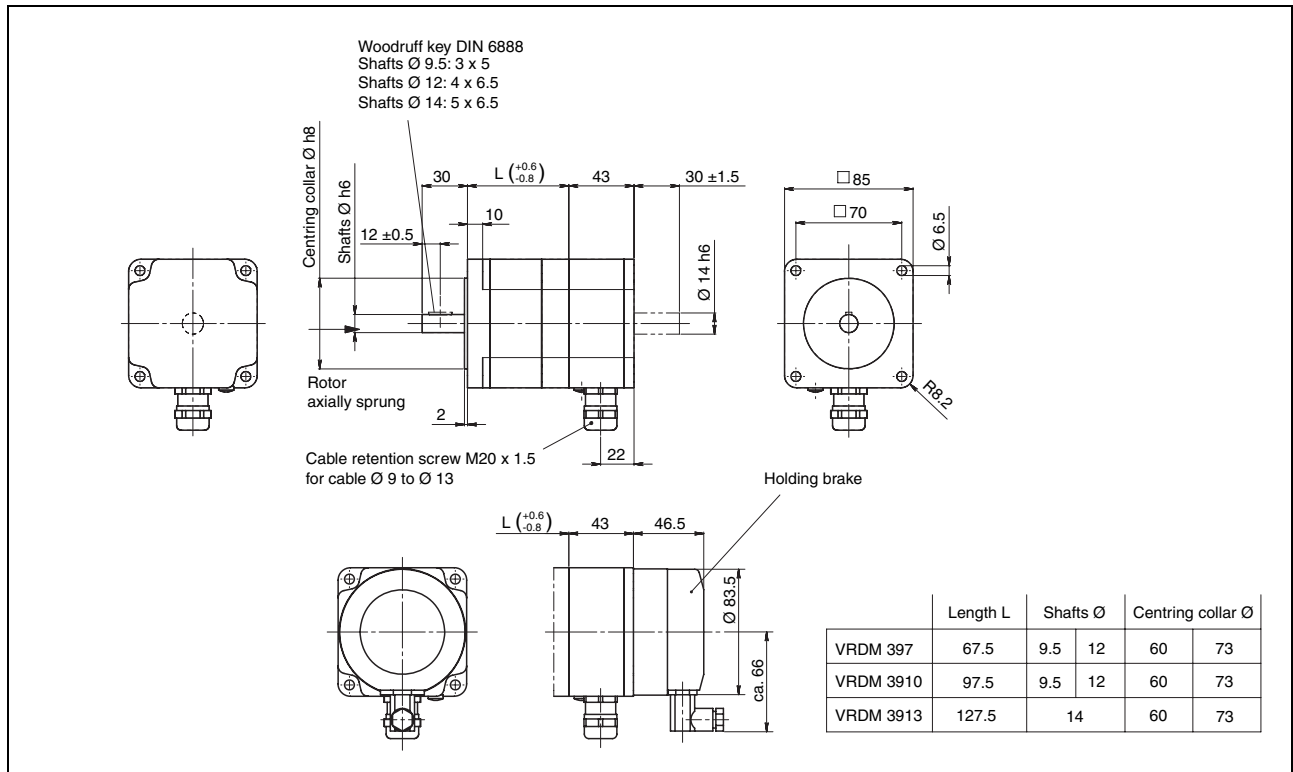


3-phase stepper motor VRDM 368 in terminal box version

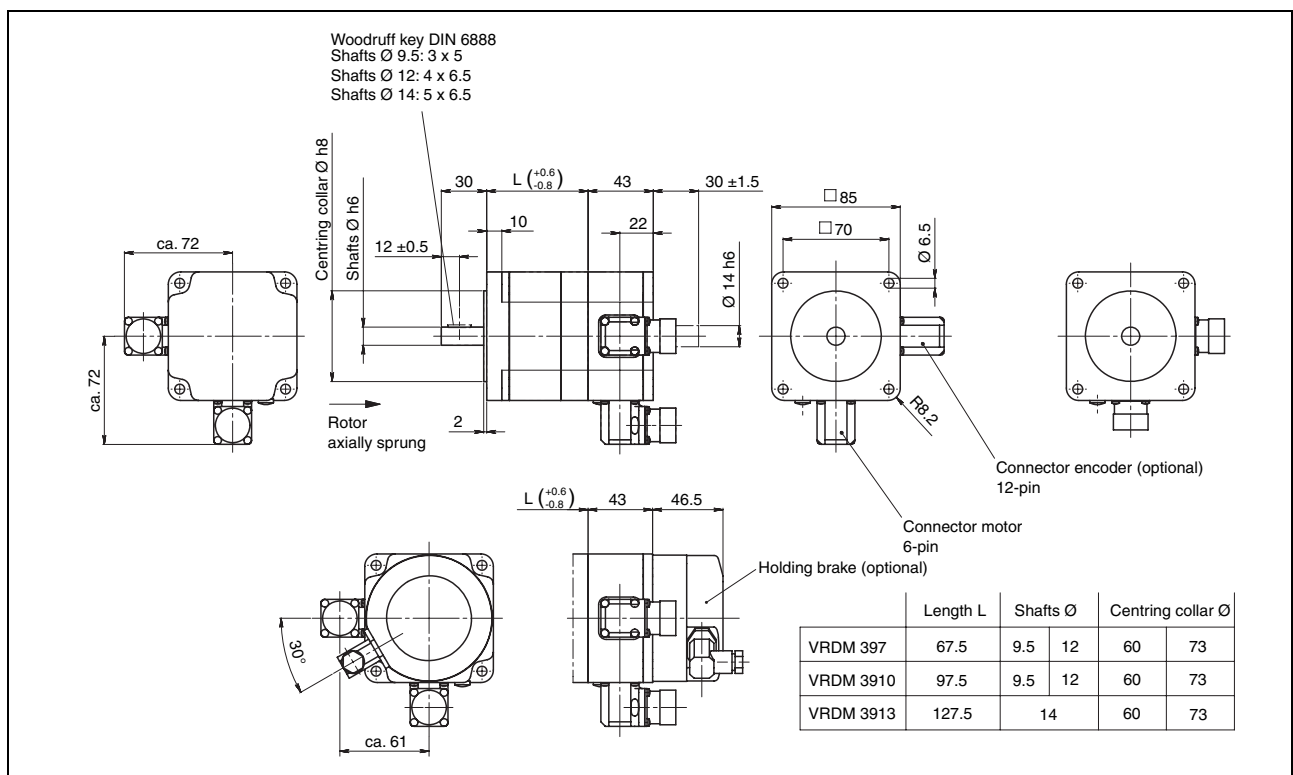


3-phase stepper motor VRDM 368 in connector version

VRDM 39•

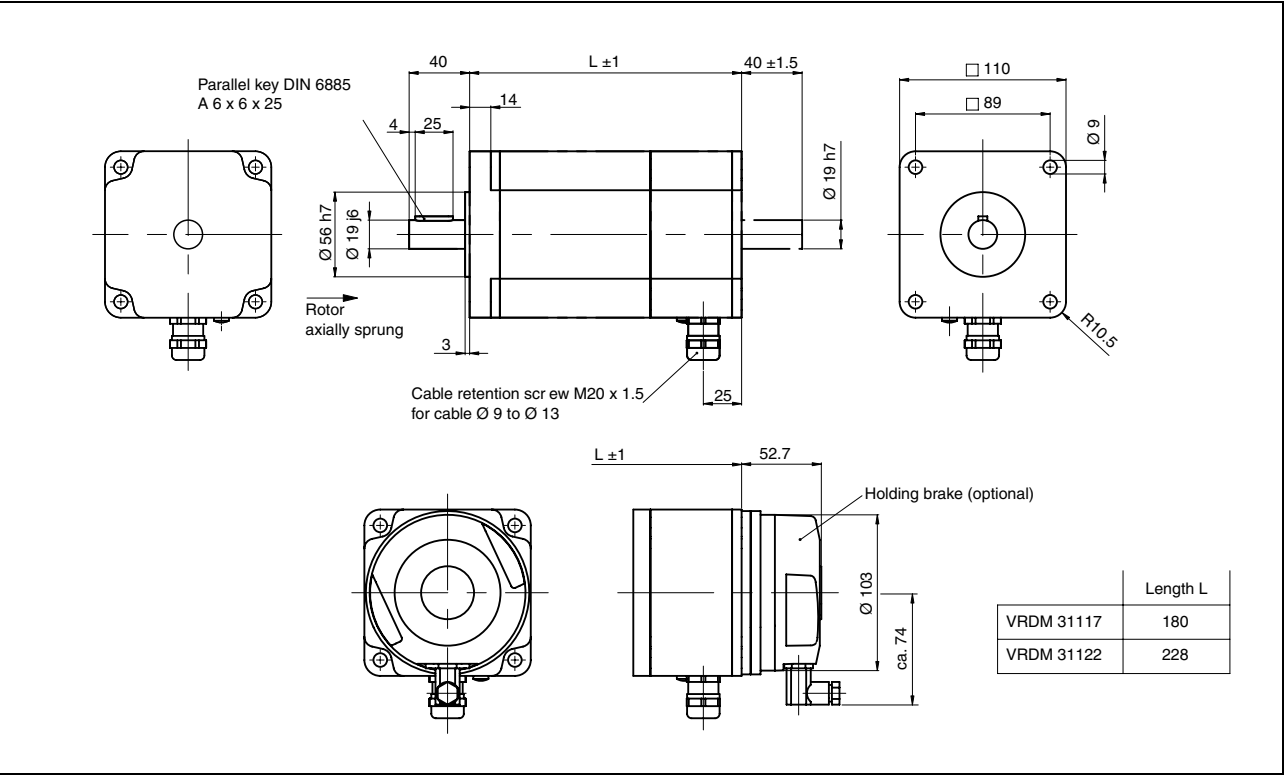


3-phase stepper motor VRDM 39• in terminal box version

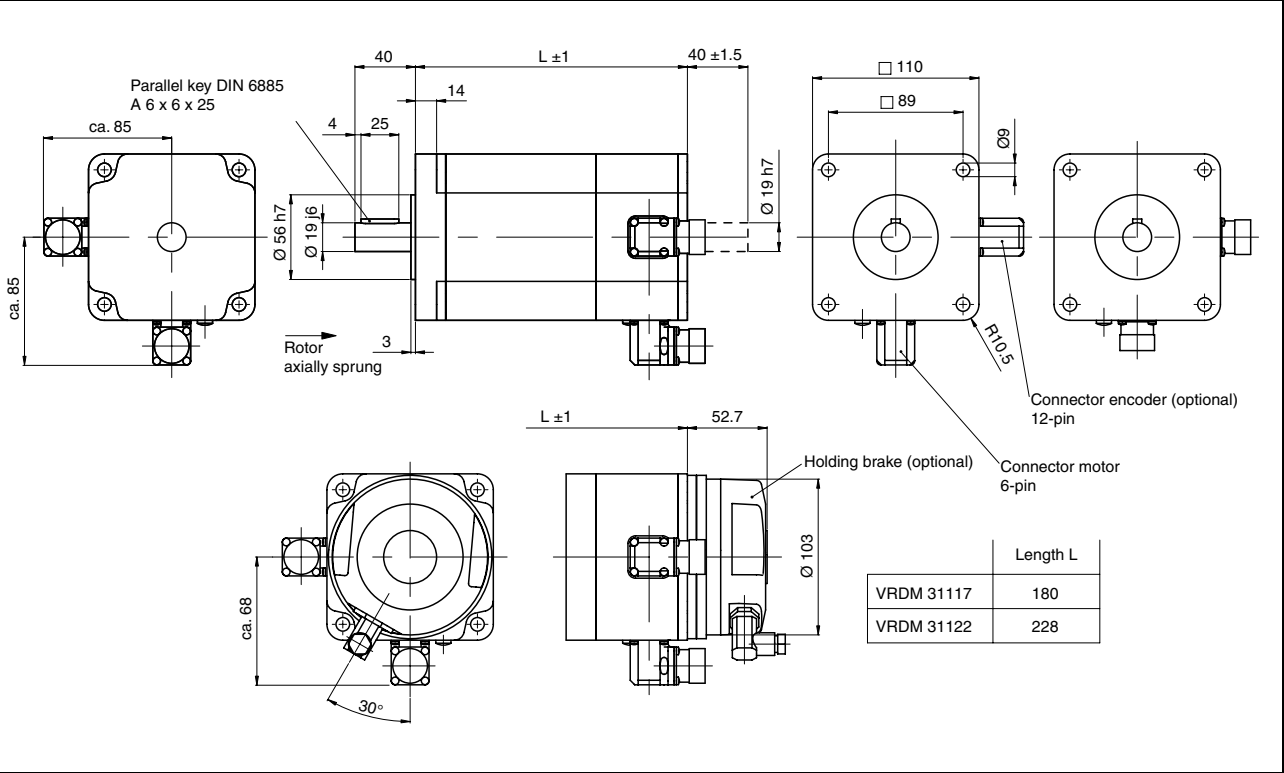


3-phase stepper motor VRDM 39• in connector version

VRDM 311•



3-phase stepper motor VRDM 311• in terminal box version



3-phase stepper motor VRDM 311• in connector version



Options

Holding brake

The holding brake is an electromagnetic sprung brake and fixes the motor axis after switching off the motor current (e.g. in case of power failure or emergency stop). The shaft must be fixed with torque loads resulting from gravity, e.g. with Z-axes in handling technology.

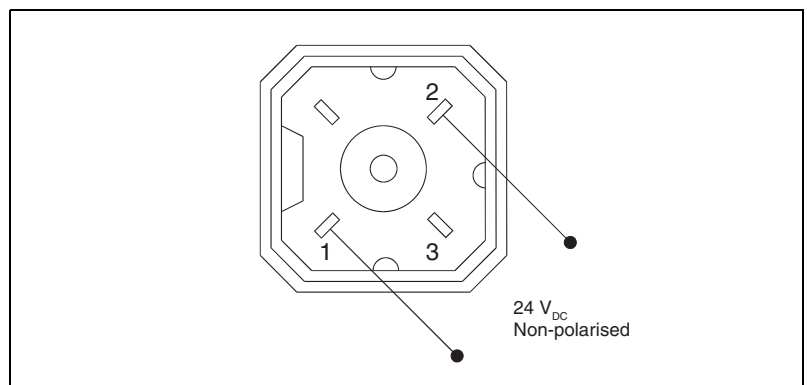
Technical Data

Holding brake for motor type		VRDM 36•	VRDM 39•	VRDM 311•
Nominal voltage	V	24	24	24
Holding torque	Nm	1	6	16
Pull-in power	W	8	24	28
Moment of inertia	kgcm ²	0.016	0.2	0.35
Energise time (release brake)	ms	58	40	60
Shutdown time (apply brake)	ms	14	20	30
Mass	kg	Approx. 0.5	Approx. 1.5	Approx. 2.0

Note: In order to ensure the safe function of the holding brake for Z-axes, the static load torque must be no greater than 25% of the holding torque of the motor.

Wiring diagram

The connector is a part of the scope of supply.
Connector name: Hirschmann Type G4 5M



Wiring diagram of the connector for the holding brake



Encoder

Three-phase stepper motors from Berger Lahr can be fitted with an encoder. If the stepper drive is fitted with rotation monitoring electronics, the encoder operates as a measurement system for reporting the actual position of the rotor.

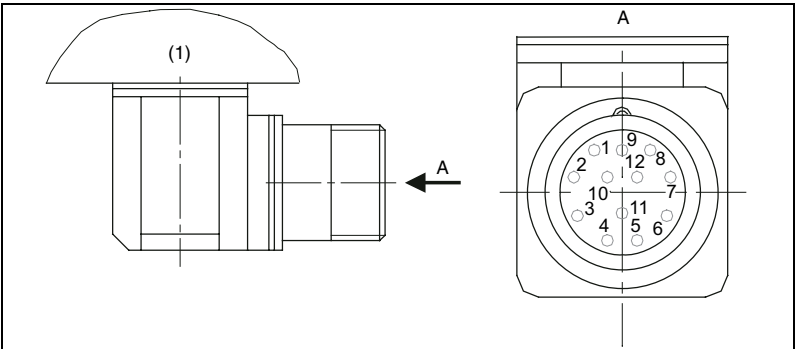
The rotation monitoring compares the setpoint and actual position of the motor and reports errors if the actual position deviates from the setpoint position. For example, this enables detection of mechanical overload of the motor.

Note: an encoder can only be used with motors with connector. A temperature sensor is integrated to protect the encoder from high temperatures.

Technical Data

Resolution	Inc/rev.	1000
Index plus	Inc/rev.	1
Output		RS 422
Signals		A; B; I
Signal shape		Rectangular
Supply voltage	V	5 ± 5%
Supply current	A	max.0.125

Wiring diagram



Wiring diagram of encoder plug on VRDM 3••

(1) Motor housing

Pin	Designation
1	A
2	A negated
3	B
4	B negated
5	C, I
6	C negated, negated
7	5V _{GND}
8	+ 5
9	-SENSE
10	+SENSE
11	Temperature sensor
12	not connected

Gear



Stepper motors from Berger Lahr can also be fitted with integrated planetary gear. The PLE gearboxes are economical planetary gears that meet most requirements for accuracy. The PLS gearboxes are high-quality gearboxes with very low rotation play. This gearbox can be supplied with one of three ratios: 3:1, 5:1 and 8:1. The output torque of the gearbox is determined by multiplying the torque of the motor with the gear ratio and the efficiency of the gearbox (0.96). The following table shows the preferred gearboxes for the motors.

Motor type	Gearbox type	
VRDM 368	PLE 60	PLS 70
VRDM 39•	PLE 80	PLS 90
VRDM 31117	PLE 120	PLS 115
VRDM 31122		PLS 115

Technical data PLE gearboxes

PLE gearbox general

Gear stages		1
Life time ¹⁾	h	10000
Efficiency at full load	%	96
Housing material		aluminium
Surface		black anodised
Shaft material		C 45
Bearings		roller bearing
Operating temperature ²⁾	°C	-25 ... +90, shortly +120
Degree of protection ³⁾		IP 54
Lubrication		life lubrication

¹⁾ Life time with an output speed of 100 1/min and T = 30 °C

²⁾ Referring to the housing surface

³⁾ With mounting position IM V3 (drive shaft vertical, shaft end upward) only protection class IP 41 is guaranteed

Size of PLE		60	80	120
Max. radial force ^{1) 2)}	N	500	950	2000
Max. axial force	N	600	1200	2800
Torsional play	arcmin	< 20	< 12	< 8
Max. drive speed	1/min	13000	7000	6500
Recommended drive speed	1/min	4000	4000	3500
Torsional stiffness	Nm/arcmin	2.3	6	12
Weight	kg	0.9	2.1	6.0

¹⁾ The information refers to min. 20000 h life time with an output speed of 100 1/min and application factor K = 100 min and S1 operating mode for electrical machines and T=30°C

²⁾ Refers to the centre of the drive shaft and 50% duty cycle

Caution: the actual output torque must be less than the rated output torque of the gearbox, otherwise the gearbox may be destroyed.

Technical data PLS gearboxes**PLS gearbox general**

Gear stages		1
Life time ¹⁾	h	20000
Efficiency at full load	%	98
Housing material		aluminium
Surface		black anodised
Shaft material		C 45
Bearings		tapered roller bearings
Operating temperature ²⁾	°C	-25 ... +100, shortly +124
Degree of protection ³⁾		IP 65
Lubrication		life lubrication

¹⁾ Life time with an output speed of 100 1/min and T = 30 °C

²⁾ Referring to the housing surface

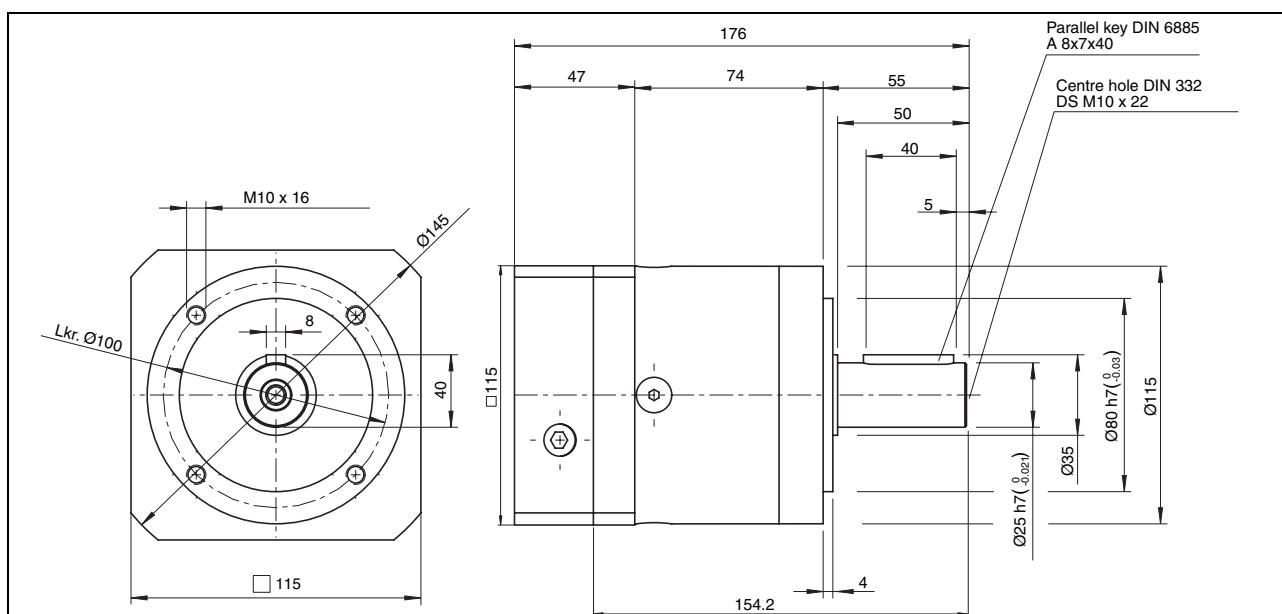
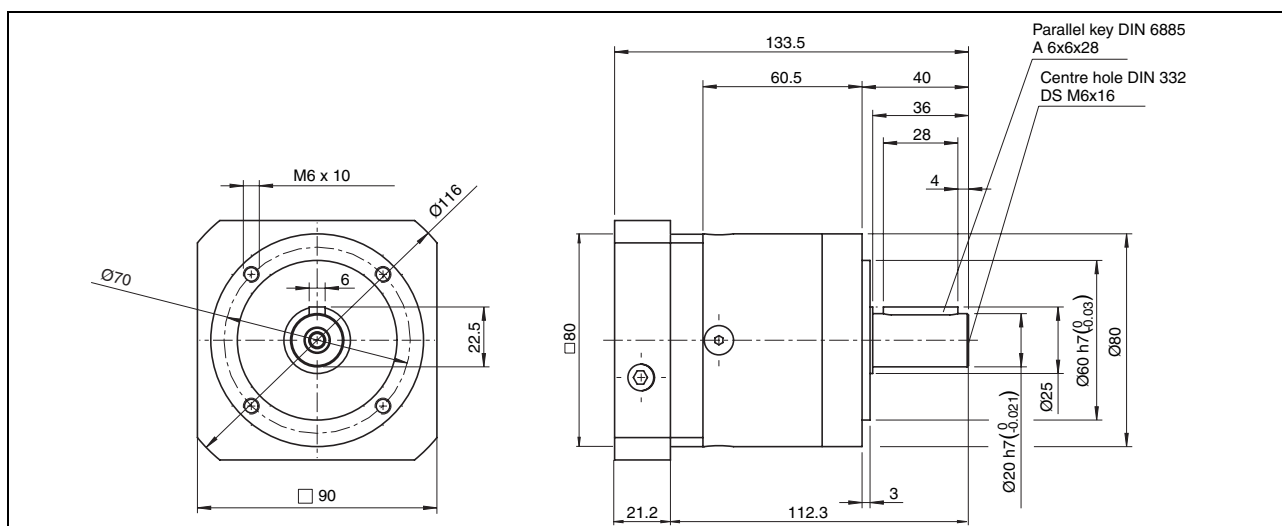
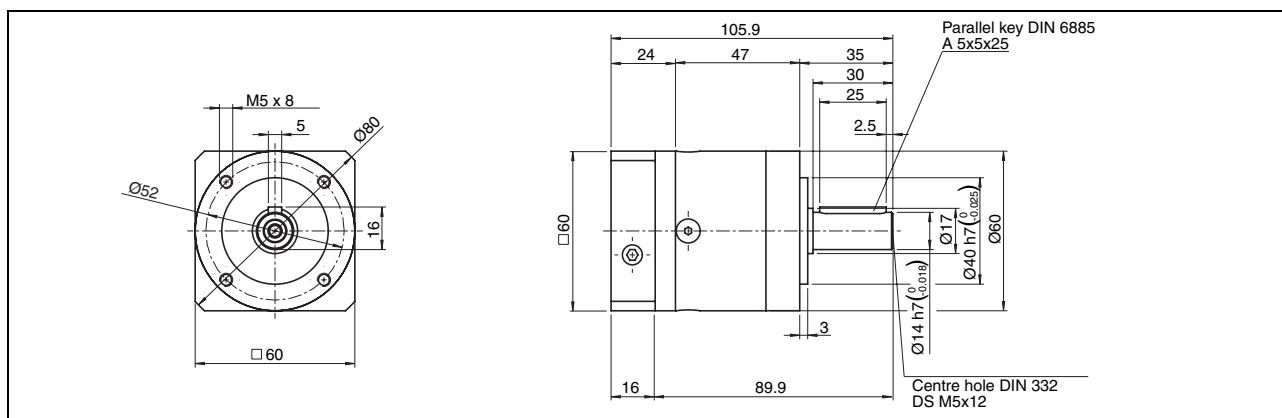
³⁾ With mounting position IM V3 (drive shaft vertical, shaft end upward) only protection class IP 41 is guaranteed

Size of PLS		70	90	115
Max. radial force ^{1) 2)}	N	3000	4000	5000
Max. axial force	N	6000	9000	12000
Torsional play	arcmin	<3	<3	<3
Max. drive speed	1/min	14000	10000	8500
Recommended drive speed	1/min	5000	4500	4000
Torsional stiffness	Nm/arcmin	6	9	20
Weight	kg	3.0	4.3	9.0

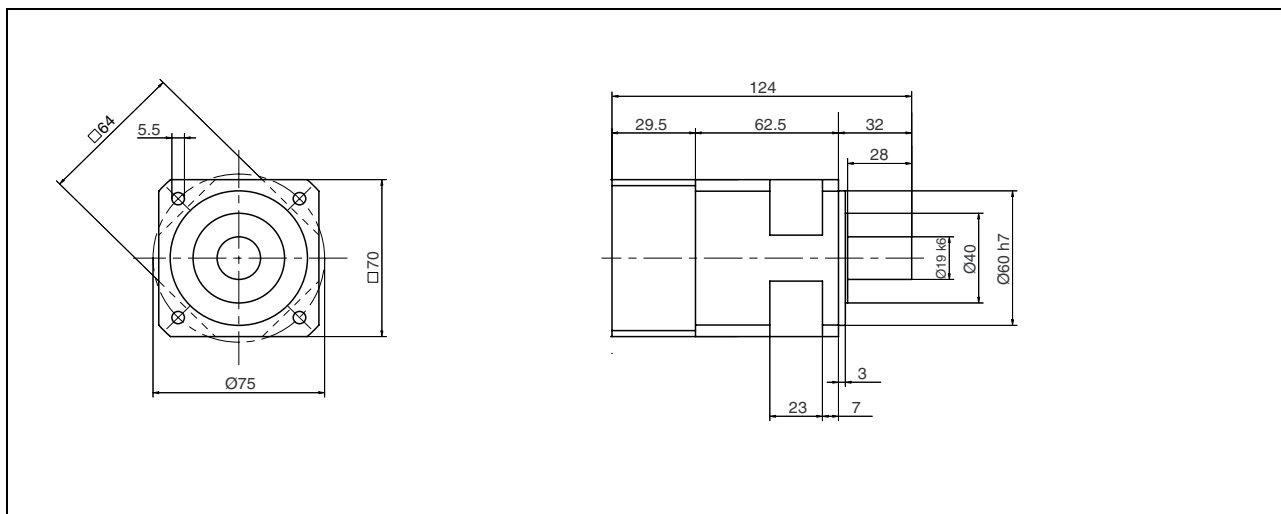
¹⁾ The information refers to min. 20000 h life time with an output speed of 100 1/min and application factor K = 100 min and S1 operating mode for electrical machines and T=30°C

²⁾ Refers to the centre of the drive shaft and 50% ED

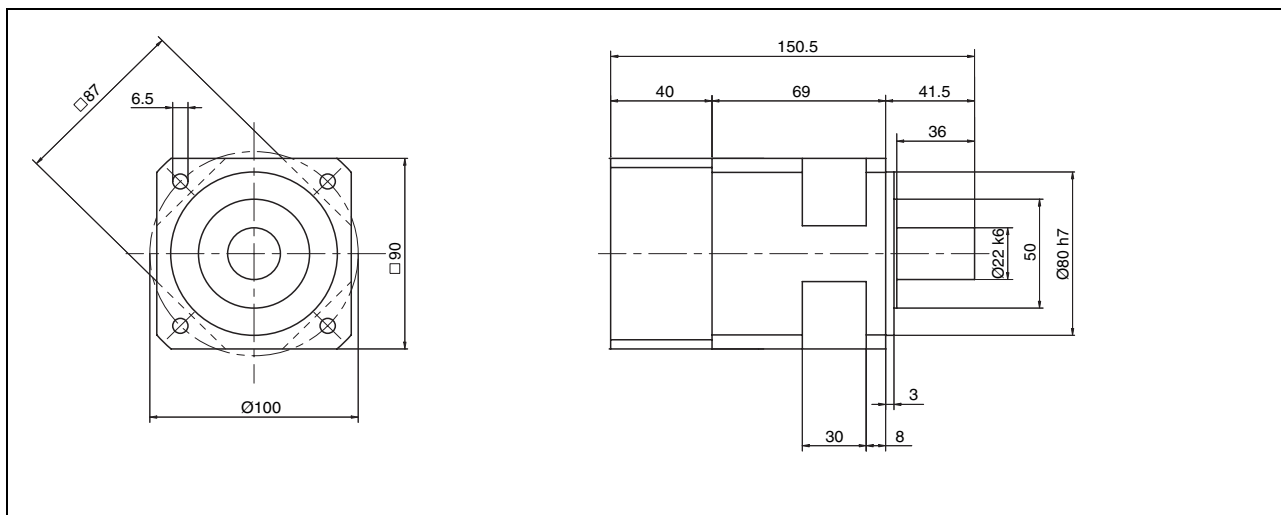
Dimensional drawings



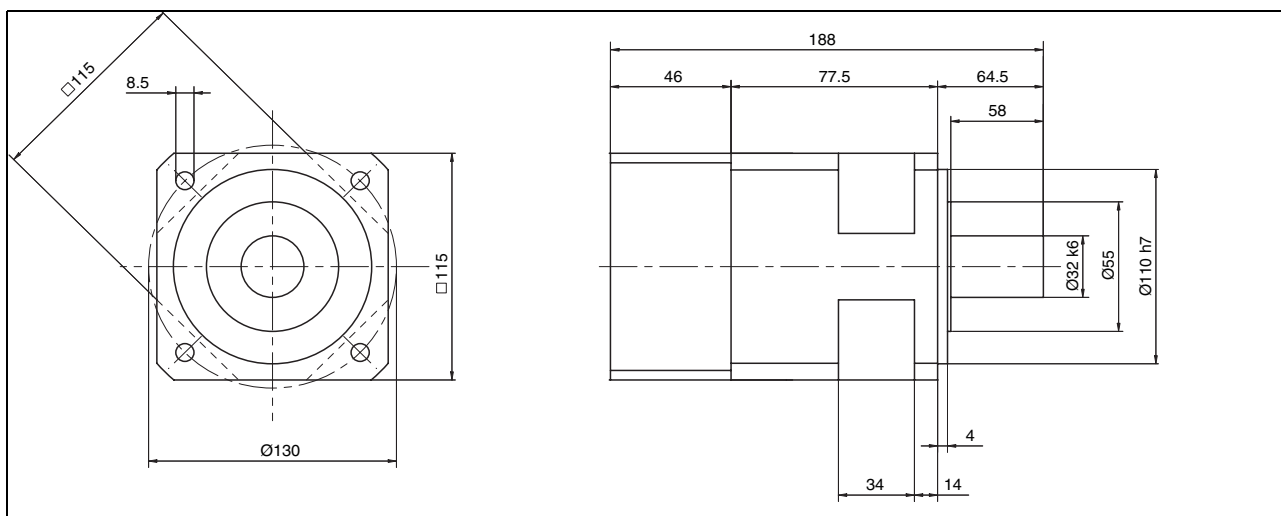
Dimensional drawings



PLS gearbox 70



PLS gearbox 90



PLS gearbox 115

Type code																									
VRDM 368																									
Example:	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Phase count 3	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Size (Flange) 6 = 57.2 mm	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Length 8 = 79 mm	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Number of pole pairs 50	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	B	OOO			
Rotor L = laminated rotor plate	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Maximum voltage W = 230 V _{AC} (325 V _{DC})	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	B	OOO			
Connection type B = Terminal box C = connector	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Position capture E = Encoder (1000 increments/revolution) O = without encoder	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
holding brake B = Brake O = Without brake	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Degree of protection IP41 = IP 41 at shaft bushing	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Gearbox type O = Without gearbox 2 = PLE 60 A = PLS 70	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Gear ratio O = Without gearbox 3 = 3:1 5 = 5:1 8 = 8:1	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Shaft diameter D8 = 8 mm DO = with gearbox	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Shaft modelFront O = Smooth shaft or gearbox	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Centring collar 38 = 38.10 mm OO = with gearbox	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Second shaft: O = without 2 = with	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Connection direction motor plug ¹⁾ O = without, L = left, R = right B = back, F = front, S = straight	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Connection direction encoder plug ¹⁾ O = without, L = left, R = right B = back, F = front, S = straight	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Braided wire output O = Without	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			
Braided wire length OOO = Without	VRDM	3	6	8	/	50	L	W	C	E	O	IP41	2	5	DO	O	OO	2	B	B	O	OOO			

¹⁾ Connection direction viewed from front at 1st shaft end, connector up.

Note:

Please note the description of the possible motor types on page 38.

VRDM 39•																						
Example:	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Phase count 3	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Size (Flange) 9 = 85 mm	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Motor length 7 = 68 mm 10 = 98 mm 13 = 128 mm	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Number of pole pairs 50	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	B	OOO
Rotor L = laminated rotor plate	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Maximum voltage W = 230 V _{AC} (325 V _{DC})	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	B	OOO
Connection type B = Terminal box C = connector	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Position capture E = Encoder (1000 increments/revolution) O = without encoder	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
holding brake B = Brake O = Without brake	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Degree of protection IP41 = IP 41 at shaft bushing IP56 = 56 at shaft bushing at front	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Gearbox type O = Without gearbox 3 = PLE 80 B = PLS 90	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Gear ratio O = Without gearbox 3 = 3:1 5 = 5:1 8 = 8:1	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Shaft diameter D9 = 9.5 mm D2 = 12 mm D4 = 14 mm DO = with gearbox	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Shaft modelFront O = smooth shaft or gearbox K = sliding spring per DIN 6888	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Centring collar 60 = 60 mm 73 = 73 mm OO = with gearbox	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Second shaft O = without 2 = with	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Connection direction motor plug ¹⁾ O = without, L = left, R = right B = back, F = front, S = straight	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Connection direction encoder plug ¹⁾ O = without, L = left, R = right B = back, F = front, S = straight	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Braided wire output O = Without	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO
Braided wire length OOO = Without	VRDM	3	9	10	/	50	L	W	C	E	O	IP41	3	5	DO	O	OO	2	B	B	O	OOO

¹⁾ Connection direction viewed from front at 1st shaft end, connector up.

Note:

Please note the description of the possible motor types on page 38.

VRDM 311•																						
Example:	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Phase count 3	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Size (Flange) 11 = 110 mm	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Length 17 = 180 mm 22 = 228 mm	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Number of pole pairs 50	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	B	OOO
Rotor L = laminated rotor plate	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Maximum voltage W = 230 V _{AC} (325 V _{DC})	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	B	OOO
Connection type B = Terminal box C = connector	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Recording of position E = Encoder (1000 increments/revolution) O = without encoder	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Holding brake B = Brake O = Without brake	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Degree of protection IP41 = IP 41 at shaft bushing IP56 = IP 56 at shaft bushing at front	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Gearbox type O = Without gearbox 4 = PLE 120 C = PLS 115	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Gear ratio O = Without gearbox 3 = 3:1 5 = 5:1 8 = 8:1	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Shaft diameter D9 = 19 mm DO = with gearbox	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Shaft modelFront O = Smooth shaft or gearbox K = parallel key as per DIN 6885	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Centring collar 56 = 56 mm OO = with gearbox	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Second shaft O = without 2 = with	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Connection direction motor plug ¹⁾ O = without, L = left, R = right B = back, F = front, S = straight	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Connection direction encoder plug ¹⁾ O = without, L = left, R = right B = back, F = front, S = straight	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Braided wire output O = Without	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO
Braided wire length OOO = Without	VRDM	3	11	17	/	50	L	W	C	E	O	IP41	4	5	DO	O	OO	2	B	B	O	OOO

¹⁾ Connection direction viewed from front at 1st shaft end, connector up.

Note:

Please note the description of the possible motor types on page 38.



Accessories

EMC mains filter

Function

A mains filter is integrated in the SD3 as standard equipment to comply with the IEC/EN 61800-3 standards governing electromagnetic compatibility (EMC). These standards must be met for the CE approval under the EMC guideline.

The additional mains filter makes it possible to meet stricter requirements.

This drive system meets the EMC requirements for the second environment according to the standard IEC 61800-3, if the described measures are taken into account during installation. The following note should be taken into account outside of the application area:

Better values can be achieved depending on the device and the application and also the structure, e.g. on mounting in an enclosed switching cabinet.

If the limit values for the first environment (public networks, category C2) are required, external mains filters must be connected in series.

The following limiting values for wiring related interference quantities are met by EMC compatible designs:

Without external mains filter	C3 up to 10m motor cable length
With external mains filter	C2 up to 20 m motor cable length C3 up to 50m motor cable length

The operator must ensure compliance with the EMC Directives.

Usage depending on the power network type

This mains filter can only be used in TN networks (connection to neutral conductor) and TT networks (neutral conductor connected to earth).

The filters cannot be used in IT mains (isolated or over a high impedance earthed neutral conductor).

Standard IEC 61800-3, Annex D2.1, states that the mains filters may not be used for this mains type because correct operation of the insulation monitoring equipment cannot be guaranteed.

In addition, the efficiency of the mains filter in this network type depends on the type of impedance between neutral conductor and earth. Therefore, the efficiency is not predictable.

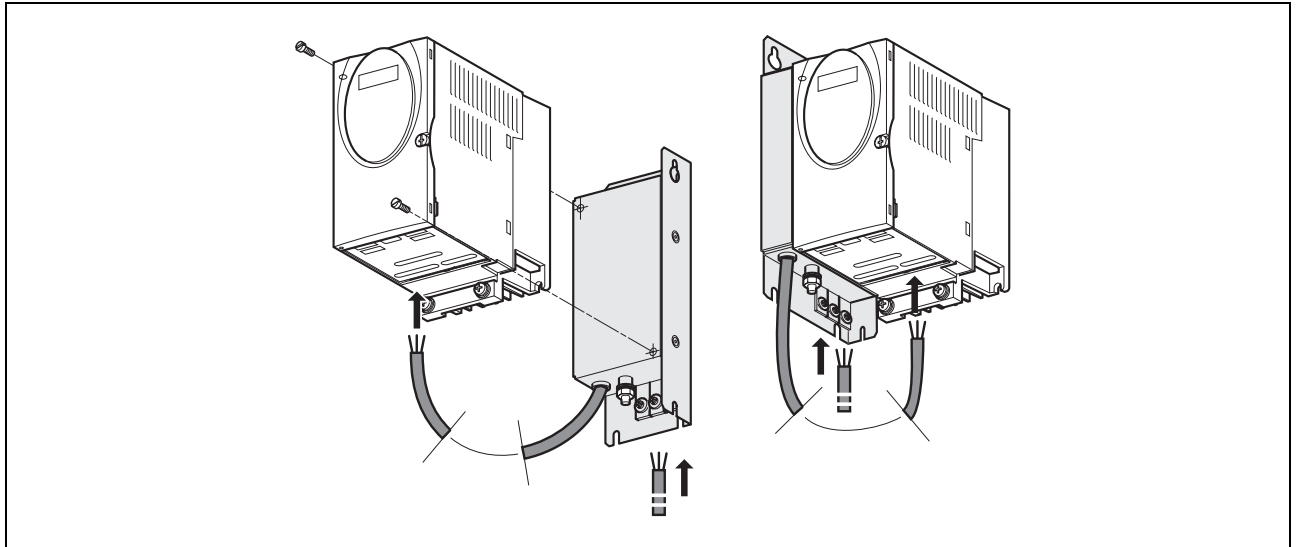
An isolating transformer is required for machines that must be installed on an IT mains to allow the machine to be operated locally as on a TN or TT system.

Technical data on the external mains filter

Compliance with the standards		EN 133200
Degree of protection		IP 21 and IP 41 in upper section
Maximum relative humidity		93% without condensation and surface water accumulation as per IEC 68-2-3
Ambient temperature		
• Operating temperature	°C	-10 ... +60
• Transport and storage temperature	°C	-5...+70
Maximum installation height	m	1000 (Over 1000 m decrease the current by 1% per additional 100 m)
Oscillation stress as per IEC 80068-2-6		3 ... 13 Hz: 1.5 mm peak 13 ... 150 Hz: 1 g peak
Shock stress as per IEC 60068-2-27		15 g for 11 ms
Maximum rated voltage		
• 50/60 Hz, 1-phase	V	240 + 10%
• 50/60 Hz, 3-phase	V	240 + 10% 500 + 10% 600 + 10%

Application case, category: EN 61800-3: 2001-02; IEC 61800-3, Ed. 2	Description
First environment, general availability; category C1	Use in living area, sale e. g. through construction market
First environment, restricted availability; category C2	Operation in living areas, sale through dealers only
Second environment; category C3	Operation in industrial mains

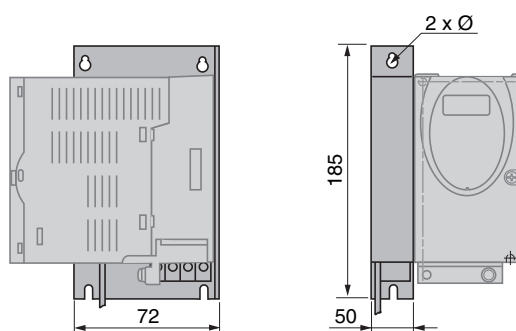
Mounting



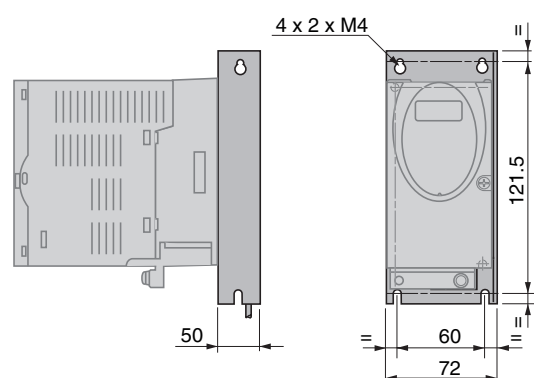
Mounting mains filters

Dimensional drawings

Mounting of the mains filter next to the stepper drive



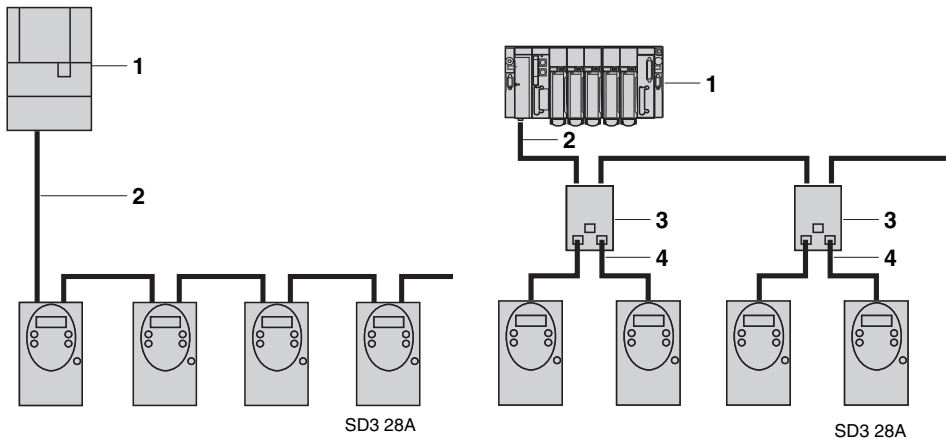
Mounting of the mains filter behind to the stepper drive



Order data

Designation	Description	for SD3..			Order number
		26	28 A	28B	
EMC mains filter	EMC mains filter 1-phase, 9 A, 115/230 V _{AC}	x	x	x	VW3A31401

Fieldbus CANopen



CANopen connection without tapping box

- CANopen connection with tapping box
- (1) PLC or motion controller, e.g. TLM2
 - (2) CANopen cable
 - (3) CANopen tapping box VW3CANTAP2
 - (4) CANopen cable VW3CANCARR••

The SD3 28A stepper drive can be connected directly to a CANopen fieldbus over two interfaces (CN1 or CN4).

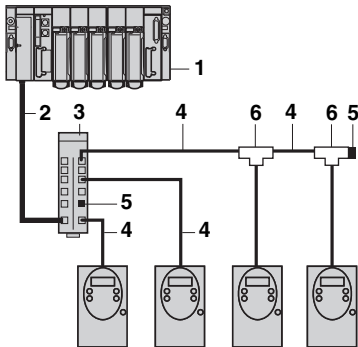
At interface CN1 three pins as spring loaded terminals and three connections are available. The CN4 interface is a RJ45 plug.

In a CAN bus multiple network devices can be connected over one bus cable. Every network device must be configured before operation on the network. The baud rate must be the same for all devices in the fieldbus. Address and baud rate are set during commissioning.

The devices at the two ends of a bus cable string must be terminated. On a CAN this can be done with terminating resistors. A terminating resistor is integrated in the device. It is enabled with the S1 switch.

Order data						
Designation	Description		for SD3..			Order number
			26	28 A	28B	
CANopen tapping box				x		VW3CANTAP2
CAN cable	with 2 RJ45 connectors	0.3 m		x		VW3CANCARR03
		1.0 m		x		VW3CANCARR1

Modbus fieldbus

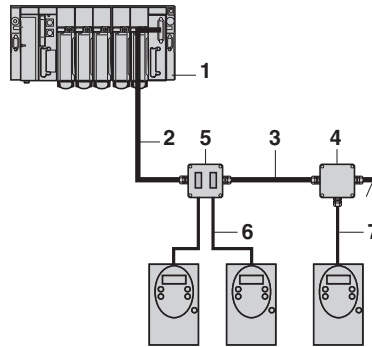


Connection through terminal modules and RJ45 connectors

- (1) PLC
- (2) Modbus cable, depending on the types of control unit or PLC
- (3) Modbus LU9GC3 terminal module
- (4) Modbus cable VW3A8306R
- (5) RC terminal adapter VW3A8306RC
- (6) Modbus T-tapping module VW3A8306TF

Connection via screw terminals:

In this case a Modbus VW3A8306D30 cable and an RC VW3A8306DRC terminal adapter are required.



Connection via tapping boxes

- (1) PLC
- (2) Modbus cable, depending on the types of control unit or PLC
- (3) Modbus cable VW3A8306
- (4) Modbus tapping box TSXSCA50
- (5) Modbus cable VW3A8306
- (6) Modbus T-tapping module VW3A8306TF
- (7) Modbus cable VW3A8306D30

The SD3 28A stepper motor drive can be connected directly to a Modbus fieldbus via the CN4 interface.

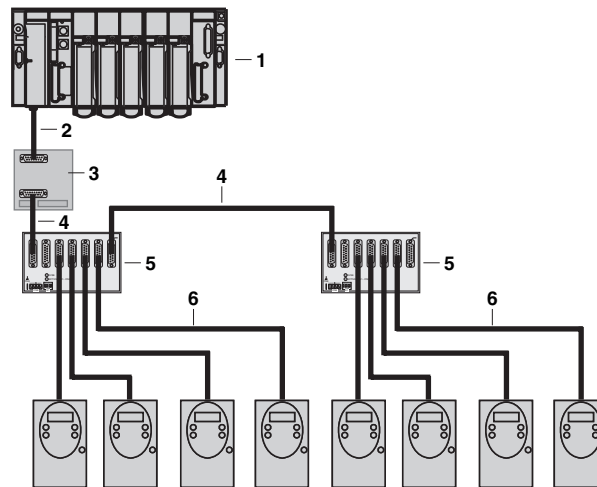
In Modbus multiple network devices can be connected over one bus cable. Every network device must be configured before operation on the network. Every device is assigned a unique node address.

The baud rate must be the same for all devices in the fieldbus.

Order data

Designation	Description		for SD3...			Order number
			26	28 A	28B	
Modbus tapping box	3 screw terminal strips, RC terminal adapter, for connection to VW3A8306D30 cable			x		TSXSCA50
Modbus 2-way tapping box	2 15-pin SubD female connectors, 2 screw terminal strips, RC terminal adapter, for connection with VW3A8306 cable			x		TSXSCA62
Modbus connector module	10 RJ45 connectors, 1 screw terminal strip			x		LU9GC3
Modbus RC terminal adapter	for RJ45 connectors	120 Ω, 1 nF		x		VW3A8306RC
		150 Ω		x		VW3A8306R
	for screw terminal strip	120 Ω, 1 nF		x		VW3A8306DRC
		150 Ω		x		VW3A8306DR
Modbus T-branch module	with integrated cable	0.3 m		x		VW3A8306TF03
		1.0 m		x		VW3A8306TF10
Modbus cable	with 1 RJ45 connector, 1 end isolated, for Modbus tapping box TSXSCA50	3.0 m		x		VW3A8306D30
Modbus cable	with 1 RJ45 connector, 1 15-pin SubD connector, for Modbus 2-way tapping box TSXSCA62	3.0 m		x		VW3A8306
Modbus cable	2 RJ45 connectors	0.3 m		x		VW3A8306R03
		1.0 m		x		VW3A8306R10
		3.0 m		x		VW3A8306R30
Modbus cable	4-wire, shield and twisted, RS485, without connector	100 m		x		TSXCSA100
		200 m		x		TSXCSA200
		500 m		x		TSXCSA500

Pulse/direction interface (SD3 28)



SD3 28A

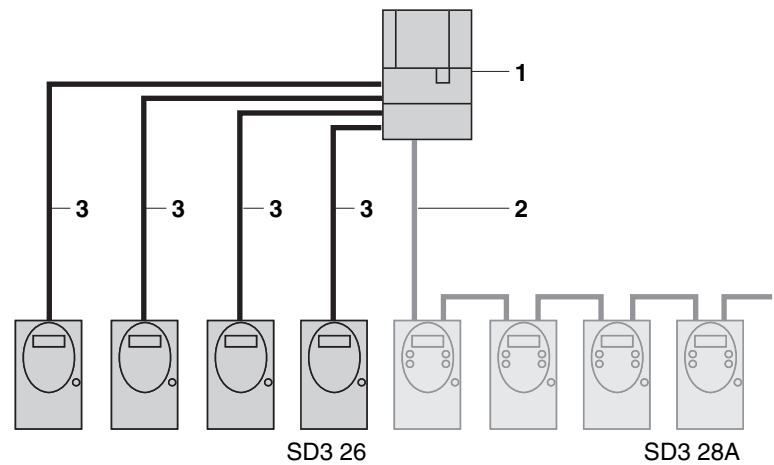
- (1) PLC
- (2) Connector cable VW3M8210R**
- (3) RS422 interface adapter USIC VW3M3102
- (4) Cascading cable VW3M8211R05
- (5) Reference Value Adapter VW3M3101
- (6) Connector cable VW3M8209R**

The SD3 28 stepper drives are suitable for setting reference values over externally fed pulse/direction signals. This is required for the "electronic gear" operating mode. In this case, the CN5 pulse/direction interface is used for feeding the reference signals (pulse/direction) or A/B encoder signals.

Order data

Designation	Description		for SD 3..			Order number
			26	28 A	28B	
Reference value adapter	For distribution of A/B encoder signals and P/R signals on 5 devices with 24-V _{DC} power supply unit for 5-V _{DC} encoder power supply; for installation on top-hat rail			x	x	VW3M3101
Cascading cable	For Reference Value Adapter RVA VW3M3101; with 2 15-pin SubD15 female connectors	0.5 m		x	x	VW3M8211R05
RS422 interface adapter USIC (Universal Signal Interface Converter)	for adaptation of activation signals to RS422 standard			x	x	VW3M3102
Pulse/direction connector cable for connecting a PLC to USIC	Shielded; USIC-side with SubD15 female connector, other end open	0.5 m		x	x	VW3M8210R05
		1.5 m		x	x	VW3M8210R15
		3.0 m		x	x	VW3M8210R30
		5.0 m		x	x	VW3M8210R50
Cable for pulse/direction, ESIM, A/B	Device side with 10-pin Molex connector, other cable end open	0.5 m		x	x	VW3M8201R05
		1.5 m		x	x	VW3M8201R15
		3.0 m		x	x	VW3M8201R30
		5.0 m		x	x	VW3M8201R50
Pulse/direction connector cable on Schneider Premium CFY	Device side with 10-pin Molex plug, CFY side with 15-pin SubD connector	0.5 m		x	x	VW3M8204R05
		1.5 m		x	x	VW3M8204R15
		3.0 m		x	x	VW3M8204R30
		5.0 m		x	x	VW3M8204R50
Pulse/direction connector cable on Siemens S5 IP247	Device side with 10-pin Molex plug, IP247 side with SubD9 connector	3.0 m		x	x	VW3M8205R30
Pulse/direction connector cable on Siemens S5 IP267	Device side with 10-pin Molex plug, IP267 side with SubD9 connector	3.0 m		x	x	VW3M8206R30
Pulse/direction connector cable on Siemens S7 -300 FM353	Device side with 10-pin Molex plug, FM353 side with SubD15 connector	3.0 m		x	x	VW3M8207R30
Pulse/direction connector cable, A/B to Reference Value Adapter, USIC, TLM2 or WP/WPM 311	Device side with 10-pin Molex connector, other end of cable with SubD15 female connector	0.5 m		x	x	VW3M8209R05
		1.5 m		x	x	VW3M8209R15
		3.0 m		x	x	VW3M8209R30
		5.0 m		x	x	VW3M8209R50

Signal interface (SD3 26)



- (1) PLC or Motion Controller
- (2) CANOpen cable
- (3) Connector cable VW3S8208..

The CN1 signal interface of the SD3 26 stepper drive is used for feeding the reference signals (pulse/direction).

Order data						
Designation	Description		for SD 3..			Order number
			26	28 A	28B	
Pulse/direction cable	5 V, shielded; device side with 24-pin Molex plug; other cable end open	0.5 m	x			VW3S8201R05
		1.5 m	x			VW3S8201R15
		3.0 m	x			VW3S8201R30
		5.0 m	x			VW3S8201R50
	24 V, shielded; device side with 24-pin Molex plug; other cable end open	0.5 m	x			VW3S8202R05
		1.5 m	x			VW3S8202R15
		3.0 m	x			VW3S8202R30
		5.0 m	x			VW3S8202R50
Pulse/direction connector cable on Schneider Premium CFY	Device side with 24-pin Molex plug; CFY-side with 15-pin SubD connector	1.5 m	x			VW3S8204R15
		3.0 m	x			VW3S8204R30
Pulse/direction connector cable on Siemens S7-300 FM353	Device side with 24-pin Molex plug; FM353 side with SubD15 female connector	0.5 m	x			VW3S8206R15
		1.5 m	x			VW3S8206R30
Connector cable pulse/direction to TLM2 or WP/WPM 311	Device side with 24-pin Molex plug; other cable end with SubD15 female connector	0.5 m	x			VW3S8208R05
		1.5 m	x			VW3S8208R15
		3.0 m	x			VW3S8208R30
		5.0 m	x			VW3S8208R50

Remote terminal

A remote terminal can be connected to the SD3 28 stepper drive, which can be attached to a switching cabinet door with an IP 65 seal. The terminal has a display and enables access to the same functions as the control panel integrated into the stepper drive (HMI).

Description



- (1) Display
 - Four seven-segment displays, still legible from 5 m away
 - Display of numeric values and codes
 - Save values when display flashes
 - Flashing display on device fault
- (2) ESC
 - Closing a menu or parameter
 - Return from displayed to last saved value
- (3) Red LED on: DC bus under power
- (4) ENT
 - Calling a menu or parameter
 - Save the displayed value
- (5) Quick Stop (Software Stop)
- (6) Error reset (Continue)
- (7) No function
- (8) Down arrow
 - Switch to next menu or parameter
 - Reduce the displayed value
- (9) Up arrow
 - Switch to previous menu or parameter
 - Increase the displayed value

Order data						
Designation	Description	for SD3..			Order number	
		26	28 A	28B		
Remote terminal	incl. cable with 2 plugs, seal and screws for mounting in degree of protection IP 65 on the switching cabinet door		x	x	VW3A31101	

BLCT commissioning software

Description

The Windows-based BLCT commissioning software is used for easy commissioning, parameterisation, simulations and diagnostics of the SD3 28 stepper drive. Compared to the integrated control panel (HMI) the commissioning software offers further options such as:

- Graphic interfaces for parameterisation and status display
- Extensive diagnostic tools for optimisation and maintenance
- Long-term recording as an aid to assessing operating behaviour
- Testing input and output signals
- Tracking signal sequences on the monitor
- Archiving of all device settings and records (with export functions for data processing)

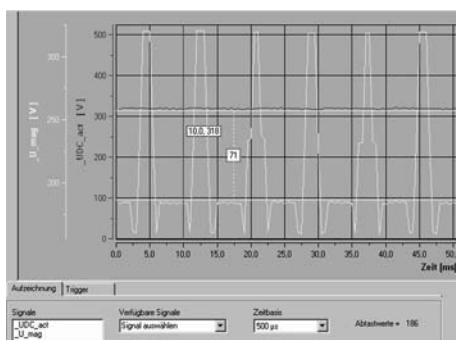


System requirements

You will need a PC or laptop with a free serial port and MS Windows® 2000 or newer.

Reference source

The current version of the BLCT commissioning software can be downloaded from the download area of the Berger Lahr web site <http://www.berger-lahr.de>.



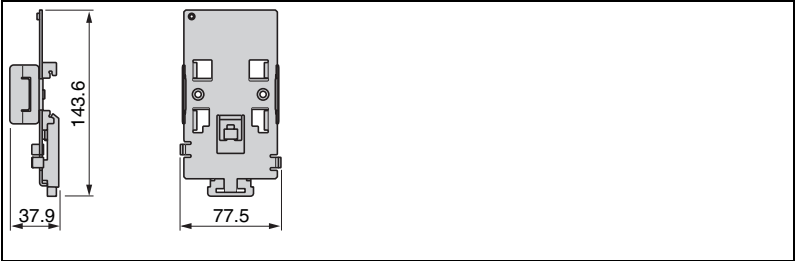
Order data

Designation	Description	for SD3..			Order number
		26	28 A	28B	
RJ45 programming cable with RS485/RS232 adapter	3.0 m		x	x	ACC2CRAAEF030

Adapter plate

The adapter plate is used for mounting the SD3 on a top-hat rail.

Dimensional drawing



Adapter plate

Order data					
Designation	Description	for SD3..			Order number
		26	28 A	28B	
Adapter plate	For mounting on top-hat rail	x	x	x	VW3A11851

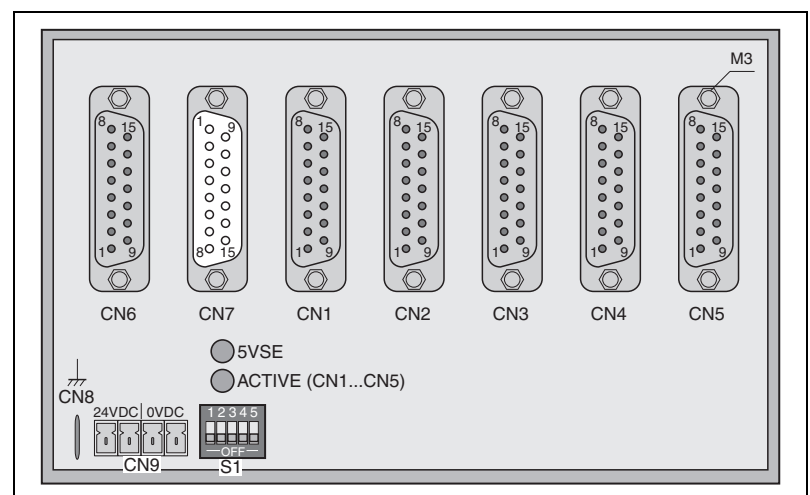
Reference value adapter RVA

Reference signals of a master device can be sent simultaneously to up to five devices using the RVA (Reference Value Adapter). This adapter also supplies the supply voltage (5V, monitored with sense wires) for the encoder. The correct power supply is shown by a "5VSE" LED.

An external rotary encoder (A/B signals) or an encoder simulation (ESIM) can be used as a master device. Pulse/direction signals can also be sent from a master controller.

The RVA reference value adapter is powered by 24 V at the CN9 terminals. A master controller (pulse/direction) can be connected to CN6. An external rotary encoder or an ESIM signal can be applied to CN7.

Terminals



Reference Value Adapter RVA, connections

Technical Data		
Mechanical data		
Dimensions (H x W x D)	mm	77 x 135 x 37
Electrical Data		
Input		
• Supply voltage	V _{DC}	19.2 ... 30
• Current consumption	A	15 ... 150
- 5VSE unloaded	mA	50
- 5VSE 300 mA	mA	150
Output, encoder		
• 5VSE		sense-regulated, short-circuit-proof, overload-proof
• Max. output current	mA	4.75 ... 5.25
		300

Order data						
Designation	Description		for SD3..			Order number
			26	28 A	28B	
Reference value adapter	For distribution of A/B encoder signals and P/R signals on 5 devices with 24-V _{DC} power supply unit for 5-V _{DC} encoder power supply; for mounting on top-hat rail			x	x	VW3M3101
Cascading cable	for Reference Value Adapter VW3M3101	0.5 m		x	x	VW3M8211R05

RS422 interface adapter USIC



The USIC (Universal Signal Interface Converter) is an interface adapter, which is used as a universal adapter from a pulse/direction interface to a master controller (e.g. PLC).

A USIC is recommended in the following cases:

- If 24-V signals are to be connected to 5-V inputs.
- If the signals must be electrically isolated (e.g. incorrect reference potential, strong interference in environment).
- If signals with an open collector are connected over distances greater than 3 m or the frequency is greater than 50 kHz.

The USIC has the following features:

- 24V or 5V inputs (optocoupler) are available as required.
- Actuation signals are adapted for products with inputs that comply with RS422.
- Electrical isolation of signals

Note: a power supply (24 V corresponding to PELV) must be provided by the customer.

Technical Data

Mechanical data		
Dimensions (H x W x D)	mm	68 x 73 x 38
Degree of protection as per EN 60529		IP 00
Electrical Data		
Supply voltage	V _{DC}	20 ... 30
Current consumption	A	15 ... 150
Ripple voltage	V _{SS}	< 2
Signal inputs		opto-isolated, secure against reverse polarity
• Resistance network, plugged in		75 Ω, standard from factory
- Level		5-V level (U _S : 2.5 ... 5.25 Nm)
- Max. input voltage	V	5.25
- Turn-on point U _E	V	2.5
- Turn-off point U _A	V	0.4
- Typ. input current at nominal voltage	mA	10
• Resistance network		
- Level		24 V level (U _S : 20 ... 30 V)
- Max. input voltage	V	30
- Turn-on point U _E	V	20
- Turn-off point U _A	V	3
- Typ. input current at nominal voltage	mA	10
Signal outputs		open collector outputs, short-circuit protected
• Open collector outputs		short-circuit protected
- Max. output voltage	V	30
- Max. output current	mA	50
• RS422 outputs		short-circuit protected
Ambient conditions		
Operating temperature ¹⁾	°C	0 - +50
Transport and storage temperature	°C	-25 ... +70
Pollution degree		Step 2
Rel. humidity as per IEC 60721-3-3, Class 3K3	%	5 ... 85%, no condensation allowed
Oscillation stress as per IEC 80068-2-6		3 ... 13 Hz: 1.5 mm peak 13 ... 150 Hz: 1 g peak
Shock stress as per IEC 60068-2-27		15 g for 11 ms

¹⁾ no icing

Order data

Designation	Description	for SD3..			Order number
		26	28 A	28B	
USIC (Universal Signal Interface Converter)	for adaptation of activation signals to RS422 standard		x	x	VW3M3102
Pulse/direction connector cable for connecting a PLC to USIC	Shielded; USIC-side with SubD15 female connector, other end open	0.5 m	x	x	VW3M8210R05
		1.5 m	x	x	VW3M8210R15
		3.0 m	x	x	VW3M8210R30
		5.0 m	x	x	VW3M8210R50

Order data – general overview						
Designation	Description		for SD3..			Order number
			26	28 A	28B	
EMC mains filter	EMC mains filter 1-phase, 9 A, 115/230 V _{AC}		x	x	x	VW3A31401
CANopen						
CANopen tapping box				x		VW3CANTAP2
CAN cable	With 2 RJ45 connectors	0.3 m		x		VW3CANCARR03
		1.0 m		x		VW3CANCARR1
Modbus						
Modbus tapping box	3 screw terminal strips, RC terminal adapter, for connection to VW3A8306D30 cable			x		TSXSACA50
Modbus 2-way tapping box	2 15-pin SubD female connectors, 2 screw terminal strips, RC terminal adapter, for connection with VW3A8306 cable			x		TSXSACA62
Modbus connector module	10 RJ45 connectors, 1 screw terminal strip			x		LU9GC3
Modbus RC terminal adapter	For RJ45 connectors	120 Ω, 1 nF		x		VW3A8306RC
		150 Ω		x		VW3A8306R
	For screw terminal strip	120 Ω, 1 nF		x		VW3A8306DRC
		150 Ω		x		VW3A8306DR
Modbus T-branch module	With integrated cable	0.3 m		x		VW3A8306TF03
		1.0 m		x		VW3A8306TF10
Modbus cable	With 1 RJ45 connector, 1 end isolated, for Modbus tapping box TSXSACA50	3.0 m		x		VW3A8306D30
Modbus cable	With 1 RJ45 connector, 1 15-pin SubD connector, for Modbus 2-way tapping box TSXSACA62	3.0 m		x		VW3A8306
Modbus cable	2 RJ45 connectors	0.3 m		x		VW3A8306R03
		1.0 m		x		VW3A8306R10
		3.0 m		x		VW3A8306R30
Modbus cable	4-wire, shield and twisted, RS485, without connector	100 m		x		TSXCSA100
		200 m		x		TSXCSA200
		500 m		x		TSXCSA500
Pulse/direction interface						
Reference value adapter	For distribution of A/B encoder signals and P/R signals on 5 devices with 24-V _{DC} power supply unit for 5-V _{DC} encoder power supply; for mounting on top-hat rail			x	x	VW3M3101
Cascading cable	For Reference Value Adapter VW3M3101	0.5 m		x	x	VW3M8211R05
USIC (Universal Signal Interface Converter)	For adaptation of activation signals to RS422 standard			x	x	VW3M3102
Pulse/direction connector cable for connecting a PLC to USIC	Shielded; USIC-side with SubD15 female connector, other end open	0.5 m		x	x	VW3M8210R05
		1.5 m		x	x	VW3M8210R15
		3.0 m		x	x	VW3M8210R30
		5.0 m		x	x	VW3M8210R50
Cable for pulse/direction, ESIM, A/B	Device side with 10-pin Molex connector, other cable end open	0.5 m		x	x	VW3M8201R05
		1.5 m		x	x	VW3M8201R15
		3.0 m		x	x	VW3M8201R30
		5.0 m		x	x	VW3M8201R50
Pulse/direction connector cable on Schneider Premium CFY	Device side with 10-pin Molex plug, CFY side with 15-pin SubD connector	0.5 m		x	x	VW3M8204R05
		1.5 m		x	x	VW3M8204R15
		3.0 m		x	x	VW3M8204R30
		5.0 m		x	x	VW3M8204R50
Pulse/direction connector cable on Siemens S5 IP247	Device side with 10-pin Molex plug, IP247 side with SubD9 connector	3.0 m		x	x	VW3M8205R30
Pulse/direction connector cable on Siemens S5 IP267	Device side with 10-pin Molex plug, IP267 side with SubD9 connector	3.0 m		x	x	VW3M8206R30
Pulse/direction connector cable on Siemens S7-300 FM353	Device side with 10-pin Molex plug, FM353 side with SubD15 connector	3.0 m		x	x	VW3M8207R30
Pulse/direction connector cable, A/B to Reference Value Adapter, USIC, TLM2 or WP/WPM 311	Device side with 10-pin Molex connector, other end of cable with SubD15 female connector	0.5 m		x	x	VW3M8209R05
		1.5 m		x	x	VW3M8209R15
		3.0 m		x	x	VW3M8209R30
		5.0 m		x	x	VW3M8209R50

Designation	Description		for SD3..			Order number	
			26	28 A	28B		
Signal interface							
Pulse/direction cable	5 V, shielded; Device side with 24-pin Molex plug; other cable end open	0.5 m	x			VW3S8201R05	
		1.5 m	x			VW3S8201R15	
		3.0 m	x			VW3S8201R30	
		5.0 m	x			VW3S8201R50	
	24 V, shielded; Device side with 24-pin Molex plug; other cable end open	0.5 m	x			VW3S8202R05	
		1.5 m	x			VW3S8202R15	
		3.0 m	x			VW3S8202R30	
		5.0 m	x			VW3S8202R50	
	Pulse/direction connector cable on Schneider Premium CFY	1.5 m	x			VW3S8204R15	
		3.0 m	x			VW3S8204R30	
Pulse/direction connector cable on Siemens S7-300 FM353	Device side with 24-pin Molex plug; FM353 side with SubD15 female connector	0.5 m	x			VW3S8206R15	
		1.5 m	x			VW3S8206R30	
Pulse/direction connector cable to TLM2 or WP/WPM 311	Device side with 24-pin Molex plug; other cable end with SubD15 female connector	0.5 m	x			VW3S8208R05	
		1.5 m	x			VW3S8208R15	
		3.0 m	x			VW3S8208R30	
		5.0 m	x			VW3S8208R50	
Motor cable							
Cable for 3-phase stepper motor	4 x 1.5 mm, shielded; Motor side with 6-pin circular plug; other cable end open	3.0 m	x	x	x	VW3S5101R30	
		5.0 m	x	x	x	VW3S5101R50	
		10.0 m	x	x	x	VW3S5101R100	
		15.0 m	x	x	x	VW3S5101R150	
	4 x 1.5 mm, shielded; both cable ends open	20.0 m	x	x	x	VW3S5101R200	
		3.0 m	x	x	x	VW3S5102R30	
		5.0 m	x	x	x	VW3S5102R50	
		10.0 m	x	x	x	VW3S5102R100	
		15.0 m	x	x	x	VW3S5102R150	
		20.0 m	x	x	x	VW3S5102R200	
Encoder cable							
Encoder cable	Configured for stepper motor; shielded; motor side with 12-pin encoder plug; device side with 12-pin Molex plug	3.0 m	x	x	x	VW3S8101R30	
		5.0 m	x	x	x	VW3S8101R50	
		10.0 m	x	x	x	VW3S8101R100	
		15.0 m	x	x	x	VW3S8101R150	
		20.0 m	x	x	x	VW3S8101R200	
BLCT commissioning software							
RJ45 programming cable with RS485/RS232 adapter		3.0 m		x	x	ACC2CRAAEF030	
Reference value adapter RVA							
Reference value adapter				x	x	VW3M3101	
For distribution of A/B encoder signals and P/R signals on 5 devices with 24-V _{DC} power supply unit for 5-V _{DC} encoder power supply; for installation on top-hat rail							
Cascading cable		for Reference Value Adapter VW3M3101	0.5 m		x	x	VW3M8211R05
USIC							
USIC (Universal Signal Interface Converter)		For adaptation of activation signals to RS422 standard			x	x	VW3M3102
Pulse/direction connector cable for connecting a PLC to USIC							
Shielded; USIC-side with SubD15 female connector,other end open		0.5 m		x	x	VW3M8210R05	
		1.5 m		x	x	VW3M8210R15	
		3.0 m		x	x	VW3M8210R30	
		5.0 m		x	x	VW3M8210R50	
Other accessories							
Remote terminal		Incl. cable with 2 plugs, seal and screws for mounting in degree of protection IP 65 on the switching cabinet door			x	x	VW3A31101
Adapter plate		For mounting on top-hat rail		x	x	x	VW3A11851
Connector set		With 5 24-pin Molex plugs; with crimp contacts		x	x	x	VW3S8212
Fan set		Fan set 24 V _{DC}		x	x	x	VW3S3101
Technical documentation		CD-ROM, multilingual		x	x	x	ACC1RDBAM00XX

Conversion tables

Rotor inertia

	lb-in ²	lb-ft ²	lb-in-s ²	lb-ft-s ² slug-ft ²	kg-cm ²	kg-cm-s ²	g-cm ²	g-cm-s ²	oz-in ²	oz-in-s ²
lb-in ²	–	6.94×10^{-3}	2.59×10^{-3}	2.15×10^{-4}	2.926	2.98×10^{-3}	2.92×10^3	2.984	16	4.14×10^{-2}
lb-ft ²	144	–	0.3729	3.10×10^{-2}	421.40	0.4297	4.21×10^5	429.71	2304	5.967
lb-in-s ²	386.08	2.681	–	8.33×10^{-2}	1.129×10^3	1.152	1.129×10^6	1.152×10^3	6.177×10^3	16
lb-ft-s ² slug-ft ²	4.63×10^3	32.17	12	–	1.35×10^4	13.825	1.355×10^7	1.38×10^4	7.41×10^4	192
kg-cm ²	0.3417	2.37×10^{-3}	8.85×10^{-4}	7.37×10^{-6}	–	1.019×10^{-3}	1000	1.019	5.46	1.41×10^{-2}
kg-cm-s ²	335.1	2.327	0.8679	7.23×10^{-2}	980.66	–	9.8×10^5	1000	5.36×10^3	13.887
g-cm ²	3.417×10^4	2.37×10^{-6}	8.85×10^{-7}	7.37×10^{-8}	1×10^{-3}	1.01×10^{-6}	–	1.01×10^{-3}	5.46×10^{-3}	1.41×10^{-6}
g-cm-s ²	0.335	2.32×10^{-3}	8.67×10^{-4}	7.23×10^{-5}	0.9806	1×10^{-3}	980.6	–	5.36	1.38×10^{-2}
oz-in ²	0.0625	4.3×10^{-4}	1.61×10^{-6}	1.34×10^{-6}	0.182	1.86×10^{-4}	182.9	0.186	–	2.59×10^{-3}
oz-in-s ²	24.13	0.1675	6.25×10^{-2}	5.20×10^{-3}	70.615	7.20×10^{-2}	7.06×10^4	72	386.08	–

Torque

	lb-in	lb-ft	oz-in	Nm	kg-m	kg-cm	g-cm	dyne-cm
lb-in	–	8.333×10^{-2}	16	0.113	1.152×10^{-2}	1.152	1.152×10^3	1.129×10^6
lb-ft	12	–	192	1.355	0.138	13.825	1.382×10^4	1.355×10^7
oz-in	6.25×10^{-2}	5.208×10^{-3}	–	7.061×10^{-3}	7.200×10^{-4}	7.200×10^{-2}	72.007	7.061×10^4
Nm	8.850	0.737	141.612	–	0.102	10.197	1.019×10^4	1×10^7
kg-m	86.796	7.233	1.388×10^3	9.806	–	100	1×10^5	9.806×10^7
kg-cm	0.8679	7.233×10^{-2}	13.877	9.806×10^{-2}	10^{-2}	–	1000	9.806×10^5
g-cm	8.679×10^{-4}	7.233×10^{-5}	1.388×10^{-2}	9.806×10^{-5}	1×10^{-5}	1×10^{-3}	–	980.665
dyne-cm	8.850×10^{-7}	7.375×10^{-8}	1.416×10^{-5}	10^{-7}	1.019×10^{-8}	1.0197×10^{-6}	1.019×10^{-6}	–

Power

	H.P.	W
H.P.	–	745.7
W	1.31×10^{-3}	–

Length

	in	ft	yd	m	cm	mm
in	–	0.0833	0.028	0.0254	2.54	25.4
ft	12	–	0.333	0.3048	30.48	304.8
yd	36	3	–	0.914	91.44	914.4
m	39.37	3.281	1.09	–	100	1000
cm	0.3937	0.03281	1.09×10^{-2}	0.01	–	10
mm	0.03937	0.00328	1.09×10^{-3}	0.001	0.1	–

Rotation

	1/min (rpm)	rad/sec	deg./sec
1/min (rpm)	–	0.105	6.0
rad/sec	9.55	–	57.30
deg./sec	0.167	1.745×10^{-2}	–

Weight

	lb	oz	slug	kg	g
lb	–	16	0.0311	0.453592	453.592
oz	6.35×10^{-2}	–	1.93×10^{-3}	0.028349	28.35
slug	32.17	514.8	–	14.5939	1.459×10^4
kg	2.20462	35.274	0.0685218	–	1000
g	2.205×10^{-3}	3.527×10^{-3}	6.852×10^{-5}	0.001	–

Temperature

	°F	°C
°F	–	$(9 - 32) \cdot \frac{5}{9}$
°C	$9 \cdot \frac{9}{5} + 32$	–

Force

	lb	oz	gf	dyne	N
lb	–	16	453.592	4.448×10^5	4.4482
oz	0.0625	–	28.35	2.780×10^4	0.27801
gf	2.205×10^{-3}	0.03527	–	980.665	N.A.
dyne	2.248×10^{-6}	3.59×10^{-6}	1.02×10^{-3}	–	0.0001
N	0.22481	3.5967	N.A.	100,000	–

Example for conversion:

Conversion of a 10 inch length measurement into metres. Look for the entry “in” (= inch) in the “Length” table in the left column and the entry “m” (= metre) in the header. The table cell at the point of intersection of the column and the row will show the conversion factor: “0.0254”. Multiply 10 inches by 0.0254 and you will get the value in metres: $10 \text{ in} \times 0.0254 = 0.254 \text{ m}$.



Berger Lahr offers you the positioning and automation solutions you need, based on our technology and proven series of products. Our comprehensive engineering and consulting service is ready to support and advise you every step of the way.

Berger Lahr is a member company of the Schneider Electric Group. With its Merlin Gerlin, Square D and Telemecanique brands, Schneider Electric is one of the leading providers of electrical and automation-engineering solutions.

