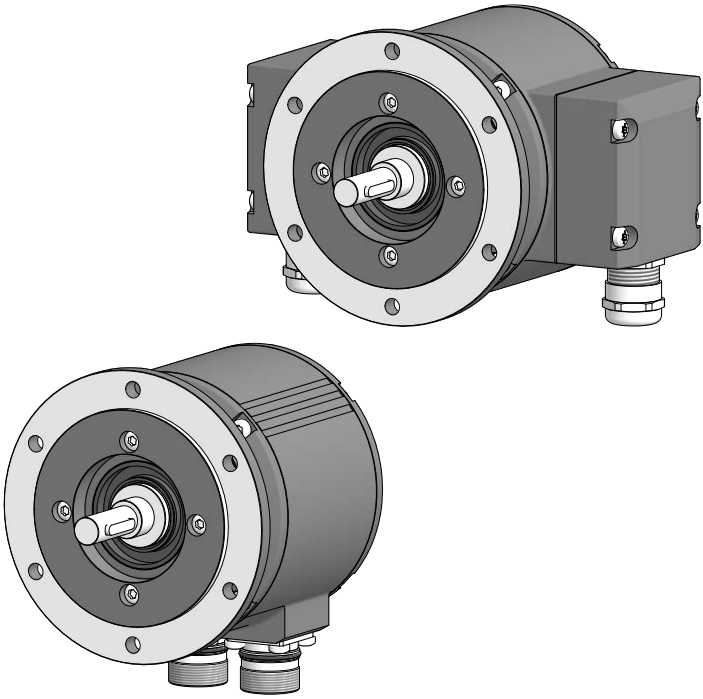
Baumer

Passion for Sensors

Installation and operating instructions



PMG 10 - SSI

Absolute encoder with magnetic sensing

MB245EN - 11171693, 16A1, Baumer_PMG10-SSI_II_EN

HÜBNER BERLIN
A Baumer Brand

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1. IMPORTENT NOTES

1.1 Symbol guide

Warning
Disregarding could result in serious injury, death or damage to property

Attention
Disregarding could result in damage to property or damage/malfunction of the encoder

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Additional information and recommendations

1.2 Intended use

The encoder is a precision measurement device for the acquisition of speed/position information for the control of drive units and the provision of electronic output signals for downstream devices.

The encoder must not be used for any other purpose. The function of the encoder is described in this mouting instruction. The customer must check the suitability for the purpose intended.

Mounting and selection must be executed by authorized and qualified personnel. Mounting, electrical commissioning or any other work with the encoder or system is to be performed by appropriately qualified staff only.

Do not put encoder into service if there is any visible evidence of damage.

Do not operate encoder beyond the limit values stated in this mounting instruction.

Any risk of personal injury, damage of the system or company equipment due to failure or malfunction of the encoder has to be eliminated by corresponding safety measures.

Warning
Disregarding intended use could result in serious injury and damage to property.

1.3 Exclusion from liability

The manufacturer is not liable for any damage to persons or property resulting from not intended use of the encoder.

1.4 Maintenance and lifetime

The encoder may be only opened as described in this instruction. Repair or maintenance work that requires opening the encoder completely must be carried out by the manufacturer.

Alterations of the device are not permitted.

The expected operating life of the device depends on the ball bearings, which are equipped with a permanent lubrication.

In the event of queries or subsequent deliveries, the data on the device type label must be quoted, especially the type designation and the serial number.

1.5 Approvals and warranty

EU Declaration of Conformity meeting to the European Directives.

We grant a 2-year warranty in accordance with the regulations of the Central Association of the German Electrical Industry (ZVEI).

i warranty seal
Damaging the warranty seal on the encoder invalidates warranty.

1.6 Storage temperature and disposal

The storage temperature range of the encoder is between -15...+70 °C (caused by packing).

Encoder components are to be disposed of according to the regulations prevailing in the respective country.

2. SAFETY AND ATTENTION INSTRUCTIONS

2.1 Safety instructions

Explosion risk
Spark formation can cause a fire or an explosion.

» Do not use the encoder in areas with explosive and/or highly infl ammable materials. They may explode and/or catch fi re by possible spark formation.

Risk of serious injuries due to rotating shafts
Hair and clothes may become tangled in rotating shafts. Touching the rotating parts can cause extremely serious injuries.

» Before all work switch off all operating voltages and ensure machinery is stationary.

» Prevent reconnection operating voltages by third parties.

Risk of serious injuries due to consequential damages
Plants can be deregulated due to malfunction or faulty signals of the encoder.

» Damage caused by faulty operation or by a malfunction of the encoder has to be eliminated by corresponding safety measures.

Risk of burns due to formation of heat
The encoder heats up at higher speed so there is a serious risk of burning shortly after the machine has been turned off.

» Examine carefully wether the encoder overheats. Wear suitable gloves if necessary.

2.2 Attention instructions for mounting and operation

☞ Risk of destruction due to electrostatic charge
Electronic parts contained in the encoder are sensitive to high voltages.

» Do not touch plug contacts or electronic components.

» Protect output terminals against external voltages.

» Do not exceed max. operating voltage.

☞ Risk of destruction due to mechanical overload
Rigid mounting may give rise to constraining forces.

» Never restrict the freedom of movement of the encoder. The installation instructions must be followed.

» It is essential that the specified clearances and/or angles are observed.

☞ Risk of destruction due to mechanical shock
Violent shocks, e. g. due to hammer impacts, can lead to the destruction of the sensing system.

» Never use force. Assembly is simple when correct procedure is followed.

» Use suitable puller for disassembly.

☞ Risk of destruction due to contamination
Dirt penetrating inside the encoder can cause short circuits and damage the optical sensing system.

» Absolute cleanliness must be maintained when carrying out any work on the open terminal box.

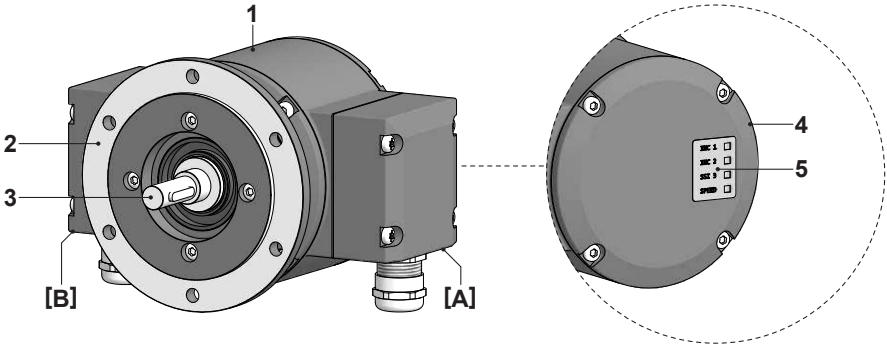
» When dismantling, never allow lubricants to penetrate the encoder.

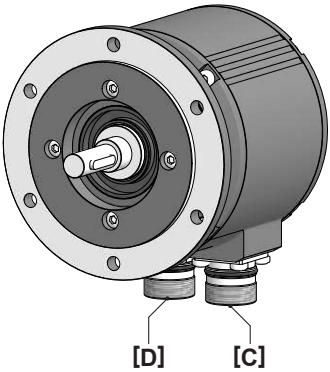
☞ Risk of destruction due to adhesive fluids
Adhesive fluids can damage the optical sensing system and the bearings. Dismounting an encoder, secured to a shaft by adhesive may lead to the destruction of the unit.

» Do not use adhesive fluids for fixing.

3. PREPARATION

3.1 Scope of delivery





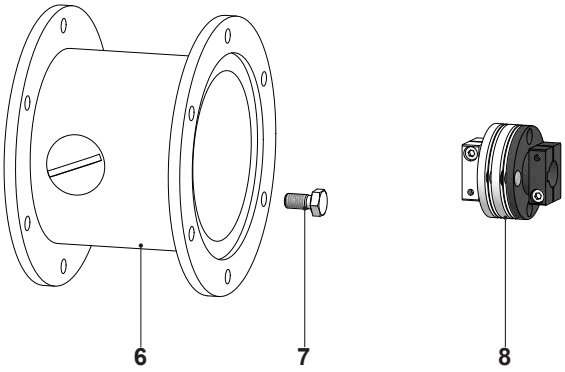
1 Housing
2 EURO flange B10
3 Solid shaft with key
4 Bearing shield
5 LED function indicators

Radial terminal boxes* (see *section 5*):
[A] SSI + additional output 1
[B] Speed switch + additional output 2
Radial flange connectors* (see *section 5*):
[C] SSI + additional output 1
[D] Speed switch + additional output 2

* Depending on version

3.2 Required accessory for mounting (not included in scope of delivery)

i Connecting cables and respective mating connectors are required for the electrical connection. Details see *section 5, page 11*.



6 Installation fitting, customized

7 Fixing screws for installation fitting ISO 4017, M6x16 mm

8 Spring disk coupling K 35, available as accessory, see *section 4.4, page 9*.

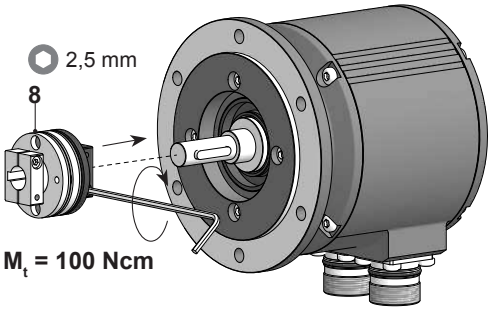
3.3 Required tools (not included in scope of delivery)

- 2,5 mm
- 10 und 22 mm
- TX 10, TX 20

4. MOUNTING

4.1 Mounting the spring disk couling to the encoder

We recommend using the Baumer Hübner spring disk coupling K 35, see *section 4.4, page 9*, available as accessory. When other couplings are used pay attention to manufacturer's notes.

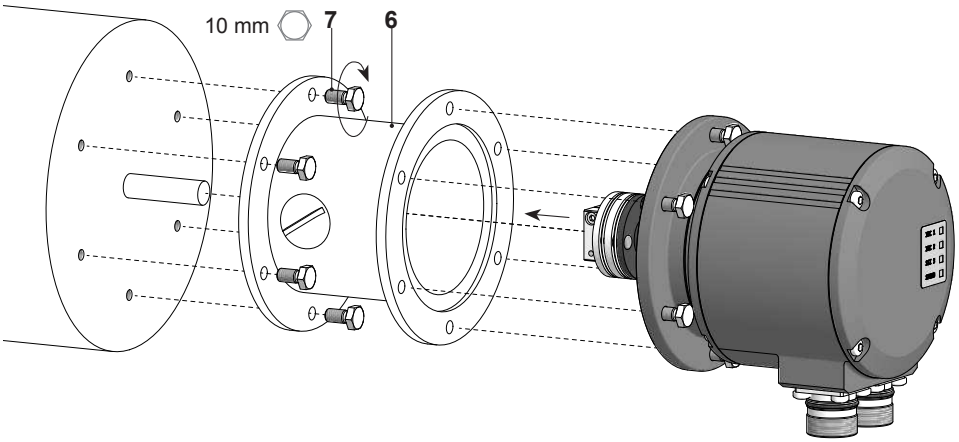


4.2 Mounting to drive shaft

☞ Lifetime restrictions and angle error by radial deviations
High runout of the drive shaft can cause encoder angle error.
High runout of the drive shaft can cause vibrations, which can shorten the lifetime of the encoder.

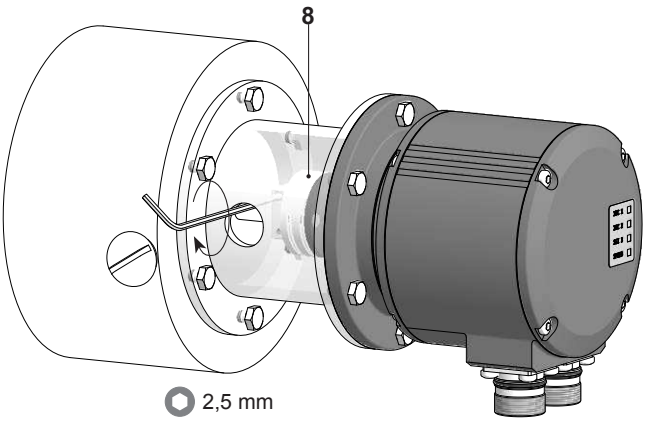
» Lubricate drive shaft!

» Minimize drive shaft runout (≤0.2 mm; ≤0.03 mm recommended).



i The encoder must be mounted with cable connection facing downward and not exposed to water.

4.3 Mounting the spring disk couling to drive shaft

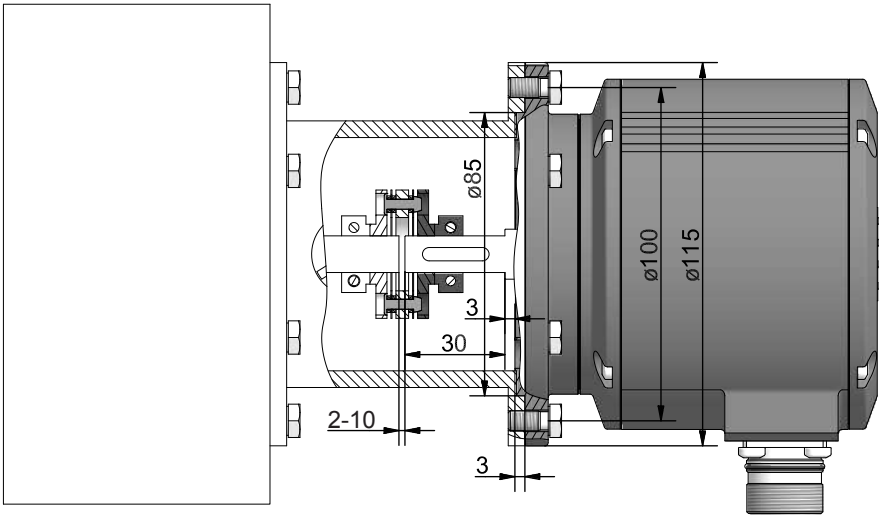


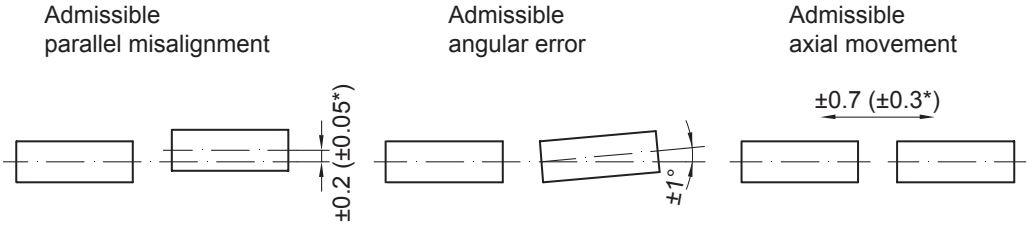
4.4 Maximum permissible mounting tolerance when the Baumer Hübner K 35 spring disk coupling is used

Encoders should be driven through the Baumer Hübner K 35 spring disk coupling (accessory), that can be pushed onto the shaft without axial loading

☞ The encoder must be mounted on the drive with the least possible angular error and parallel misalignment.

☞ Risk of damaging the ball bearings
Coupling components must not be driven onto the shaft with improper force (e. g. hammer impacts), because of the risk of damaging the ball bearings.





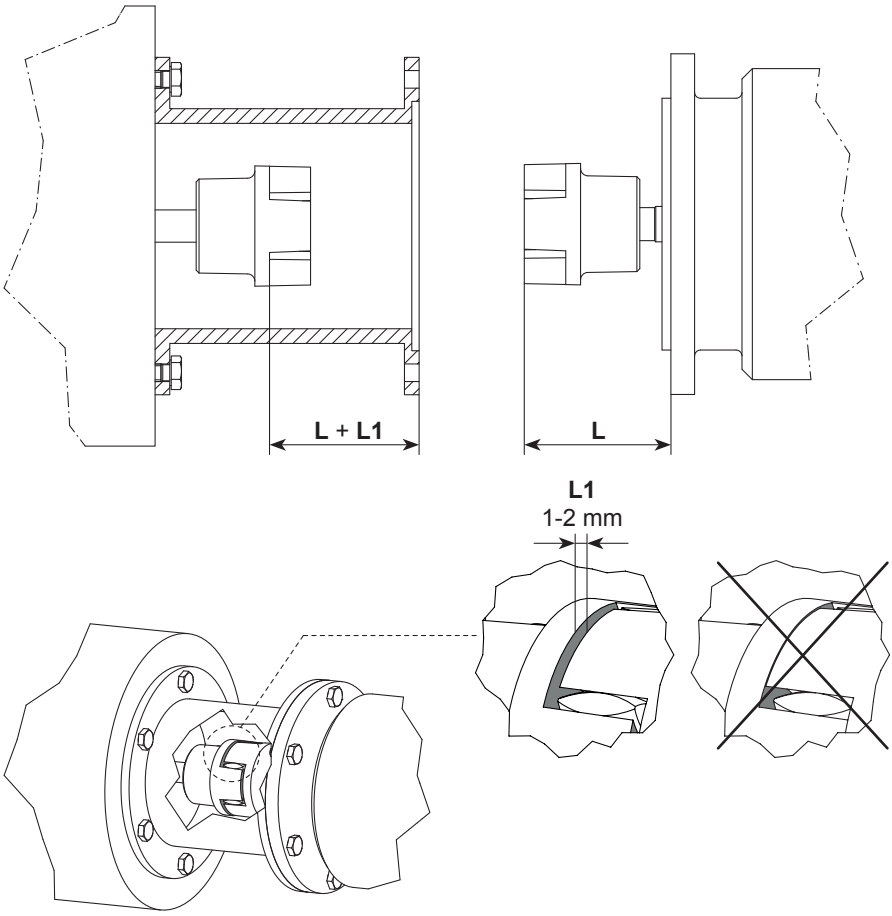
* For insulated hub version

All dimensions in millimeters, unless otherwise stated.

4.5 Note when using a jaw-type coupling (for example „ROTEX®“)

☞ Incorrect mounting of the jaw-type coupling can damage the encoder.
Avoid blocking of both coupling halves (claws pressed together). The encoder shaft must not subjected to direct axial shock.

» Use a depth gauge to find and observe the correct distances (**L**, **L1**), see below.



5. ELECTRICAL CONNECTION

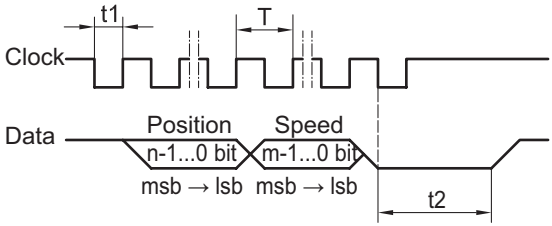
5.1 Terminal significance

+UB	Voltage supply
⊥	Ground
A+	Channel A+
A–	Channel A– (channel A+ inverted)
B+	Channel B+
B–	Channel B– (channel B+ inverted)
R+	Zero pulse (reference signal)
R–	Zero pulse inverted
nE+	System OK+ / error output
nE–	System OK– / error output inverted
PRE	PRESET/RESET
DIR	Rotating direction
SP+*	DSL_OUT1 / speed switch (Open-Collector** or Solid State Relay**)
SP–*	DSL_OUT2 / speed switch (0 V** or Solid State Relay**)
SA*	RS485+ / programming interface
SB*	RS485– / programming interface
D+	DATA+ (SSI)
D–	DATA– (SSI)
C+	CLOCK+ (SSI)
C–	CLOCK– (SSI)
dnu	Do not use

* Only at version with speed switch

** Depending on the version

5.2 Data transfer SSI

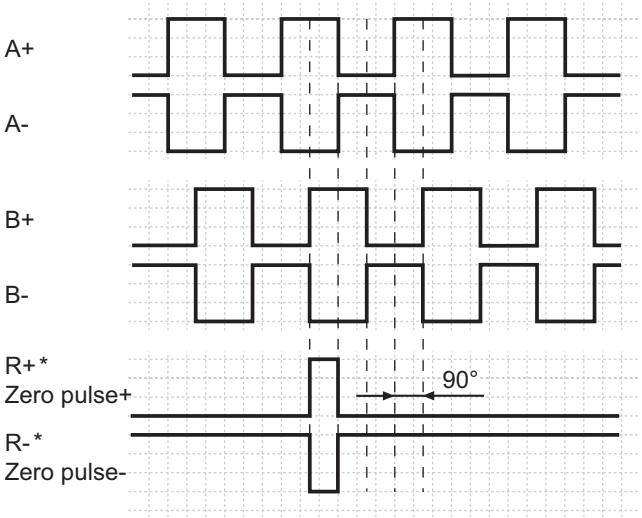


Clock frequency	100 kHz...2 MHz
Period (T)	0.5…10 µs
Time lag (t1)	0.25…5 µs
Monoflop time (t2)	20 µs (internal)
n, m	Number of bits

i For continous clocking, the SSI word is transmitted only once followed by zero values (no ring register operation).

5.3 Output signals incremental (additional outputs)

At positive rotating direction



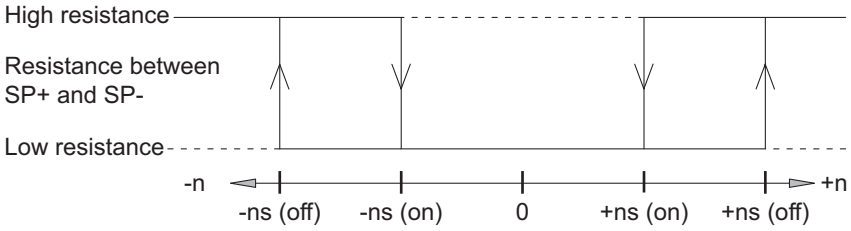
* Only additional output 2

5.4 LED function displays

LED	Red	Green
INC1 (additional output incremental 1)	Undervoltage Overload Over-temperature	OK
INC2 (additional output incremental 2)	Undervoltage Overload Over-temperature	OK
Status	Internal error	OK
Speed	Speed higher switching speed (overspeed)	Speed lower switching speed

5.5 Speed switch - Switching characteristics

Event	State of the speed switch output
During initialisation	High resistance (overspeed)
After initialisation and speed ≤ -ns (off)	High resistance (overspeed)
-ns (off) < speed ≤ -ns (on)	State unchanged Low resistance (no overspeed) after initialisation if the encoder is rotating between the switching range during initialisation.
-ns (on) < speed < +ns (on)	Low resistance (no overspeed)
+ns (on) ≤ speed < +ns (off)	State unchanged Low resistance (no overspeed) after initialisation if the encoder is rotating between the switching range during initialisation.
+ns (off) ≤ speed	High resistance (overspeed)



n = Speed
+ns (on) = Activation speed at shaft rotation in positive rotating direction*
+ns (off) = Deactivation speed at shaft rotation in positive rotating direction*
-ns (on) = Activation speed at shaft rotation in negative rotating direction*
-ns (off) = Deactivation at shaft rotation in negative rotating direction*

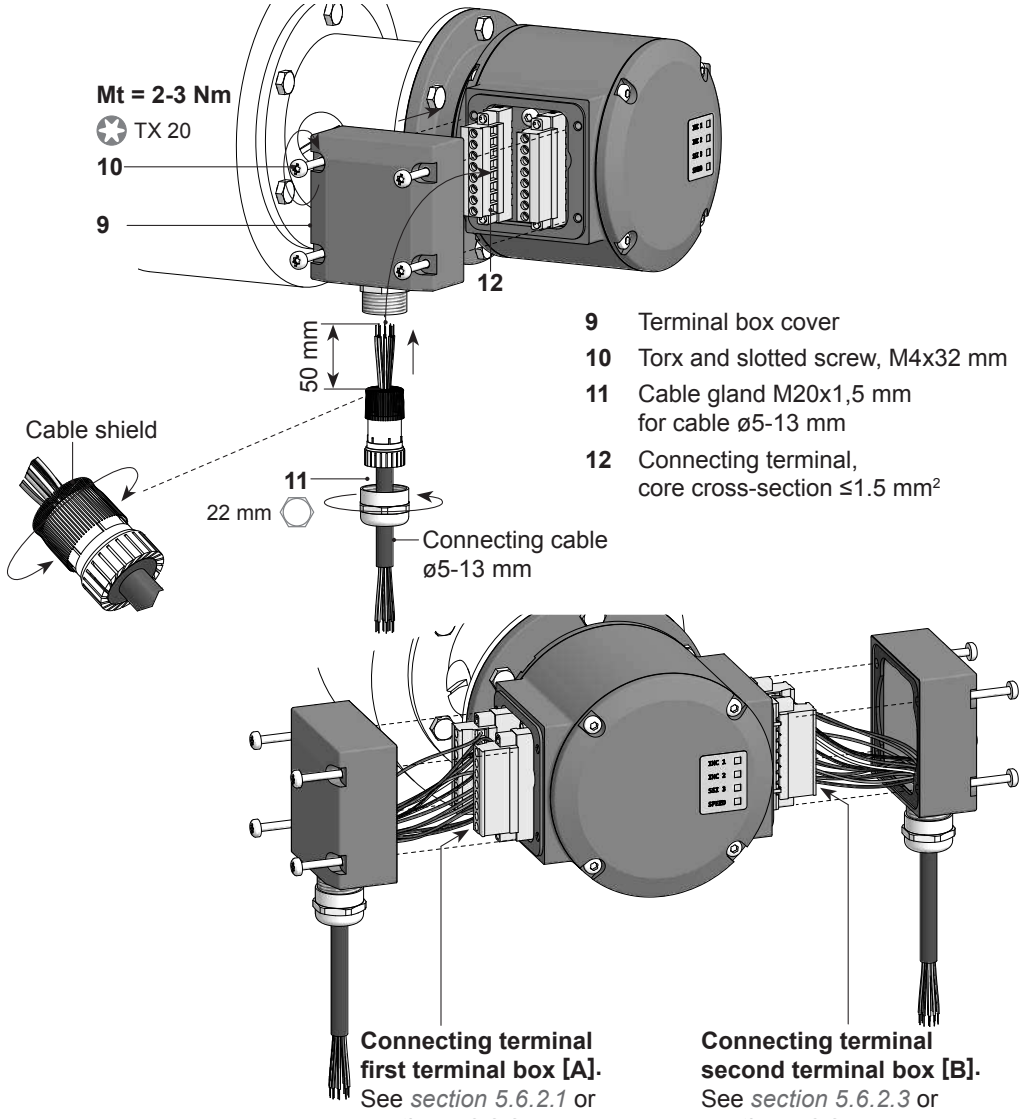
* See *section 6, page 20*.

5.6 Version with radial terminal boxes

5.6.1 Cable connection

☞ To ensure the specified protection of the device the correct cable diameter must be used.

Connecting cables are not in scope of delivery.



9 Terminal box cover

10 Torx and slotted screw, M4x32 mm

11 Cable gland M20x1,5 mm for cable ø5-13 mm

12 Connecting terminal, core cross-section ≤1.5 mm²

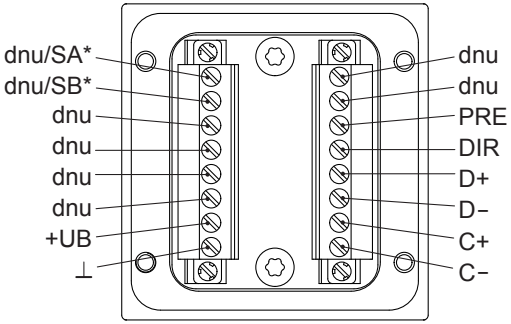
Connecting terminal first terminal box [A]. See *section 5.6.2.1* or *section 5.6.2.2*.

Connecting terminal second terminal box [B]. See *section 5.6.2.3* or *section 5.6.2.4*.

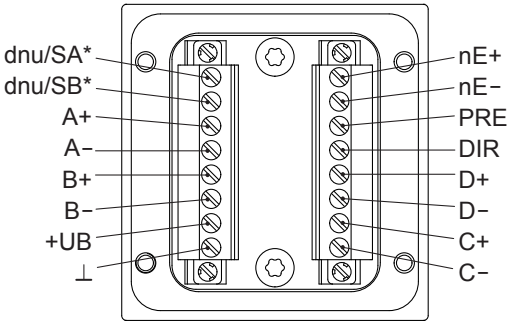
5.6.2 Assignment connecting terminal

☞ Do not connect voltage supply to outputs! Danger of damage!
Please, beware of possible voltage drop in long cable leads (inputs and outputs)!

5.6.2.1 Connecting terminal first terminal box [A] SSI without additional output 1

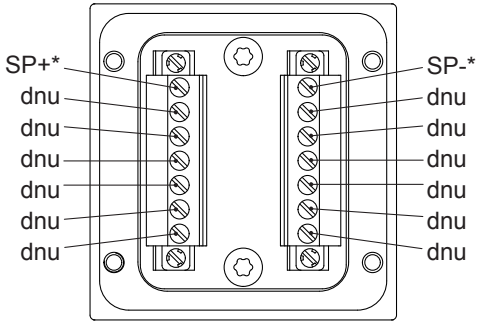


5.6.2.2 Connecting terminal first terminal box [A] SSI with additional output 1

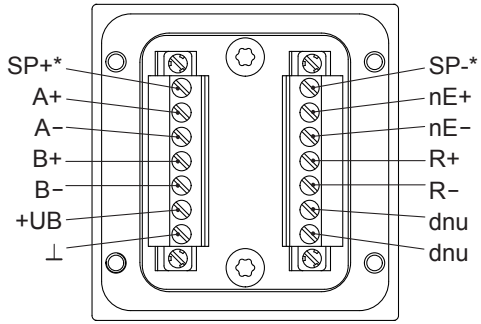


* Only at version with speed switch

5.6.2.3 Connecting terminal second terminal box [B] Speed switch without additonal output 2



5.6.2.4 Connecting terminal second terminal box [B] Speed switch with additonal output 2



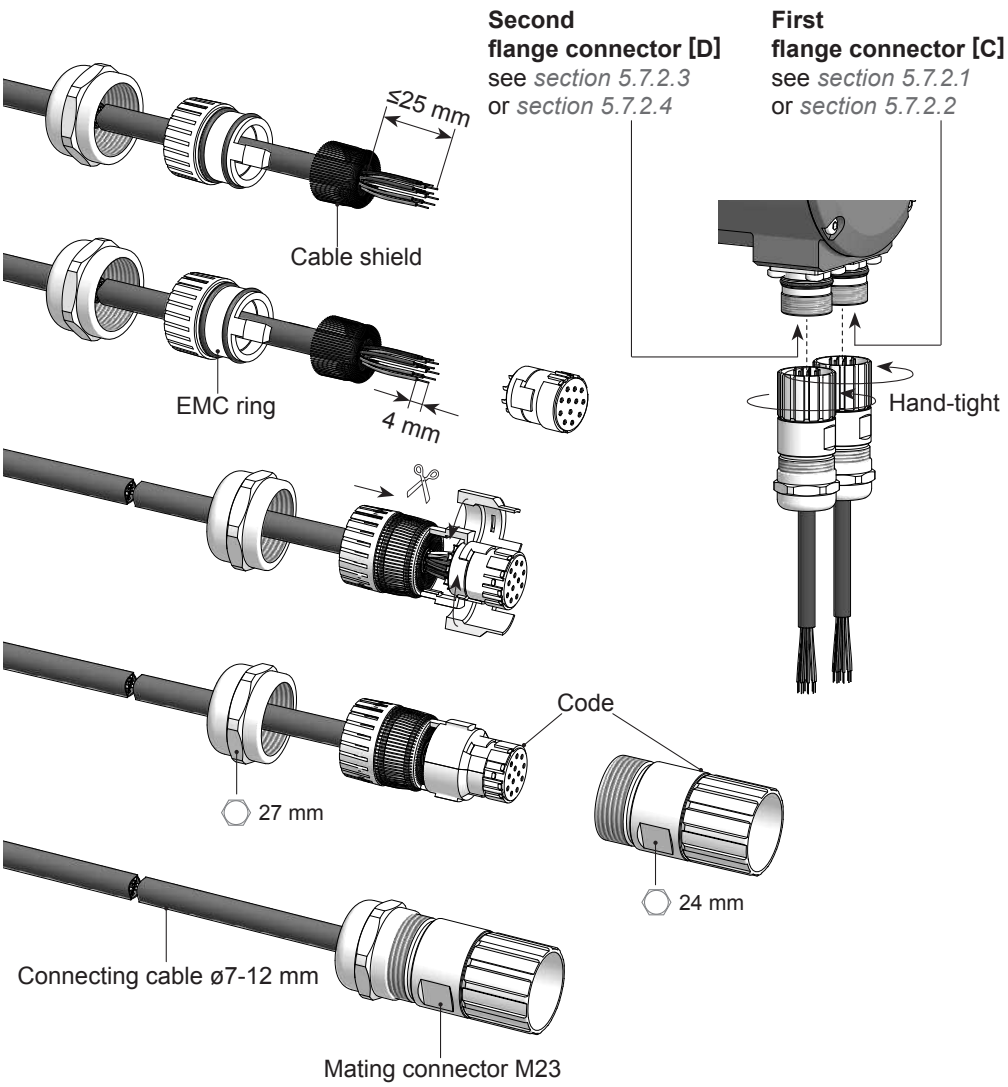
* Only at version with speed switch

5.7 Version with radial flange connectors

5.7.1 Cable connection mating connector M23 (accessory)

☞ To ensure the specified protection of the device the correct cable diameter must be used.

Connecting cables and mating connectors are not in scope of delivery.

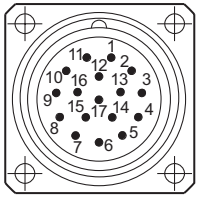


5.7.2 Assignment flange connectors

☞ Do not connect voltage supply to outputs! Danger of damage!
Please, beware of possible voltage drop in long cable leads (inputs and outputs)!

5.7.2.1 First flange connector [C] SSI without additional output 1

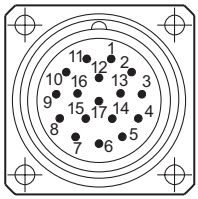
Flange connector M23 (male, 17-pin, clockwise)



PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	dnu	**10**	⊥
2	DIR	**11**	Internal shield
3	dnu/SB*	**12**	dnu
4	dnu	**13**	dnu
5	PRE	**14**	D+
6	dnu/SA*	**15**	dnu
7	+UB	**16**	dnu
8	C+	**17**	D−
9	C−		

5.7.2.2 First flange connector [C] SSI with additional output 1

Flange connector M23 (male, 17-pin, clockwise)

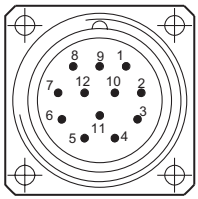


PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	nE−	**10**	⊥
2	DIR	**11**	Internal shield
3	dnu/SB*	**12**	B+
4	nE+	**13**	B−
5	PRE	**14**	D+
6	dnu/SA*	**15**	A+
7	+UB	**16**	A−
8	C+	**17**	D−
9	C−		

* Only at version with speed switch

5.7.2.3 Second flange connector [D]
Speed switch without additional output 2

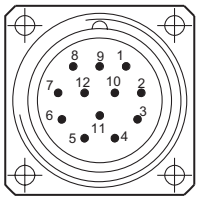
Flange connector M23 (male, 12-pin, clockwise)



PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	dnu	**7**	SP+*
2	dnu	**8**	dnu
3	dnu	**9**	SP−*
4	dnu	**10**	dnu
5	dnu	**11**	dnu
6	dnu	**12**	dnu

5.7.2.4 Second flange connector [D]
Speed switch with additional output 2

Flange connector M23 (male, 12-pin, clockwise)

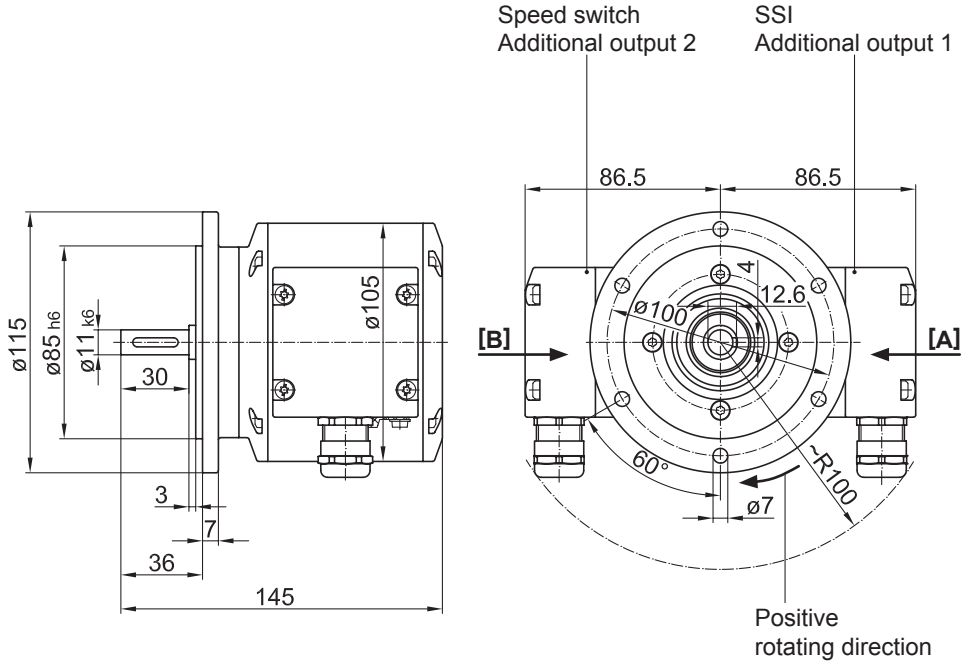


PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	B−	**7**	SP+*
2	nE−	**8**	B+
3	R+	**9**	SP−*
4	R−	**10**	⊥
5	A+	**11**	nE+
6	A−	**12**	+UB

* Only at version with speed switch

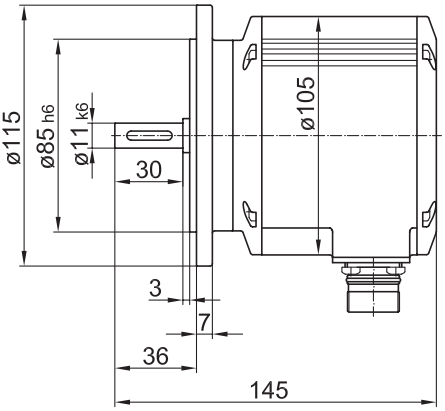
6. DIMENSIONS

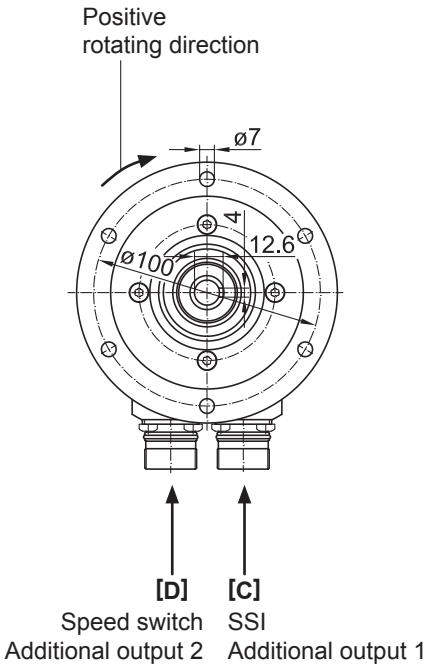
6.1 With radial terminal boxes



All dimensions in millimeters, unless otherwise stated.

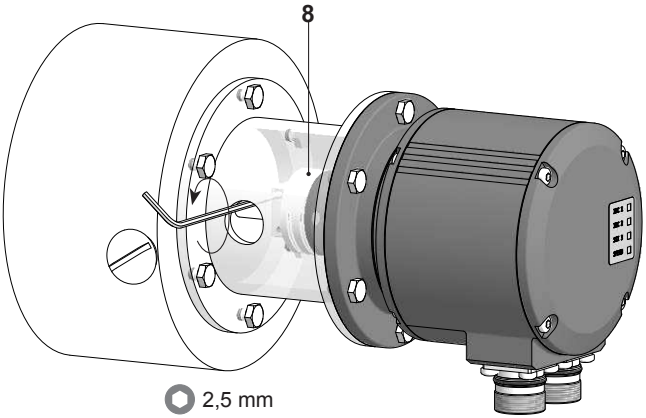
6.2 With radial flange connectors

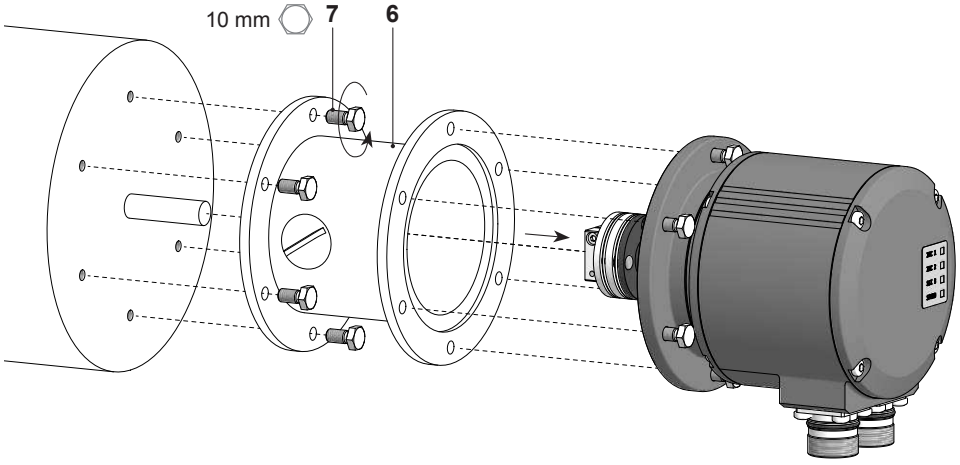


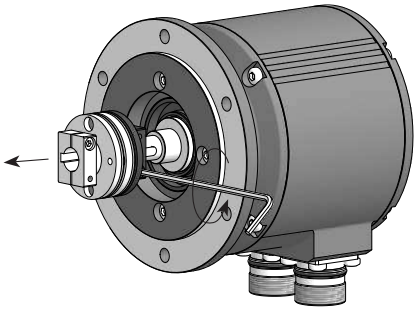


All dimensions in millimeters, unless otherwise stated.

7. DISMOUNTING







8. TECHNICAL DATA

8.1 Technical data - electrical ratings

Voltage supply	4,75...30 VDC
Short-circuit proof	Yes
Consumption w/o load	≤100 mA (SSI)
Initializing time	≤500 ms after power on
Interface	SSI
Function	Multiturn
Steps per turn	1048576 / 20 Bit
Number of turns	1048576 / 20 Bit
Additional outputs	Square-wave HTL Square-wave TTL (RS422)
Sensing method	Magnetic
Code	Gray (default) or binary
Code sequence	CW/CCW programmable CW default
Input signals	SSI clock, PRESET, rotating direction
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Diagnostic functions	Self-diagnosis
Status indicator	4 LEDs integrated in device back side
Approvals	CE

8.2 Technical data - electrical ratings (speed switch)

Interface	RS485
Switching accuracy	±2 % (or Digit)
Switching outputs	1 output (Open-Collector* or Solid State Relay*)
Output switching capacity	30 VDC; ≤100 mA
Switching delay time	≤20 ms

* Depending on the version

8.3 Technical data - mechanical design

Size (flange)	ø115 mm
Shaft type	ø11 mm solid shaft
Flange	EURO flange B10
Protection DIN EN 60529	IP 66/IP 67
Operating speed	≤12000 U/min
Schaltdrehzahlbereich	±2...12000 rpm, default 12000 rpm
Operating torque typ.	10 Ncm
Rotor moment of inertia	1 kgcm^2
Admitted shaft load	≤450 N axial ≤650 N radial
Materials	Housing: aluminium alloy Shaft: stainless steel
Operating temperature	-40...+85 °C
Relative humidity	95 % non-condensing
Resistance	IEC 60068-2-6 Vibration 30 g, 10-2000 Hz IEC 60068-2-27 Shock 400 g, 1 ms
Corrosion protection	IEC 60068-2-52 Salt mist Complies to ISO 12944-5:1998 Protective paint systems (C5-M)
Weight approx.	1.9 kg (depending on version)
Connection	Terminal box (2x with speed switch/additional output 2) Flange connector M23 (2x with speed switch/additional output 2)

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