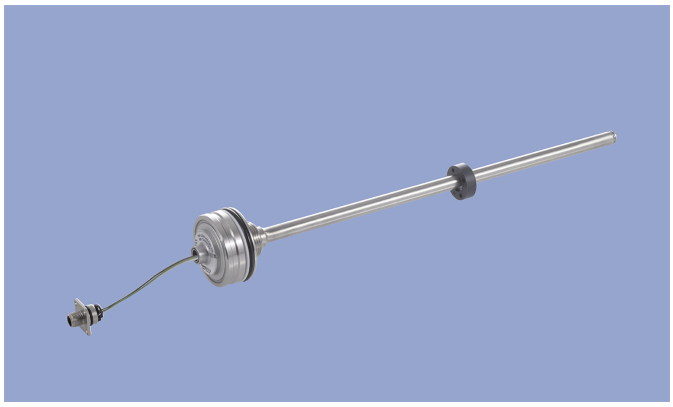
novotechnik
Siedle Group

NOVOSTRICTIVE
Transducer
Touchless

TM1
Plug-in Flange
4 ... 20 mA
Mobile Applications



Special Features
- For integration in pneumatic and hydraulic cylinders
- Touchless magnetostrictive measurement technology
- Operating pressure up to 350 bar, peaks up to 450 bar
- Ring-shaped position marker does not contact sensor
- Unlimited mechanical life
- No velocity limit for position marker
- Absolute output
- Outstanding accuracy performance up to 0.04 %
- Wide range of supply voltage
- Optimized for use in mobile applications with highest EMC requirements such as ISO pulses and high interferences to ISO 11452, exceeds E1 requirements
- Other configurations see separate data sheets

Applications
Hydraulic or pneumatic cylinders in
- Agricultural and forestry machinery
- Construction machines
- Vehicles with loading and unloading devices
- Vehicles with extension arms

The absolute position transducer can be used directly in-cylinder and thus enables a compact and cost-effective position measurement. The sensor consists of a stainless steel flange welded to a pressure tight rod and can therefore be used in harsh environments.
The magnetostrictive measuring technology offers excellent accuracy for measuring lengths up to 2000 mm.
The passive ring-shaped position marker allows a mechanically decoupled measurement.

Description	
Material	Flange: SS 1.4307 / AISI 304L Flange cover: AlSiMgBi Rod: SS 1.4571 / AISI 316Ti Sealing: O-ring FKM 80, Supporting ring: PTFE
Mounting	Plugged into cylinders, secured in position with set screw M5 ISO 4026 / Plugged and secured in position with set screw M5 ISO 4026
Electrical connection	Cable 3x 0.5 mm² (AWG 20), PUR, unshielded / Connector M12x1, A-coded / Connector system M12x1, A-coded with lead wires

Mechanical Data	
Dimensions	See dimension drawing

Ordering Specifications

Ordering specifications

Preferred types printed in bold

Supply voltage Ub
8: Ub = 12/24 VDC

Output signal
2: 4 ... 20 mA

Output characteristic
1: Rising output characteristic, seen from flange
2: Falling output characteristic, seen from flange

Electrical connection
104: Connector M12x1, 4-pin
251: Cable, 3-pole, unshielded, A = 1 m
253: Cable, 3-pole, unshielded, A = 3 m
255: Cable, 3-pole, unshielded, A = 5 m
438: Plug system M12x1, 4-pin, with lead wires 80 mm
442: Plug system M12x1, 4-pin, with lead wires 120 mm
446: Plug system M12x1, 4-pin, with lead wires 160 mm
450: Plug system M12x1, 4-pin, with lead wires 200 mm
454: Plug system M12x1, 4-pin, with lead wires 240 mm

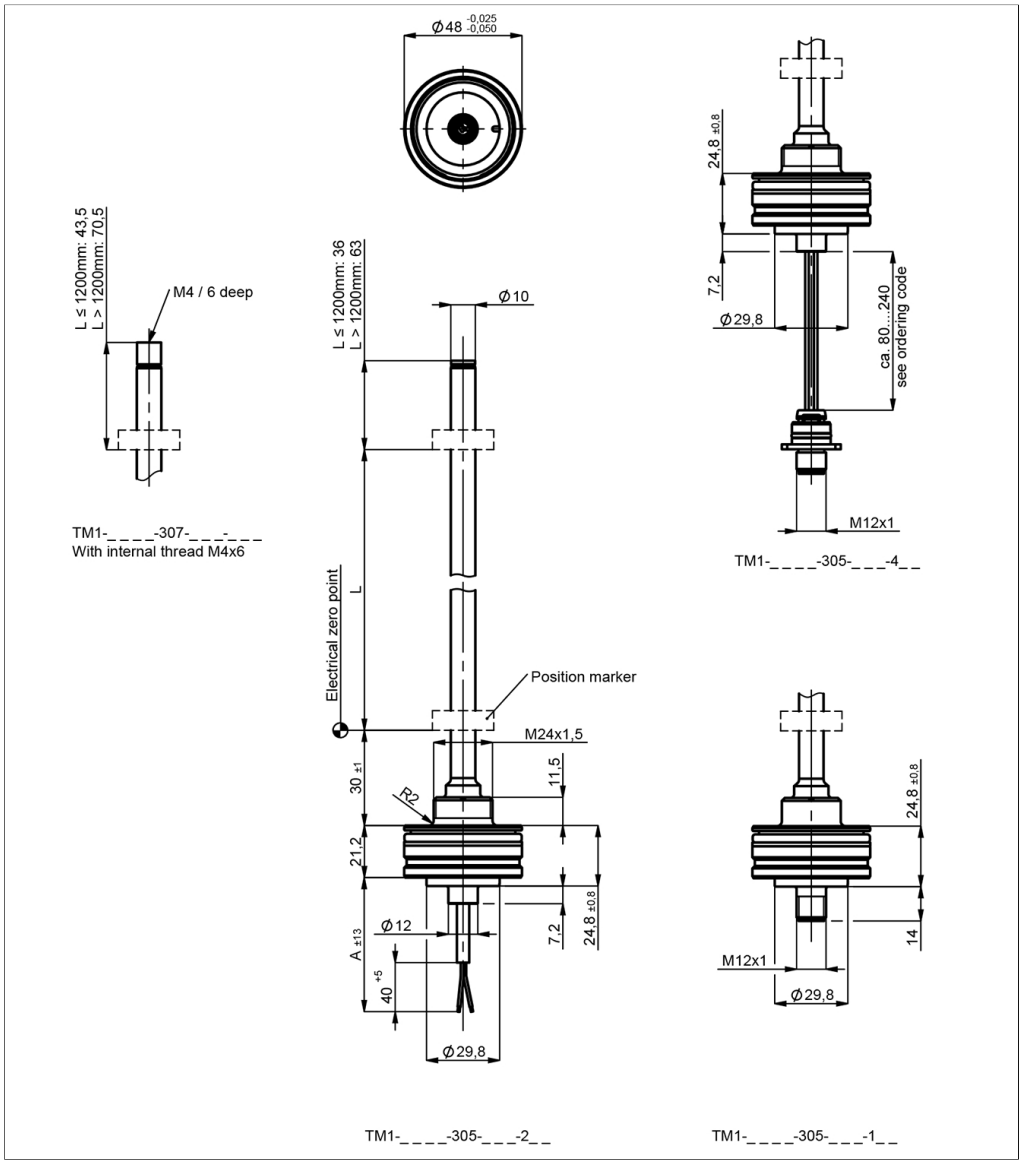
T M 1 – 0 5 0 0 – 3 0 5 – 8 2 1 – 4 4 2

Mechanical version
305: Plug-in flange Ø 48 mm
307: Plug-in flange Ø 48 mm with internal thread M4x6 at rod end, additional length 7.5 mm

Series

Electrical measuring range
Standard lengths 0050 up to 2000 mm in 25 mm-steps
Other lengths on request

Drawing



CAD data see
www.novotechnik.de/en/download/cad-data/

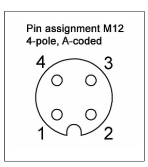
Technical Data

Type	**TM1-_ _ _ _-305-82_-_ _ _**
Output signal	4 ... 20 mA
Burden	@Ub 24 V: ≤ 500 Ω, @Ub 12 V: ≤ 250 Ω
Sampling rate / Update rate	0.5 kHz
Electrical measuring range (dim. L)	0 ... 50 mm up to 0 ... 2000 mm
Absolute linearity	≤ ±0.04 %FS (min. 300 µm)
Tolerance of electr. zero point	±1 mm
Resolution	≤ 0.1 mm
Repeatability	≤ ±0.1 mm
Hysteresis	≤ ±0.1 mm
Temperature error	typ. 50 ppm/K (min. 0.01 mm/K)
Supply voltage Ub	12/24 VDC (8 ... 32 VDC)
Supply voltage ripple	≤ 10% Ub
Power drain w/o load	< 1 W
Overvoltage protection	36 VDC (permanent)
Polarity protection	yes (-36 VDC)
Short circuit protection	yes (output vs GND and supply voltage up to 36 VDC)
Insulation resistance (500 VDC)	≥ 10 MΩ
Environmental Data	
Max. operational speed	Mechanically unlimited
Vibration IEC 60068-2-6	20 g, 10 ... 2000 Hz, Amax = 0.75 mm
Shock IEC 60068-2-27	100 g, 11 ms (single hit)
Protection class DIN EN 60529	IP67 (Connector system M12, fastened, when correctly fitted in cylinder: IP69)
Operating temperature	-40 ... +105°C (connector M12 / Kabel), -40 ... +85°C (connector system M12)
Operating humidity	0 ... 95 % R.H. (no condensation)
Working pressure	≤ 350 bar
Pressure peaks	≤ 450 bar
Burst pressure	> 700 bar
Life	Mechanically unlimited
Functional safety	If you need assistance in using our products in safety-related systems, please contact us
MTTF (IEC 60050)	355 years
EMC Compatibility	
ISO 10605 ESD (Handling/Component)	8 kV / 15 kV
ISO 11452-2 Radiated HF-fields	100 V/m
ISO 11452-4 BCI (Bulk current injection)	200 mA
CISPR 25 Radiated emission	Level 4
ISO 7637-2 Transient Emissions	Level 1/2
ISO 7637-2 Pulses on supply lines	(1, 2a, 2b, 3a, 3b) Level 4
ISO 7637-3 Pulses on output lines	(3a, 3b) Fast Level 2
ISO 16750 Pulses on supply lines	Starting profile Level 4 @12 V / Level 3 @24 V, Load dump A +200 V
EN 13309 Construction machinery	
ISO 14982 Agricult./forestry machines	
Emission/Immunity	Exceeds E1 requirements
	The EMC measurements are conducted in a reference cylinder. The EMC properties can deviate when using different cylinders.

FS = Full scale: Signal span according to electrical measuring range

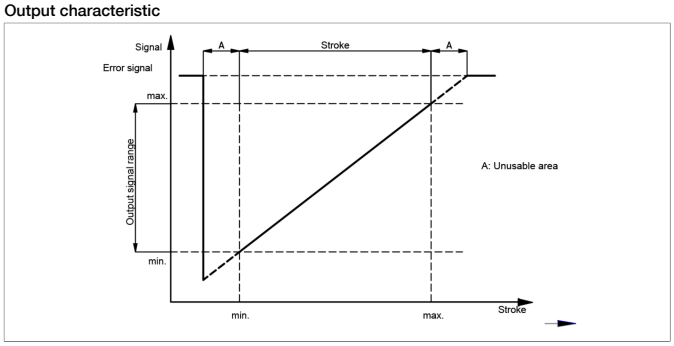
Connection Assignment

Signal	Cable code 2_ _	Connector code 1_ _	Plug system code 4_ _
Supply voltage Ub	BN	Pin 1	Pin 1
GND	WH	Pin 3	Pin 3
Signal output	GN	Pin 2	Pin 2
Do not connect	-	Pin 4	Pin 4

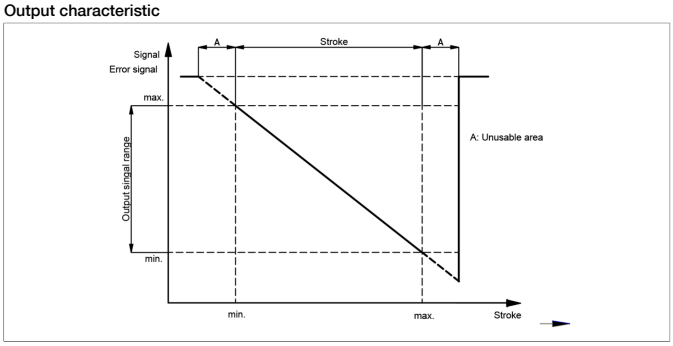


Technical Data
Output Characteristics

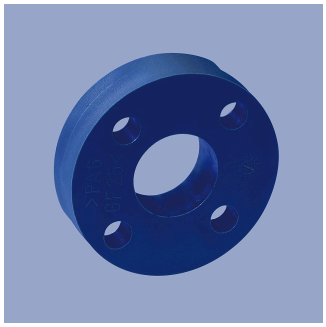
Output characteristic

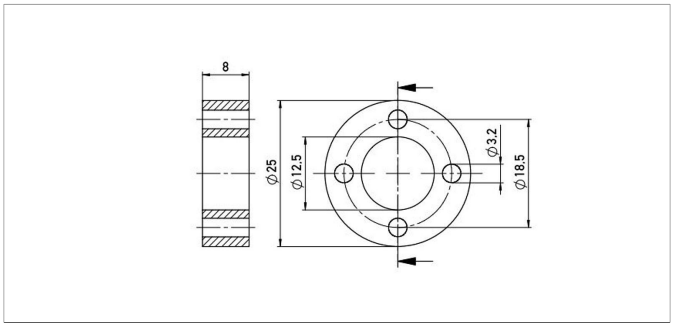


Output characteristic



Position Markers



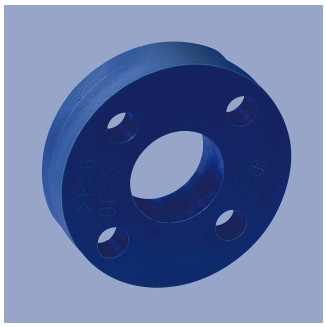


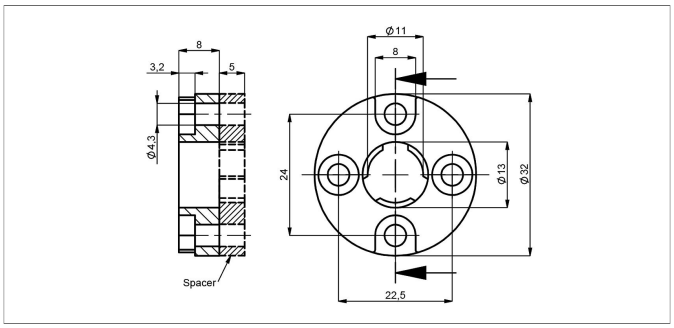
Z-TH1-P18

Ring position marker for fixation with screws M3

Material	PA6-GF
Weight	approx. 12 g
Operating temp.	-40 ... +100°C
Surface pressure	max. 40 N/mm²
Fastening torque of mounting	max. 100 Ncm

P/N	Pack. unit [pcs]
400005697	1





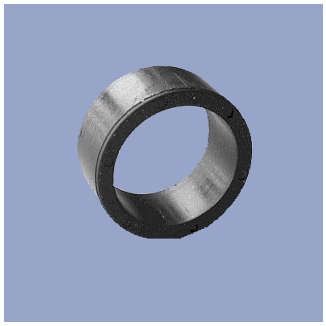
Z-TH1-P19

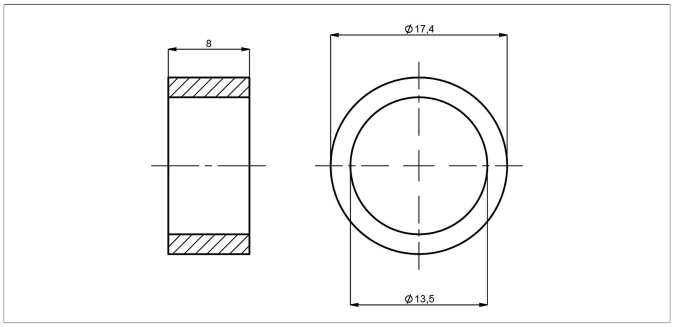
Z-TH1-PD19 With spacer

Ring position marker for fixation with screws M4, optionally with or without spacer

Material	PA6-GF, Spacer: POM-GF
Weight	approx. 14 g
Operating temp.	-40 ... +100°C
Surface pressure	max. 40 N/mm²
Fastening torque	max. 100 Ncm

P/N	Spacer	Pack. unit [pcs]
400005698	-	1
400107117	incl.	1



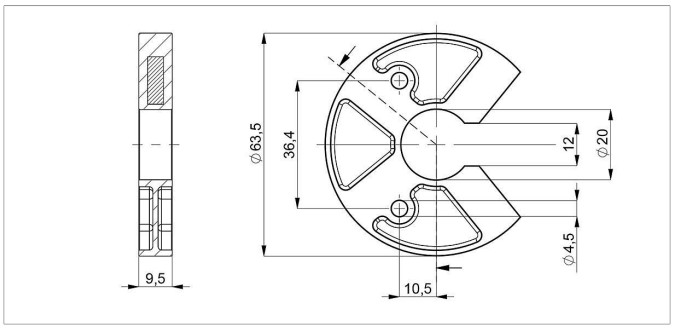


Z-TH1-P30

Ring position marker for mounting via lock washer and retaining ring

Material	NdFeB bonded (EP)
Weight	approx. 5 g
Operating temp.	-40 ... +100°C
Surface pressure	max. 10 N/mm²

P/N	Pack. unit [pcs]
400106139	1



Z-TH1-P25

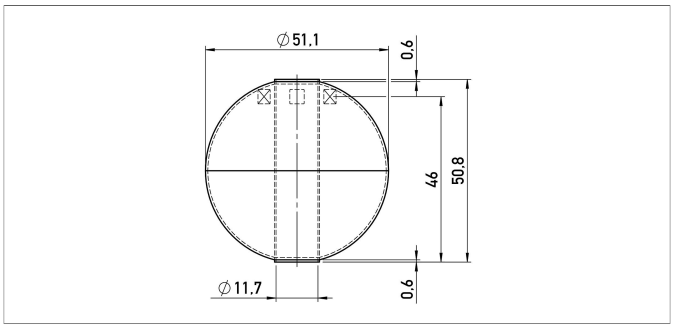
U-shaped position marker for fixation with M4 screws

Caution: for dimension of electrical zero point please follow the user manual!

Material	PA6-GF
Operating temp.	-40 ... +105°C
Surface pressure	max. 40 N/mm²
Fastening torque of mounting	max. 100 Ncm

P/N	Pack. unit [pcs]
400105076	1

Position Markers

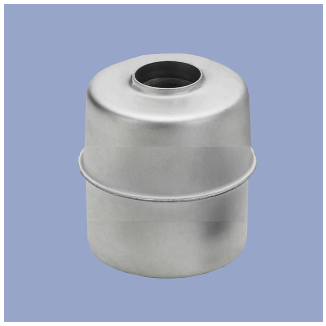


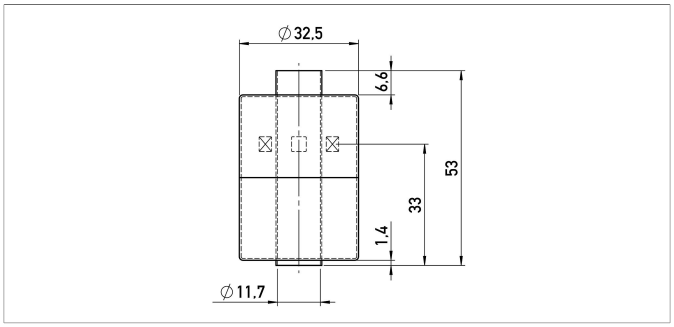
Z-TH1-P32

Ball-type floating position marker

Material	SS 1.4571 / AISI 316Ti
Weight	approx. 42 g
Operating temp.	-40 ... +100°C
Compression strength	≤ 40 bar
Density	720 kg/m³
Immersion depth in water	36.7 mm

P/N	Pack. unit [pcs]
400105703	1



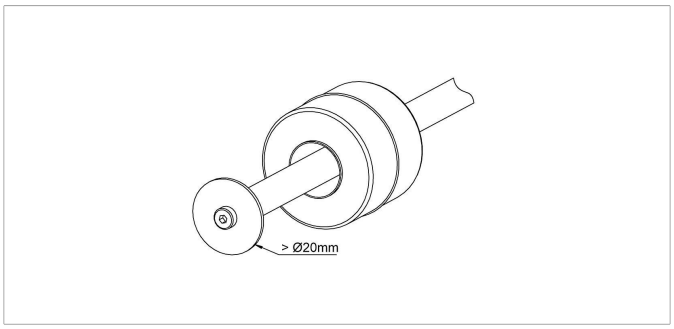


Z-TH1-P31

Cylinder floating position marker

Material	SS 1.4404 / AISI 316L
Weight	approx. 20 g
Operating temp.	-40 ... +100°C
Compression strength	≤ 24 bar
Density	740 kg/m³
Immersion depth in water	approx. 26.6 mm

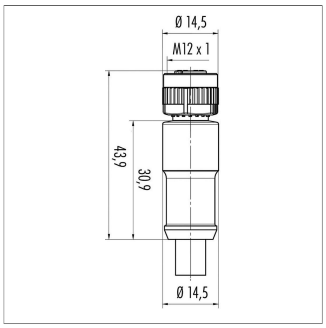
P/N	Pack. unit [pcs]
400105704	1

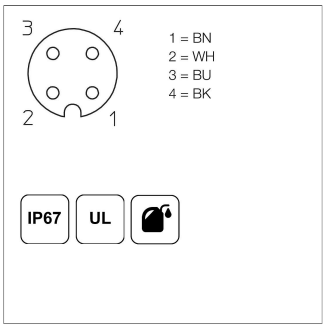


Floating Position Marker - Installation Recommendation

When using floating position markers, we recommend to secure the marker against loss with a washer at the rod end.
For this purpose, a sensor version with inner thread at the rod end is required (s. ordering code).

Connector System M12



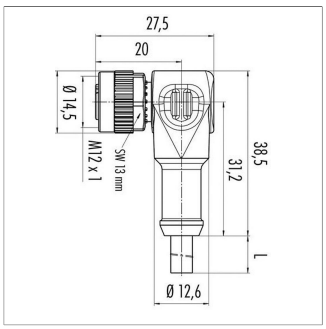


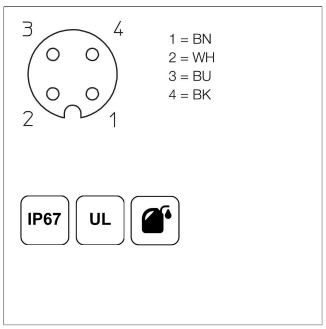
EEM-33-35/36/37

M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended

Plug housing	PA
Cable sheath	PUR, Ø = max. 6 mm, -40 ... +85°C (fixed)
Lead wires	PP, 0.34 mm²

P/N	Type	Length
400056135	EEM-33-35	2 m
400056136	EEM-33-36	5 m
400056137	EEM-33-37	10 m



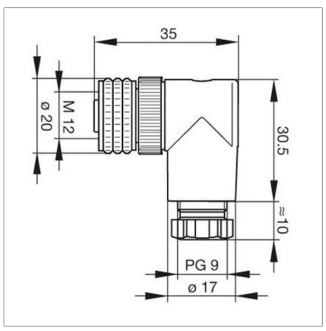


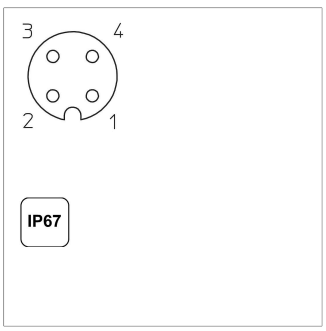
EEM-33-38/39/40

M12x1 Mating female connector, 4-pin, angled, A-coded, with molded cable, not shielded, IP67, open ended

Plug housing	PA
Cable sheath	PUR, Ø = max. 6 mm, -40 ... +85°C (fixed)
Lead wires	PP, 0.34 mm²

P/N	Type	Length
400056138	EEM-33-38	2 m
400056139	EEM-33-39	5 m
400056140	EEM-33-40	10 m



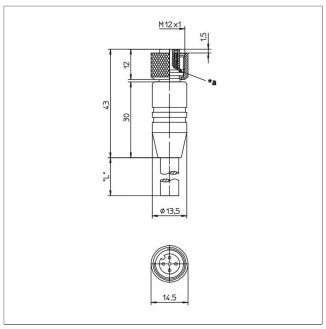


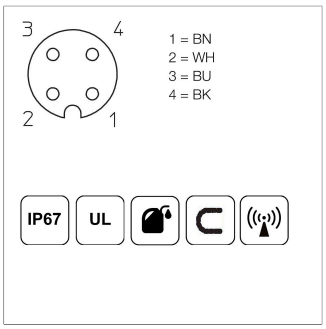
EEM-33-89

M12x1 Mating female connector, 4-pin, angled, A-coded, with coupling nut, screw termination, IP67, not shieldable

Operating temp.	-25 ... +90°C
Plug housing	PBT
For wire gauge	6 ... 8 mm, max. 0.75 mm²

P/N	Type
400005634	EEM-33-89





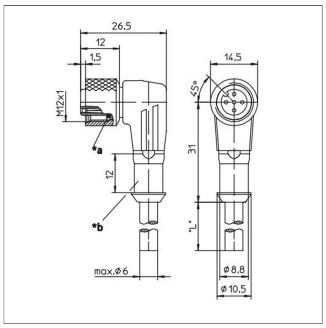
EEM-33-32/62/97

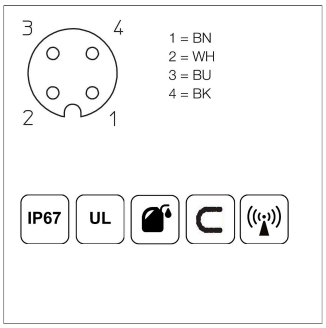
M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, shielded, IP67, open ended

Plug housing	PA
Cable sheath	PUR, Ø = max. 6 mm, -25 ... +80°C (moved) -50 ... +80°C (fixed)
Lead wires	PP, 0.34 mm²

P/N	Type	Length
400005600	EEM-33-32	2 m
400005609	EEM-33-62	5 m
400005650	EEM-33-97	10 m

Connector System M12





EEM-33-33/63/99

M12x1 Mating female connector, 4-pin, angled, A-coded, with molded cable, shielded, IP67, open ended

Plug housing	PA
Cable sheath	PUR, Ø = max. 6 mm, -25 ... +80°C (moved) -50 ... +80°C (fixed)
Lead wires	PP, 0.34 mm²

P/N	Type	Length
400005601	EEM-33-33	2 m
400005610	EEM-33-63	5 m
400005696	EEM-33-99	10 m

IP67 Protection class IP67 DIN EN 60529

IP68 Protection class IP68 DIN EN 60529

Very good Electromagnetic Compatibiliy (EMC) and shield systems

Very good resistance to oils, coolants and lubricants

Suited for applications in dragchains

UL UL - approved

CAN CAN-Bus

novotechnik
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© Aug 18, 2026

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