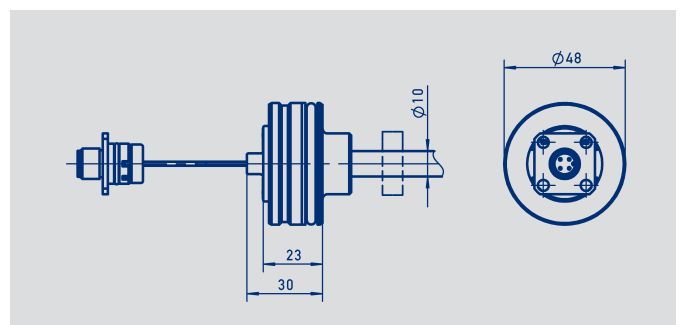
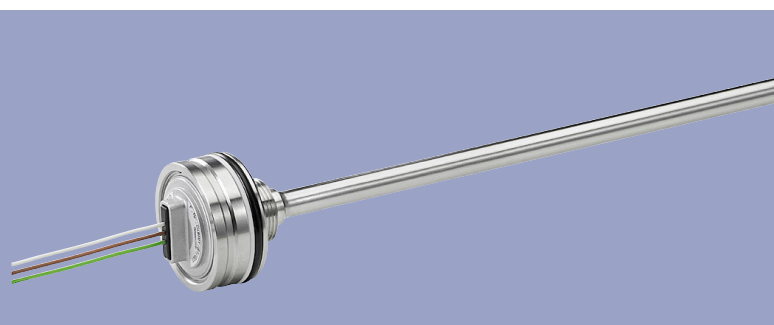
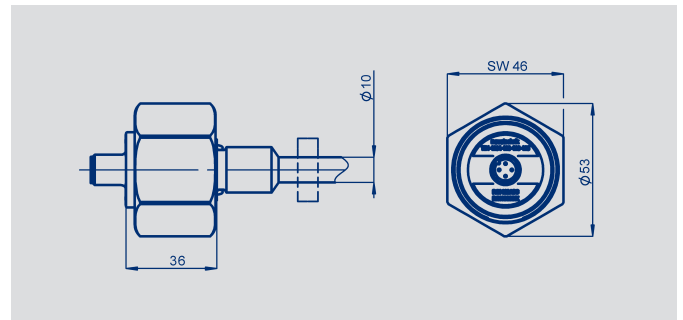
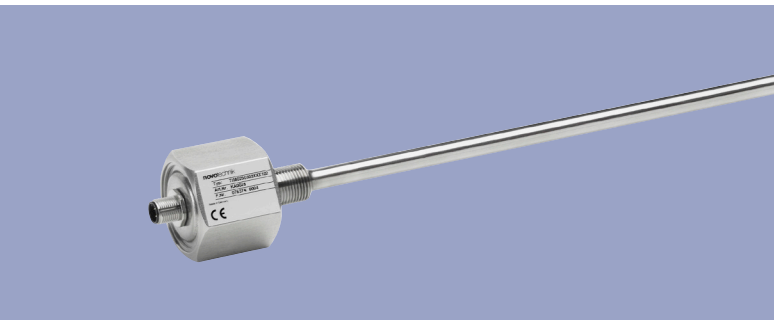


**Transducer  
up to 2500 mm  
touchless  
absolute**

Series TIM



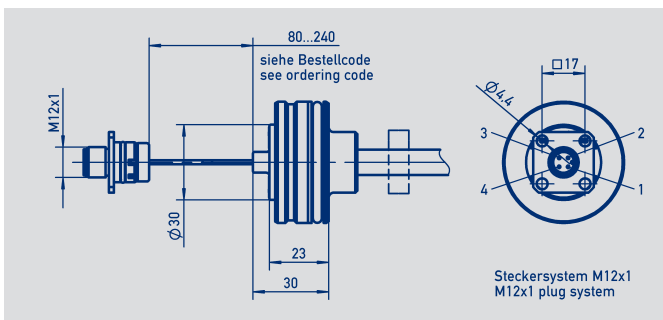
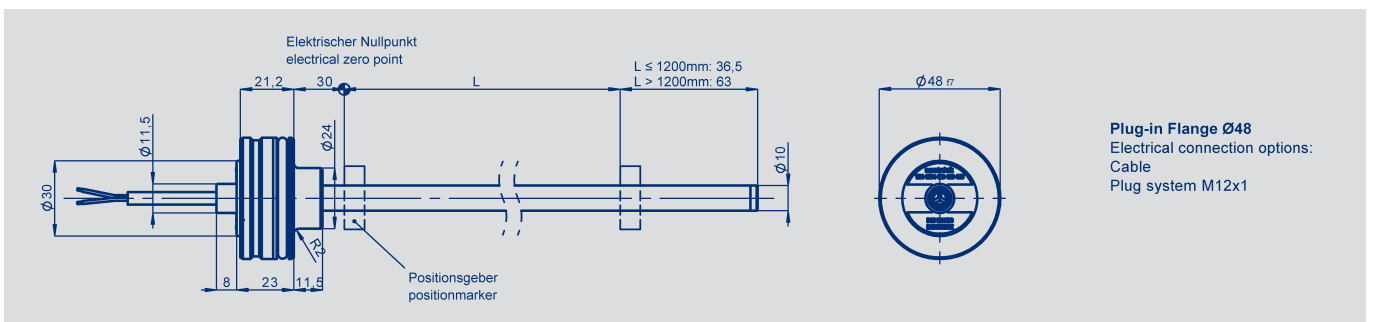
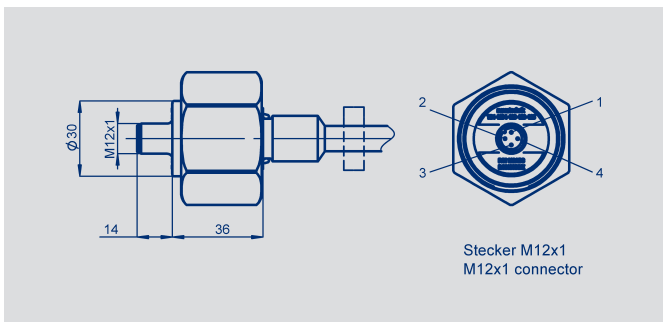
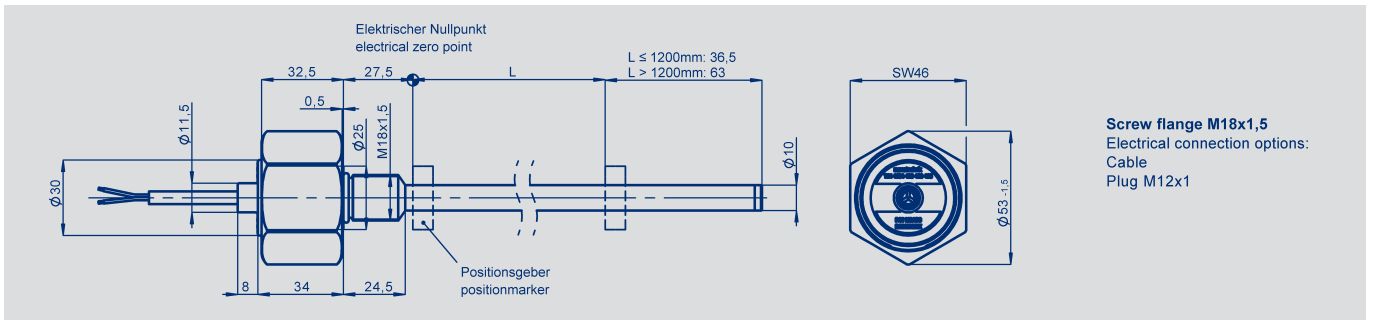
**Special features**

- Rod style transducer
- For integration in pneumatic and hydraulic cylinders
- Operating pressure up to 350 bar, peaks up to 450 bar
- Touchless magnetostrictive measurement technology
- 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 %
- Analog (current, voltage) and fieldbus interfaces
- Wide range of supply voltage
- EMC for mobile applications
- Immunity against HF fields up to 200 V/m
- Screw flange M18x1.5 or plug-in flange Ø 48 mm
- Optionally plug, cable or lead wire connection
- Simple integration in cylinders with M12 plug-system

**Applications**

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

**Mechanical Data**



## Technical Data Analog Versions

Type designations	TIM - - - - - 3 - - - - 841 - - - - TIM - - - - - 3 - - - - 851 - - - - Analog voltage	TIM - - - - - 3 - - - - 911 - - - - Analog voltage	TIM - - - - - 3 - - - - 821 - - - - Analog current	
<b>Mechanical Data</b>				
Dimensions	see drawing			
<b>Electrical Data</b>				
Electrical measuring range (dimension L)	0050 up to 2500 0050 up to 1000 in 50 mm steps, 1000 up to 2000 in 100 mm steps, 2000 up to 2500 in 250 mm steps. Other lengths in 10 mm steps on request.			mm
Absolute linearity	50 ... 250 mm: $\leq \pm 0.1$ 260 ... 2000 mm: $\leq \pm 0.04$ 2010 ... 2500 mm: $\leq \pm 0.8$			mm % FS mm
Tolerance of electrical zero point	$\leq 1$			mm
Output signal	0.5 ... 4.5 VDC 0.25 ... 4.75 VDC (load $\geq 10\text{ k}\Omega$ )	0.1 ... 10.0 VDC (load $\geq 10\text{ k}\Omega$ )	4.0 ... 20.0 mA (burden $\leq 500\ \Omega$ at 24 VDC) (burden $\leq 250\ \Omega$ at 12 VDC)	
Update rate	> 500			Hz
Resolution	typ. 0.1			$\pm$ mm
Repeatability	0.1			$\pm$ mm
Hysteresis	0.1			$\pm$ mm
Supply voltage	8 ... 32	16 ... 34	8 ... 32	VDC
Supply voltage ripple	< 1			% ss
Power consumption without load	< 1			W
Temperature coefficient	typ. 50			ppm/K
Overvoltage protection	36 (GND - supply)			VDC
Polarity protection	-36			VDC
Insulation resistance (500 VDC)	$\geq 10$ (GND vs. housing, for 60 s)			M $\Omega$
Cross-section cable	AWG 20, 0.5			mm <sup>2</sup>
<b>Environmental Data</b>				
Operating temperature range	-40 ... +105 with cable connection and M12 plug system -40 ... +85 with M12 connector		-	$^{\circ}\text{C}$ $^{\circ}\text{C}$
Operating humidity range	0...90 (no condensation)			% R.H.
Shock per DIN IEC68T2-27	100 (11 ms) (single hit)			g
Vibration per DIN IEC68T2-6	20 (r.m.s) (10...2000 Hz)			g
Protection class per DIN EN 60529	IP67 (M12x1 plug system IP69K, plugged)			
Pressure rating				
Working pressure	$\leq 350$			bar
Pressure peaks	$\leq 450$			bar
Burst pressure	$\leq 600$			bar
Operating speed of position marker	mechanically unlimited			
Functional safety	When using our products in safety-related systems please contact us			
EMC compatibility*	ISO 14982 Agricultural and forestry machines EN 13309 Construction machines ISO 10605 Packaging and Handling + Component Test (ESD) ISO 11452-2 Radiated EM HF-Fields, Absorberhall 200 V/m ISO 11452-4 BCI (Bulk Current Injection) 200 mA CISPR25 Radiated Emission ISO 7637-1/2 Transient Impulses			

\*) The EMC measurements are performed in a reference cylinder. The values can deviate when using different cylinders.

**Ordering Specifications**  
Analog Versions

**Ordering specifications**

**Operating voltage**

8: 12/24 V mobile electronic (8 ... 32 V)  
9: 24 V mobile electronic (16 ... 34 V)

**Output signal at supply = 12/24 V**

2: 4 ... 20 mA  
4: 0.5 ... 4.5 V  
5: 0.25 ... 4.75 V

**Output signal at supply = 24 V**

1: 0.1 V ... 10 V

**Output characteristics**

1: Positive gradient, seen from flange

**Electrical connection**

104: 4-pin round connector M12x1 \*\*  
251: 3-pin cable, 1.0 m, unshielded  
253: 3-pin cable, 3.0 m, unshielded  
255: 3-pin cable, 5.0 m, unshielded  
260: 3-pin cable, 10 m, unshielded  
438: Plug system M12x1, 4-pin, with wires 80 mm \*  
442: Plug system M12x1, 4-pin, with wires 120 mm \*  
446: Plug system M12x1, 4-pin, with wires 160 mm \*  
450: Plug system M12x1, 4-pin, with wires 200 mm \*  
454: Plug system M12x1, 4-pin, with wires 240 mm \*

\* only plug-in flange

\*\* only screw flange

**T I M - 0 5 0 0 - 3 0 5 - 8 5 1 - 2 5 1**

Series

Electrical measuring range

Multiple standard lengths from 0050 up to 2500 mm

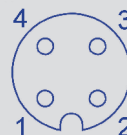
Mechanical version

305: Plug-in flange Ø 48 mm  
306: Screw flange M18x1.5

**Pin assignment**

Output connector	Output cable	Signal
Code 104, 4 __	Code 2 __	
PIN 1	BN brown	Supply
PIN 2	GN green	Output signal
PIN 3	WH white	GND
PIN 4	-	do not connect

Pin assignment, A-coded



Technical Data



<b>Type designations</b>	<b>TIM - - - - - 3 _ - -64 _ - - - -</b> <b>Digital CANopen</b>	
<b>Mechanical Data</b>		
Dimensions	see drawing	
<b>Electrical Data</b>		
Measurement	Position and speed	
Electrical measuring range (dimension L)	0050 up to 2500 0050 up to 1000 in 50 mm steps, 1000 up to 2000 in 100 mm steps, 2000 up to 2500 in 250 mm steps. Other lengths in 10 mm steps on request.	mm
Measuring range speed	0 ... 1000	mm/s
Output signal / protocol	CANopen protocol to CiA DS-301 V4.02, Encoder profile DS-406 V3.2, LSS services to CiA DS-305	
Prgrammable parameter	Node ID, baud rate	
Node ID	0 ... 127 (default 127)	
Baud rate	10 ... 1000 see ordering code	kBaud
Resolution position	0.1	
Resolution speed	1	
Update rate	1	
Absolute linearity	50 ... 250 mm: $\leq \pm 0.1$ 260 ... 2000 mm: $\leq \pm 0.04$ 2010 ... 2500 mm: $\leq \pm 0.8$	mm % FS mm
Tolerance of electrical zero point	0.2	
Repeatability	0.1	
Hysteresis	0.1	
Supply voltage	12/24 (8 ... 32)	
Supply voltage ripple	< 1	
Power consumption without load	< 1.5	
Temperature coefficient	typ. 50	
Overvoltage protection	36 (GND - supply)	
Polarity protection	-36	
Insulation resistance (500 VDC)	$\geq 10$ (GND vs. housing, for 60 s)	
Bus termination internal	without	
<b>Environmental Data</b>		
Operating temperature range	-40 ... +105 with cable connection and M12 plug system -40 ... +85 with M12 connector	°C °C
Operating humidity range	0...90 (no condensation)	
Shock per DIN IEC68T2-27	100 (11 ms) (single hit)	
Vibration per DIN IEC68T2-6	20 (r.m.s) (10...2000 Hz)	
Protection class per DIN EN 60529	IP67 (M12x1 plug system IP69K, plugged)	
Pressure rating		
Working pressure	$\leq 350$	bar
Pressure peaks	$\leq 450$	bar
Burst pressure	$\leq 600$	bar
Operating speed of position marker	mechanically unlimited	
Functional safety	When using our products in safety-related systems please contact us	
EMC compatibility*	ISO 14982 Agricultural and forestry machines EN 13309 Construction machines ISO 10605 Packaging and Handling + Component Test (ESD) ISO 11452-2 Radiated EM HF-Fields, Absorberhall 200 V/m ISO 11452-4 BCI (Bulk Current Injection) 200 mA CISPR25 Radiated Emission ISO 7637-1/2 Transient Impulses	

\*) The EMC measurements are performed in a reference cylinder. The values can deviate when using different cylinders.

**Ordering Specifications**



**Ordering specifications**

**Interface**

6: CANOpen interface to CiA DS-406, supply = 12/24 V (8...32 V)

**Interface parameter**

1: 1 x position and 1 x speed (1 position marker)

**Baud rate**

- 1: baud rate 1000 kBaud
- 2: baud rate 800 kBaud
- 3: baud rate 500 kBaud
- 4: baud rate 250 kBaud
- 5: baud rate 125 kBaud
- 7: baud rate 50 kBaud
- 8: baud rate 20 kBaud
- 9: baud rate 10 kBaud

**Electrical connection**

- 106: 5-pin round connector M12x1 \*\*
- 468: Connector system M12x1, 5-pin, with wires 80 mm \*
- 472: Connector system M12x1, 5-pin, with wires 120 mm \*
- 476: Connector system M12x1, 5-pin, with wires 160 mm \*
- 480: Connector system M12x1, 5-pin, with wires 200 mm \*
- 484: Connector system M12x1, 5-pin, with wires 240 mm \*

\* only plug-in flange  
\*\* only screw flange

**T I M - 0 5 0 0 - 3 0 5 - 6 1 4 - 4 6 8**

Series

**Electrical measuring range**

Standard lengths  
from 0050 up to 2500 mm

**Mechanical version**

305: Plug-in flange Ø 48 mm  
306: Screw flange M18x1.5

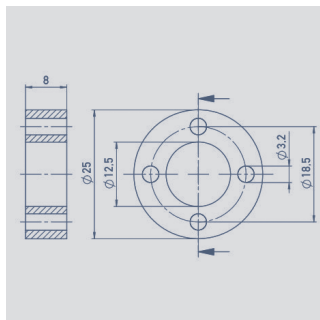
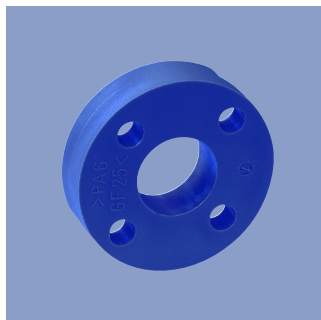
**Pin assignment**

Output connector Code 106, 4 _ _	Signal
Pin 1	do not connect
Pin 2	Supply
Pin 3	GND
Pin 4	CAN_H
Pin 5	CAN_L

Pin assignment, A-coded



**Accessories**  
Position marker

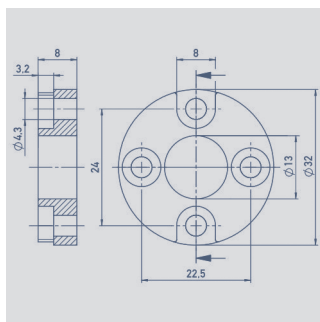
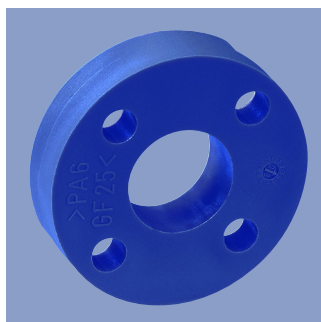


**Ring Position Marker Z-TH1-P18**

P/N 005697

Series TH1 / TIM

Material	PA6-GF25
Weight approx.	12 g
Operating temperature	-40 ... +100° C
Surface pressure max.	40 N/mm <sup>2</sup>
Fastening torque of mounting screws, max.	1 Nm

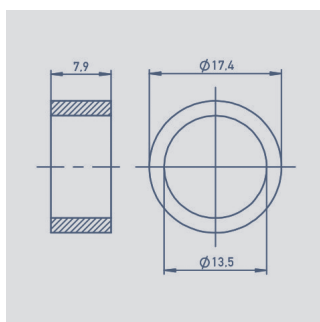
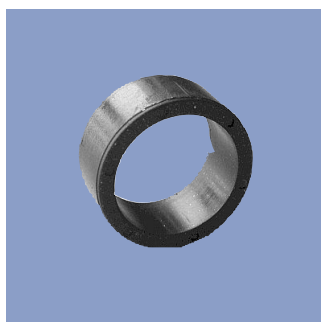


**Ring Position Marker Z-TH1-P19**

P/N 005698

Series TH1 / TIM

Material	PA6-GF25
Weight approx.	14 g
Operating temperature	-40 ... +100°C
Surface pressure max.	40 N/mm <sup>2</sup>
Fastening torque of mounting screws, max.	1 Nm

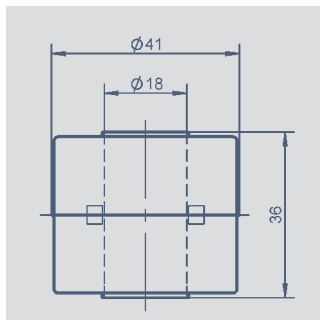
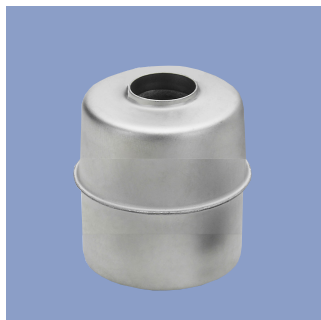


**Ring Position Marker Z-TIM-P20**

P/N 005699

Series TH1 / TIM

Material	PA-Neonbond Compound
Weight approx.	5 g
Operating temperature	-40 ... +100°C
Surface pressure max.	10 N/mm <sup>2</sup>
Mounting via lock washer and lock ring	



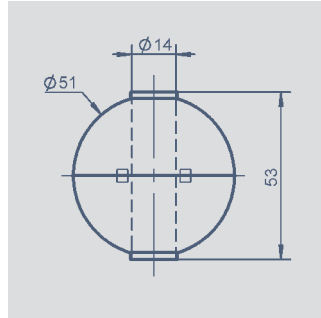
**Cylinder - Floating Position Marker Z-TH1-P21**

P/N 056044

Series TH1 / TIM

Material	1.4404
Weight approx.	20 g
Operating temperature	-40 ... +100°C
Compression strength, min.	< 8 bar
Density	740 kg/m <sup>3</sup>
Immersion depth in water	26,6 mm

**Accessories**  
Position marker

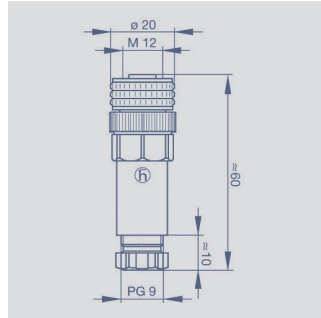


**Bowl - Floating Position Marker Z-TH1-P22**  
P/N 056045  
Series TH1 / TIM

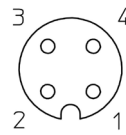
Material	1.4571
Weight approx.	42 g
Operating temperature	-40 ... +100°C
Compression strength, min.	< 60 bar
Density	720 kg/m <sup>3</sup>
Immersion depth in water	36,7 mm



**Accessories**  
Connector System M12



Pin assignment

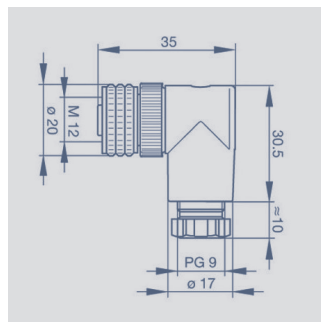


**M12x1 Mating female connector, 4-pin, straight, A-coded, with coupling nut, screw termination, IP67, not shielded**

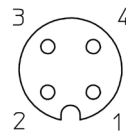
Connector housing Plastic PBT  
-25 °C...+90 °C

For wire gauge 6...8 mm, max. 0.75 mm<sup>2</sup>

Type EEM 33-88, P/N 005633



Pin assignment

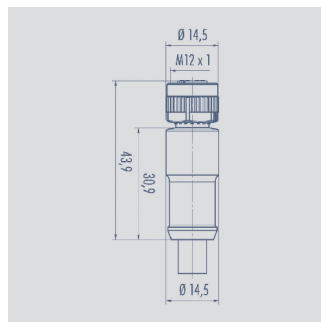


**M12x1 Mating female connector, 4-pin, angled, A-coded, with coupling nut, screw termination, IP67, not shielded**

Connector housing Plastic PBT  
-25 °C...+90 °C

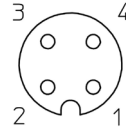
For wire gauge 6...8 mm, max. 0.75 mm<sup>2</sup>

Type EEM 33-89, P/N 005634



Pin assignment

- 1 = brown
- 2 = white
- 3 = blue
- 4 = black



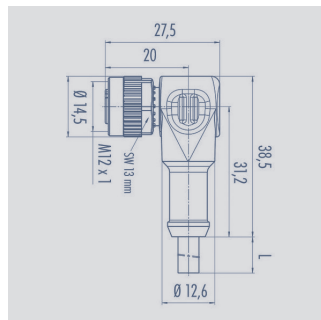
**M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended**

Connector housing Plastic PA

Cable sheath PUR; Ø = max. 6 mm, -40 °C...+85 °C (fixed)

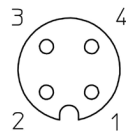
Wires PP, 0.34 mm<sup>2</sup>

Length	Type	P/N
2 m	EEM 33-35	056135
5 m	EEM 33-36	056136
10 m	EEM 33-37	056137



Pin assignment

- 1 = brown
- 2 = white
- 3 = blue
- 4 = black



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

Connector housing Plastic PA

Cable sheath PUR; Ø = max. 6 mm, -40 °C...+85 °C (fixed)

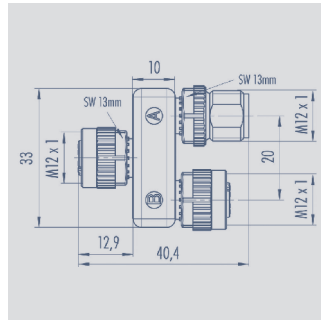
Wires PP, 0.34 mm<sup>2</sup>

Length	Type	P/N
2 m	EEM 33-38	056138
5 m	EEM 33-39	056139
10 m	EEM 33-40	056140

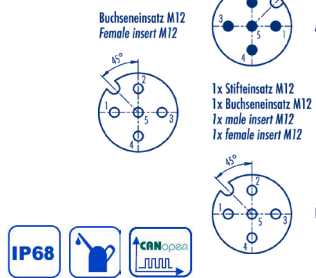
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Pin assignment

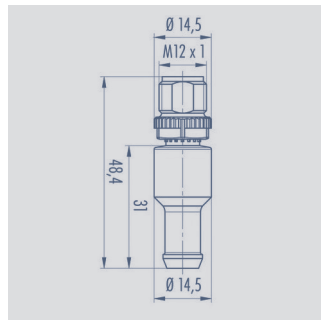


**M12x1 splitter / T-connector, 5-pin, A-coded, IP68, 1:1 connection, female - male - female, CAN-Bus**

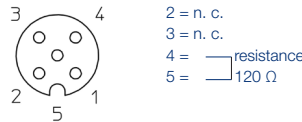
Connector housing PUR

Temperature range -25 °C... +85 °C

Type EEM 33-45, P/N 056145



Pin assignment

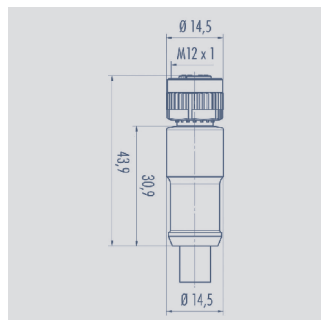


**M12x1 terminating resistor, 5-pin, A-coded, IP67, 120 Ω resistance, CAN-Bus**

Connector housing PUR

Temperature range -25 °C... +85 °C

Type EEM 33-47, P/N 056147



Pin assignment

- 1 = shield
- 2 = red (0,34 mm<sup>2</sup>)
- 3 = black (0,34 mm<sup>2</sup>)
- 4 = white (0,25 mm<sup>2</sup>)
- 5 = blue (0,25 mm<sup>2</sup>)

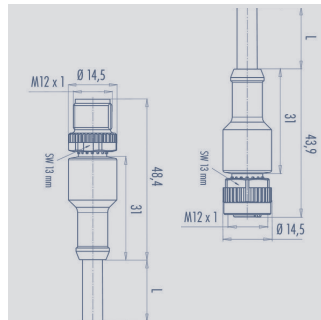
**M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded, open ended, CAN-Bus**

Connector housing PUR

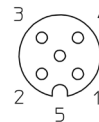
Cable sheath PUR Ø = max. 7.2 mm, -25 °C...+85 °C (moved)

Wires PP 2x 0.25 mm<sup>2</sup> + 2 x 0.34 mm<sup>2</sup>

Length	Type	P/N
2 m	EEM 33-41	056141
5 m	EEM 33-42	056142
10 m	EEM 33-43	056143



Pin assignment



**M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP68, CAN-Bus**

Connector housing PUR

Cable sheath PUR; Ø 7.2 mm -25 °C... +85 °C (fixed)

Length	Type	P/N
5 m	EEM 33-44	056144

