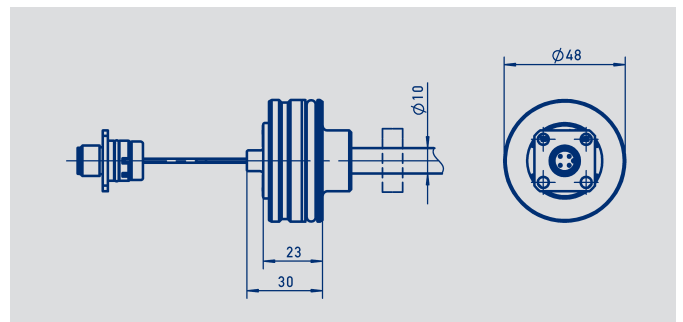
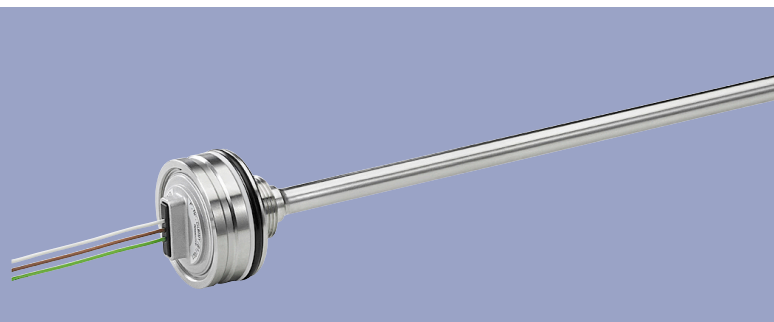
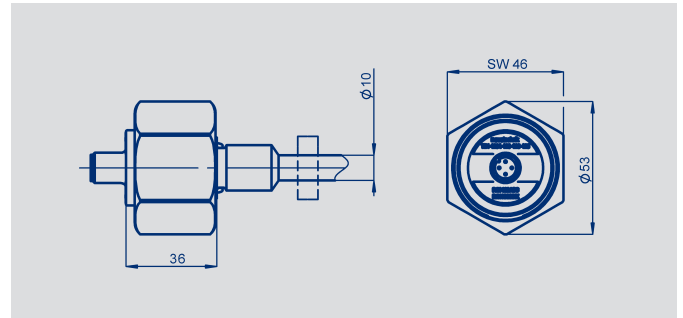
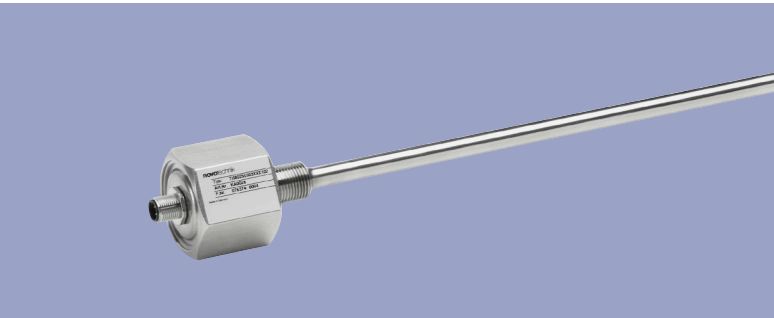


**Transducer
up to 2500 mm
touchless
absolute**

Series TIM



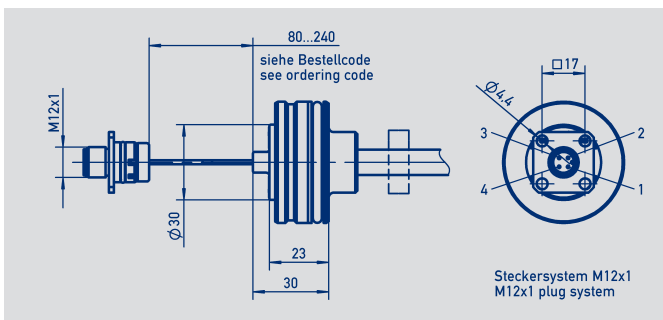
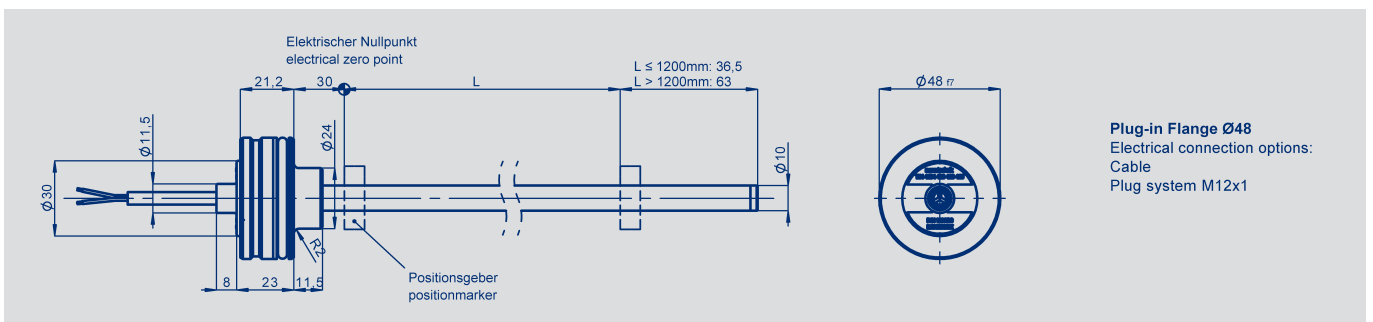
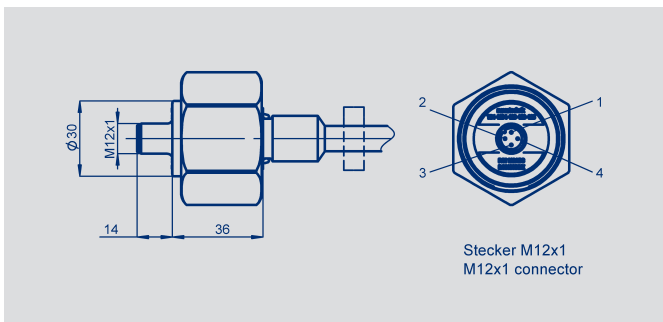
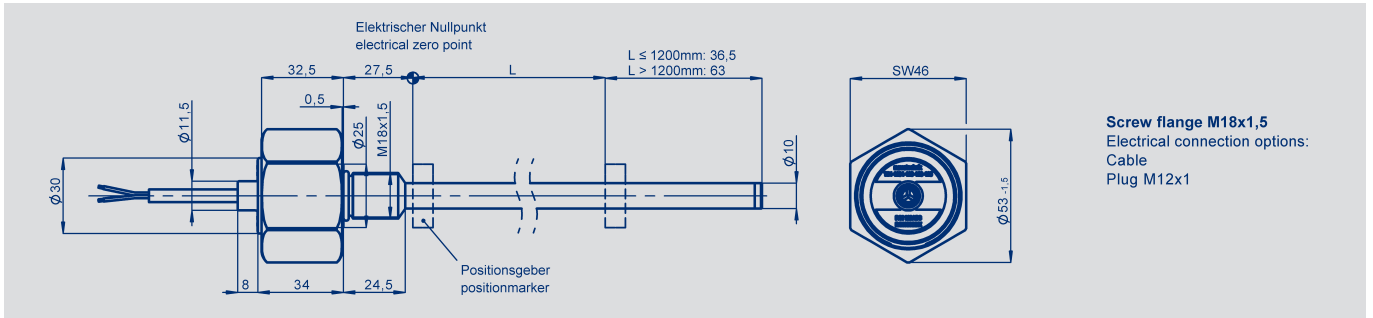
Special features

- 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	
Mechanical Data				
Dimensions	see drawing			
Electrical Data				
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	≤ 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)	≥ 10 (GND vs. housing, for 60 s)			M Ω
Cross-section cable	AWG 20, 0.5			mm ²
Environmental Data				
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	≤ 350			bar
Pressure peaks	≤ 450			bar
Burst pressure	≤ 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

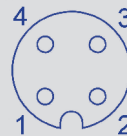
Mechanical version

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



Type designations	TIM - - - - - 3 _ - -64 _ - - - - Digital CANopen	
Mechanical Data		
Dimensions	see drawing	
Electrical Data		
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)	≥ 10 (GND vs. housing, for 60 s)	
Bus termination internal	without	
Environmental Data		
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	≤ 350	bar
Pressure peaks	≤ 450	bar
Burst pressure	≤ 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

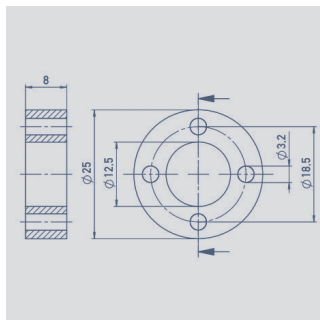
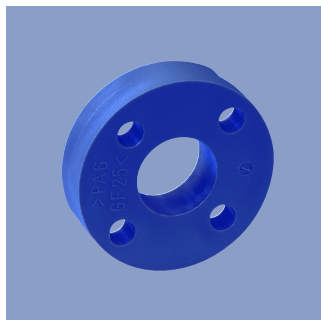
Pin assignment

Output connector	Signal
Code 106, 4 _ _	
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

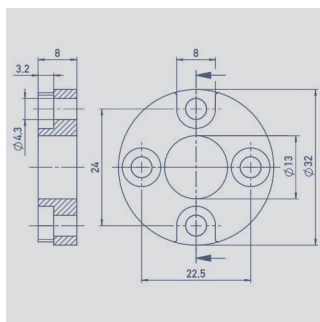
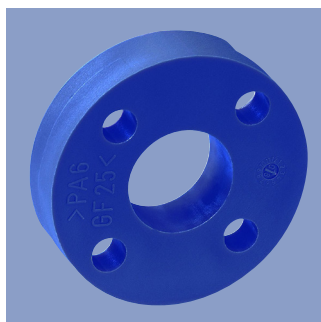


Ring Position Marker Z-TH1-P18

P/N 005697

Series TH1 / TIM

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

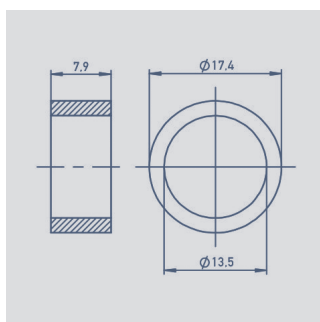
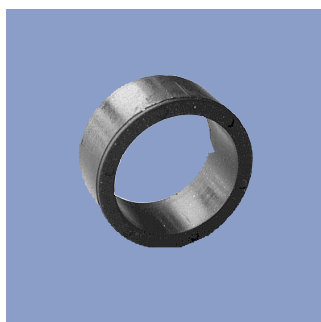


Ring Position Marker Z-TH1-P19

P/N 005698

Series TH1 / TIM

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

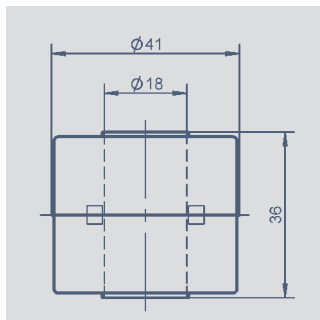
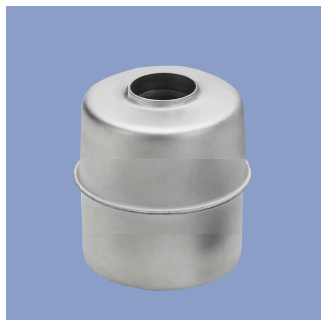


Ring Position Marker Z-TIM-P20

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 ²
Mounting via lock washer and lock ring	



Cylinder - Floating Position Marker Z-TH1-P21

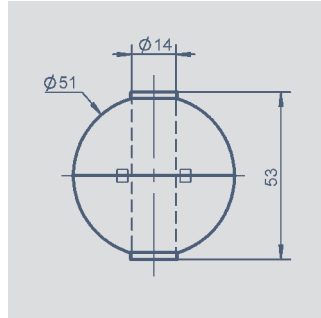
P/N 056044

Series TH1 / TIM

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

Accessories

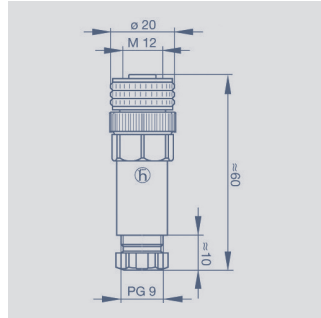
Position marker



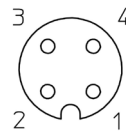
Bowl - Floating Position Marker Z-TH1-P22
P/N 056045
Series TH1 / TIM

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

Accessories
Connector System M12



Pin assignment



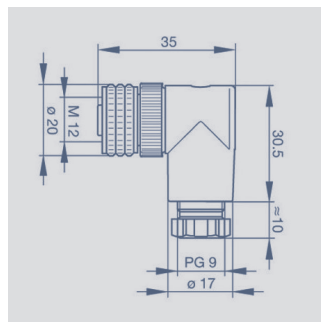
IP67

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

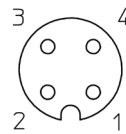
Connector housing Plastic PBT
-25 °C...+90 °C

For wire gauge 6...8 mm, max. 0.75 mm²

Type EEM 33-88, P/N 005633



Pin assignment



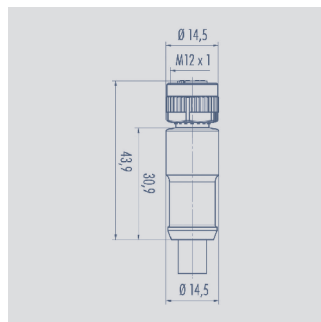
IP67

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

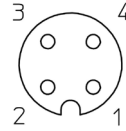
For wire gauge 6...8 mm, max. 0.75 mm²

Type EEM 33-89, P/N 005634



Pin assignment

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



IP67 **UL**

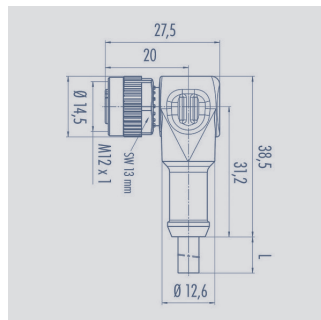
M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended

Connector housing Plastic PA

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

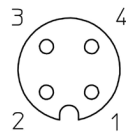
Wires PP, 0.34 mm²

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



IP67 **UL**

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)

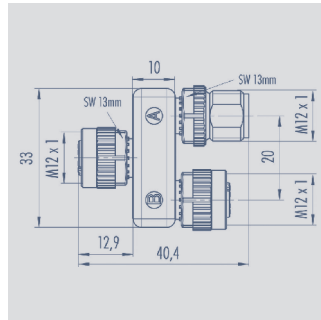
Wires PP, 0.34 mm²

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

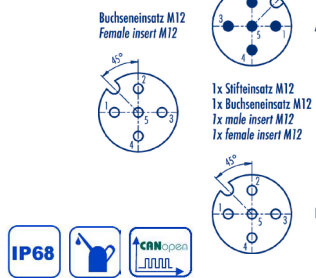
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Pin assignment



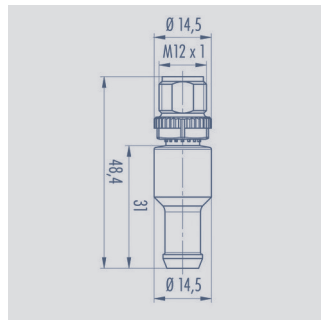
M12x1 splitter / T-connector, 5-pin, A-coded, IP68, 1:1 connection, female - male - female, CAN-Bus

Connector housing PUR

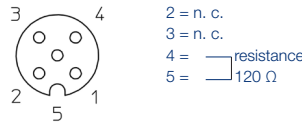
Temperature

range -25 °C... +85 °C

Type EEM 33-45, P/N 056145



Pin assignment



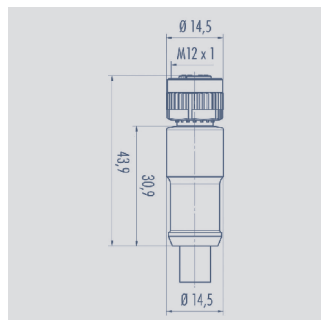
M12x1 terminating resistor, 5-pin, A-coded, IP67, 120 Ω resistance, CAN-Bus

Connector housing PUR

Temperature

range -25 °C... +85 °C

Type EEM 33-47, P/N 056147



Pin assignment

- 1 = shield
- 2 = red (0,34 mm²)
- 3 = black (0,34 mm²)
- 4 = white (0,25 mm²)
- 5 = blue (0,25 mm²)



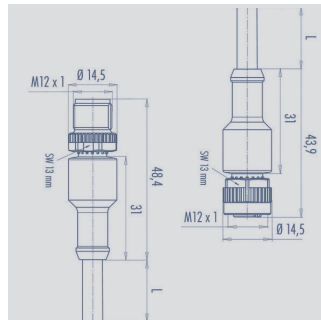
M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded, open ended, CAN-Bus

Connector housing PUR

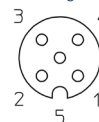
Cable sheath PUR Ø = max. 7.2 mm,
-25 °C...+85 °C (moved)

Wires PP 2x 0.25 mm²
+ 2 x 0.34 mm²

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