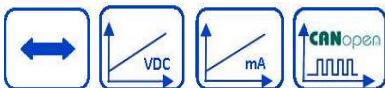
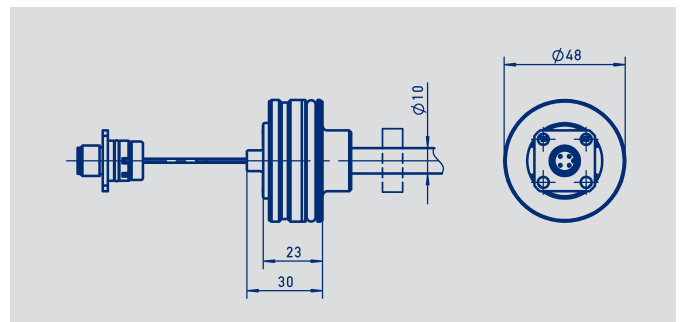
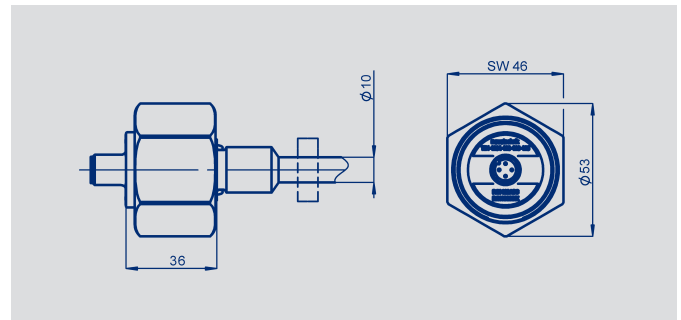
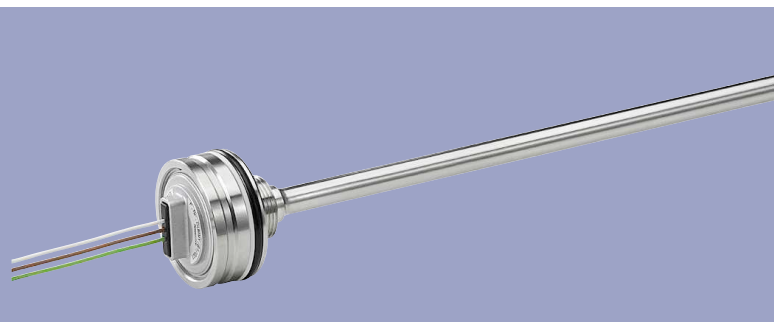
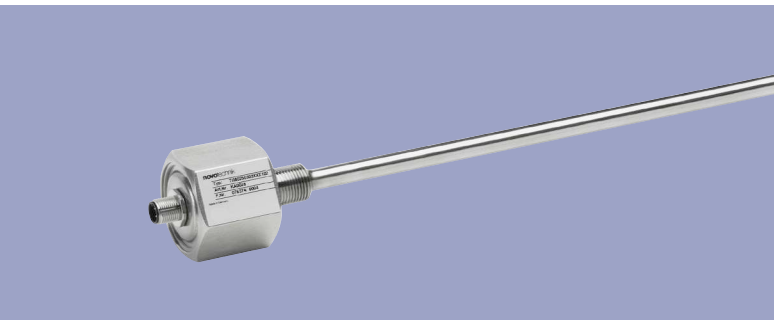


**Transducer
up to 2500 mm
touchless
absolute**

Series TIM



Special features

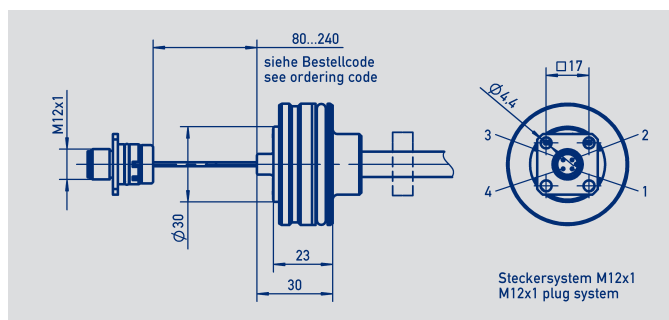
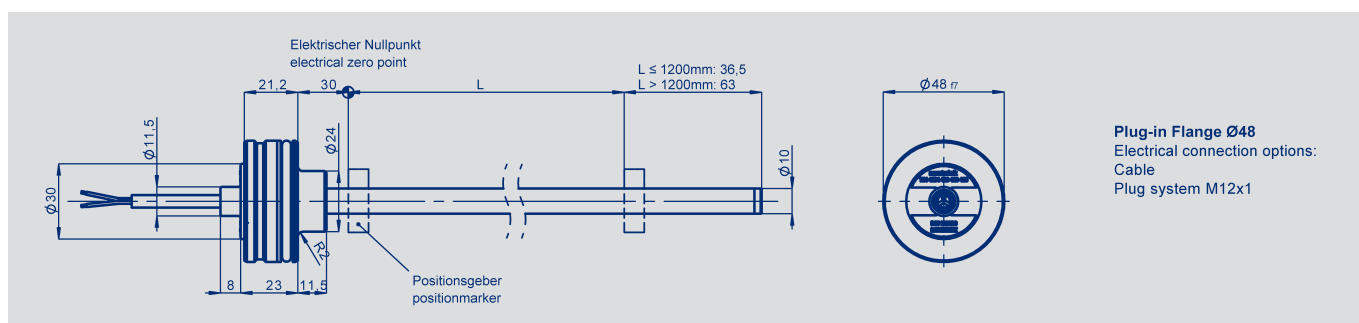
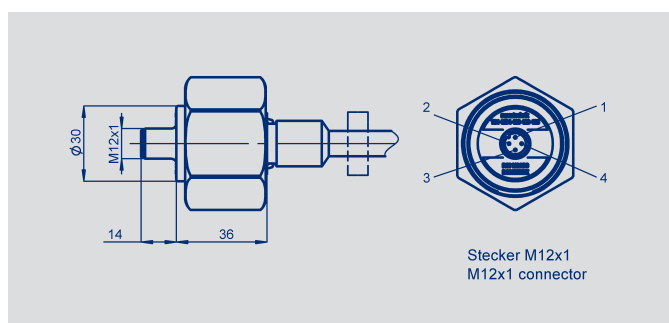
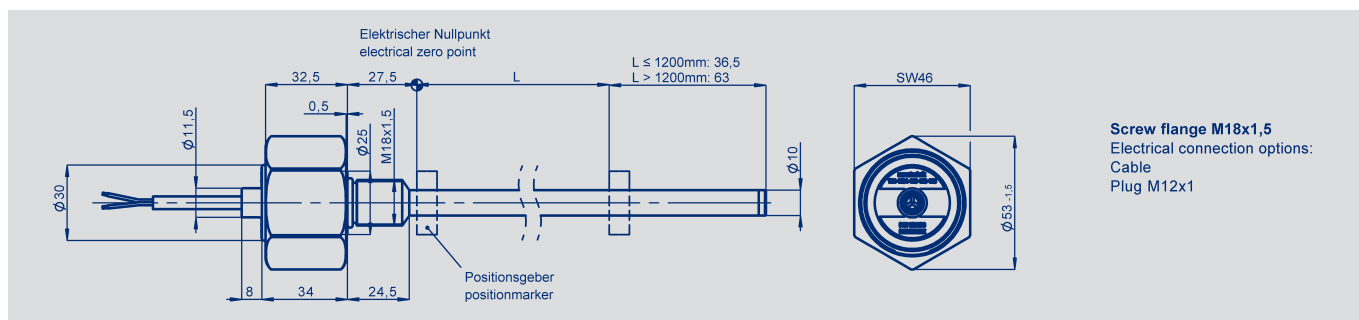
- Rod style transducer
- For integration in pneumatic and hydraulic cylinders
- Operating pressure up to 350 bar, peaks up to 450 bar
- Touchless magnetostrictive measurement technology
- Ring-shaped position marker does not contact sensor
- Unlimited mechanical life
- No velocity limit for position 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.		
Absolute linearity	50 ... 250 mm: $\leq \pm 0.1$		mm
	260 ... 2000 mm: $\leq \pm 0.04$		% FS
	2010 ... 2500 mm: $\leq \pm 0.8$		mm
Tolerance of electrical zero point	≤ 1		
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		
Resolution	typ. 0.1		
Repeatability	0.1		
Hysteresis	0.1		
Supply voltage	8 ... 32	16 ... 34	8 ... 32
Supply voltage ripple	< 1		
Power consumption without load	< 1		
Temperature coefficient	typ. 50		
Overvoltage protection	36 (GND - supply)		
Polarity protection	-36		
Insulation resistance (500 VDC)	≥ 10 (GND vs. housing, for 60 s)		
Cross-section cable	AWG 20, 0.5		
Environmental Data			
Operating temperature range	-40 ... +105 with cable connection and M12 plug system		
	-40 ... +85 with M12 connector		
Operating humidity range	0...90 (no condensation)		
Shock per DIN IEC68T2-27	100 (11 ms) (single hit)		
Vibration per DIN EIC68T2-6	20 (r.m.s) (10...2000 Hz)		
Protection class per DIN EN 60529	IP67 (M12x1 plug system IP69K, plugged)		
Pressure rating			
Working pressure	≤ 350		
Pressure peaks	≤ 450		
Burst pressure	≤ 600		
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

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 plus in flange

- * 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

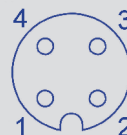
305: Plug-in flange Ø 48 mm

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	mm
Resolution speed	1	mm/s
Update rate	1	kHz
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	$\pm$ mm
Repeatability	0.1	$\pm$ mm
Hysteresis	0.1	$\pm$ mm
Supply voltage	12/24 (8 ... 32)	VDC
Supply voltage ripple	< 1	% ss
Power consumption without load	< 1.5	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
Bus termination internal	without	
Environmental Data		
Operating temperature range	-40 ... +105 with cable connection and M12 plug system -40 ... +85 with M12 connector	$^{\circ}$ C $^{\circ}$ 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



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

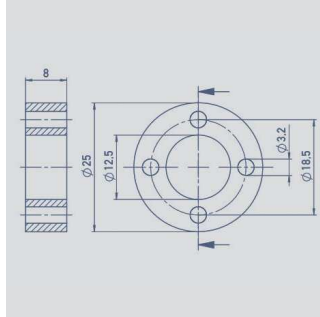
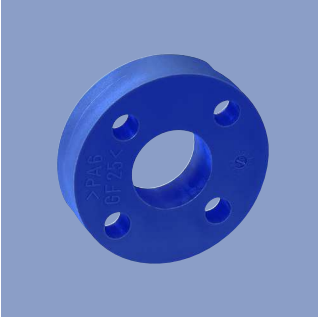
Output connector	Signal
Code 106, 4 _ _	
Pin 1	do not connect
Pin 2	Supply
Pin 3	GND
Pin 4	CAN_H
Pin 5	CAN_L

Pin assignment, A-coded



Accessories

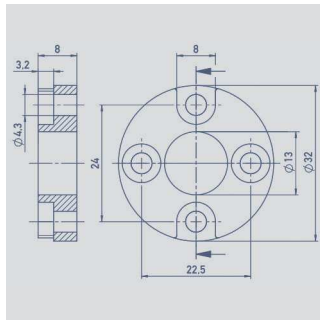
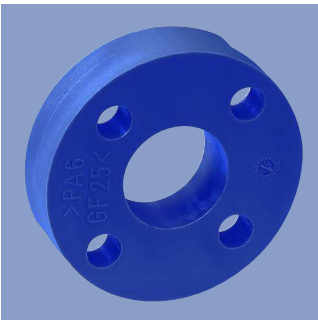
Position marker



P/N 005697

Series TH1 /

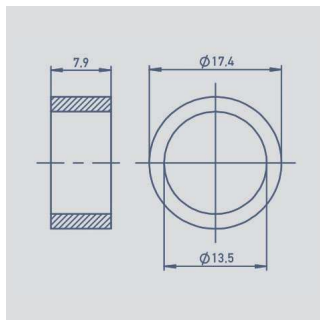
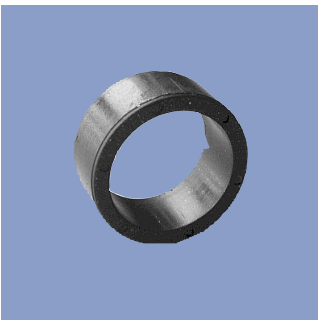
Material	PA6-GF25
Weight approx.	12 g
Operating temperature	-40 ... +100° C
Surface pressure max.	40 N/mm²
Fastening torque of mounting screws, max.	1 Nm



P/N 005698

Material

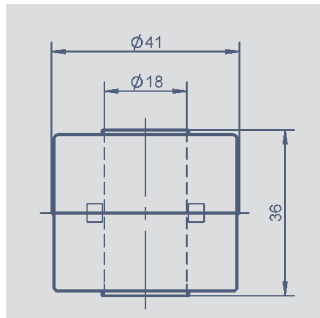
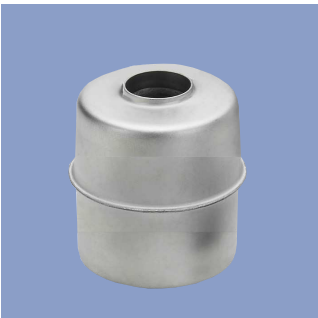
Weight approx.	14 g
Operating temperature	-40 ... +100°C
Surface pressure max.	40 N/mm²
Fastening torque of mounting screws, max.	1 Nm



P/N 005699

Material

Material	PA-Neonbond Compound
Weight approx.	5 g
Operating temperature	-40 ... +100°C
Surface pressure max.	10 N/mm²
Mounting via lock washer and lock ring	



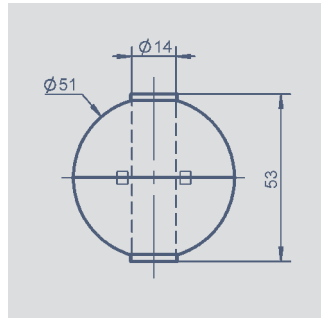
P/N 056044

Material

Weight approx.	20 g
Operating temperature	-40 ... +100°C
Compression strength, min.	< 8 bar
Density	740 kg/m³
Immersion depth in water	26,6 mm

Accessories

Position marker

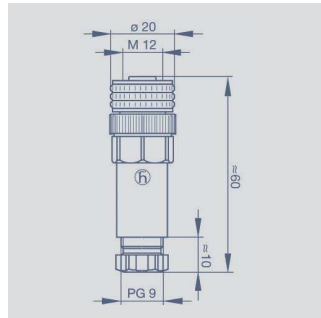


Bowl - Floating Position Marker Z-TH1-P22
P/N 056045
Series TH1 / TIM

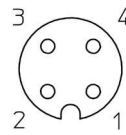
Material	1.4571
Weight approx.	42 g
Operating temperature	-40 ... +100°C
Compression strength, min.	< 60 bar
Density	720 kg/m³
Immersion depth in water	36,7 mm

Accessories

Connector System M12



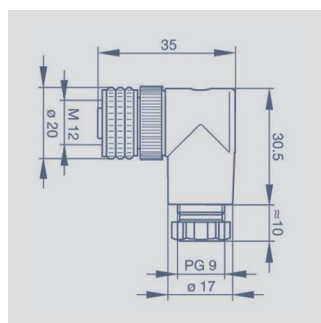
Pin assignment



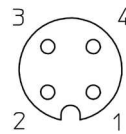
IP67

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 mm ²
Type EEM 33-88, P/N 005633	



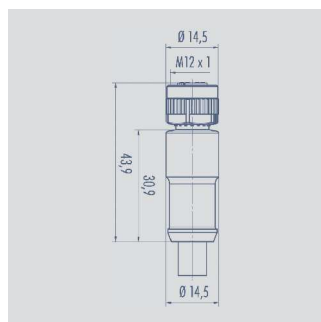
Pin assignment



IP67

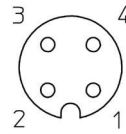
M12x1 Mating female connector, 4-pin, angled, A-coded, with coupling nut, screw termination, IP67, not shielded

Connector housing	Plastic PBT -25 °C...+90 °C
For wire gauge	6...8 mm, max. 0.75 mm ²
Type EEM 33-89, P/N 005634	



Pin assignment

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



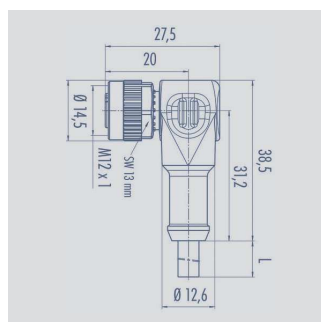
IP67

UL



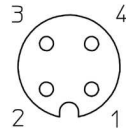
M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended

Connector housing	Plastic PA	
Cable sheath	PUR; Ø = max. 6 mm, -40 °C...+85 °C (fixed)	
Wires	PP, 0.34 mm ²	
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



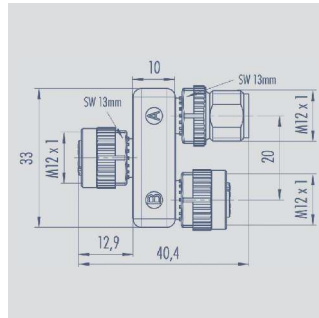
IP67

UL

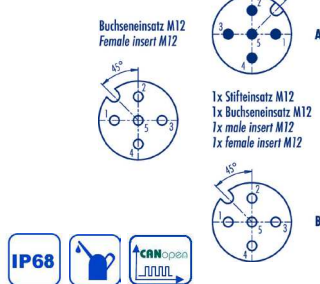


M12x1 Mating female connector, 4-pin, angled, A-coded, with molded cable, not shielded, IP67, open ended

Connector housing	Plastic PA	
Cable sheath	PUR; Ø = max. 6 mm, -40 °C...+85 °C (fixed)	
Wires	PP, 0,34 mm ²	
Length	Type	P/N
2 m	EEM 33-38	056138
5 m	EEM 33-39	056139
10 m	EEM 33-40	056140



Pin assignment



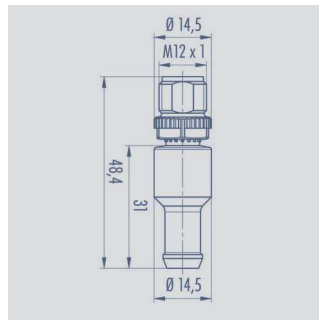
M12x1 splitter / T-connector, 5-pin,
A-coded, IP68, 1:1 connection,
female - male - female, CAN-Bus

Connector housing PUR

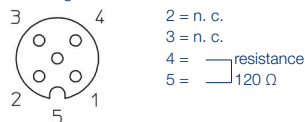
Temperature

range -25 °C... +85 °C

Type EEM 33-45, P/N 056145



Pin assignment



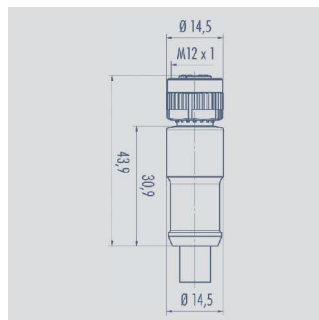
M12x1 terminating resistor, 5-pin, A-coded,
IP67, 120 Ω resistance, CAN-Bus

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)

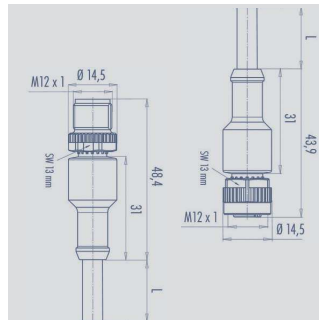
M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded, open ended, CAN-Bus

Connector housing PUR

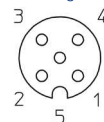
Cable sheath	PUR Ø = max. 7.2 mm, -25 °C...+85 °C (moved)
--------------	---

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