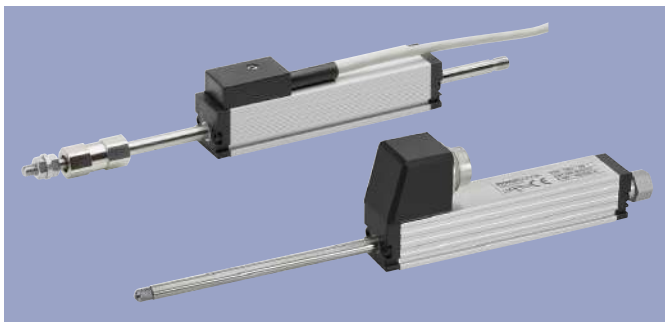
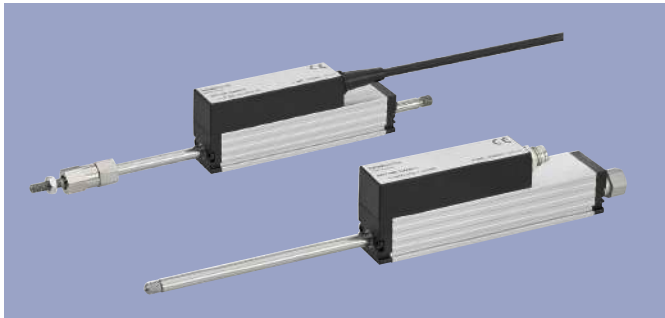


Short Stroke Transducer potentiometric 10mm up to 150 mm

Series TE1
Series T / TS
Series TR / TRS



Special features

- Extremely compact design 18 x 18 mm
- Long life up to 100 million movements
- Outstanding linearity up to $\pm 0.075\%$
- Repeatability to ± 0.002 mm
- Models with push rod or spring-loaded with internal return spring
- Actuating shaft with double-sided support
- Compatible to standard probe tips
- Insensitive to shock and vibration
- Optionally cable or plug connection
- Special ball-coupling eliminates lateral forces
- High operational speeds - up to 10 m/s
- Series TE1 with integrated signal processing for normalized outputs current or voltage
- Low temperature coefficient < 20 ppm/K
- Inductive series LS1 in same design see separate data sheet

Compact transducer with proven conductive-plastic technology.

The model with push rod and ball coupling enables a backlash- and lateral force-free operation even with parallel and angular displacement of transducer and measuring direction. Characteristic for the robust design is the double-sided support of the actuating rod. For the spring-loaded type, this bearing allows high lateral forces on the tip of the rod which may occur during scanning of cams or wedge plates.

The series TE1 with integrated signal processing (4 ... 20 mA or 0 ... 10 V) is connected directly to the analog inputs of the controller, the connection of potentiometric series T/TS/TR/TRS is done at a high impedance voltage input or via signal conditioner.

Applications

- Measuring / control technology
- Manufacturing Engineering
 - Woodwork machines
 - Riveting machines
 - Packaging machines
 - Welding machines
- Assembly / Test devices
- Medical appliances
- Building technology

Contents

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Series TE1 with integrated signal processing	
Dimension drawing	4
Technical data	5
Ordering specifications	5
Series T / TS / TR / TRS	
Dimension drawing	6
Technical data	7
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Accessories	
M16 / M8 connector system	9
Sensor mounting	12
Signal processing	13

Mechanical Data

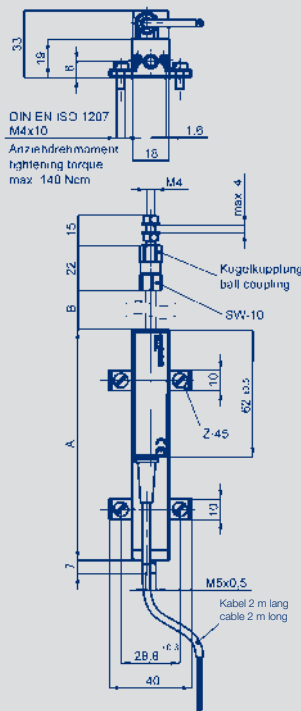
Description						
Housing	aluminum AlMgSi, anodized					
Mounting	adjustable clamps 2 x Z-45 and 4 x cylinder screw M4x10 (included in delivery)					
Actuating rod	stainless steel AISI 303, 1.4305 spring-loaded type: with anti-twist safeguard, internal thread M2.5x6					
Ball coupling for push rod type	hardened ball with spring pressure on carbide plate (included in delivery)					
Probe tip for spring-loaded type	stainless steel with external thread M2.5 and pressed-in hardened metal ball (included in delivery)					
Bearings	double-sided DU glide bearings					
Resistance element	conductive-plastic					
Wiper	precious metal multi-finger wiper, elastomer damped					
Electrical connections						
Series T / TR / TE1	3-pole cable, PVC insulated, 0.14 mm² (AWG 26), shielded, 2 m length					
Series TS / TRS	5-pin connector M16x0.75 (IEC 130-9), other connectors on request					
Series TE1	3-pin connector M8x1, shielded					
Mechanical Data						
Push rod type	T/TS-0025 TE1-0025-101	T/TS-0050 TE1-0050-101	T/TS-0075 TE1-0075-101	T/TS-0100 TE1-0100-101	T/TS-0150 TE1-0150-101	
Housing (dimension A)	63	88	113	138	188	+1 mm
Mechanical stroke (dimension B)	30	55	80	105	155	±1.5 mm
Maximum operational speed	10					m/s
Weight						
with cable T / TE1	140 / 183	160 / 202	170 / 222	190 / 245	220 / 328	g
with connector TS / TE1	86 / 138	107 / 157	132 / 177	150 / 201	190 / 280	g
Weight of shaft with coupling and wiper	35	43	52	58	74	g
Operating force (horizontally)	≤ 0.30					N
Max. displacements of ball coupling	±1 mm parallel offset, ±2.5° angular offset					
Maximum permitted torque for mounting screws	140					Ncm
Spring-loaded type	TR-0010	TR/TRS-0025 TE1-0025-102	TR/TRS-0050 TE1-0050-102	TR/TRS-0075 TE1-0075-102	TR/TRS-0100 TE1-0100-102	
Housing (dimension A)	48	63	94.4	134.4	166	+1 mm
Mechanical stroke (dimension B)	15	30	55	80	105	±1.5 mm
Flange nut (dimension C)	7	12	12	12	12	mm
Excess length of push rod in end position (dimension D)	6	32	32	32	32	mm
Weight						
with cable TR / TE1	80	120 / 174	150 / 197	180 / 228	200 / 294	g
with connector TRS / TE1		74 / 128	100 / 152	128 / 183	150 / 248	g
Weight of shaft with wiper	18	25	36	48	57	g
Operating force extended (horizontally)	≤ 3.5	≤ 2.5	≤ 2.5	≤ 2.5	≤ 2.5	N
Operating force retracted (horizontally)	≤ 5.0	≤ 5.0	≤ 5.0	≤ 5.0	≤ 5.0	N
Operating force to end stop	max. 5					N
Operating frequency (maximum) *	20	18	14	11	10	Hz
Maximum permitted torque for fixing screws	140					Ncm
Environmental Data						
Temperature range T / TS / TR / TRS	-30 ... +100					°C
Temperature range TE1	-40 ... +85					°C
Operating humidity range	0 ... 95 (no condensation)					% R.H.
Vibration	5 ... 2000 Amax = 0.75 amax = 20					Hz mm g
Shock	50 11					g ms
Life	> 100x10⁶					movem.
Protection class (DIN EN 60529)	IP40					

*) Data refer to critical application "probe tip upwards"

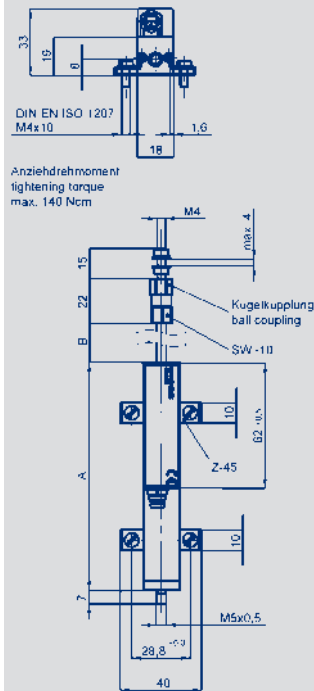
Dimension drawing

Series TE1

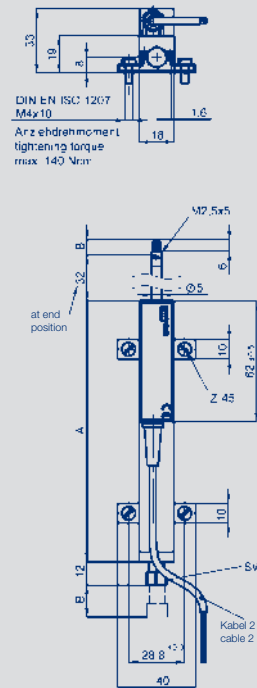
Push rod type - cable outlet
Series TE1-____-101-____-202



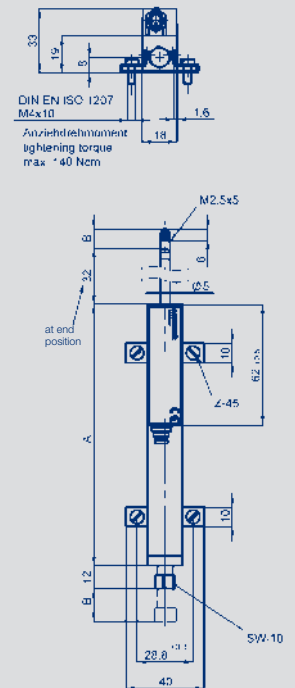
Push rod type - connector outlet
Series TE1-____-101-____-101



Spring-loaded type - cable outlet
Series TE1-____-102-____-202



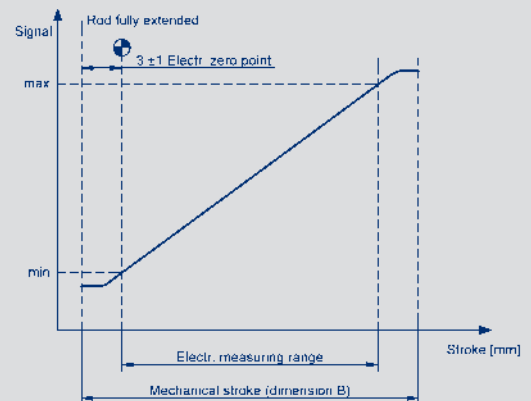
Spring-loaded type, connector outlet
Series TE1-____-102-____-101



Connection assignment

Signal	Cable code 202	Connector code 101	Connector with cable EEM 33-56 /-57 /-58 /-59 /-60 /-61
Supply voltage Ub	GN	pin 1	BN
Signal output	WH	pin 4	BK
GND	BN	pin 3	BU

Rising characteristic output



Technical Data Ordering Code

Series TE1

Type	TE1-0025	TE1-0050	TE1-0075	TE1-0100	TE1-0150	
Electrical Data						
Measuring range	25	50	75	100	150	mm
Independent linearity *	0.2	0.15	0.1	0.075	0.075	± % FS
Absolute linearity *	0.275	0.225	0.175	0.15	0.15	± % FS
Repeatability	0.002					±mm
Resolution	unlimited					
Dynamic (electrically)	> 10					kHz
Tolerance of electr. zero point	typ. ± 1.0					mm
Output signal voltage or current	0 ... 10 V (load ≥ 10 kΩ, residual voltage ≤ 10 mV) 10 ... 0 V (load ≥ 10 kΩ, residual voltage ≤ 10 mV) 4 ... 20 mA (burden ≤ 500 Ω) 20 ... 4 mA (burden ≤ 500 Ω)					
Short circuit protection	yes, all outputs vs.GND and Ub					
Supply voltage Ub	16 ... 30					V
Supply voltage ripple	max. 10					% Vss
Power consumption without load	< 1					W
Temperature coefficient	< 20					ppm/K
Overvoltage protection	< 36 (permanent)					V
Reverse protection	yes, supply lines					
Insulation resistance (500 VDC)	≥ 10					MΩ
Environmental Data						
MTTF (ISO 13849-1, parts count method, w/o load)	25					Jahre
Functional safety	If you need assistance in using our products in safety-related systems, please contact us					
EMC compatibility	EN 61000-4-2 Electrostatic discharge (ESD) 4 kV, 8 kV EN 61000-4-3 Electromagnetic fields 10 V/m EN 61000-4-4 Fast transients (Burst) 1 kV EN 61000-4-6 Conducted disturbances, induced by RF-fields 10 V eff. EN 61000-4-8 Power frequency magnetic fields 30 A/m EN 55016-2-3 Radiated disturbances class B					

*) Other linearities on request

Ordering specifications

Preferred types printed in bold

Electrical interface 4: Analog interface

Output signal analog interface 4 _ _

1: Voltage output

2: Current output

Analog interface voltage output 41 _

1: 0 V ... 10 V (actuating rod extended = 0 V)

2: 10 V ... 0 V (actuating rod extended = 10 V)

Analog interface current output 42 _

1: 4 mA ... 20 mA (actuating rod extended = 4 mA)

2: 20 mA ... 4 mA (actuating rod extended = 20 mA)

Electrical connection

101: Connector M8x1, 3-pin, axial output

202: Cable, 3-pole, 2 m, shielded

T E 1 - 0 1 0 0 - 1 0 2 - 4 1 1 - 1 0 1

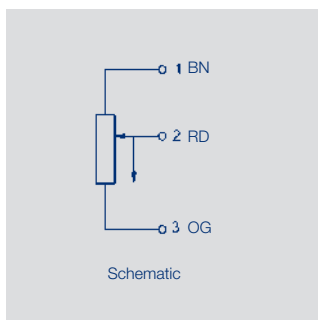
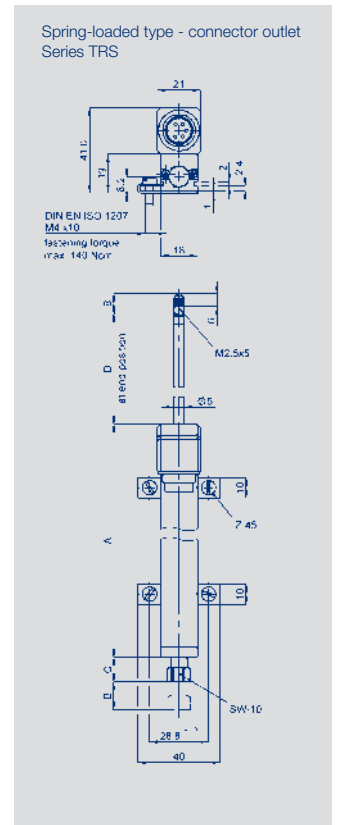
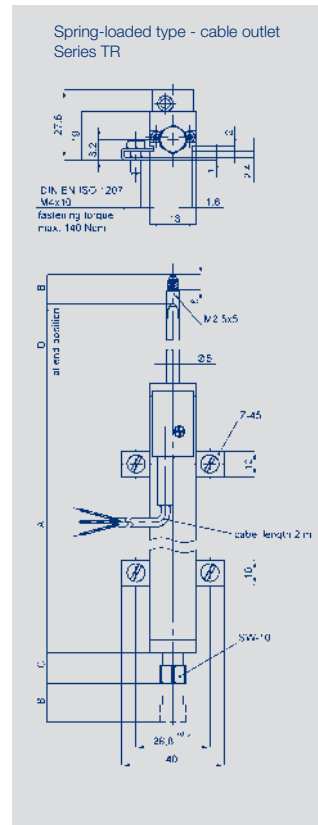
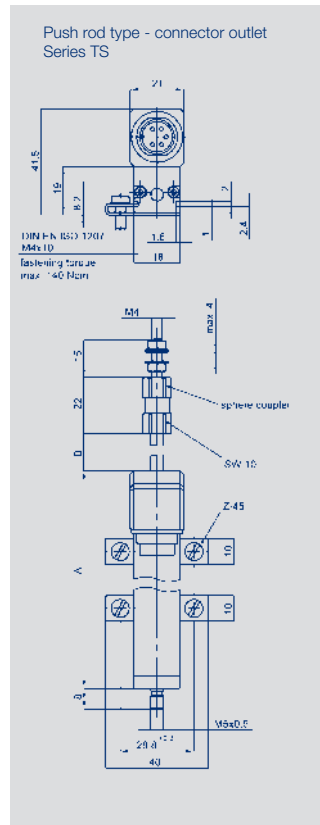
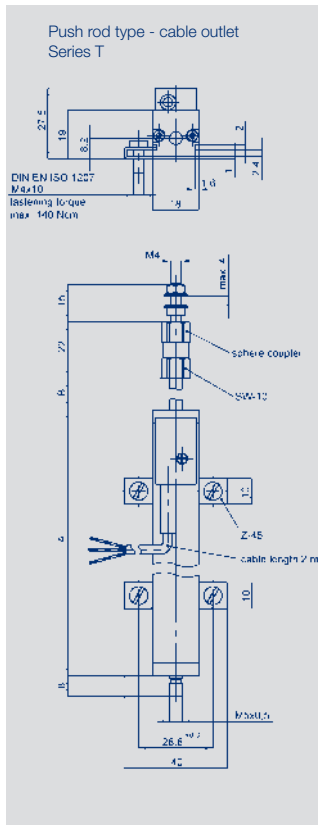
Series

Electrical measuring range
Standard lengths
0025 mm up to 0150 mm

Mechanical versions
101: Push rod type
102: Spring-loaded type (max. 100 mm)

Dimension drawing

Series T / TS
Series TR / TRS



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

Technical data

Series T / TS
Series TR / TRS

Electrical Data							
Push rod type		T/TS-0025	T/TS-0050	T/TS-0075	T/TS-0100	T/TS-0150	
Spring-loaded type	TR-0010	TR/TRS-0025	TR/TRS-0050	TR/TRS-0075	TR/TRS-0100		
Defined electrical range	10	25	50	75	100	150	mm
Electrical stroke	12	27	52	77	102	152	mm
Nominal resistance	1	1	5	5	5	5	kΩ
Resistance tolerance	20						±%
Independent linearity	≤ 0.25	0.2	0.15	0.1	0.075	0.075	±%
Repeatability	≤ 0.002						±mm
Recommended operating wiper current	≤ 1						μA
Maximum wiper current in case of malfunction	10						mA
Maximum permissible applied voltage	24	42	42	42	42	42	V
Effective temperature coefficient of the output-to-applied voltage ratio	typ. 5						ppm/K
Insulation resistance (500 VDC)	≥ 10						MΩ
Dielectric strength (500 VAC, 50 Hz)	≤ 100						μA

Important

All values specified in this data sheet for linearity, lifetime and temperature coefficient are only valid for a sensor used as a voltage divider with virtually no load applied to the wiper ($I_e \leq 1 \mu A$).

Ordering Specifications

Series T / TS
Series TR / TRS

Ordering specifications	
Push rod type	P/N
T-0025	023202
TS-0025	023232
T-0050	023203
TS-0050	023233
T-0075	023204
TS-0075	023234
T-0100	023205
TS-0100	023235
T-0150	023206
TS-0150	023236

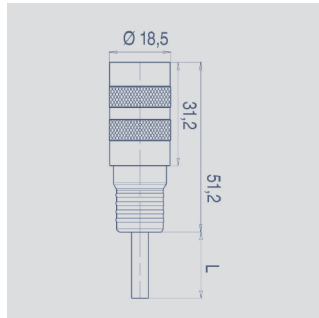
Spring-loaded type	
TR-0010	023260
TR-0025	023261
TRS-0025	023271
TR-0050	023262
TRS-0050	023272
TR-0075	023263
TRS-0075	023273
TR-0100	023264
TRS-0100	023274

Available on request		
Push rod type	P/N	independent linearity
T-0025-1	023207	±0.1 %
TS-0025-1	023237	±0.1 %
T-0050-1	023208	±0.1 %
TS-0050-1	023238	±0.1 %
T-0050-05	023209	±0.05 %
TS-0050-05	023239	±0.05 %
T-0075-05	023213	±0.05 %
TS-0075-05	023243	±0.05 %
T-0100-05	023214	±0.05 %
TS-0100-05	023244	±0.05 %
T-0150-05	023215	±0.05 %
TS-0150-05	023245	±0.05 %

Spring-loaded type		
TR-0025-1	023265	±0.1 %
TRS-0025-1	023275	±0.1 %
TR-0050-1	023266	±0.1 %
TRS-0050-1	023276	±0.1 %
TR-0050-05	023267	±0.05 %
TRS-0050-05	023277	±0.05 %
TR-0075-05	023268	±0.05 %
TRS-0075-05	023278	±0.05 %
TR-0100-05	023269	±0.05 %
TRS-0100-05	023279	±0.05 %

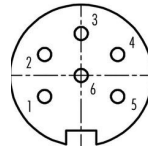
Accessories

Connector system M16



Pin assignment

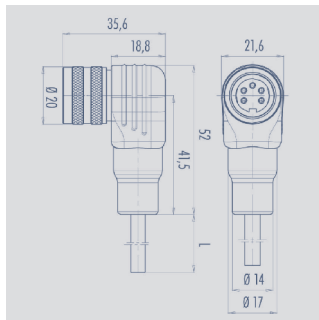
- 1 = white
- 2 = brown
- 3 = blue
- 4 = black
- 5 = grey
- 6 = green



M16x0.75 Mating female connector, 6-pin, straight, with molded cable, 2 m length, shielded, IP67, open ended

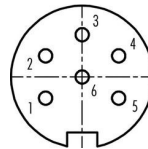
Connector housing	PUR
Cable sheath	PUR; Ø max. 6 mm, -5...+70 °C (moved) -20...+70 °C (fixed)
Wires	PVC, 6 x 0.25 mm ²
Type EEM 33-26, P/N 056126	

This coupling can be used in combination with 5-pin M16 connectors. Than „pin 6 / green“ is open.



Pin assignment

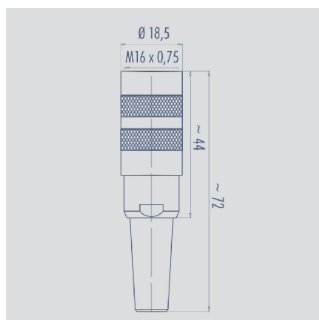
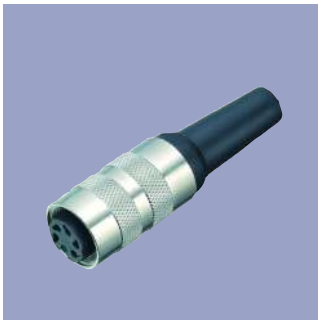
- 1 = white
- 2 = brown
- 3 = blue
- 4 = black
- 5 = grey
- 6 = green



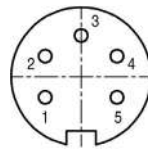
M16x0.75 Mating female connector 6-pin, angled, with molded cable, 2 m length, shielded, IP67, open ended

Connector housing	PUR
Cable sheath	PUR; Ø max. 6 mm, -5...+70 °C (moved) -20...+70 °C (fixed)
Wires	PVC, 6 x 0.25 mm ²
Type EEM 33-27, P/N 056127	

This coupling can be used in combination with 5-pin M16 connectors. Than „pin 6 / green“ is open.

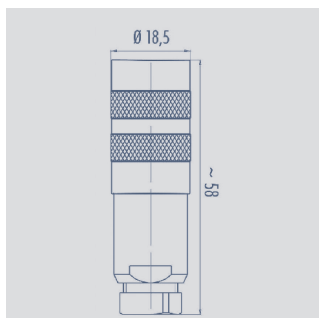


Pin assignment

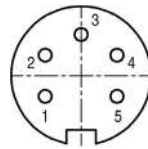


M16x0.75 Mating female connector 5-pin, straight, with coupling nut, solder terminal, IP40, shielded

Connector housing	CuZn (Brass, nickel plated) -40 °C... +85 °C
For wire gauge	4...6 mm, max. 0.75 mm ²
Type EEM 33-71, P/N 005612	



Pin assignment

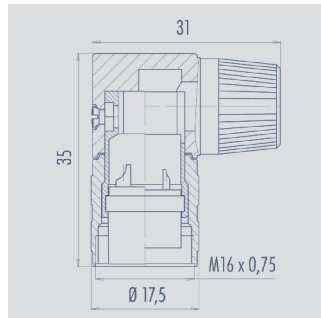


M16x0.75 Mating female connector 5-pin, straight, with coupling nut, solder terminal, IP67, shielded

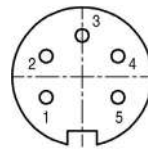
Connector housing	CuZn (Brass, nickel plated) -40 °C... +95 °C
For wire gauge	4...6 mm, PG7 max. 0.75 mm ²
Type EEM 33-76, P/N 005614	

Accessories

Connector system M16



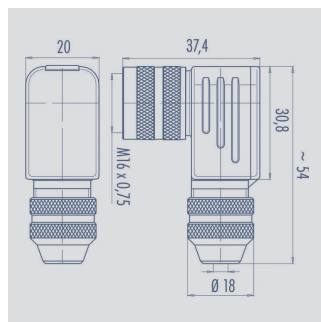
Pin assignment



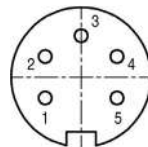
IP40

M16x0.75 Mating female connector
5-pin, angled, with coupling nut,
solder terminal, IP40, not shielded

Connector housing	Plastic PA -40 °C... +85 °C
For wire gauge	6...8 mm, max. 0.75 mm²
Type EEM 33-72, P/N 005613	



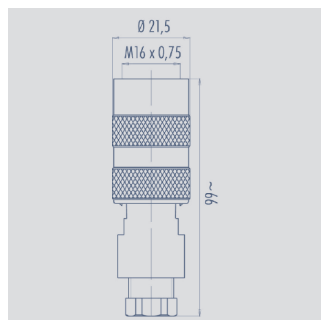
Pin assignment



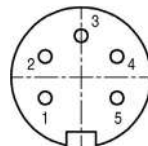
IP67  UL

M16x0.75 Mating female connector
5-pin, angled, with coupling nut,
solder terminal, IP67, shielded

Connector housing	CuZn (Brass, nickel plated) -40 °C... +95 °C
For wire gauge	4...6 mm, PG 7 max. 0.75 mm²
Type EEM 33-77, P/N 005615	



Pin assignment



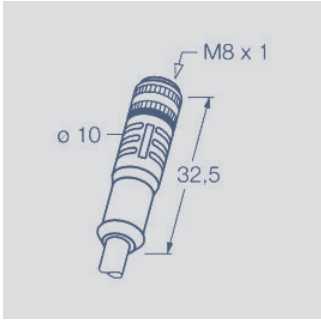
IP67

M16x0.75 Mating female connector
5-pin, straight, with coupling nut,
solder terminal, IP67, not shielded

Connector housing	Plastic PA -40 °C... +95 °C
For wire gauge	4...6 mm, max. 0.75 mm²
Type EEM 33-70, P/N 005611	

Accessories

Connector System M8



Pin assignment

1 = brown

3 = blue

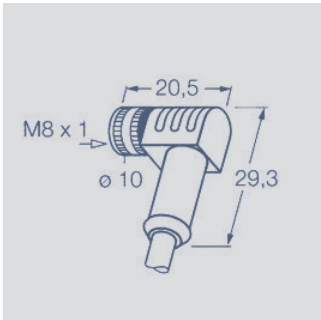
4 = black

IP67

M8x1 Mating female connector, 3-pin, straight, with molded cable, shielded, IP67, open ended

Connector housing	Plastic PA	
Cable sheath	PUR; Ø = max. 6 mm, -40 °C ... +90 °C	
Wires	PP, 3x0.25 mm²	

Length	Type	P/N
2 m	EEM 33-56	005602
5 m	EEM 33-58	005604
10 m	EEM 33-60	005606



Pin assignment

1 = brown

3 = blue

4 =black

IP67

M8x1 Mating female connector, 3-pin, angled, with molded cable, shielded, IP67, open ended

Connector housing	Plastic PA	
Cable sheath	PUR; Ø = max. 6 mm, -40 °C ... +90 °C	
Wires	PP, 3x0.25 mm²	

Length	Type	P/N
2 m	EEM 33-57	005603
5 m	EEM 33-59	005605
10 m	EEM 33-61	005607

IP67

Protection class IP67 (DIN EN60529)

IP40

Protection class IP40 (DIN EN 60529)

Very good Electromagnetic Compatibility (EMC) and shielded systems

Very good resistance to oils, coolants and lubricants

Suited for applications in dragchains

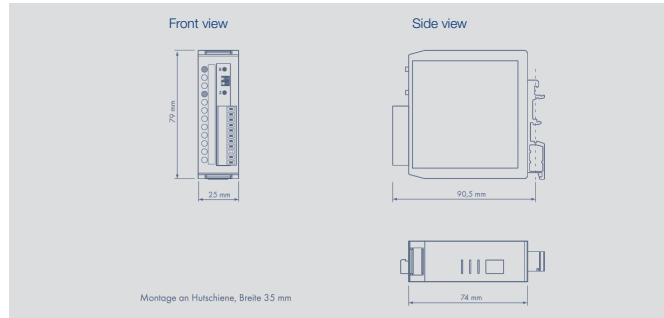
UL - approved

Note: The protection class is valid only in locked position with its plugs. The application of these products in harsh environments must be checked in particular cases.

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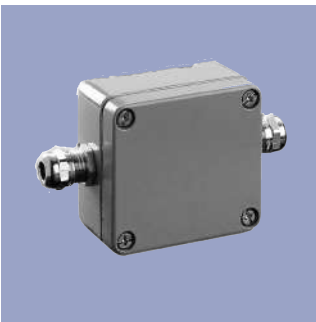


Signal conditioner

Simple teach-in function to adapt start and end point. Switchable current or voltage output.

Type MUP-400, P/N 05420x

Detailed data see separate
Data sheet MUP-400

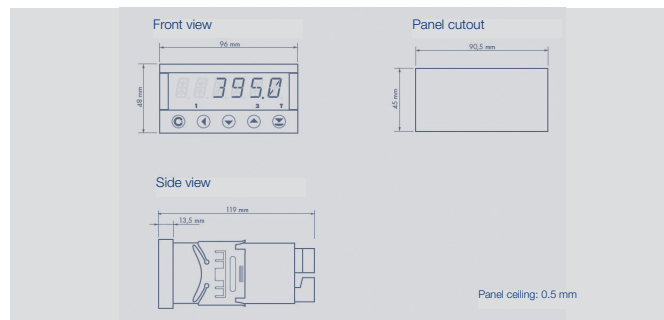


Signal conditioner

Electronics inside robust housing even for outside use. Zero point and span adjustable.

Type MUK-350, P/N 05417x

Detailed data see separate
Data sheet MUK-350



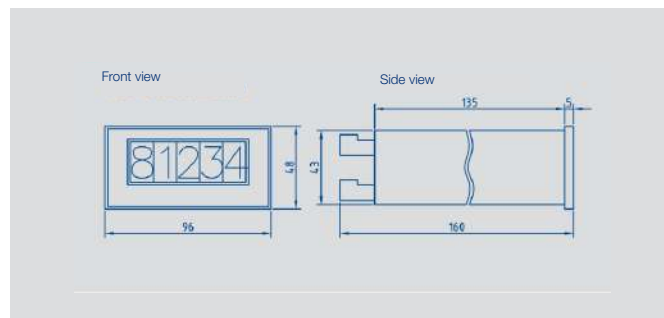
Multifunction Display

Microprocessor-controlled measuring devices for direct connection of potentiometric sensors or sensors with standardized analog output signals.

- accuracy up to 0.1 %
- display range -99 999...999 999
- good cost/value ratio

Type MAP-40 _ _ _ _ _

Detailed data see separate
Data sheet MAP-4000



Multifunction displays

Microprocessor-controlled measuring devices with galvanic isolation for direct connection of potentiometric sensors or sensors with standardized analog output signals.

- accuracy up to 0.01 %
- display range -9 999...40 000

Type MAP-3(4) _ _ _ _ _

Detailed data see separate
Data sheet MAP-300/400