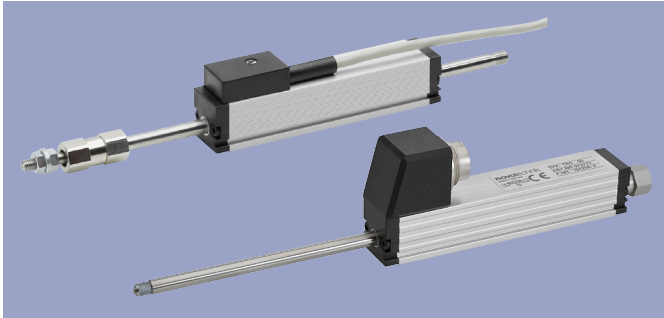


**Short Stroke Transducer  
potentiometric  
10 mm up to 150 mm**

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  $\pm 0.002$  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
- Low temperature coefficient  $< 20$  ppm/K
- Series TE1 with integrated signal processing for normalized outputs current or voltage in same design see separate data sheet
- 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 connection of these potentiometric series 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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<hr/>	
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## Mechanical Data

<b>Description</b>						
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	3-pole cable, PVC insulated, 0.14 mm <sup>2</sup> (AWG 26), shielded, 2 m length					
Series TS / TRS	5-pin connector M16x0.75 (IEC 130-9), other connectors on request					
<b>Mechanical Data</b>						
Maximum permitted torque for mounting screws	140					Ncm
Push rod type	T/TS-0025	T/TS-0050	T/TS-0075	T/TS-0100	T/TS-0150	
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	140	160	170	190	220	g
with connector	86	107	132	150	190	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					
Spring-loaded type	TR-0010	TR/TRS-0025	TR/TRS-0050	TR/TRS-0075	TR/TRS-0100	
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 SW-10 (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	80	120	150	180	200	g
with connector		74	100	128	150	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
<b>Environmental Data</b>						
Operating temperature	-30 ... +100					°C
Operating humidity range	0 ... 95 (no condensation)					% R.H.
Vibration (IEC 60068-2-6)	5 ... 2000 A <sub>max</sub> = 0.75 a <sub>max</sub> = 20					Hz mm g
Shock (IEC 60068-2-27)	50 11					g ms
Life	> 100x10 <sup>6</sup>					movem.
Protection class (DIN EN 60529)	IP40					

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



## Technical data

Electrical Data							
Push rod type	TR-0010	T/TS-0025 TR/TRS-0025	T/TS-0050 TR/TRS-0050	T/TS-0075 TR/TRS-0075	T/TS-0100 TR/TRS-0100	T/TS-0150	
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

### 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

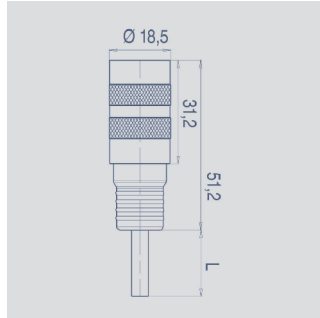
### Available on request

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 %

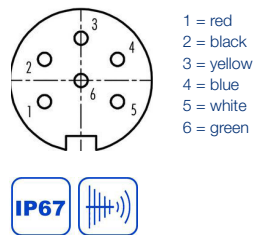
### Spring-loaded type

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



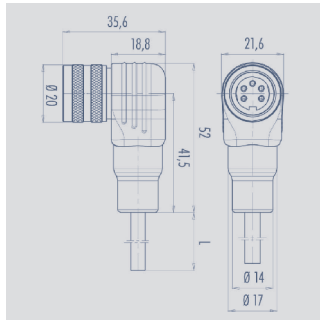
Pin assignment



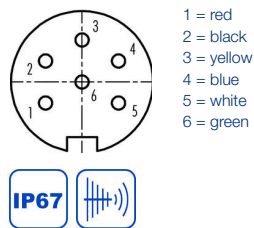
**M16x0.75 Mating female connector, 6-pin, straight, with molded cable, 2 m length, shielded, IP67, open ended**

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 <sup>2</sup>
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.



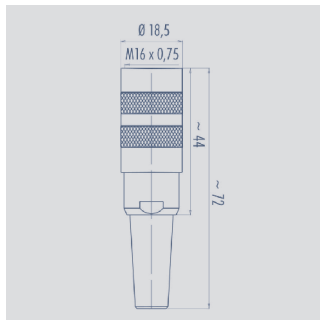
Pin assignment



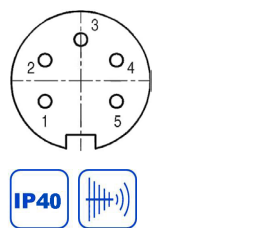
**M16x0.75 Mating female connector, 6-pin, angled, with molded cable, 2 m length, shielded, IP67, open ended**

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 <sup>2</sup>
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.

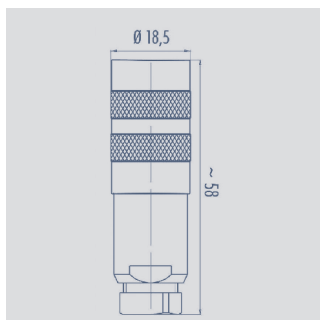


Pin assignment

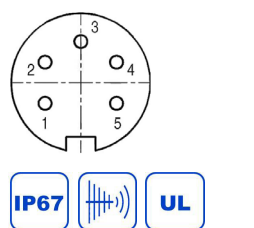


**M16x0.75 Mating female connector, 5-pin, straight, with coupling nut, solder terminal, IP40, shielded**

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



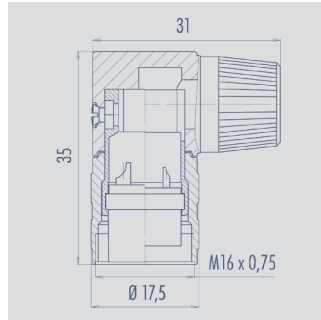
Pin assignment



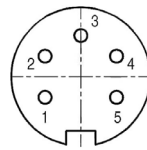
**M16x0.75 Mating female connector, 5-pin, straight, with coupling nut, solder terminal, IP67, shielded**

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

**Accessories**  
Connector system M16



Pin assignment



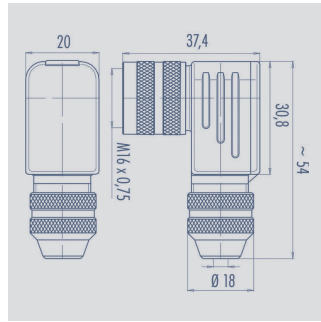
**IP40**

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

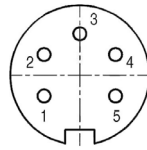
Connector housing Plastic PA  
-40 °C... +85 °C

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

Type EEM 33-72, P/N 005613



Pin assignment



**IP67**



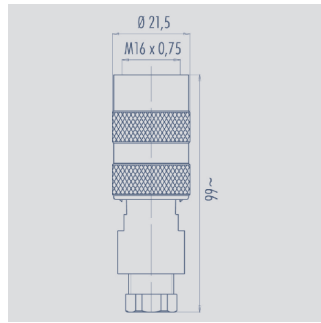
**UL**

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

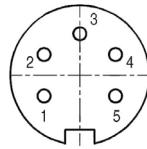
Connector housing CuZn  
(Brass, nickel plated)  
-40 °C... +95 °C

For wire gauge 4...6 mm, PG 7  
max. 0.75 mm<sup>2</sup>

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 mm<sup>2</sup>

Type EEM 33-70, P/N 005611

**IP40** Protection class IP40  
(DIN EN60529)

**IP67** Protection class IP67  
(DIN EN60529)

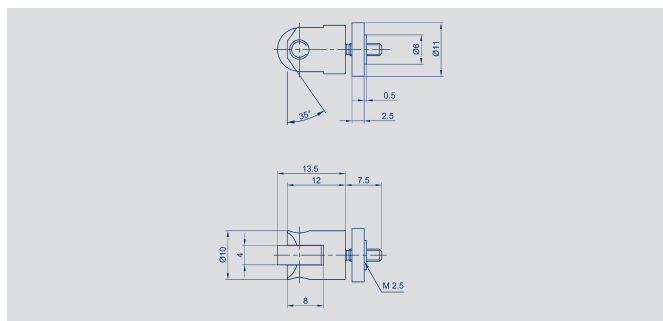
Very good Electromagnetic Compatibility (EMC) and shielded systems

**UL** 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.

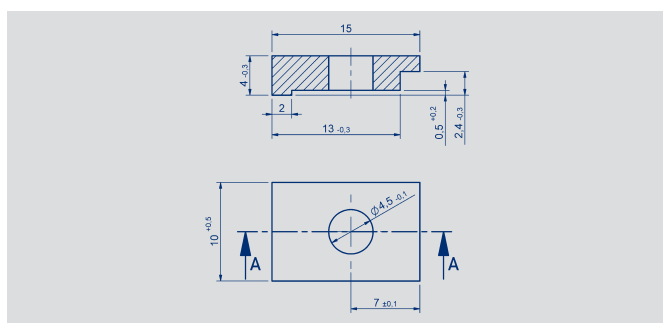
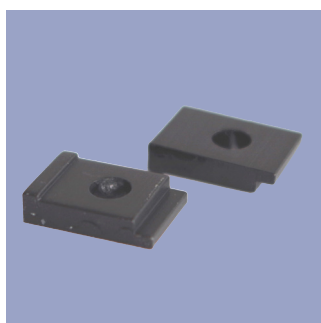


**Accessories**  
Sensor mounting  
Signal processing



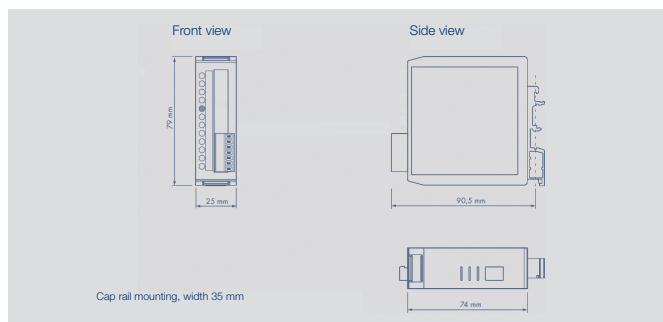
**Roller head**, hardened steel.  
Mounting via external thread M2.5 at push rod. Lock with knurled screw.

Type Z-R50, P/N 005678



**Clamps**  
4 single clamps, anodized aluminum, with screw M4x10 - 4.8 tinned, for lower total height

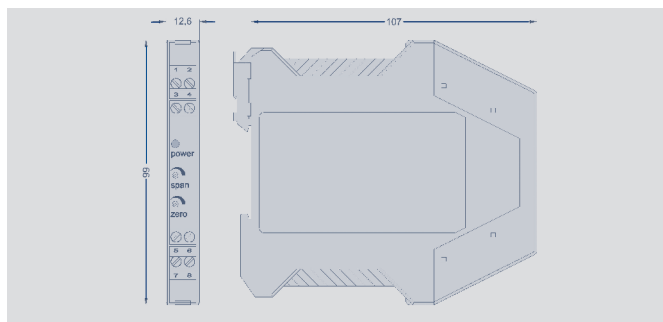
Type Z-FTI-B01, P/N 059010



**Signal conditioner**  
Cost-efficient basic version with fixed output range, voltage or current output. Not adjustable.

Type MUP-080, P/N 05422x

Detailed data see separate  
Data sheet MUP-080



**Signal conditioner**  
Voltage or current output, adjustable zero and span. Available with or without electrical isolation. Compact size.

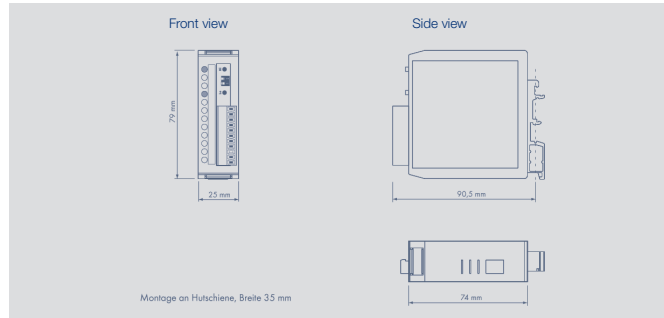
Type MUP-110-x, P/N 05401x  
Type MUP-160-x, P/N 05406x

Detailed data see separate  
Data sheet MUP-110\_160

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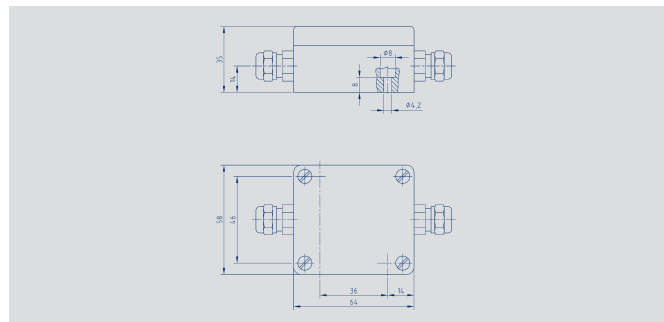
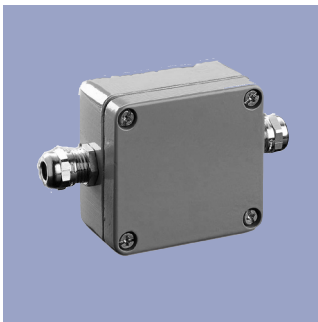


**Signal conditioner**

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

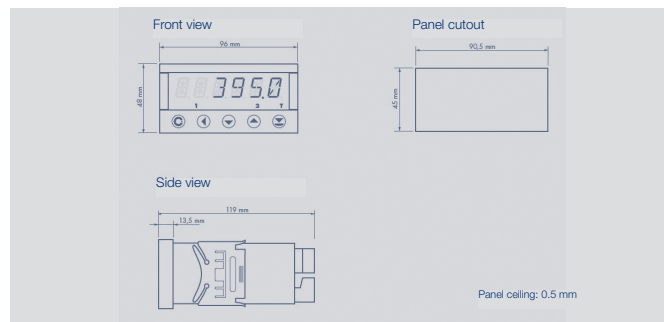


**Signal conditioner**

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

The specifications contained in our datasheets are intended solely for informational purposes. The documented specification values are based on ideal operational and environmental conditions and can vary significantly depending on the actual customer application. Using our products at or close to one or more of the specified performance ranges can lead to limitations regarding other performance parameters. It is therefore necessary that the end user verifies relevant performance parameters in the intended application. We reserve the right to change product specifications without notice.