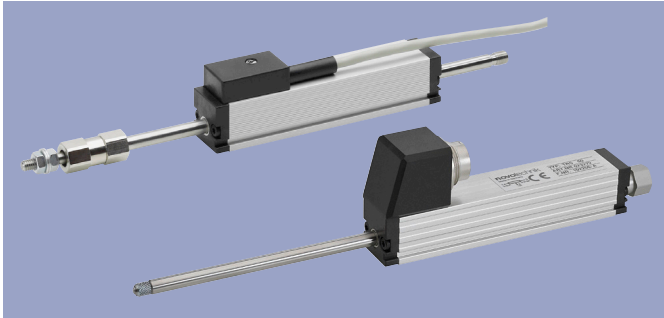


**Short Stroke Transducer
potentiometric
10 mm up to 150 mm**

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 ± 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

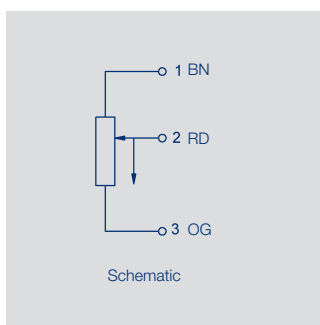
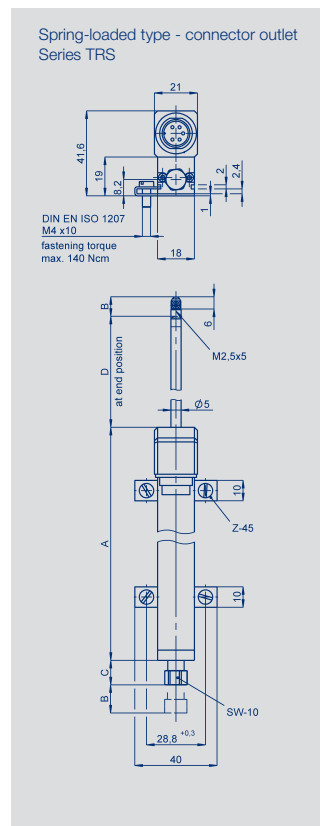
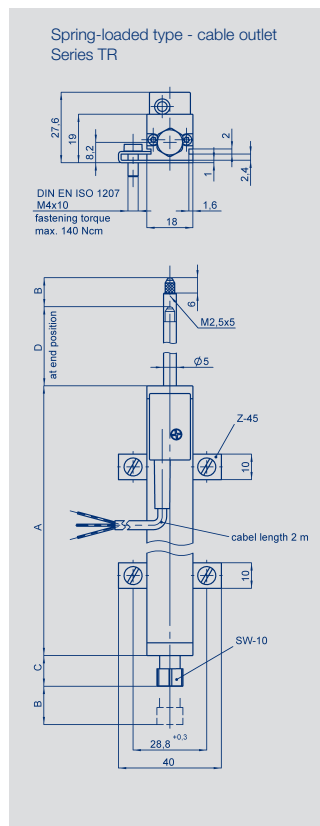
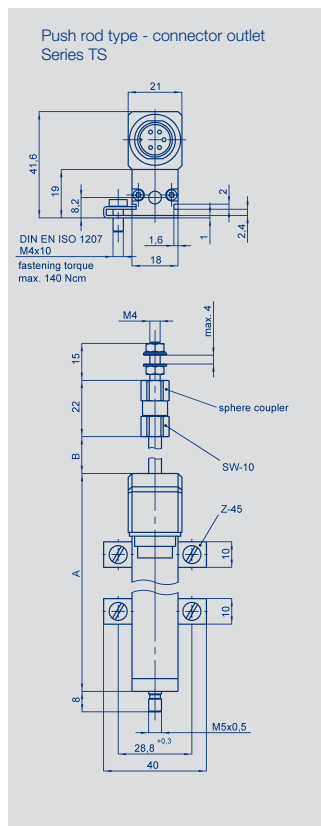
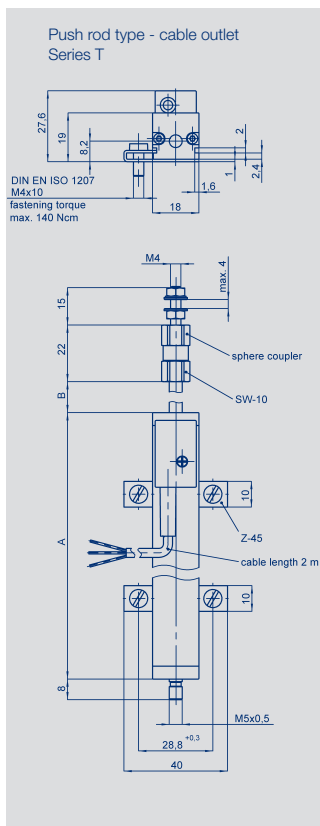
| | |
|-------------------------|---|
| Mechanical data | 3 |
| Dimension drawing | 4 |
| Technical data | 5 |
| Ordering specifications | 6 |
| <hr/> | |
| Accessories | |
| M16 connector system | 7 |
| Sensor mounting | 9 |
| Signal processing | 9 |

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 | 3-pole cable, PVC insulated, 0.14 mm ² (AWG 26), shielded, 2 m length | | | | | |
| Series TS / TRS | 5-pin connector M16x0.75 (IEC 130-9), other connectors on request | | | | | |
| Mechanical Data | | | | | | |
| 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 |
| Environmental Data | | | | | | |
| Operating temperature | -30 ... +100 | | | | | °C |
| Operating humidity range | 0 ... 95 (no condensation) | | | | | % R.H. |
| Vibration (IEC 60068-2-6) | 5 ... 2000 A _{max} = 0.75 a _{max} = 20 | | | | | Hz mm g |
| Shock (IEC 60068-2-27) | 50 11 | | | | | g ms |
| Life | > 100x10 ⁶ | | | | | movem. |
| Protection class (DIN EN 60529) | IP40 | | | | | |

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

Dimension drawing



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

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 | k Ω |
| Resistance tolerance | 20 | | | | | | \pm % |
| Independent linearity | ≤ 0.25 | 0.2 | 0.15 | 0.1 | 0.075 | 0.075 | \pm % |
| Repeatability | ≤ 0.002 | | | | | | \pm mm |
| Recommended operating wiper current | ≤ 1 | | | | | | μ A |
| 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 | | | | | | M Ω |
| Dielectric strength (500 VAC, 50 Hz) | ≤ 100 | | | | | | μ A |

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 ($I_e \leq 1 \mu\text{A}$).

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 |

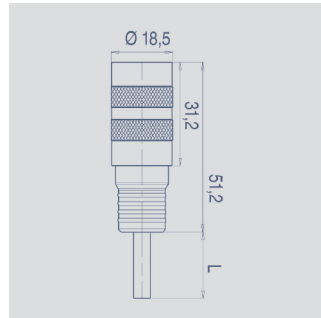
Available on request

| 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 % |

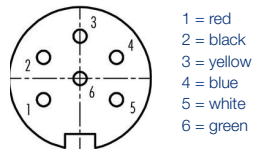
Spring-loaded type

| | | |
|-------------|--------|---------|
| 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

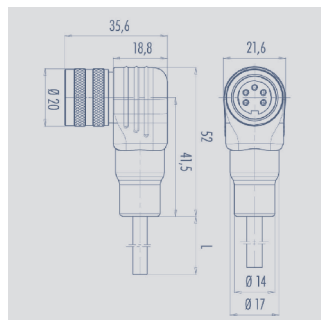
Connector housing PUR

Cable sheath PUR; Ø max. 6 mm, -5...+70 °C (moved) -20...+70 °C (fixed)

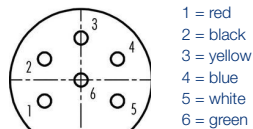
Wires PVC, 6 x 0.25 mm²

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

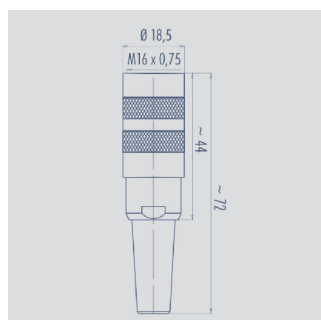
Connector housing PUR

Cable sheath PUR; Ø max. 6 mm, -5...+70 °C (moved) -20...+70 °C (fixed)

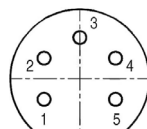
Wires PVC, 6 x 0.25 mm²

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

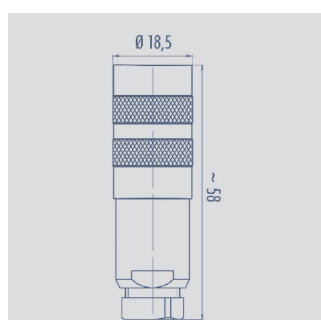


M16x0.75 Mating female connector, 5-pin, straight, with coupling nut, solder terminal, IP40, shielded

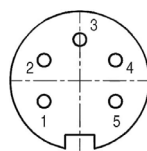
Connector housing CuZn (Brass, nickel plated) -40 °C... +85 °C

For wire gauge 4...6 mm, max. 0.75 mm²

Type EEM 33-71, P/N 005612



Pin assignment



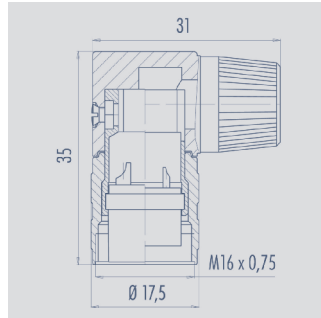
M16x0.75 Mating female connector, 5-pin, straight, with coupling nut, solder terminal, IP67, shielded

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

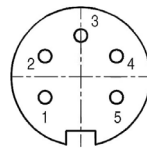
For wire gauge 4...6 mm, PG7 max. 0.75 mm²

Type EEM 33-76, P/N 005614

Accessories
Connector system M16



Pin assignment



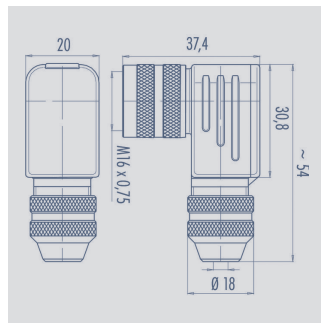
IP40

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

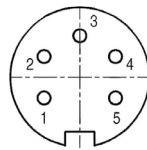
Connector housing Plastic PA
-40 °C... +85 °C

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

Type EEM 33-72, P/N 005613



Pin assignment



IP67



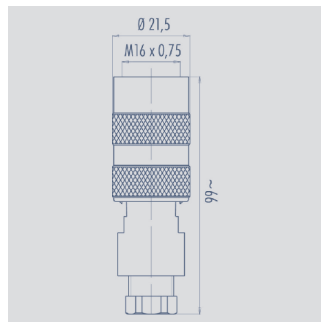
UL

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

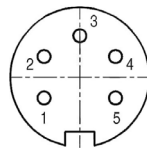
Connector housing CuZn
(Brass, nickel plated)
-40 °C... +95 °C

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

IP40 Protection class IP40
(DIN EN60529)

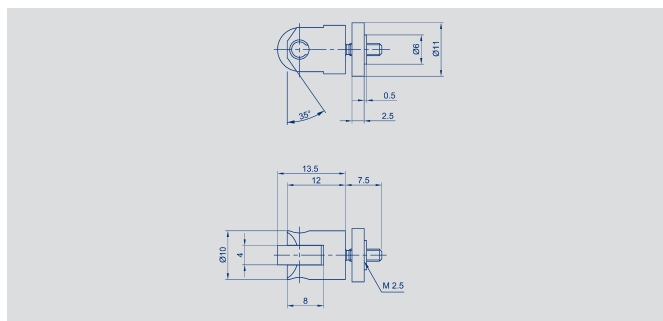
IP67 Protection class IP67
(DIN EN60529)

Very good Electromagnetic Compatibility (EMC) and shielded systems

UL UL - approved

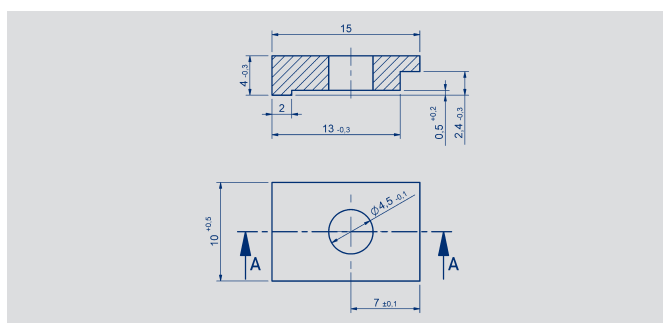
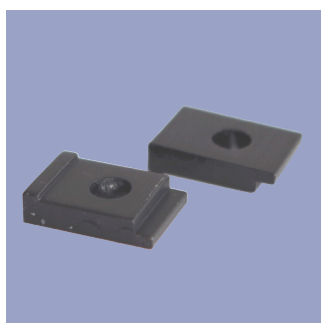
Note: The protection class is valid only in locked position with its plugs. The application of these products in harsh environments must be checked in particular cases.

Accessories
Sensor mounting
Signal processing



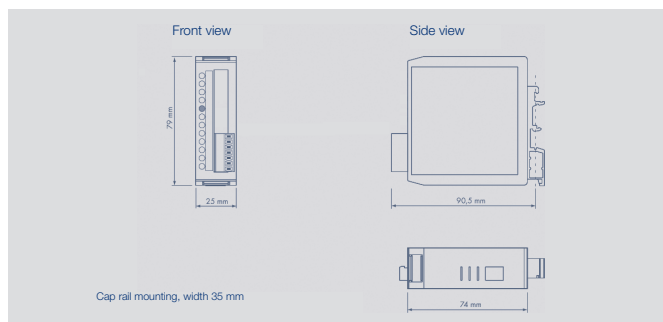
Roller head, hardened steel.
Mounting via external thread M2.5 at push rod. Lock with knurled screw.

Type Z-R50, P/N 005678



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

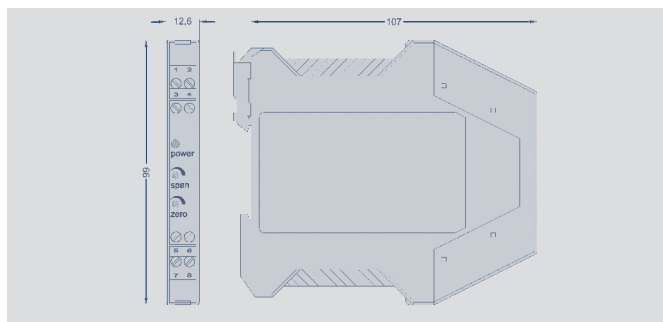
Type Z-FTI-B01, P/N 059010



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.

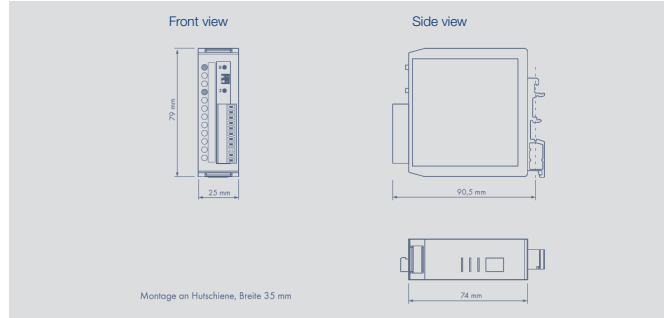
Type MUP-110-x, P/N 05401x
Type MUP-160-x, P/N 05406x

Detailed data see separate
Data sheet MUP-110_160

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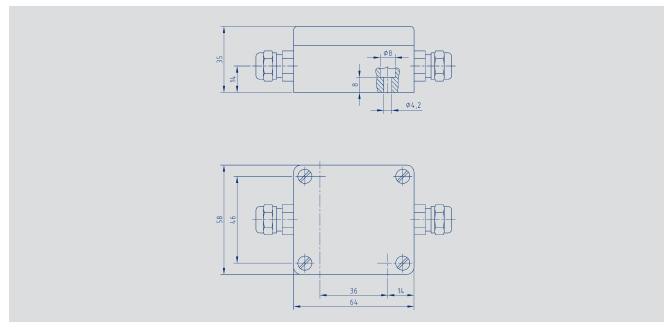
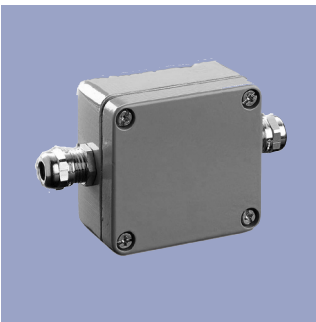


Signal conditioner

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

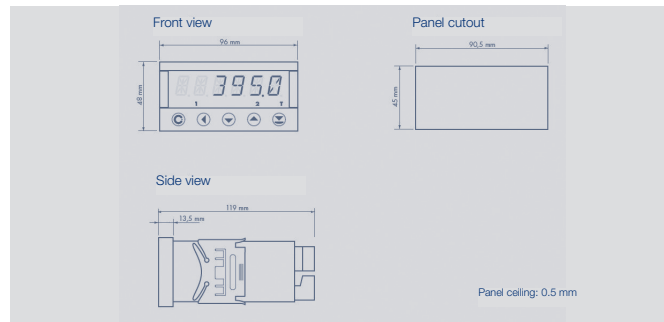


Signal conditioner

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



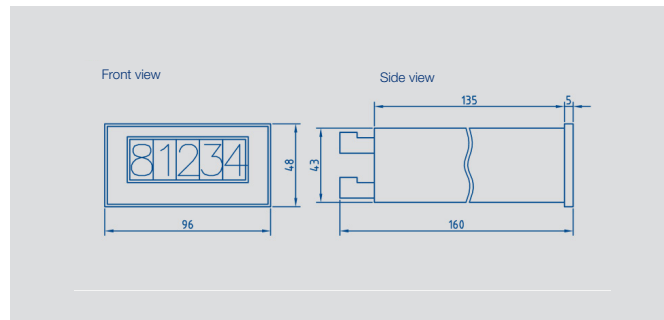
Multifunction Display

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



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

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.