



More Precision

wireSENSOR // Draw-wire displacement sensors



Low-cost draw-wire sensors wire**SENSOR** MK46 analog

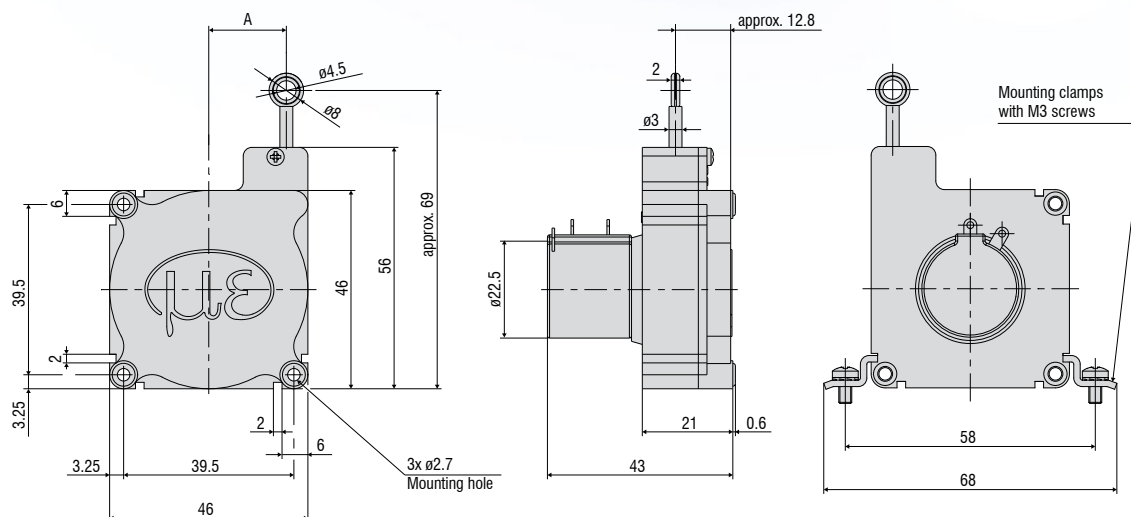
Robust plastic housing

Customer-specific designs

Wire or hybrid potentiometer

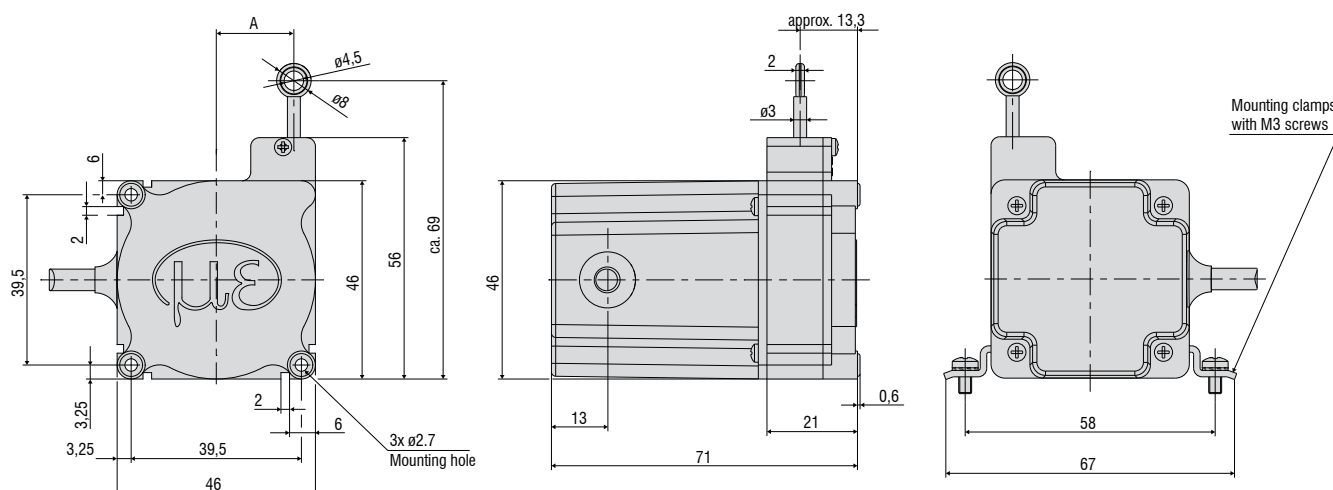


Output P10/P25



| Measuring range (mm) | A (mm) |
|----------------------|------------|
| 1000 | approx. 18 |
| 1250 | approx. 20 |

Output CR-P10/CR-P25/CR-U10/CR-I10



All dimensions in mm, not to scale

| Model | | WPS-1000-MK46 | WPS-1250-MK46 |
|---------------------------------|---|---|---------------------------------|
| Measuring range | | 1000 mm | 1250 mm |
| Analog output | | Potentiometer | Potentiometer, current, voltage |
| Resolution | Wire potentiometer P25 | 0.3 mm | 0.4 mm |
| | Hybrid potentiometer P10/U10/I10 | towards infinity | |
| Linearity | Wire potentiometer P25 $\leq \pm 0.25\%$ FSO | $\leq \pm 2.5$ mm | $\leq \pm 3.12$ mm |
| | Hybrid potentiometer P10/U10/I10 $\leq \pm 0.1\%$ FSO | $\leq \pm 1$ mm | $\leq \pm 1.2$ mm |
| Sensor element | | Wire/hybrid potentiometer | |
| Wire extension force (max.) | | approx. 1.6 N | approx. 1.5 N |
| Wire retraction force (min.) | | approx. 1 N | |
| Wire acceleration (max.) | | approx. 5 g | |
| Material | Housing | Plastics | |
| | Measuring wire | Polyamide-coated stainless steel (\varnothing 0.36 mm) | |
| Wire mounting | | Eyelet (\varnothing 4.5 mm) | |
| Installation | | Mounting holes or mounting grooves on the sensor housing | |
| Temperature range | Storage | -20 ... +80 °C | |
| | Operation | -20 ... +80 °C | |
| Connection | P10/P25 | Soldering tags | |
| | CR-P10/CR-P25/CR-U10/CR-I10 | integrated cable, radial, length 1 m | |
| Shock (DIN EN 60068-2-27) | | 50 g / 5 ms in 3 axes, 2 directions and 1000 shocks each | |
| Vibration (DIN EN 60068-2-6) | | 20 g / 20 ... 2000 Hz in 3 axes and 10 cycles each | |
| Protection class (DIN EN 60529) | | IP20 | |
| Weight | | approx. 80 g | |

FSO = Full Scale Output

¹⁾ Specifications for analog outputs from page 58 onwards.

Article designation

| WPS - | 1000 - | MK46 - | P25 |
|-------|-----------------------|-------------|--|
| | | | Output type: P10: Potentiometer P25: Potentiometer CR-P10/P25: potentiometer, integrated cable, radial, 1 m |
| | | MK46 series | |
| | Measuring range in mm | | |

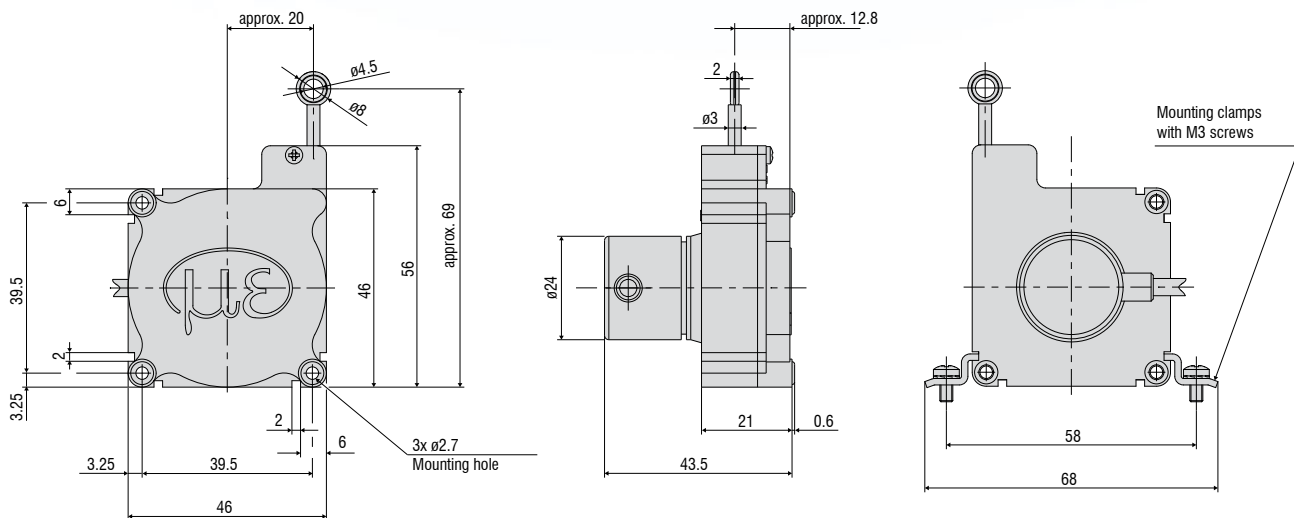
| WPS - | 1250 - | MK46 - | P25 |
|-------|-----------------------|-------------|--|
| | | | Output type: P10: Potentiometer P25: Potentiometer CR-P10/P25: potentiometer, integrated cable, radial, 1 m CR-U10: Voltage, integrated cable, radial, 1 m CR-I10: Current, integrated cable, radial, 1 m |
| | | MK46 series | |
| | Measuring range in mm | | |

Low-cost draw-wire sensors **wireSENSOR MK46 digital**

Robust plastic housing

Customer-specific designs

Incremental encoder



All dimensions in mm, not to scale

| Model | | WPS-1250-MK46 |
|---------------------------------|----------------|--|
| Measuring range | | 1250 mm |
| Digital output ¹⁾ | | Encoder: E (5 ... 24 VDC) / Encoder E830 (8 ... 30 VDC) |
| Resolution | | 4 pulses/mm |
| | | 0.25 mm |
| Linearity | ≤ ±0.05% FSO | ≤ ±0.625 mm |
| Sensor element | | Incremental encoder |
| Wire extension force (max.) | | approx. 1.5 N |
| Wire retraction force (min.) | | approx. 1 N |
| Wire acceleration (max.) | | approx. 5 g |
| Material | Housing | Plastics |
| | Measuring wire | Polyamide-coated stainless steel (ø 0.36 mm) |
| Wire mounting | | Eyelet (ø 4.5 mm) |
| Installation | | Mounting holes or mounting grooves on the sensor housing |
| Temperature range | Storage | -20 ... +80 °C |
| | Operation | -20 ... +80 °C |
| Connection | | integrated cable, radial, length 1 m |
| Shock (DIN EN 60068-2-27) | | 50 g / 5 ms in 3 axes, 2 directions and 1000 shocks each |
| Vibration (DIN EN 60068-2-6) | | 20 g / 20 ... 2000 Hz in 3 axes and 10 cycles each |
| Protection class (DIN EN 60529) | | IP54 |
| Weight | | approx. 120 g (incl. cable) |

FSO = Full Scale Output

¹⁾ Specifications for digital outputs from page 59 onwards.

Article designation

| | | | |
|-------|-----------------------|-------------|---|
| WPS - | 1250 - | MK46 - | E |
| | | | Output type: Encoder E (5 ... 24 VDC) Encoder E830 (8 ... 30 VDC) |
| | | MK46 series | |
| | Measuring range in mm | | |

Options

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Customer-specific modifications for your series application

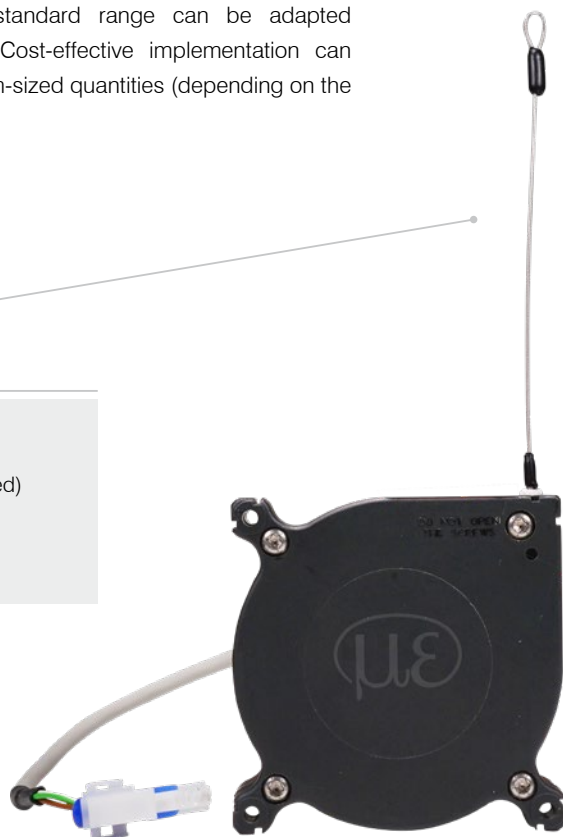
If the standard models do not meet certain specific requirements, draw-wire sensors from the standard range can be adapted accordingly by Micro-Epsilon. Cost-effective implementation can already be achieved with medium-sized quantities (depending on the type and number of changes).

Measuring wire

- Plastics
- Stainless steel (coated/uncoated)
- Different diameters
- Thicker wire for improved snap protection

Wire attachment

- Wire clip
- Eyelet
- Thread
- Wire extension



Connection/Output signal

- Different cable lengths
- Different plug variants
- Redundant sensor element
- Adaption of supply voltage
- Inverted signal
- Redundant signal outputs
- Alignment cable/connector outlet



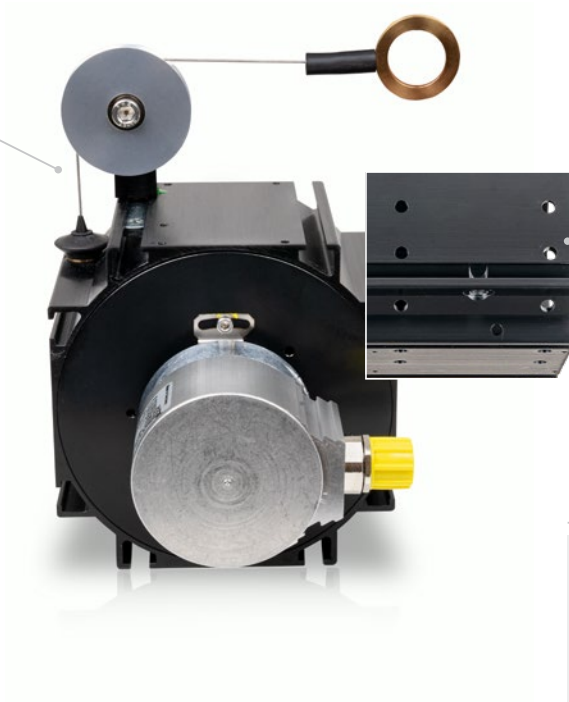


Sensor mounting

- Mounting bracket
- Mounting plate
- Magnetic holder

Wire guide

- Wire wiper
- Different designs of integrated deflection pulleys
- Wire outlet socket from ceramics for increased diagonal pull up to 15°



Housing and environment

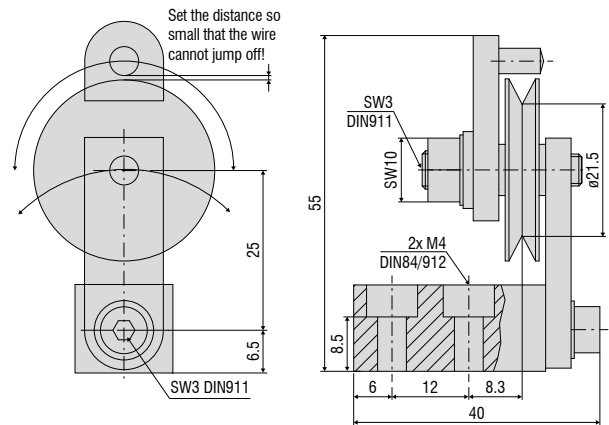
- Wire outlet right (standard) / left
- Protection class up to IP69K
- Drainage holes
- Stainless steel spring
- Housing material
- Wire acceleration
- Snap protection

* Some options cannot be combined with each other;
availability of options on request

Wire deflection pulleys for external installation

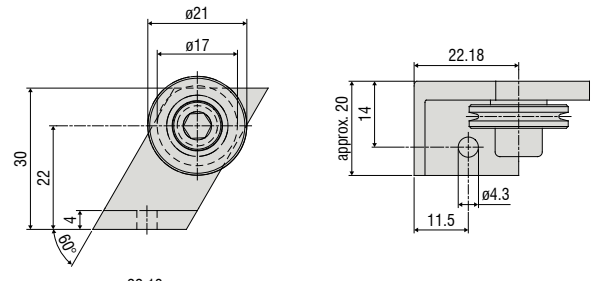
TR1-WDS

Wire deflection pulley, adjustable, for sensors with a wire diameter ≤ 0.45 mm



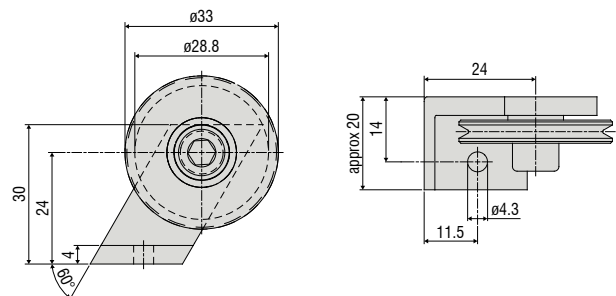
TR3-WDS

Wire deflection pulley, fixed, for sensors with a wire diameter ≤ 0.45 mm



TR4-WDS

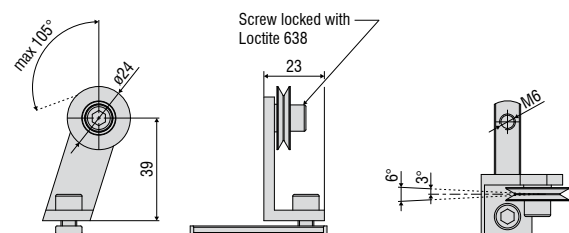
Wire deflection pulley, fixed, for sensors with a wire diameter of 0.8 mm to 1 mm



Wire deflection pulley for direct installation on the sensor housing

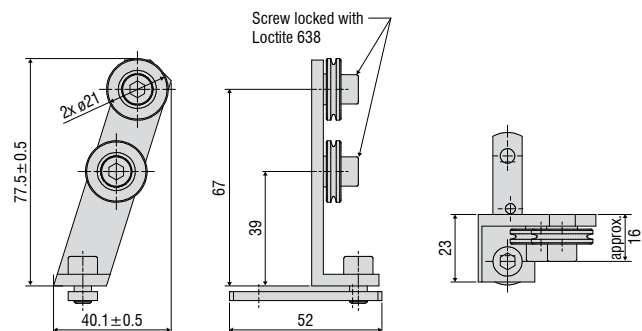
TR5-WDS

Integrated wire deflection pulley for P115 sensors with a wire diameter of 0.45 mm

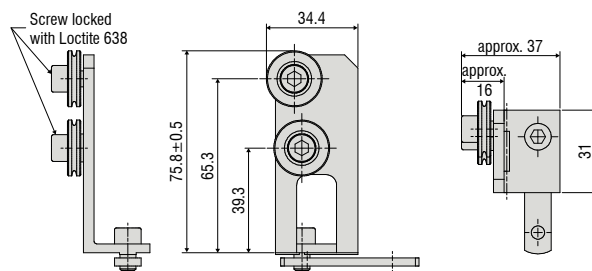


All dimensions in mm, not to scale

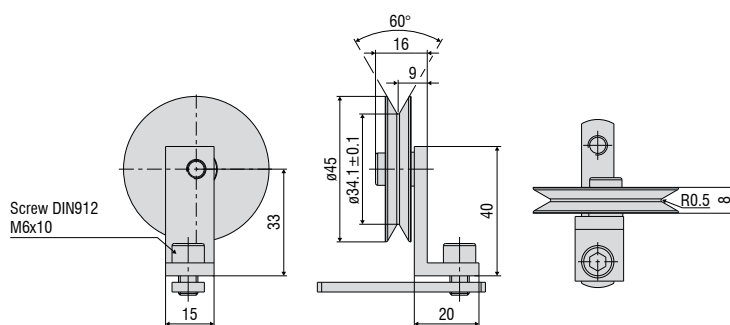
Integrated double deflection pulley for P115 sensors with a wire diameter of 0.45 mm



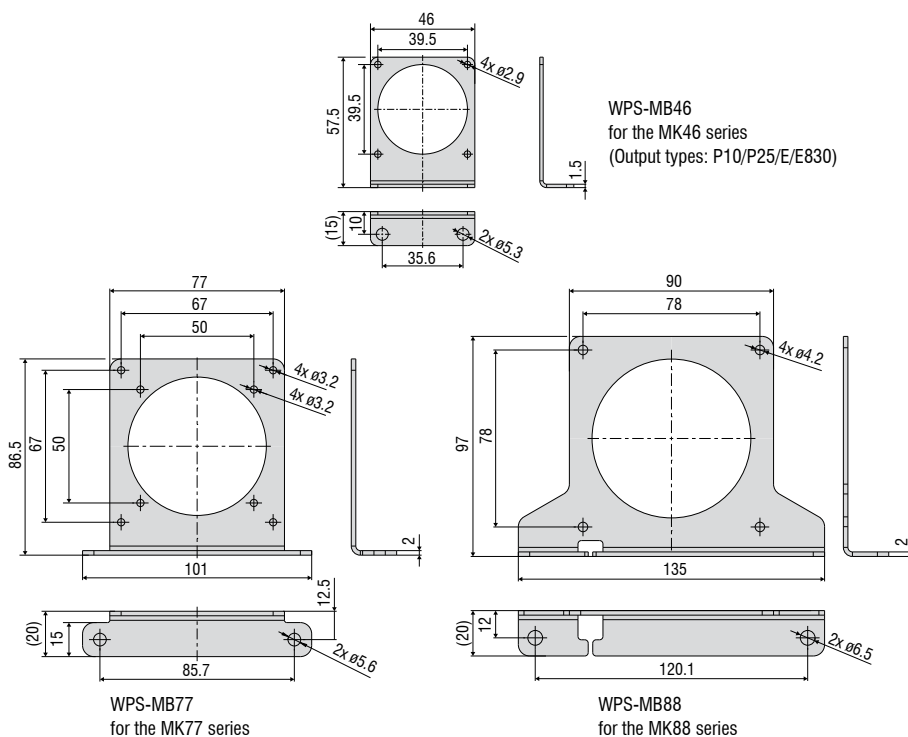
Integrated double deflection pulley, 90° angled, for P115 sensors with a wire diameter of 0.45 mm



Integrated wire deflection pulley for the P115 sensors with a wire diameter of 1 mm



Mounting bracket set

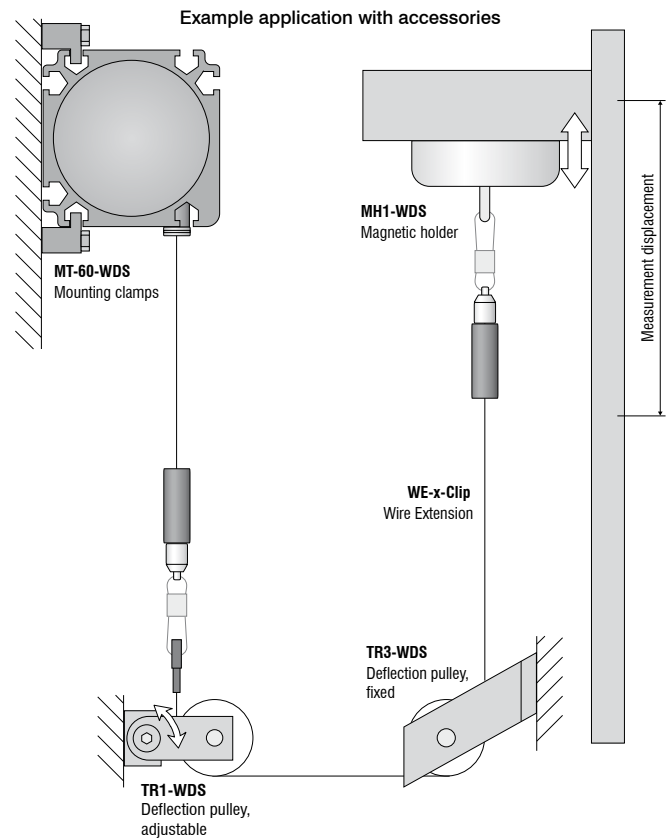


Accessories & Notes for installation

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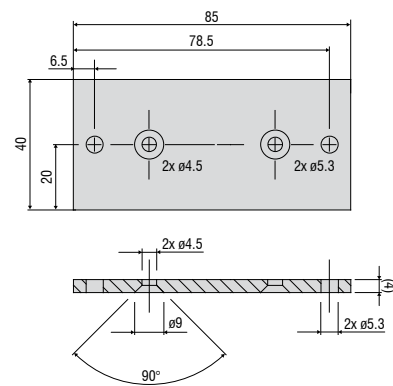
Accessories

| | |
|-----------------|--|
| WE-xxxx-M4 | Wire extension with M4 wire connection, x=wire length |
| WE-xxxx-Clip | Wire extension with eyelet, x = wire length |
| WE-xxx-Clip-WSS | Wire extension with clip and uncoated wire d=0.45 mm |
| WE-xxxx-Ring-PW | Wire extension with plastic ring and para-aramid wire, 1 mm |
| GK1-WDS | Fork head for M4 |
| MH1-WDS | Magnetic holder for wire attachment |
| MH2-WDS | Magnetic holder for sensor mounting |
| MT-60-WDS | Mounting clamps for WDS-P60 |
| FC8 | Mating plug for WDS straight, 8-pin |
| FC8/90 | Mating plug, 90° angled for WDS |
| PC3/8-WDS | Sensor cable, 3 m long, for WDS with 8-pin cable connector |
| WDS-MP60 | Mounting plate for P60 models |
| WPS-MB46 | Mounting bracket set for the MK46 series (output type: P10/P25/E/E830) |
| WPS-MB77 | Mounting bracket set for the MK77 series |
| WPS-MB88 | Mounting bracket set for the MK88 series |
| PC2/10-WDS-A | Cable for SSI encoder, 2 m long |
| PC10/10-WDS-A | Cable for SSI encoder, 10 m long |
| PC5/5-IWT | Sensor cable, 5 m long, M12x1 connector, 5-pin, A-coding |



WDS-MP60

Mounting plate for P60 models

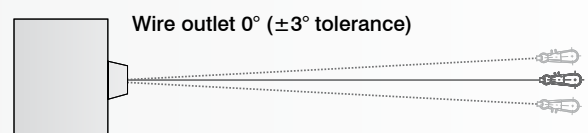


All dimensions in mm, not to scale

Installation instructions:

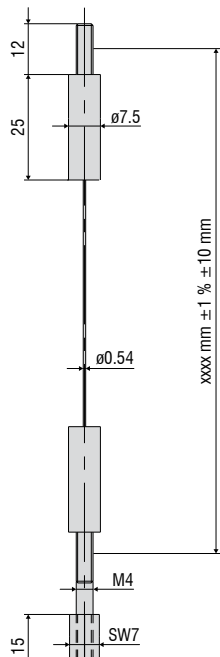
Wire attachment: during installation, do not allow at any time the measuring wire to freely return.

Angle of wire outlet: Make sure during installation that the wire outlet is straight (tolerance of $\pm 3^\circ$). Exceeding this tolerance leads to increased wear of the wire material and on the wire outlet.

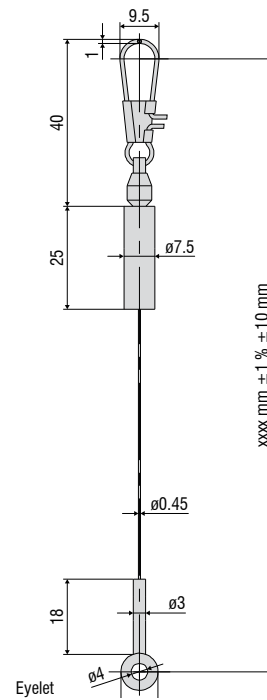


WE-xxxx-M4

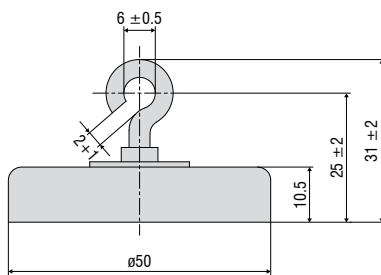
Wire extension with M4 wire connection, x=wire length

**WE-xxxx-Clip**

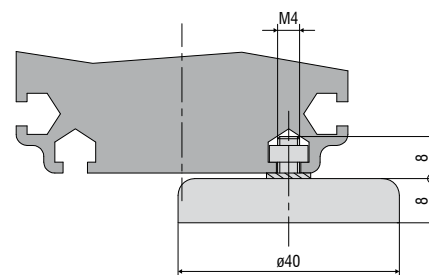
Wire extension with eyelet, x = wire length

**MH1-WDS**

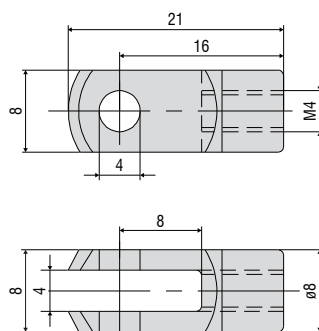
Magnetic holder for wire attachment

**MH2-WDS**

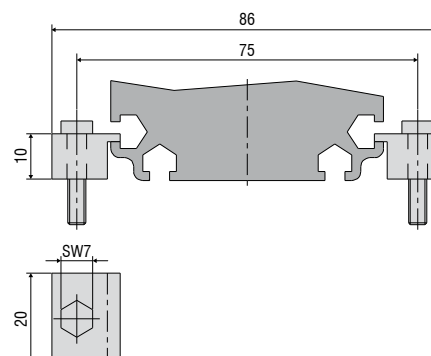
Magnetic holder for sensor mounting

**GK1-WDS**

Fork head for M4

**MT-60-WDS**

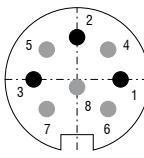
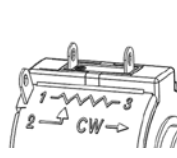
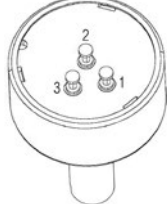
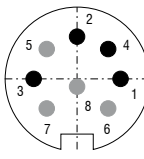
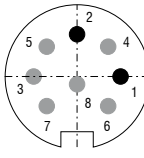
Mounting clamps for WDS-P60



Output specifications

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Analog

| Output | | Connector M16 -SA / -SR | Integrated cable -CA / -CR | Open contacts |
|---|--|---|---|--|
| Potentiometer output (P) | |  <p>Sensor side</p> <p>1 = Input + 2 = Ground 3 = Signal</p> | White = Input + Brown = Ground Green = Signal |   <p>1 = Input + 2 = Signal 3 = Ground</p> |
| Input voltage | max. 32 VDC with 1 kOhm / max. 1 W | | | |
| Resistance | 1 kOhm ± 10 % (resistance divider) | | | |
| Temperature coefficient | ± 0.0025 % FSO/ $^{\circ}$ C | | | |
| Voltage output (U) | |  <p>Sensor side</p> <p>1 = Power supply 2 = Ground 3 = Signal 4 = Ground</p> | White = Supply Brown = Ground Green = Signal Yellow = Ground | |
| Supply voltage | 14 ... 27 VDC (non-stabilized) | | | |
| Current consumption | max. 30 mA | | | |
| Output voltage | 0 ... 10 VDC Option 0 ... 5 / ± 5 V | | | |
| Load resistance | > 5 kOhm | | | |
| Output noise | 0.5 mV _{eff} | | | |
| Temperature coefficient | ± 0.005 % FSO/ $^{\circ}$ C | | | |
| Electromagnetic compatibility (EMC) | EN 61000-6-4 EN 61000-6-2 | | | |
| Adjustment range (if supported by the model) | | | | |
| Zero | ± 20 % FSO | | | |
| Sensitivity | ± 20 % | | | |
| Current output (I) | |  <p>Sensor side</p> <p>1 = Power supply 2 = Ground</p> | White = Supply Brown = Ground | |
| Supply voltage | 14 ... 27 VDC (non-stabilized) | | | |
| Current consumption | max. 35 mA | | | |
| Output current | 4 ... 20 mA | | | |
| Load | < 600 Ohm | | | |
| Output noise | < 1.6 μ A _{eff} | | | |
| Temperature coefficient | ± 0.01 % FSO/ $^{\circ}$ C | | | |
| Electromagnetic compatibility (EMC) | EN 61000-6-4 EN 61000-6-2 | | | |
| Adjustment range (if supported by the model) | | | | |
| Zero | < ± 18 % FSO | | | |
| Sensitivity | ± 15 % | | | |

CANopen

(for the MK88 and K100 series)

| CANopen features | |
|------------------|--|
| Profiles | Communication profile CiA 301. Device profile CiA 406 (absolute linear encoder) |
| SDO | 1x SDO server |
| PDO | 2x TxPDO |
| PDO modes | Event/time-triggered, synchronous (cyclic/acyclic) |
| Preset value | The "Preset" parameter can be used to set the current measured value to any value. The difference from the original value is stored in the object. |
| Direction | Via the operating parameter, the counting direction of the measured values can be reversed |
| Diagnosis | Heartbeat, Emergency Message |
| Default setting | AutoBaud(9), Node-ID 1 |

| Setting the baud rate | |
|---|--------------------|
| Baud rate adjustable via LSS or object 0x3001 | |
| 0 | 1000 kBaud |
| 2 | 500 kBaud |
| 3 | 250 kBaud |
| 4 | 125 kBaud |
| 6 | 50 kBaud |
| 9 | AutoBaud (default) |

| Description of the connections | |
|--------------------------------|----------------|
| Pin | Assignment |
| 1 | n. c. |
| 2 | V+ (7...32VDC) |
| 3 | GND |
| 4 | CAN-High |
| 5 | CAN-Low |



| Setting the subscriber address (node ID) |
|---|
| Address adjustable via LSS or object 0x3000 (1....127, 1 = default) |

Output specifications

wireSENSOR

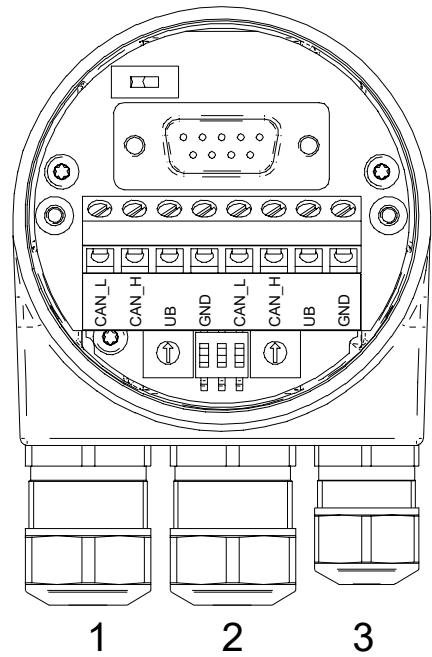
CANopen

(for P60, P96, P115 and P200 series)



| Setting the CANopen baud rate | | | |
|-------------------------------|--------------------|-----|------------------------|
| Baud rate | DIP switch setting | | |
| | 1 | 2 | 3 |
| 10 kBit/s | OFF | OFF | OFF |
| 20 kBit/s | OFF | OFF | ON |
| 50 kBit/s | OFF | ON | OFF |
| 125 kBit/s | OFF | ON | ON |
| 250 kBit/s | ON | OFF | OFF (factory settings) |
| 500 kBit/s | ON | OFF | ON |
| 800 kBit/s | ON | ON | OFF |
| 1 MBit/s | ON | ON | ON |

If Node-ID 00 is set, the baud rate can be programmed via the CAN bus.



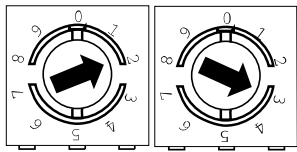
| Description of the CANopen connections | |
|--|--------------------------------|
| GND | Ground connection for UB |
| UB | Operating voltage |
| CAN_H | CAN bus signal (dominant High) |
| CAN_L | CAN bus signal (dominant Low) |

| Max. core cross-section | |
|-------------------------|-----------------------------------|
| Single-wire (rigid) | 1.5 mm ² |
| Fine-wired (flexible) | 1.0 mm ² |
| Fine-wired (flexible) | With ferrule 0.75 mm ² |

| Cable diameter | |
|-----------------|--|
| Cable gland 1,2 | ø8...10 mm (-40...+85 °C) ø5...9 mm (-25...+85 °C) |
| Cable gland 3 | ø4.5...6 mm (-40...+85 °C) ø3...6 mm (-25...+85 °C) |

| Tightening torque | |
|---|--|
| Terminal block/screw terminal max. 0.4 Nm (recommended tightening torque 0.3 Nm) | |

| Settings of the CANopen participant address | |
|--|--|
| Address can be set with rotary switch. Example: Participant address 23 | |

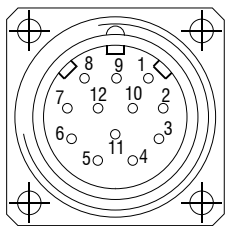


SSI (Gray Code)

| Pin assignment | |
|--|------------|
| Flange socket M23, 12-pin, pin contacts, CW (assignment according to option 3252) | |
| PIN | Assignment |
| 1 | +Vs |
| 2 | 0 V |
| 3 | Clock+ |
| 4 | Data+ |
| 5 | SET |
| 6 | Data- |
| 7 | Clock- |
| 8 | - |
| 9 | DIR |
| 10 | - |
| 11 | - |
| 12 | - |

| Connections | |
|-------------|---|
| SET | Zero setting input For setting a zero point at any point. The zeroing process is triggered by a High pulse and must take place after the rotating direction selection (DIR). Pulse duration > 100 ms. For maximum interference immunity, connect to 0 V after zeroing. |
| DIR | Counting direction input When not connected, this input is on High. DIR High means increasing output data with a clockwise rotating shaft when looking at the flange. DIR Low means increasing values with a counterclockwise rotating shaft when looking at the flange. For maximum interference immunity, connect to +Vs or 0 V depending on the direction of rotation. |

| Switching level | |
|--|---|
| SSI switch | |
| SSI clock | RS422 with terminating resistance 120 Ω |
| SSI data | RS422 |
| Control inputs of input circuit | |
| Input level High | >0.7 UB |
| Input level Low | <0.3 UB |
| Input resistance | 10 kΩ |



Output specifications

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PROFIBUS

| Profibus DP features | |
|------------------------|--|
| Bus protocol | Profibus-DPV0 |
| Device profile | Device class 1 and 2 |
| Cyclical data exchange | Communication in accordance with DPV0 |
| Input data | Position value Additional configurable speed signal |
| Output data | Preset value |
| Preset value | This parameter can be used to set the rotary encoder to a desired position value that corresponds to a defined axis position of the system. The storage is non-volatile. |
| Rotary direction | This parameter can be used to parameterize the direction of rotation in which the position value should rise or fall. |
| Scaling | Parameterization of the steps per rotation and the total resolution. |
| Gear factor | Adjustable via counter / denominator |
| Diagnosis | Position and parameter errors Monitoring multi-turn scanning Readable hour meter |

| Pin assignment | |
|----------------|----------------------------------|
| +Vs | Operating voltage 8...30 VDC |
| 0 V | Ground connection related to +Vs |
| A | Negative data line |
| B | Positive data line |

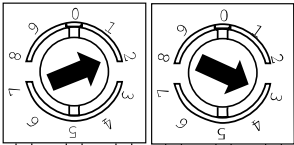
Terminals with the same designation are internally connected and functionally identical. These internal terminal connections Vs-Vs / 0V-0V may be loaded with max. 1 A each.

Terminator

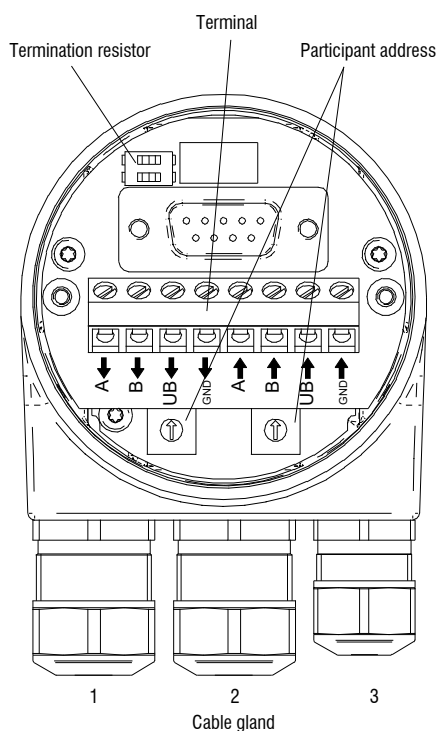


Both ON = last participant
Both OFF = participant X
Default setting OFF

Participant address



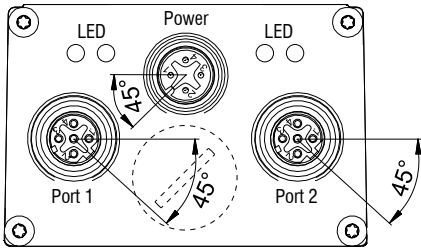
Adjustable via rotary switch
Example: Participant address 23
Default setting: 00





Cable: 1, 2 = ø8 - 10 mm (-40 - 85 °C) / ø5 - 9 mm (-25 - 85 °C)
Cable: 3 = ø4.5 - 6 mm (-40 - 85 °C) / ø3 - 6 mm (-25 - 85 °C)

PROFINET

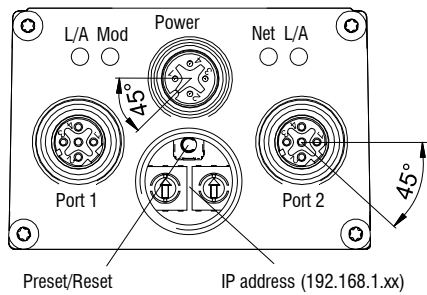
| PROFINET features | |
|------------------------|---|
| Bus protocol | PROFINET IO |
| Device profile | Encoder Profile PNO 3.162 V4.1 and V3.1 PROFIdrive Profil PNO 3.172 V4.1 |
| Real-time classes | Realtime (RT) Class 1, IRT Class 3 |
| Transmission frequency | RT: 1 ms, 2 ms, 4 ms IRT: 250 μ s, 500 μ s, 1 ms, 2 ms, 4 ms |
| Update time | Min. 500 μ s |
| Product features | <ul style="list-style-type: none">- 100 MBaud Fast Ethernet- Device replacement without removable media- Media redundancy protocol MRP- Gear factor / round axis |
| Process data | <ul style="list-style-type: none">- Position value 32-Bit input data with/without rotational speed 16 or 32 Bit- Telegram 81-83 of the PROFIdrive profile |
| LED status display | Link/Activity, Status, Error |



| Pin Assignment | | |
|---|------------|-------------------|
| Operating voltage | | |
| Pin | Connection | Description |
| 1 | UB | Operating voltage |
| 2 | n.c. | Do not connect |
| 3 | GND | Ground connection |
| 4 | n.c. | Do not connect |
|  1x flange connector M12 (pin), A-coded | | |
| PROFINET (data line) | | |
| Pin | Connection | Description |
| 1 | TxD+ | Transmitted data+ |
| 2 | RxD+ | Received data+ |
| 3 | TxD- | Transmitted data- |
| 4 | RxD- | Received data- |
|  2x flange connector M12 (socket), D-coded | | |

EtherNet/IP

| EtherNet/IP characteristics | |
|-----------------------------|--|
| Bus protocol | EtherNet/IP |
| Device profile | CIP Nov 2016, 22 _{hex} Encoder |
| Cycle time | 1 ms |
| Product features | <div>- Gear factor (round axis) and continuous operation</div> <div>- Plausibility test of adjustable parameters</div> <div>- Comprehensive diagnosis function</div> <div>- Address Conflict Detection</div> <div>- Device Level Ring</div> <div>- Several simultaneous IO connections</div> |
| LED status display | 2x Link/Activity, module status, network status |



| Pin Assignment | | |
|-------------------|------------|-------------------|
| Operating voltage | | |
| Pin | Connection | Description |
| 1 | UB | Operating voltage |
| 2 | d.c. | Do not connect |
| 3 | GND | Ground connection |
| 4 | d.c. | Do not connect |

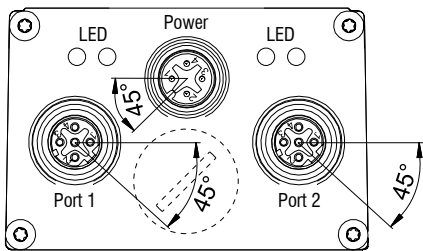
1x flange connector M12 (pin), A-coded



| EtherNet/IP (data line) | | |
| Pin | Connection | Description |
| 1 | TxD+ | Transmitted data+ |
| 2 | RxD+ | Received data+ |
| 3 | TxD- | Transmitted data- |
| 4 | RxD- | Received data- |

2x flange connector M12 (socket), D-coded

EtherCAT

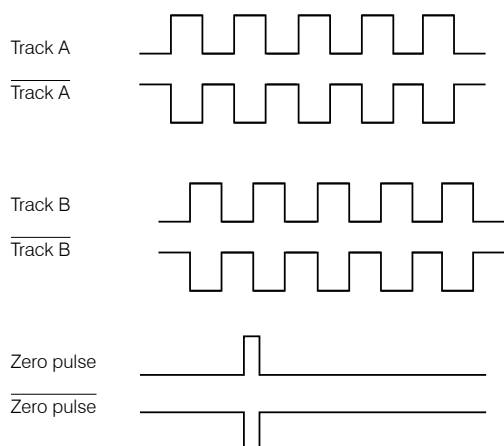
| EtherCAT characteristics | |
|--------------------------|---|
| Bus protocol | EtherCAT |
| Device profile | Encoder profile CANopen® CiA 406 Vers. 4.0.2 dated August 18, 2016 |
| Operating modes | Free Run, synchronous with SM3 Event, DC Mode (Distributed Clocks) |
| Cycle time | Min. 62.5 µs |
| Product features | <ul style="list-style-type: none">- Gear factor (round axis) and continuous operation- Time stamp (time of position data acquisition)- Plausibility check of adjustable parameters- Comprehensive diagnosis function- Preset gauge for position- File Access over EtherCAT (FoE) |
| Process data | <ul style="list-style-type: none">- Position value 32-Bit input data with/without rotational speed 32 Bit- Comprehensive process data mapping |
| LED status display | 2x Link/Activity, RUN, ERR |



| Pin Assignment | | |
|---|------------|-------------------|
| Operating voltage | | |
| Pin | Connection | Description |
| 1 | UB | Operating voltage |
| 2 | n.c. | Do not connect |
| 3 | GND | Ground connection |
| 4 | n.c. | Do not connect |
|  1x flange connector M12 (pin), A-coded | | |
| EtherCAT (data line) | | |
| Pin | Connection | Description |
| 1 | TxD+ | Transmitted data+ |
| 2 | RxD+ | Received data+ |
| 3 | TxD- | Transmitted data- |
| 4 | RxD- | Received data- |
|  2x flange connector M12 (socket), D-coded | | |

Incremental encoder

Output signals



| TTL Output | Line driver (5 VDC) |
|------------|---|
| High level | $\geq 2.5 \text{ V}$ |
| Low level | $\leq 0.5 \text{ V}$ |
| High load | $\leq 20 \text{ mA}$ |
| Tracks | A, $\overline{\text{A}}$, B, $\overline{\text{B}}$, 0 |

| Output TTL01/ TTL02 | NPN (5 VDC $\pm 5 \%$) |
|---------------------|---|
| High level | $> 4.5 \text{ V}$ |
| Low level | $< 1.0 \text{ V}$ |
| High load | $\leq 3 \text{ mA}$ |
| Tracks (TTL01) | A, B, 0 |
| Tracks (TTL02) | A, $\overline{\text{A}}$, B, $\overline{\text{B}}$, 0 |

| Output HTL | Push-pull (10 ... 30 VDC) |
|------------|---|
| High level | $\geq V+ -3 \text{ V}$ |
| Low level | $\leq 1.5 \text{ V}$ |
| High load | $\leq 40 \text{ mA}$ |
| Tracks | A, $\overline{\text{A}}$, B, $\overline{\text{B}}$, 0 |

| Output E | Push-pull (5 VDC) |
|------------|--------------------------|
| High level | $\geq V+ -2.5 \text{ V}$ |
| Low level | $\leq 0.5 \text{ V}$ |
| High load | $\leq 50 \text{ mA}$ |
| Tracks | A, B, 0 |

| Output E830 | Push-pull (8 ... 30 VDC) |
|-------------|--------------------------|
| High level | $\geq V+ -3 \text{ V}$ |
| Low level | $\leq 2.5 \text{ V}$ |
| High load | $\leq 50 \text{ mA}$ |
| Tracks | A, B, 0 |

| Pin assignment TTL, HTL | | |
|-------------------------|-------------|------------|
| Connector | Cable color | Assignment |
| Pin 1 | pink | B- |
| Pin 2 | - | - |
| Pin 3 | blue | R+ |
| Pin 4 | red | R- |
| Pin 5 | green | A+ |
| Pin 6 | yellow | A- |
| Pin 7 | - | - |
| Pin 8 | gray | B+ |
| Pin 9 | - | - |
| Pin 10 | white | GND |
| Pin 11 | - | - |
| Pin 12 | brown | UB |

| Pin assignment E, E830 | |
|------------------------|------------|
| Cable color | Assignment |
| white | 0 V |
| brown | V+ |
| green | A |
| - | \bar{A} |
| yellow | B |
| - | \bar{B} |
| gray | 0 |

| Pin assignment TTL01 | |
|----------------------|------------|
| Cable color | Assignment |
| brown | 0 V |
| gray | V+ |
| white | A |
| green | B |
| yellow | 0 |

| Pin assignment TTL02 | |
|----------------------|------------|
| Cable color | Assignment |
| red | V+ |
| black | 0 V |
| brown | A |
| black | \bar{A} |
| orange | B |
| black | \bar{B} |
| yellow | 0 |
| black | n. c. |

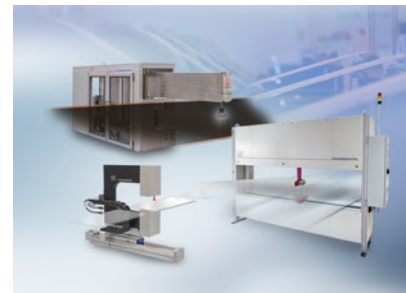
Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



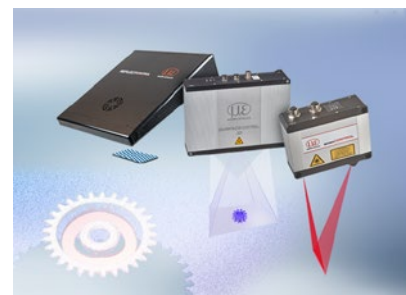
Measuring and inspection systems for metal strips, plastics and rubber



Optical micrometers and fiber optics, measuring and test amplifiers



Color recognition sensors, LED analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection