



# More Precision

**wireSENSOR** // Draw-wire displacement sensors

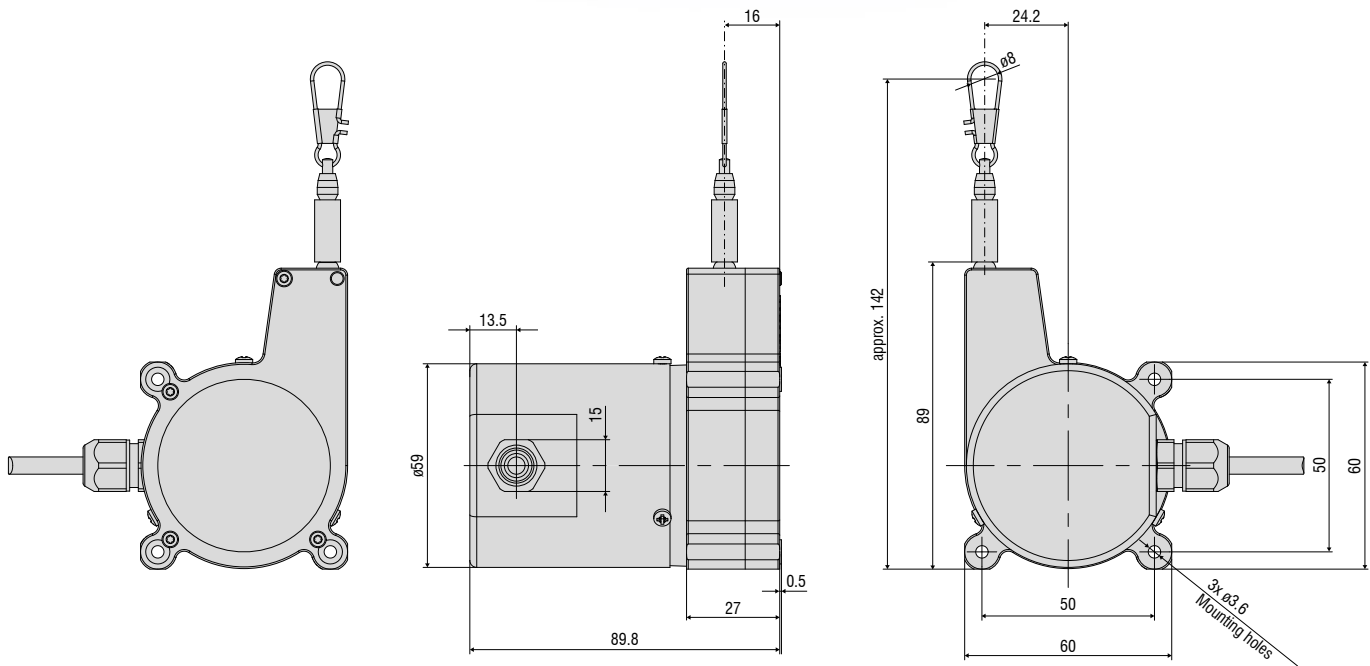


# Low-cost draw-wire sensors wire**SENSOR** MK60 analog

Robust plastic housing

Customer-specific designs

Potentiometer, current or voltage output



All dimensions in mm, not to scale

| Model                           | WPS-1500-MK60  |  |
|---------------------------------|--|--|
| Measuring range                 | 1500 mm  |  |
| Analog output <sup>1)</sup>     | Potentiometer, current, voltage                          |  |
| Resolution                      | Hybrid potentiometer P10                                 | towards infinity                             |
| Linearity                       | Hybrid potentiometer P10    ≤ ±0.15% FSO                 | ≤ ±2.25 mm                                   |
| Sensor element                  | Hybrid potentiometer                                     |  |
| Wire extension force (max.)     | approx. 8 N  |  |
| Wire retraction force (min.)    | approx. 1 N  |  |
| Wire acceleration (max.)        | approx. 5 g  |  |
| Material                        | Housing  | Glass-fiber reinforced plastic (PBT GF20)    |
|                                 | Measuring wire   | Polyamide-coated stainless steel (ø 0.45 mm) |
| Wire mounting                   | Wire clip  |  |
| Mounting                        | Mounting holes   |  |
| 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) | IP65   |  |
| Weight                          | approx. 290 g (incl. cable)                              |  |

FSO = Full Scale Output

<sup>1)</sup> Specifications for analog outputs from page 58 onwards.

### Article designation

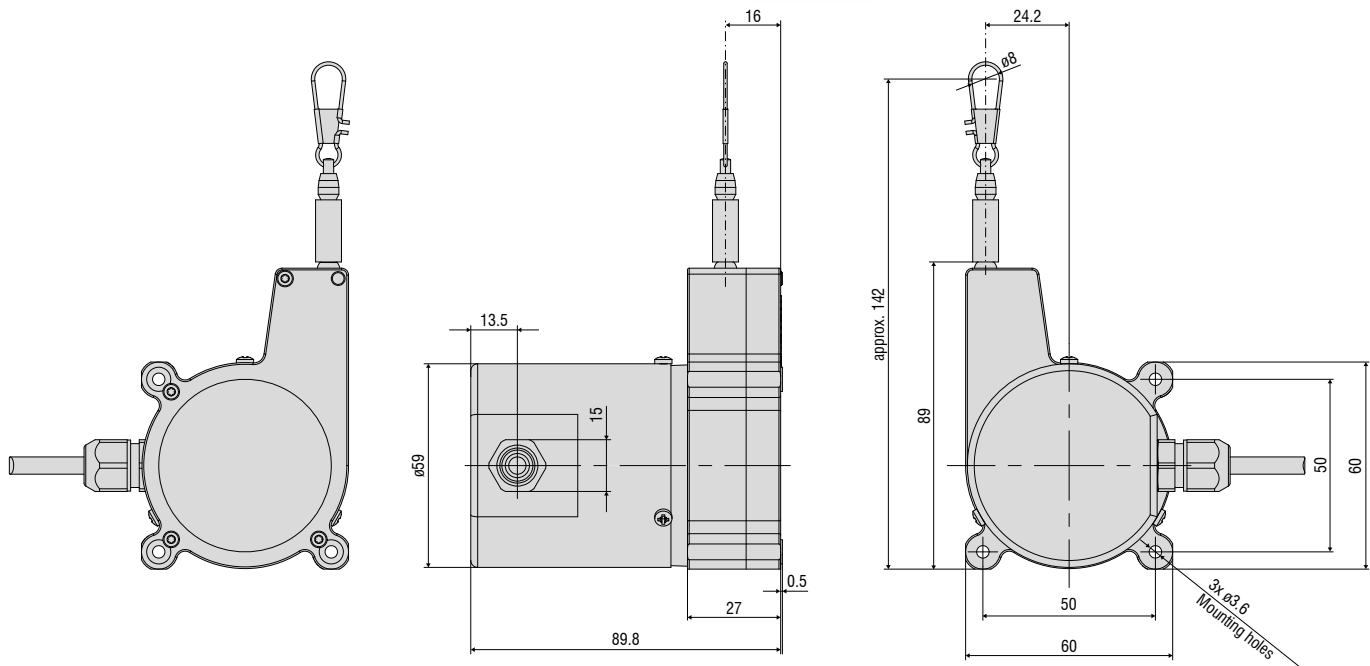
|                       |        |             |  |   |
|-----------------------|--------|-------------|--|---|
| WPS -                 | 1500 - | MK60 -      | CR -   | P   |
|                       |        |             |  | Output:<br>P: potentiometer<br>U: voltage<br>I: current |
|                       |        |             | Connection CR: integrated cable, radial, 1 m |   |
|                       |        | MK60 series |  |   |
| Measuring range in mm |        |             |  |   |

# Low-cost draw-wire sensors **wireSENSOR MK60 digital**

Robust plastic housing

Customer-specific designs

Incremental encoder



All dimensions in mm, not to scale

| Model                           |                       | WPS-2400-MK60   |
|---------------------------------|-----------------------|---|
| Measuring range                 |                       | 2400 mm   |
| Digital output <sup>1)</sup>    |                       | TTL01 (A, B, 0) / TTL02 (A, $\bar{A}$ , B, $\bar{B}$ , 0) |
| Resolution                      |                       | 6.83 pulses/mm  |
|                                 |                       | 0.146 mm  |
| Linearity                       | $\leq \pm 0.05\%$ FSO | $\leq \pm 1.2$ mm   |
| Sensor element                  |                       | Incremental encoder                                       |
| Wire extension force (max.)     |                       | approx. 8 N   |
| Wire retraction force (min.)    |                       | approx. 1 N   |
| Wire acceleration (max.)        |                       | approx. 5 g   |
| Material                        | Housing               | Glass-fiber reinforced plastic (PBT GF20)                 |
|                                 | Measuring wire        | Polyamide-coated stainless steel ( $\varnothing$ 0.45 mm) |
| Wire mounting                   |                       | Wire clip   |
| Mounting                        |                       | Mounting holes  |
| 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) |                       | IP65  |
| Weight                          |                       | approx. 290 g (incl. cable)                               |

FSO = Full Scale Output

<sup>1)</sup> Specifications for digital outputs from page 59 onwards.

#### Article designation

|       |      |        |      |  |
|-------|------|--------|------|--|
| WPS - | 2400 | MK60 - | CR - | TTL01  |
|       |      |        |      | Output:<br>TTL01: A, $\bar{B}$ , 0<br>TTL02: A, $\bar{A}$ , B, $\bar{B}$ , 0 |
|       |      |        |      | Connection CR: integrated cable, radial, 1 m                                 |
|       |      |        |      | MK60 series  |
|       |      |        |      | Measuring range in mm  |

# Options

## wireSENSOR

### 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).

#### Wire attachment

- Wire clip
- Eyelet
- Thread
- Wire extension

#### Measuring wire

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



#### 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



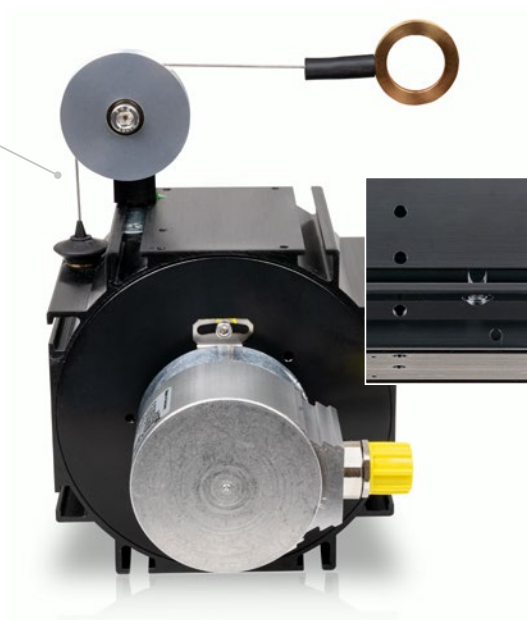


**Sensor mounting**

- 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

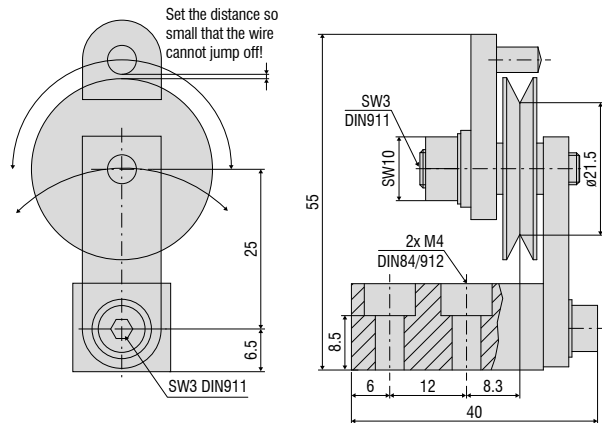
# Accessories

## wireSENSOR

### Wire deflection pulleys for external installation

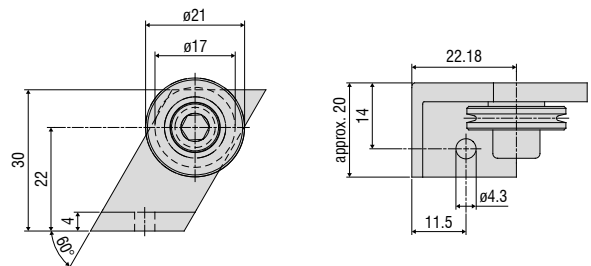
#### TR1-WDS

Wire deflection pulley, adjustable, for sensors with a wire diameter  $\leq 0.45$  mm



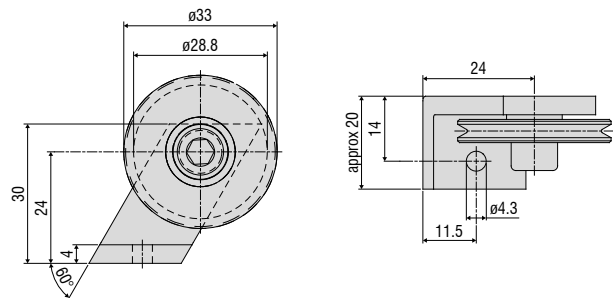
#### TR3-WDS

Wire deflection pulley, fixed, for sensors with a wire diameter  $\leq 0.45$  mm



#### TR4-WDS

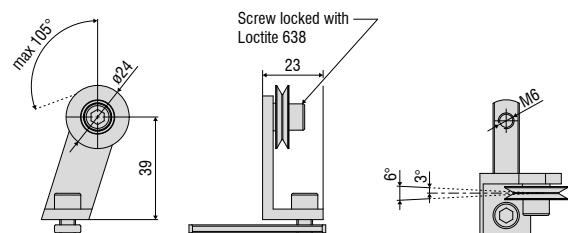
Wire deflection pulley, fixed, for sensors with a wire diameter of 0.8 mm to 1 mm



### 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

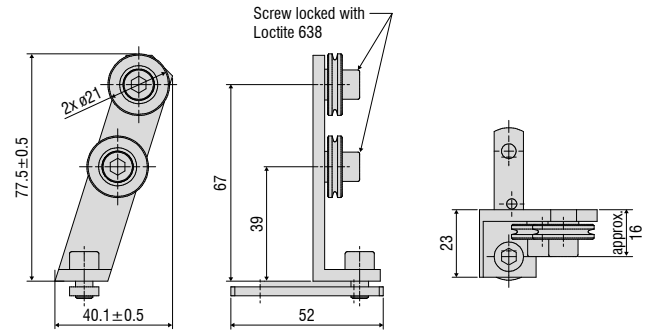


All dimensions in mm, not to scale



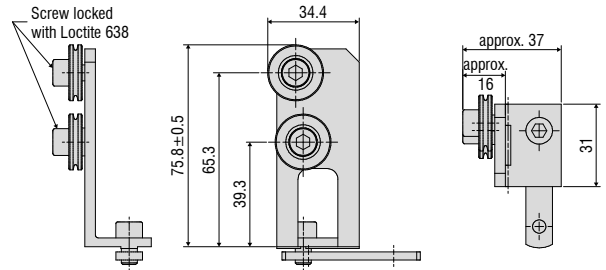
**TR5-WDS(03)**

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



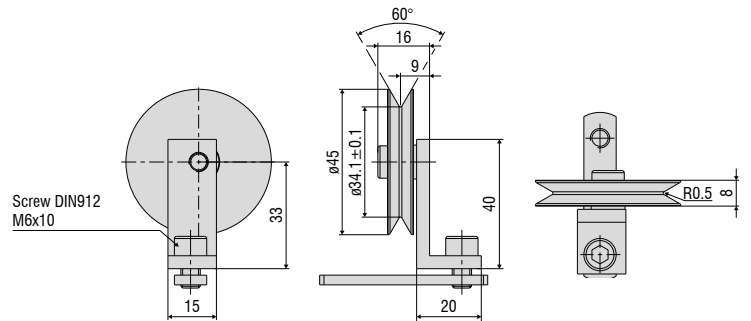
**TR5-WDS(04)**

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

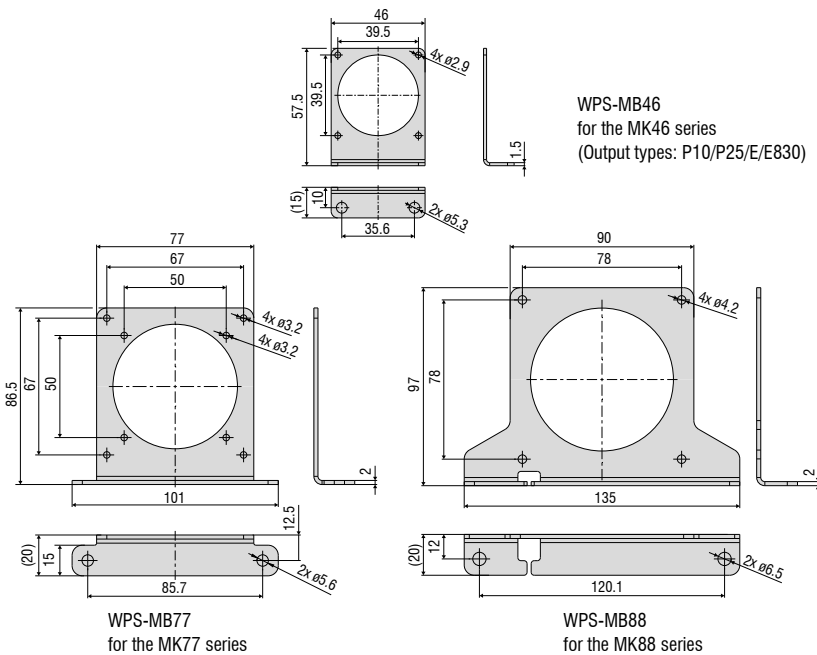


**TR6-WDS(01)**

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



**Mounting bracket set**

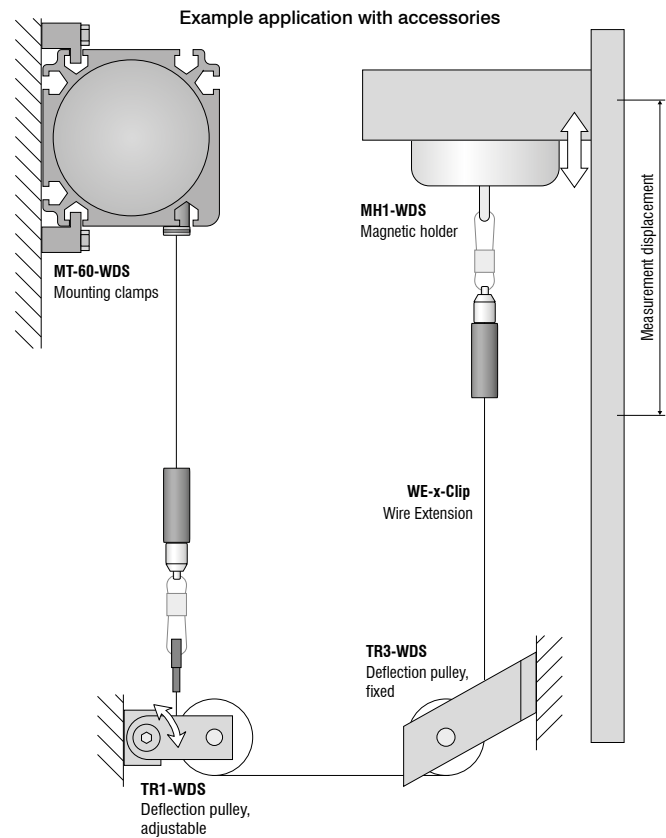


# Accessories & Notes for installation

## wireSENSOR

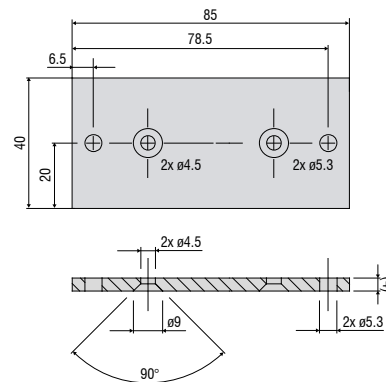
### Accessories

|                 |  |
|-----------------|--|
| WE-xxx-M4       | Wire extension with M4 wire connection, x=wire length                  |
| WE-xxx-Clip     | Wire extension with eyelet, x = wire length                            |
| WE-xxx-Clip-WSS | Wire extension with clip and uncoated wire d=0.45 mm                   |
| WE-xxx-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

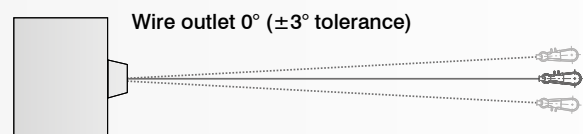
Mounting plate for P60 models



### Installation instructions:

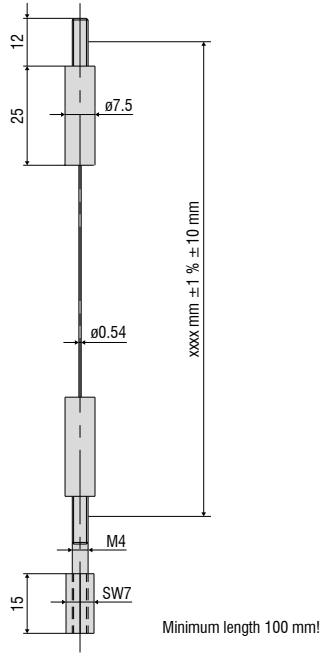
**Wire attachment:** during installation, do not allow at any time the measuring wire to freely return.

**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.



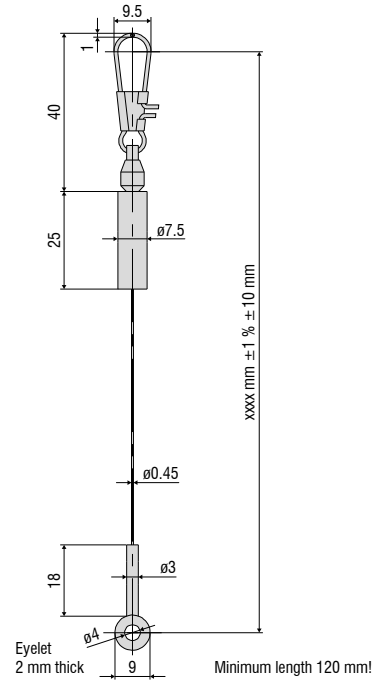
**WE-xxx-M4**

Wire extension with M4 wire connection, x=wire length



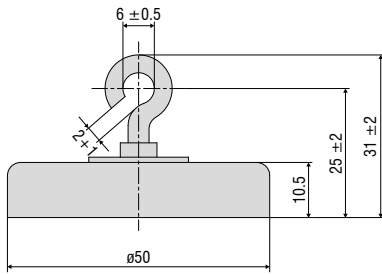
**WE-xxx-Clip**

Wire extension with eyelet, x = wire length



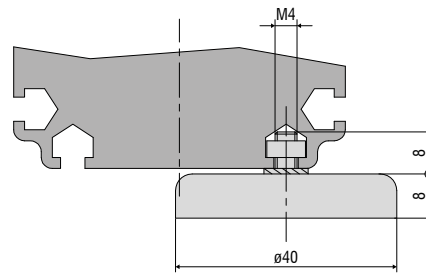
**MH1-WDS**

Magnetic holder for wire attachment



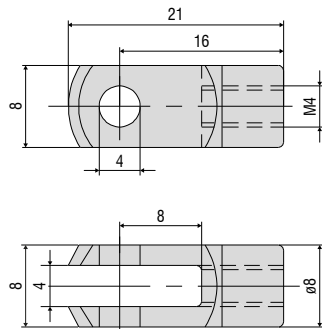
**MH2-WDS**

Magnetic holder for sensor mounting



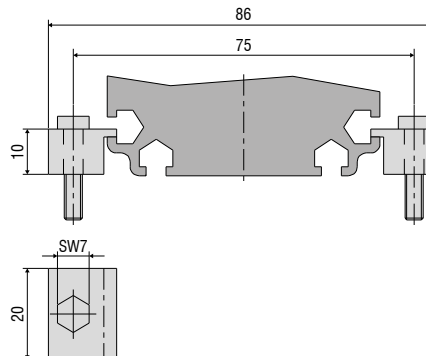
**GK1-WDS**

Fork head for M4



**MT-60-WDS**

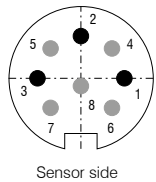
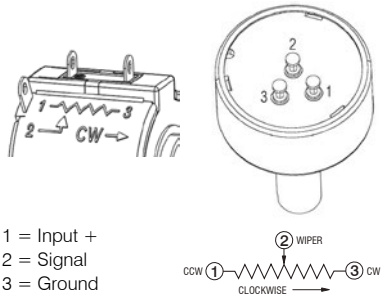
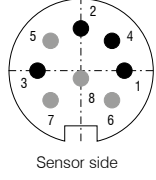
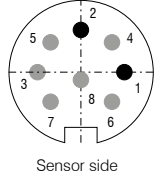
Mounting clamps for WDS-P60



# Output specifications

## wireSENSOR

### Analog

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

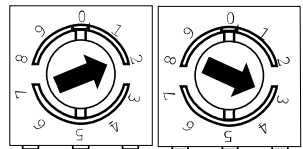
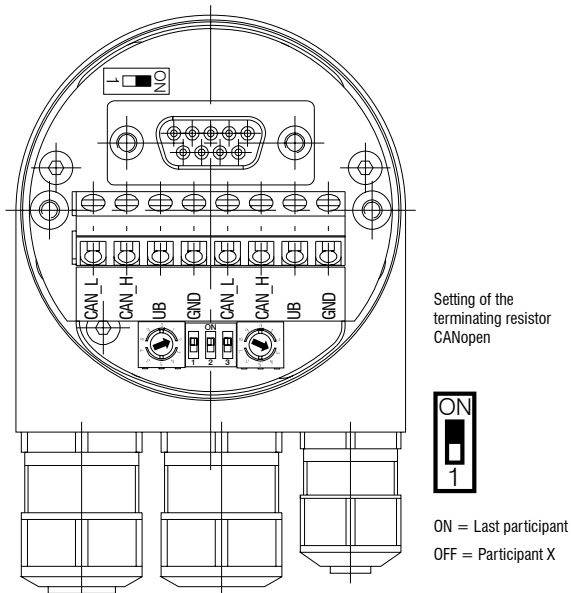
| CANopen features                     |  |
|--------------------------------------|--|
| Bus protocol                         | CANopen  |
| Device profile                       | CANopen - CiA DSP 406, V 3.0   |
| CANopen features                     | Device class 2, CAN 2.0B   |
| Operating modes<br>(with SDO progr.) | <p>Polling mode (asynch, via SDO)</p> <p>Cyclic mode (asynch-cyclic). The encoder cyclically transmits the current actual process value without a request by a master. The cycle time can be parameterized for values between 1 and 65,535 ms.</p> <p>Synch mode (synch-cyclic). The encoder transmits the current actual process value after receiving a synch telegram sent by a master. The synch counter in the encoder can be parameterized such that the position value is transmitted only after a defined number of synch telegrams.</p> <p>Acyclic mode (synch-acyclic)</p> |
| Preset value                         | With the "Preset" parameter the encoder can be set to a desired actual process value that corresponds to the defined axis position of the system. The offset value between the encoder zero point and the mechanical zero point of the system is saved in the encoder.   |
| Rotary direction                     | With the operating parameter the rotary direction in which the output code is to increase or decrease can be parameterized.  |
| Scaling                              | The steps per rotation and the total revolution can be parameterized.  |
| Diagnosis                            | The encoder supports the following error messages:<br>- Position and parameter errors<br>- Lithium cell voltage at lower limit value (multi-turn)  |
| Default setting                      | 50 kbit/s, node number 1   |

| 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 |
| 500 kBit/s                    | ON                 | OFF | ON  |
| 800 kBit/s                    | ON                 | ON  | OFF |
| 1 MBit/s                      | ON                 | ON  | ON  |

| Description of the CANopen connections |                                |
|--|--------------------------------|
| CAN_L                                  | CAN bus signal (dominant Low)  |
| CAN_H                                  | CAN bus signal (dominant High) |
| V+                                     | Supply voltage 10 ... 30 VDC   |
| GND                                    | Ground connection for V+       |

(Terminals with the same designation are internally interconnected)

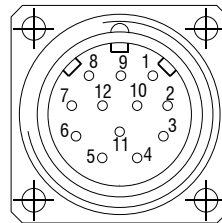
**Settings of the CANopen participant address**  
 Address can be set with rotary switch. Example: Participant address 23



# SSI (Gray Code)

| Connections   |  |
|---|--|
| 1 V+  | Supply connection of rotary encoder  |
| 2 GND   | Ground connection of rotary encoder<br>The voltage drawn to GND is V+  |
| 3 Pulses +  | Positive SSI clock input. Pulse + forms a current loop with Pulse -. A current of approx. 7 mA in direction of Pulse + input generates a logical 1 in positive logic.  |
| 4 data +  | Positive, serial data output of the differential line driver. A high level at the output corresponds to logical 1 in positive logic.   |
| 5 ZERO  | Zero-setting input for setting a zero point at any point within the total resolution.<br>The zeroing process is triggered by a High pulse (pulse duration $\geq 100$ ms) and must take place after the rotating direction selection (F/R). For maximum interference immunity, the input must be connected to GND after zeroing.  |
| 6 Data -  | Negative, serial data output of the differential line driver. A high level at the output corresponds to logical 0 in positive logic.   |
| 7 Pulses -  | Negative SSI clock input. Pulse - forms a current loop with Pulse +. A current of approx. 7 mA in direction of the clock input generates a logical 0 in positive logic.  |
| 8 / 10<br>$\overline{\text{DATAVALID}}$<br>$\overline{\text{DATAVALID}}$ MT | Diagnosis outputs DV and DV MT Jumps in data word, e.g., due to defective LED or photo receiver, are displayed via the DV output. In addition, the power supply of the multi-turn sensor unit is monitored and the DV MT output is set when the voltage falls below a specified level. Both outputs are low-active, i.e. are switched through to GND in the event of an error. |
| 9 F/R   | Forward/reverse counting direction input. When not connected, this input is on High. F/R High means increasing output data with a clockwise rotating shaft when looking at the flange. F/R Low means increasing values with a counterclockwise rotating shaft when looking at the flange.  |
| 11 / 12   | Not assigned   |

| Pin assignment |              |                                  |
|----------------|--------------|----------------------------------|
| Connector      | Cable color  | Assignment                       |
| 1              | brown        | V+                               |
| 2              | black        | GND                              |
| 3              | blue         | Pulse +                          |
| 4              | beige        | Data +                           |
| 5              | green        | ZERO                             |
| 6              | yellow       | Data -                           |
| 7              | purple       | Pulse -                          |
| 8              | brown-yellow | $\overline{\text{DATAVALID}}$    |
| 9              | pink         | F/R                              |
| 10             | black-yellow | $\overline{\text{DATAVALID}}$ MT |
| 11             | -            | -                                |
| 12             | -            | -                                |



Use twisted-pair cables as extension cables.

| Inputs   |  |
|--|--|
| Control signals $\overline{\text{F/R}}$ and zero |  |
| High level                                       | $> 0.7 \text{ V+}$   |
| Low level  | $< 0.3 \text{ V+}$   |
| Circuitry  | $\overline{\text{F/R}}$ input with 10 kOhm against V+,<br>Zero-setting input with 10 kOhm against GND. |
| SSI clock  |  |
| Optocoupler inputs for galvanic isolation        |  |

| Outputs                                |                               |                   |
|--|-------------------------------|-------------------|
| SSI data                               | RS485 driver                  |                   |
| Diagnosis outputs                      |                               |                   |
| Push-pull outputs, short circuit proof |                               |                   |
| High level                             | $> \text{V+} - 3.5 \text{ V}$ | (with I = -20 mA) |
| Low level                              | $\leq 0.5 \text{ V}$          | (with I = 20 mA)  |

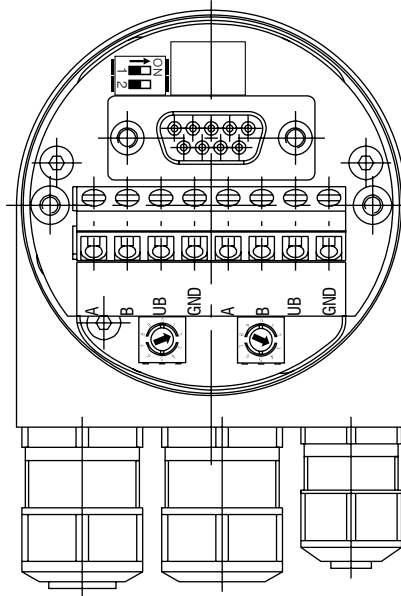
# Output specifications

## wireSENSOR

### PROFIBUS

#### Profibus DP features

|                      |  |
|----------------------|--|
| Bus protocol         | Profibus DP  |
| Profibus features    | Device class 1 and 2   |
| Data Exch. Functions | Input: Position value<br>Additional configurable speed signal (output of the current rotary speed)<br>Output: Preset value   |
| Preset value         | With the "Preset" parameter the encoder can be set to a desired actual value that corresponds to the defined axis position of the system.  |
| Parameter functions  | Rotary direction: With the operating parameter the rotary direction for which the output code is to increase or decrease can be parameterized.<br>Scaling: The steps per rotation and the total revolution can be parameterized. |
| Diagnosis            | The encoder supports the following error messages:<br>- Position error<br>- Lithium cell voltage at lower limit value (multi-turn)   |
| Default setting      | Participant address 00   |



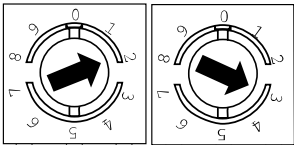
Setting of the terminating resistor Profibus DP



ON = Last participant  
OFF = Participant X

#### Settings of the Profibus participant address

Address can be set with rotary switch. Example: Participant address 23



#### Profibus DP connections

A Negative serial data line

B Positive serial data line

V+ supply voltage 10 ... 30 VDC

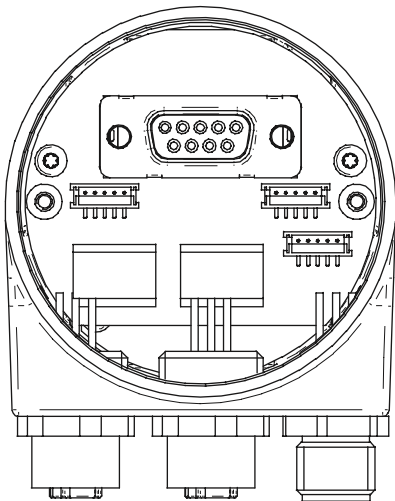
GND ground connection for V+

(Terminals with the same designation are internally interconnected)

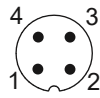


# PROFINET

| PROFINET features |  |
|-------------------|--|
| Bus protocol      | PROFINET   |
| Device profile    | Encoder profile PNO 3.162 Version 4.1  |
| Features          | <ul style="list-style-type: none"> <li>- 100 MBaud Fast Ethernet</li> <li>- Automatic address assignment</li> <li>- Real-time (RT) Class 1, IRT Class 2, IRT Class 3</li> </ul>  |
| Process data      | <ul style="list-style-type: none"> <li>- Position value 32-Bit input data with/without rotational speed 16/32 Bit</li> <li>- Telegram 81-83 of the Profidrive profile</li> </ul> |

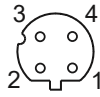


| Pin assignment |            |                   |
|----------------|------------|-------------------|
| Supply voltage |            |                   |
| Connector      | Connection | Description       |
| Pin 1          | V+         | Supply voltage    |
| Pin 2          | N.C.       | Not assigned      |
| Pin 3          | GND        | Ground connection |
| Pin 4          | N.C.       | Not assigned      |



1x M12 connector (pin), A-coded

| PROFINET (data line) |            |                   |
|----------------------|------------|-------------------|
| Connector            | Connection | Description       |
| Pin 1                | TxD+       | Transmitted data+ |
| Pin 2                | RxD+       | Received data+    |
| Pin 3                | TxD-       | Transmitted data- |
| Pin 4                | RxD-       | Received data-    |



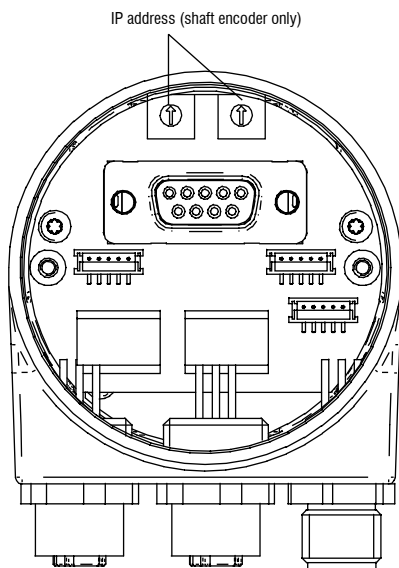
1x M12 connector (pin), A-coded

# Output specifications

## wireSENSOR

### EtherNet/IP

| Characteristics - EtherNet/IP |  |
|-------------------------------|--|
| Bus protocol                  | EtherNet/IP  |
| Device profile                | Encoder Device, Type22hex, according to CIP specification  |
| Features                      | <ul style="list-style-type: none"> <li>- 100 MBaud Fast Ethernet</li> <li>- Programmable IP address</li> <li>- Automatic IP address assignment (DHCP)</li> <li>- Direction of rotation, resolution, total resolution and preset programmable according to CIP specification</li> </ul> |
| Process data                  | Position value, warning flag, alert flag<br>Assembly Instances 1 and 2 according to CIP specification  |



| Pin assignment |            |                   |
|----------------|------------|-------------------|
| Supply voltage |            |                   |
| Connector      | Connection | Description       |
| Pin 1          | UB         | Supply voltage    |
| Pin 2          | N.C.       | Not assigned      |
| Pin 3          | GND        | Ground connection |
| Pin 4          | N.C.       | Not assigned      |



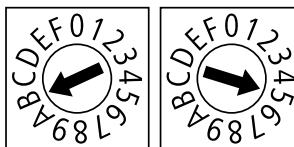
1x M12 connector (pin), A-coded

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



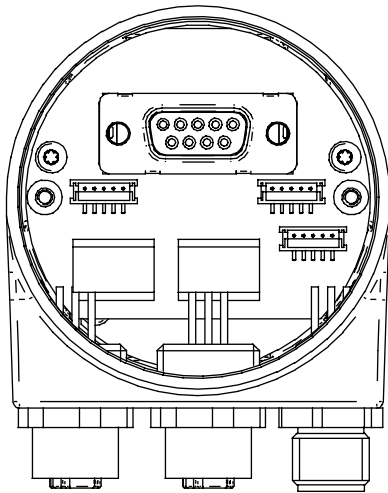
2x M12 connectors (socket), D-coded

| IP address   |
|--|
| Adjustable via HEX rotary switch. Example: IP addressB5 <sub>hex</sub> |
| Configuration via DHCP: 00hex  |



# EtherCAT

| Characteristics - EtherCAT |  |
|----------------------------|--|
| Bus protocol               | EtherCAT   |
| Device profile             | CoE (CANopen over EtherCAT)<br>DSP406  |
| Features                   | <ul style="list-style-type: none"> <li>- 100 MBaud Ethernet</li> <li>- Automatic address assignment</li> <li>- Distributed-Clock for precise synchronization. Device can be configured as „Reference Clock“</li> <li>- Default 10 byte PDO, configurable</li> <li>- 4 byte PDO / 2 byte PDO for shorter cycle times</li> </ul> |
| Process data               | Position value<br>Warnings<br>System time  |
| Cycle times                | Depending on sensor type, activated scaling function and PDO length.<br>Min. cycle time: 62.5 $\mu$ s  |
| Synchronization            | 0x00 Free Run, not synchronized<br>0x03 Distributed clocks DC, synchronized with SYNC0/SYNC1 event   |



## Pin assignment

| Supply voltage |            |                   |
|----------------|------------|-------------------|
| Connector      | Connection | Description       |
| Pin 1          | UB         | Supply voltage    |
| Pin 2          | N.C.       | Not assigned      |
| Pin 3          | GND        | Ground connection |
| Pin 4          | N.C.       | Not assigned      |



1x M12 connector (pin), A-coded

| EtherCAT (data line) |            |                   |
|----------------------|------------|-------------------|
| Connector            | Connection | Description       |
| Pin 1                | TxD+       | Transmitted data+ |
| Pin 2                | RxD+       | Received data+    |
| Pin 3                | TxD-       | Transmitted data- |
| Pin 4                | RxD-       | Received data-    |



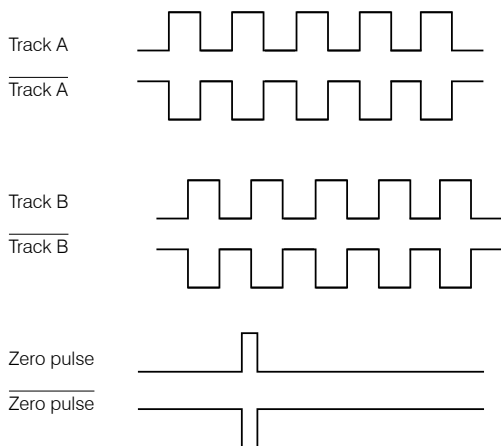
2x M12 connectors (socket), D-coded

# Output specifications

## wireSENSOR

### Incremental encoder

#### Output signals



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

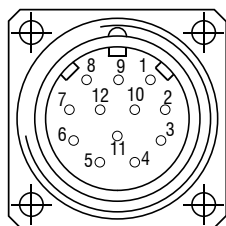
| Output TTL01/ TTL02 | NPN (5 VDC $\pm 5 \%$ )         |  |
|---------------------|---------------------------------|--|
| High level          | $> 4.5 \text{ V}$               |  |
| Low level           | $< 1.0 \text{ V}$               |  |
| High load           | $\leq 3 \text{ mA}$             |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

| Output HTL | Push-pull (10 ... 30 VDC)       |                              |
|------------|---------------------------------|------------------------------|
| High level | $\geq V+ -3 \text{ V}$          | (with $I = -20 \text{ mA}$ ) |
| Low level  | $\leq 1.5 \text{ V}$            | (with $I = 20 \text{ mA}$ )  |
| High load  | $\leq 40 \text{ mA}$            |                              |
| Tracks     | A, $\bar{A}$ , B, $\bar{B}$ , 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        | Track B inv.                   |
| Pin 2                   | blue        | V+ Sense                       |
| Pin 3                   | red         | Track N (zero pulse)           |
| Pin 4                   | black       | Track N inv. (zero pulse inv.) |
| Pin 5                   | brown       | Track A                        |
| Pin 6                   | green       | Track inv.                     |
| Pin 7                   | -           | -                              |
| Pin 8                   | gray        | Track B                        |
| Pin 9                   | -           | -                              |
| Pin 10                  | white-green | GND                            |
| Pin 11                  | white       | GND Sense                      |
| Pin 12                  | brown-green | V+                             |



V+ Sense and GND Sense are directly connected to V+ or GND. Recommendation: Use twisted-pair cables (e.g. A/A inv.) from a cable length of 10 m.

| 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



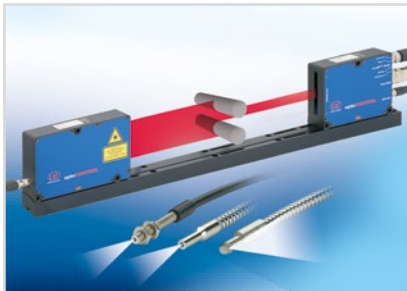
Sensors and systems for displacement, distance and position



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