



# More Precision

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



# Low-cost draw-wire sensors wire**SENSOR** MK120 analog

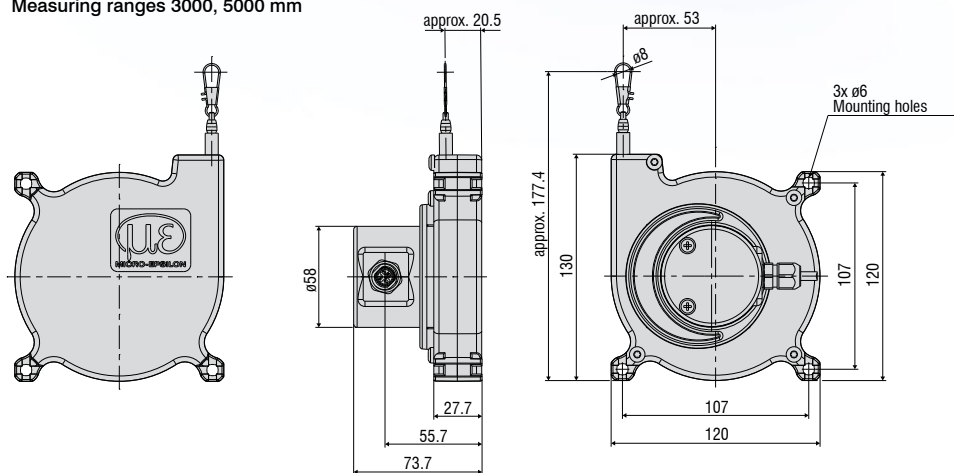
Robust plastic housing

Customer-specific designs

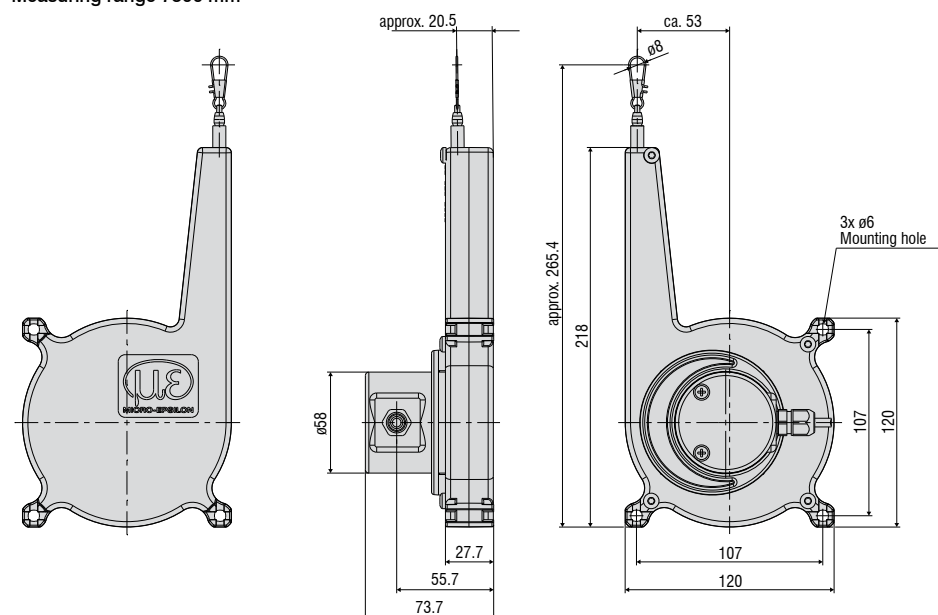
Potentiometer, current or voltage output



Measuring ranges 3000, 5000 mm



Measuring range 7500 mm



All dimensions in mm, not to scale

| Model                           |                | WPS-3000-MK120                                           | WPS-5000-MK120   | WPS-7500-MK120 |
|---------------------------------|----------------|----------------------------------------------------------|------------------|----------------|
| Measuring range                 |                | 3000 mm                                                  | 5000 mm          | 7500 mm        |
| Analog output <sup>1)</sup>     |                | Potentiometer, current, voltage                          |                  |                |
| Resolution                      |                | Hybrid potentiometer P10                                 | towards infinity |                |
| Linearity                       |                | Hybrid potentiometer P10 ≤ ±0.15% FSO                    | ≤ ±4.5 mm        | ≤ ±7.5 mm      |
| Sensor element                  |                | Hybrid potentiometer                                     |                  |                |
| Wire extension force (max.)     |                | approx. 10 N                                             |                  |                |
| Wire retraction force (min.)    |                | approx. 4 N                                              |                  |                |
| Wire acceleration (max.)        |                | approx. 6 g                                              |                  |                |
| Material                        | Housing        | Plastics (PA 6)                                          |                  |                |
|                                 | Measuring wire | Polyamide-coated stainless steel (ø 0.45 mm)             |                  |                |
| Wire mounting                   |                | Wire clip                                                |                  |                |
| 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)       |                | 40 g / 6 ms in 3 axes, 2 directions and 3000 shocks each |                  |                |
| Vibration (DIN EN 60068-2-6)    |                | 3 g / 10 ... 5000 Hz in 3 axes and 10 cycles each        |                  |                |
| Protection class (DIN EN 60529) |                | IP65                                                     |                  |                |
| Weight                          |                | approx. 850 g (incl. cable)                              |                  |                |

FSO = Full Scale Output

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

## Article designation

|                       |        |              |                                              |                                                    |
|-----------------------|--------|--------------|----------------------------------------------|----------------------------------------------------|
| WPS -                 | 3000 - | MK120 -      | CR -                                         | P                                                  |
|                       |        |              |                                              | Output:<br>P: potentiometer, U: voltage, I current |
|                       |        |              | Connection CR: integrated cable, radial, 1 m |                                                    |
|                       |        | MK120 series |                                              |                                                    |
| Measuring range in mm |        |              |                                              |                                                    |

## Options

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#### Customer-specific modifications for your series application

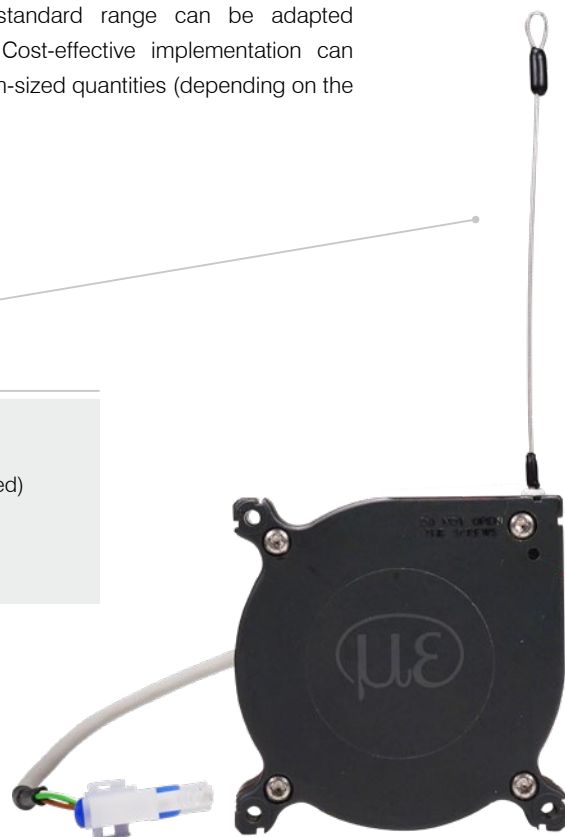
If the standard models do not meet certain specific requirements, draw-wire sensors from the standard range can be adapted accordingly by Micro-Epsilon. Cost-effective implementation can already be achieved with medium-sized quantities (depending on the type and number of changes).

#### 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



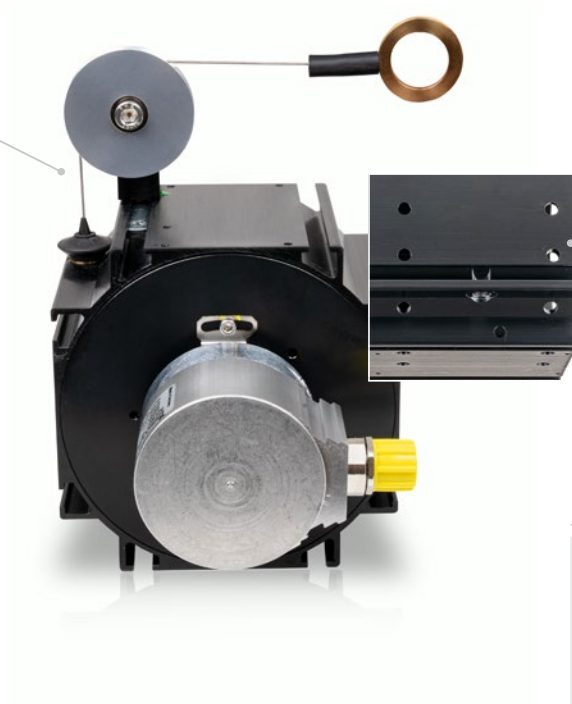


#### Sensor mounting

- 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

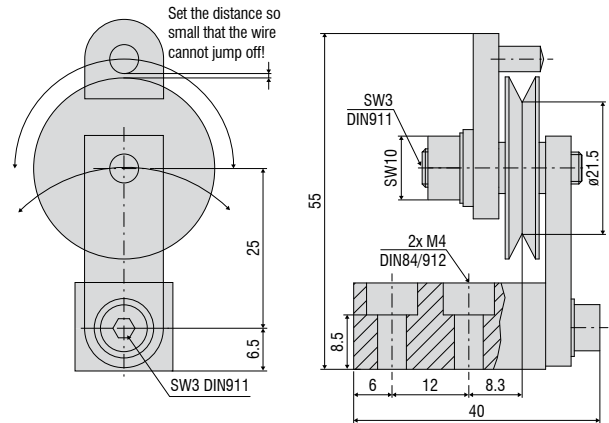
# Accessories

## wireSENSOR

### Wire deflection pulleys for external installation

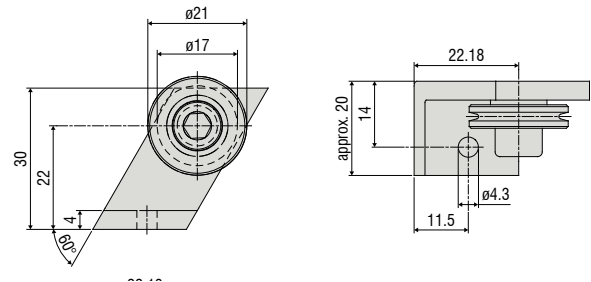
#### TR1-WDS

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



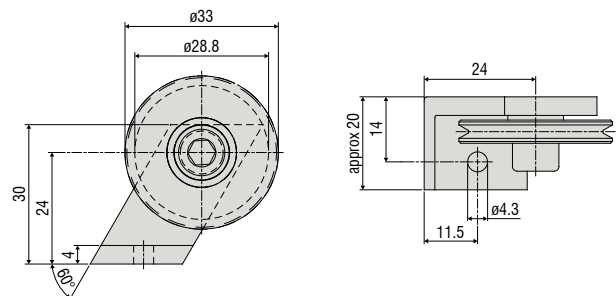
#### TR3-WDS

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



#### TR4-WDS

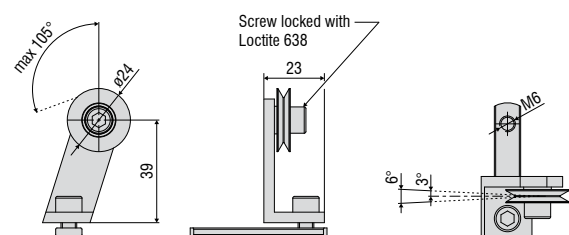
Wire deflection pulley, fixed, for sensors with a wire diameter of 0.8 mm to 1 mm



### Wire deflection pulley for direct installation on the sensor housing

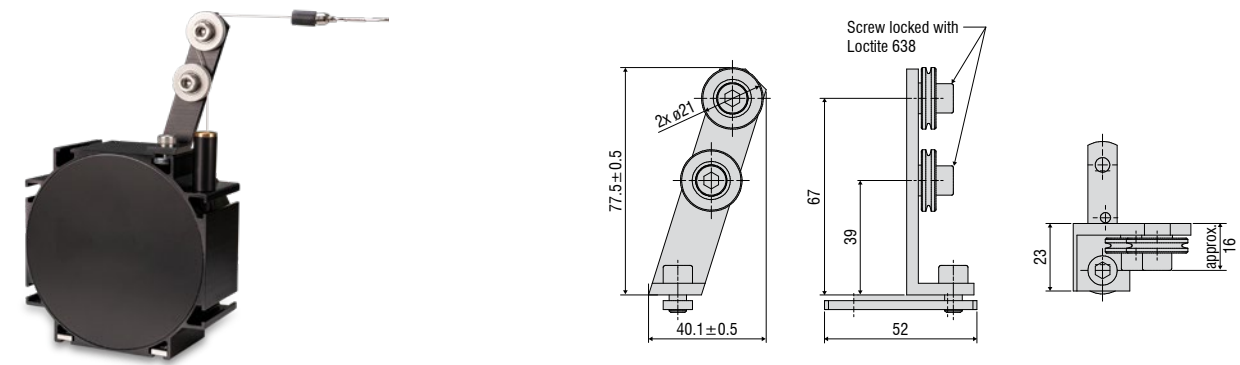
#### TR5-WDS

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

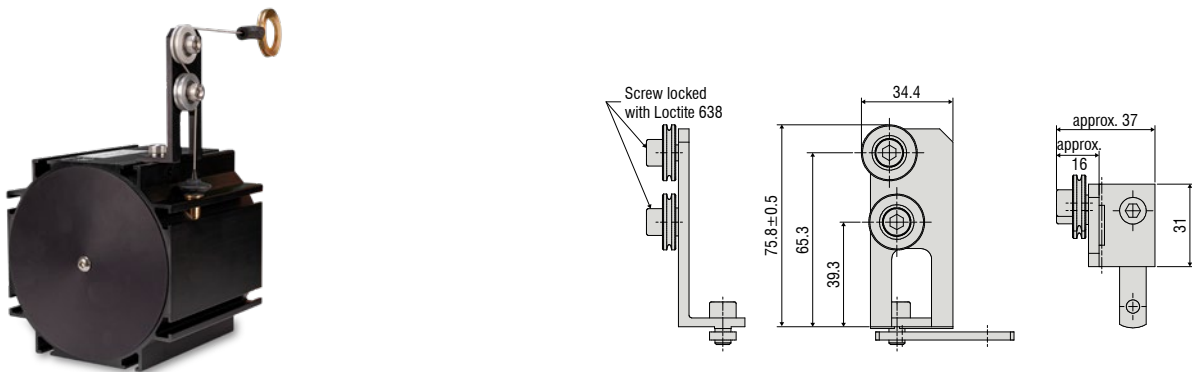


All dimensions in mm, not to scale

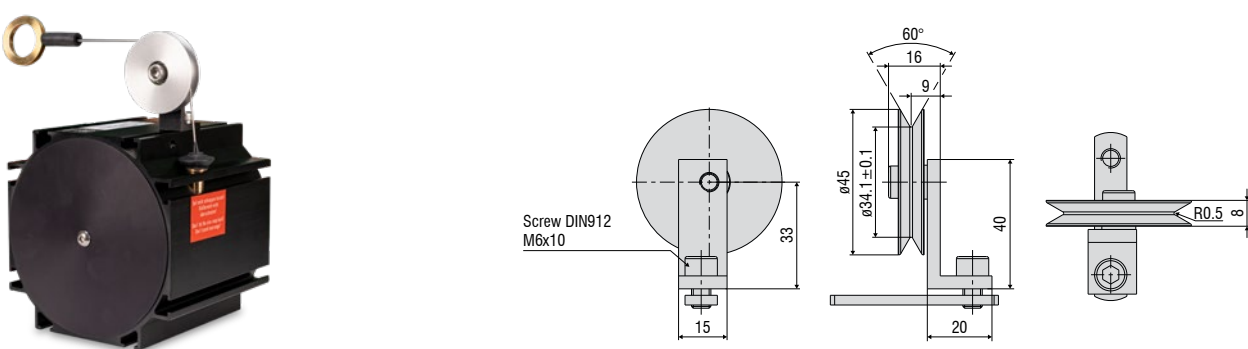
**TR5-WDS(03)**  
 Integrated double deflection pulley for P115 sensors with a wire diameter of 0.45 mm



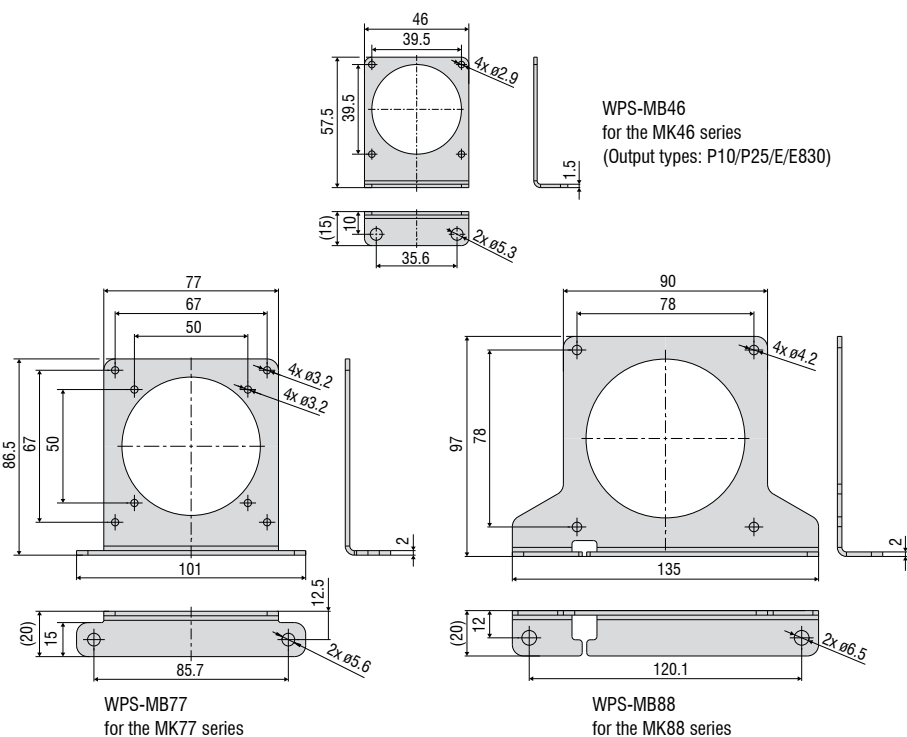
**TR5-WDS(04)**  
 Integrated double deflection pulley, 90° angled, for P115 sensors with a wire diameter of 0.45 mm



**TR6-WDS(01)**  
 Integrated wire deflection pulley for the P115 sensors with a wire diameter of 1 mm



Mounting bracket set

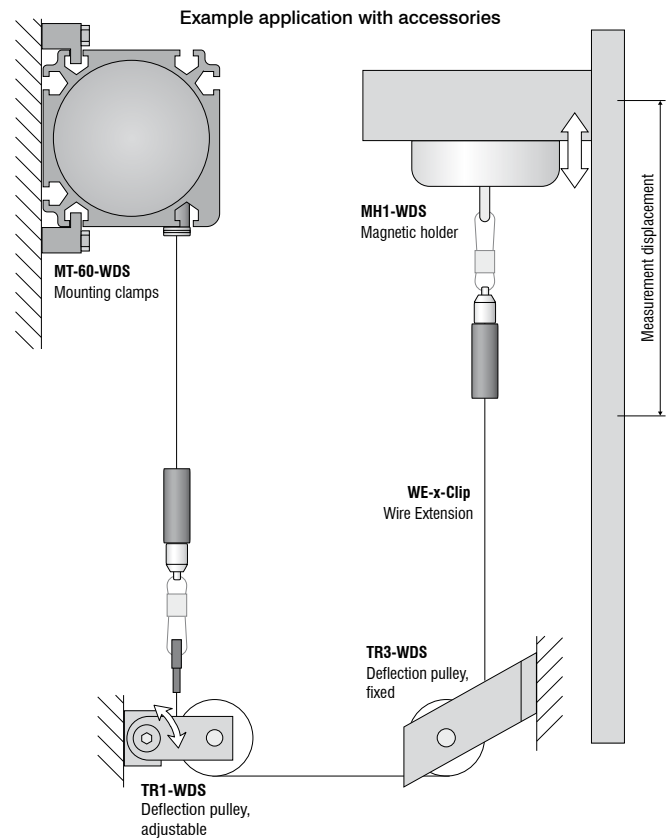


# Accessories & Notes for installation

## wireSENSOR

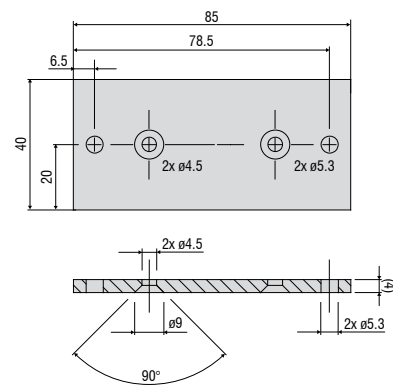
### Accessories

|                 |                                                                        |
|-----------------|------------------------------------------------------------------------|
| WE-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

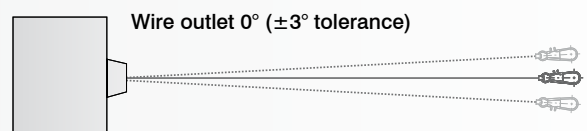


All dimensions in mm, not to scale

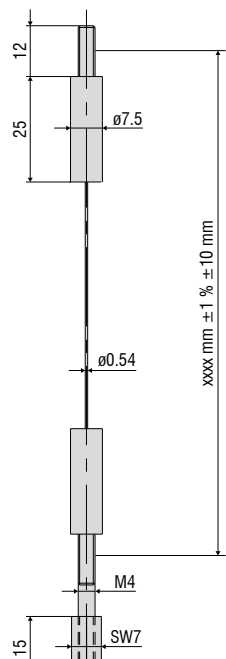
### Installation instructions:

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

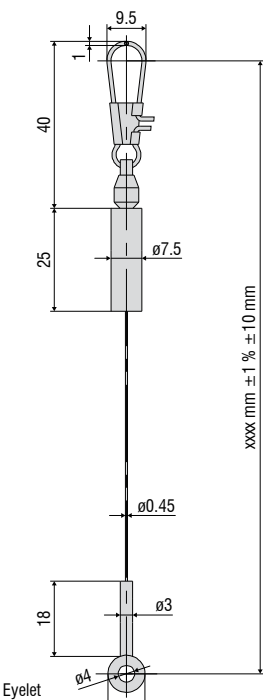
Angle of wire outlet: Make sure during installation that the wire outlet is straight (tolerance of  $\pm 3^\circ$ ). Exceeding this tolerance leads to increased wear of the wire material and on the wire outlet.



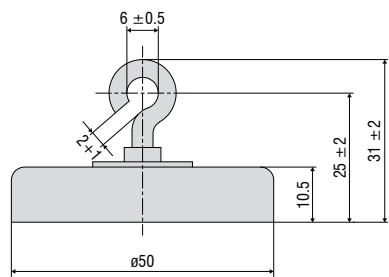
**WE-xxxx-M4**  
Wire extension with M4 wire connection, x=wire length



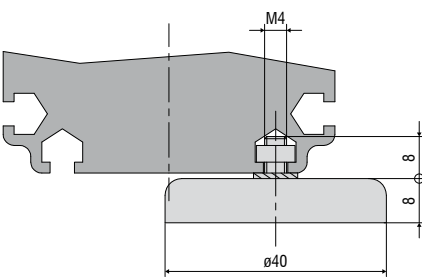
**WE-xxxx-Clip**  
Wire extension with eyelet, x = wire length



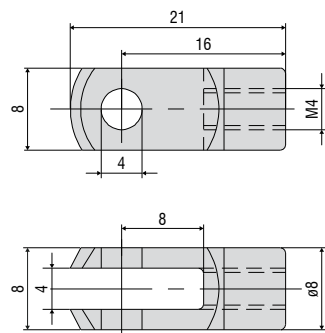
**MH1-WDS**  
Magnetic holder for wire attachment



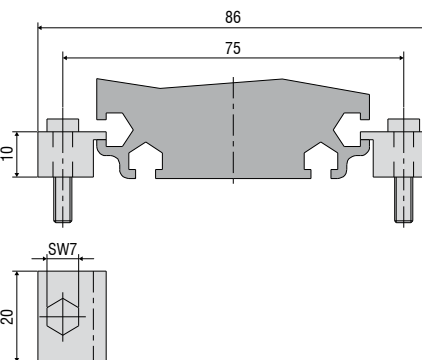
**MH2-WDS**  
Magnetic holder for sensor mounting



**GK1-WDS**  
Fork head for M4



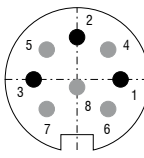
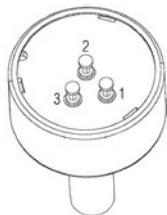
**MT-60-WDS**  
Mounting clamps for WDS-P60

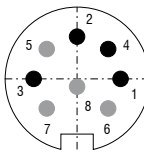


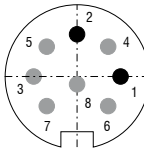
# Output specifications

## wireSENSOR

### Analog

| Output                   |                                    | Connector M16<br>-SA / -SR                                                                       | Integrated cable<br>-CA / -CR                       | Open contacts                                                                                                                                                                                                         |
|--------------------------|------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potentiometer output (P) |                                    | <br>Sensor side |                                                     | <br><br>1 = Input +<br>2 = Ground<br>3 = Signal |
| Input voltage            | max. 32 VDC with 1 kOhm / max. 1 W |                                                                                                  |                                                     |                                                                                                                                                                                                                       |
| Resistance               | 1 kOhm ± 10 % (resistance divider) |                                                                                                  |                                                     |                                                                                                                                                                                                                       |
| Temperature coefficient  | ±0.0025 % FSO/°C                   |                                                                                                  |                                                     |                                                                                                                                                                                                                       |
|                          |                                    | 1 = Input +<br>2 = Ground<br>3 = Signal                                                          | White = Input +<br>Brown = Ground<br>Green = Signal | 1 = Input +<br>2 = Signal<br>3 = Ground                                                                                                                                                                               |

|                                              |                                       |                                                                                                    |                                                                       |  |
|----------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|--|
| Voltage output (U)                           |                                       | <br>Sensor side |                                                                       |  |
| 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          |                                                                                                    |                                                                       |  |
| Adjustment range (if supported by the model) |                                       |                                                                                                    |                                                                       |  |
| Zero                                         | ± 20 % FSO                            | 1 = Power supply<br>2 = Ground<br>3 = Signal<br>4 = Ground                                         | White = Supply<br>Brown = Ground<br>Green = Signal<br>Yellow = Ground |  |
| Sensitivity                                  | ± 20 %                                |                                                                                                    |                                                                       |  |

|                                              |                                |                                                                                                    |                                  |  |
|----------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------|--|
| Current output (I)                           |                                | <br>Sensor side |                                  |  |
| 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   |                                                                                                    |                                  |  |
| Adjustment range (if supported by the model) |                                |                                                                                                    |                                  |  |
| Zero                                         | < ±18 % FSO                    | 1 = Power supply<br>2 = Ground                                                                     | White = Supply<br>Brown = Ground |  |
| 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

wire**SENSOR**

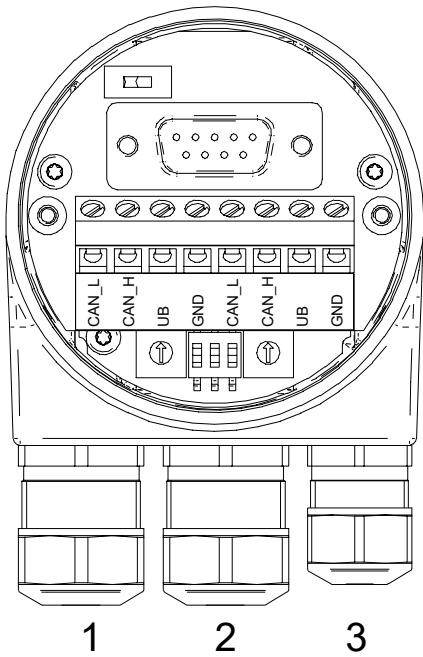
CANopen

(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.



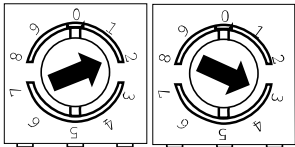
| Description of the CANopen connections |                                |
|----------------------------------------|--------------------------------|
| GND                                    | Ground connection for UB       |
| UB                                     | Operating voltage              |
| 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 mm2               |
| Fine-wired (flexible)   | With ferrule 0.75 mm2 |

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

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

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

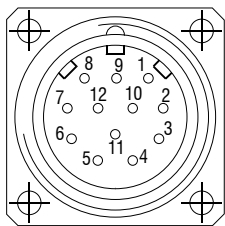


# SSI (Gray Code)

| Pin assignment                                                                       |            |
|--------------------------------------------------------------------------------------|------------|
| Flange socket M23, 12-pin, pin contacts, CW<br>(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         | <b>Zero setting input</b><br>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).<br>Pulse duration > 100 ms.<br>For maximum interference immunity, connect to 0 V after zeroing.                                                                                                    |
| DIR         | <b>Counting direction input</b><br>When not connected, this input is on High. DIR High means increasing output data with a clockwise rotating shaft when looking at the flange.<br>DIR Low means increasing values with a counterclockwise rotating shaft when looking at the flange.<br>For maximum interference immunity, connect to +Vs or 0 V depending on the direction of rotation. |

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



# Output specifications

wire**SENSOR**

## 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<br>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<br>Monitoring multi-turn scanning<br>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               |

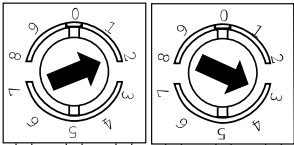
Terminals with the same designation are internally connected and functionally identical. These internal terminal connections Vs-Vs / 0V-0V may be loaded with max. 1 A each.

### Terminator

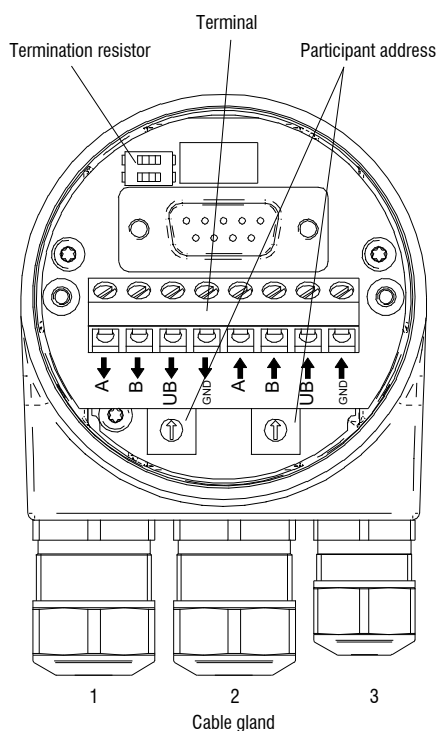


Both ON = last participant  
Both OFF = participant X  
Default setting OFF

### Participant address



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

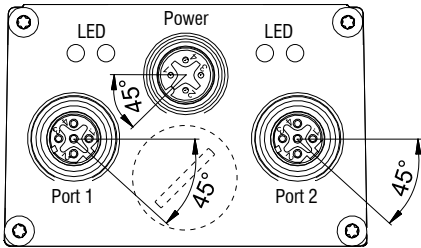


Cable: 1, 2 = ø8 - 10 mm (-40 - 85 °C) / ø5 - 9 mm (-25 - 85 °C)

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<br>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<br>IRT: 250 $\mu$ s, 500 $\mu$ s, 1 ms, 2 ms, 4 ms                                                                                                                                   |
| Update time            | Min. 500 $\mu$ s                                                                                                                                                                                          |
| Product features       | <ul style="list-style-type: none"><li>- 100 MBaud Fast Ethernet</li><li>- Device replacement without removable media</li><li>- Media redundancy protocol MRP</li><li>- Gear factor / round axis</li></ul> |
| Process data           | <ul style="list-style-type: none"><li>- Position value 32-Bit input data with/without rotational speed 16 or 32 Bit</li><li>- Telegram 81-83 of the PROFIdrive profile</li></ul>                          |
| 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

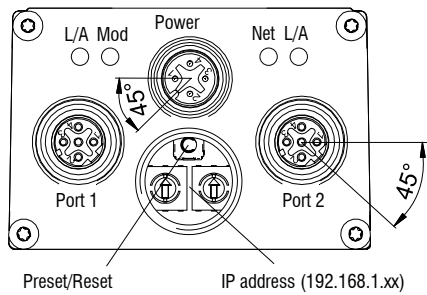
| PROFINET (data line) |  |  |
| Pin | Connection | Description |
| 1 | TxD+ | Transmitted data+ |
| 2 | RxD+ | Received data+ |
| 3 | TxD- | Transmitted data- |
| 4 | RxD- | Received data- |



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

EtherNet/IP

| EtherNet/IP characteristics |                                                                                                                                                                                                                                                                                                    |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bus protocol                | EtherNet/IP                                                                                                                                                                                                                                                                                        |
| Device profile              | CIP Nov 2016, 22 <sub>hex</sub> Encoder                                                                                                                                                                                                                                                            |
| Cycle time                  | 1 ms                                                                                                                                                                                                                                                                                               |
| Product features            | <div><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></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

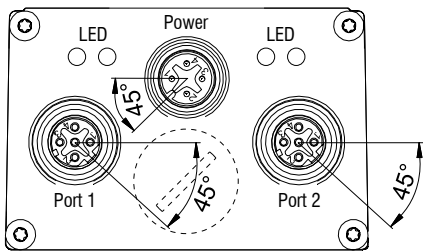
| EtherNet/IP (data line) |  |  |
| Pin | Connection | Description |
| 1 | TxD+ | Transmitted data+ |
| 2 | RxD+ | Received data+ |
| 3 | TxD- | Transmitted data- |
| 4 | RxD- | Received data- |



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

# EtherCAT

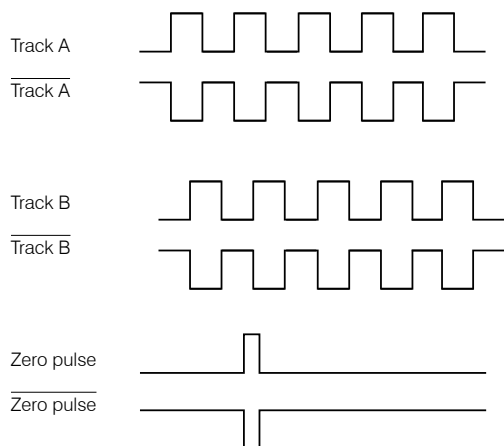
| EtherCAT characteristics |                                                                                                                                                                                                                                                                                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

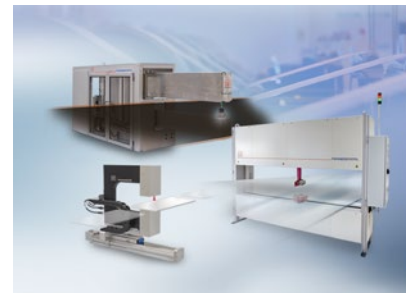
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