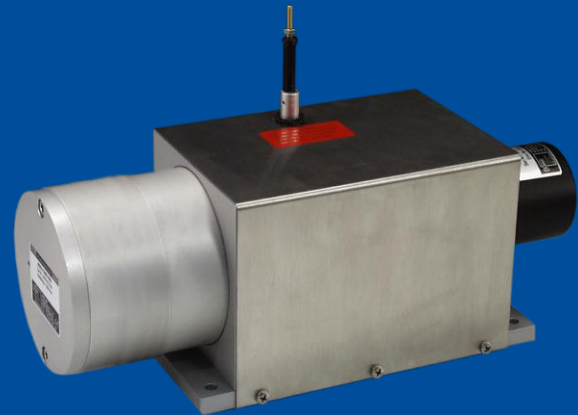




**WS60**

Displacement sensor with  
measurement length up to  
60,000 mm



- Protection class IP52, encoder IP64
- Aluminum/stainless steel housing
- With optical or incremental encoder

### Product versions



SSI



PROFI

**Absolute encoder output**



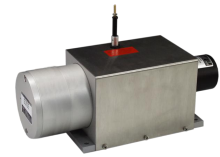
DEV



CAN



**Incremental encoder output**



**WS60 - Cable Extension Position Sensor**  
**Version with absolute encoder output**

**Specifications**

|   |  | Order options  |
|---|--|--|
| <b>Measurement range</b>  | 60000 mm   | <b>1</b> 60000   |
| <b>Output</b><br>for 12 bit per revolution<br>(4096 steps / revolution) | 0.125 mm, (8 steps / mm)   |  |
| <b>Output</b>   | Absolute encoder with synchronous serial output (SSI)<br>Absolute encoder with Profibus interface<br>Absolute encoder with Interbus interface<br>Absolute encoder with DeviceNet interface<br>Absolute encoder with CAN-interface<br>Absolute encoder with CANopen interface | <b>2</b> HSSI<br>HPROF<br>HINT<br>HDEV<br>HCAN<br>HCANOP |
| <b>Linearity</b>  | ±0.10% f.s. (standard)<br>±0.025% f.s. (optional)  | <b>3</b> L025  |
| <b>Sensing device</b>   | Absolute encoder   |  |
| <b>Material</b>   | Aluminum, stainless steel<br>measuring cable: stainless steel  |  |
| <b>Protection class</b>   | IP52, encoder IP64   |  |
| <b>Cable fixing</b>   | M4 cable fixing<br>Cable clip  | <b>4</b> M4<br>SB0                                       |
| <b>Connection</b>   | Depending on the type of encoder: connector or Bus cover   |  |
| <b>Temperature range</b>  | -20 ... +85 °C   |  |
| <b>Weight</b>   | Approx. 15 kg  |  |
| <b>EMC</b>  | DIN EN 61326-1:2013  |  |

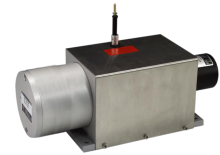
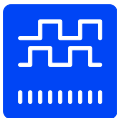
**Order code**

|      |   |          |   |          |   |          |   |          |
|------|---|----------|---|----------|---|----------|---|----------|
| WS60 | - | <b>1</b> | - | <b>2</b> | - | <b>3</b> | - | <b>4</b> |
|------|---|----------|---|----------|---|----------|---|----------|

**Order example:** WS60 – 60000 – HSSI – M4

**Accessories:**

**Mating connector CONN-CONIN-12F-G (see page 12)**



WS60 - Cable Extension Position Sensor  
**Version with incremental encoder output**

**Specifications**

|                   |  | Order options |                 |
|-------------------|--|---------------|-----------------|
| Measurement range | 60000 mm   | <b>1</b>      | 60000           |
| Resolution        | 8 pulses/mm or 32 edges/mm)  |               |                 |
| Output            | Incremental encoder TTL compatible<br>Incremental encoder HTL compatible | <b>2</b>      | LD5VC<br>PP24VC |
| Linearity         | ±0.10% f.s (standard)<br>±0.025% f.s. (optional)                         | <b>3</b>      | L025            |
| Sensing device    | Incremental encoder  |               |                 |
| Material          | Aluminum, stainless steel<br>measuring cable: stainless steel            |               |                 |
| Protection class  | IP52, encoder IP64   |               |                 |
| Cable fixing      | M4 cable fixing<br>Cable clip  | <b>4</b>      | M4<br>SB0       |
| Connection        | Connector 12 pin   |               |                 |
| Temperature range | -20 ... +85 °C   |               |                 |
| Weight            | Approx. 15 kg  |               |                 |
| EMC               | DIN EN 61326-1:2013  |               |                 |

**Order code**

WS60 – **1** – **2** – **3** – **4**

**Order example:** WS60 – 60000 – LD5VC – L025 – M4

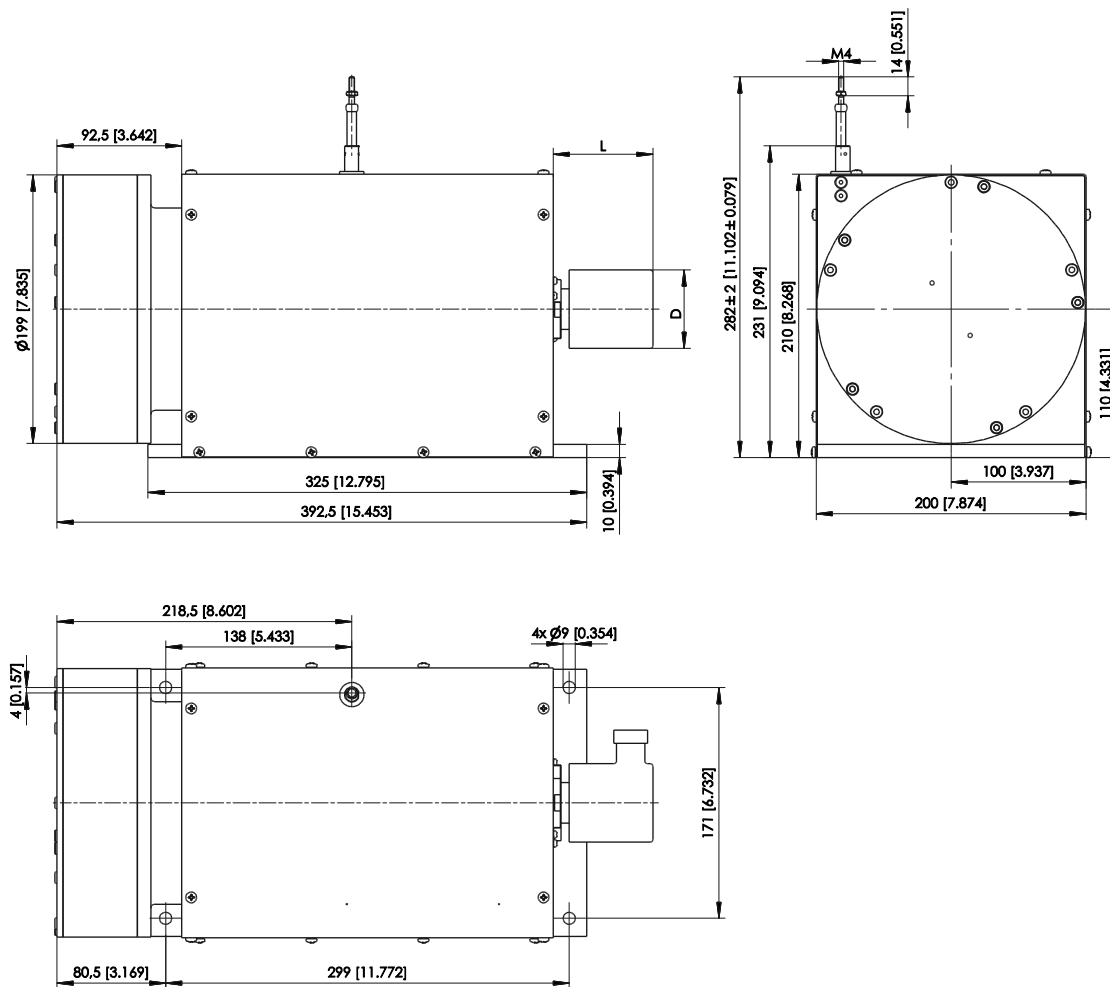
**Accessories:**

**Mating connector CONN-CONIN-12F-G (see page 12)**

| Cable forces<br>typical at = 20 °C | Measurement range<br>[mm] | Maximum pull-out force<br>[N] | Minimum pull-in force<br>[N] |
|------------------------------------|---------------------------|-------------------------------|------------------------------|
|                                    | 60000                     | 17.0                          | 6.5                          |

## Dimensions

Measurement range 60000 mm, absolute encoder output, incremental encoder output,



Dimensions in mm [inch]


Dimensions D and L depending on the encoder.

Dimensions informative only.

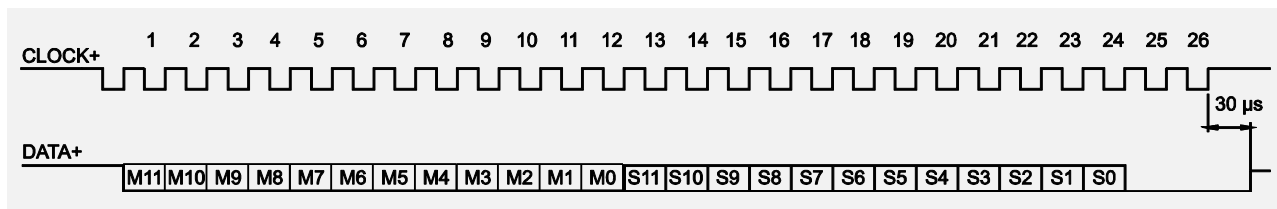
For guaranteed dimensions consult factory.

## Output specifications

### Absolute encoder output

|  |                       |                                       |
|--|-----------------------|---------------------------------------|
| <b>HSSI</b><br>synchronous serial<br><br>HSSI | Excitation voltage    | 10 ... 30 V DC                        |
|  | Excitation current    | 100 mA                                |
|  | Interface             | Standard-SSI                          |
|  | Lines / drivers       | Clock and data / RS422                |
|  | Code                  | Gray                                  |
|  | Resolution            | 12 + 12 bit                           |
|  | 3 dB cutoff frequency | 500 kHz                               |
|  | Control input         | $\overline{\text{DIRECTION}}$         |
|  | Preset key            | Zero adjustment with optical response |
|  | Alarm output          | Alarm bit (SSI option), warning bit   |
|  | Status LED            | Green = OK, red = alarm               |
|  | Connection            | 12 pin male socket                    |

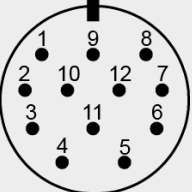
### Data format




(Mx = Multiturn bits, Sx = Singleturn bits)

### Transmission rate


| Cable length | Baud rate | Note:  |
|--------------|-----------|--|
| < 50 m       | < 400 kHz | Extension of the cable length will reduce the maximum transmission rate. |
| < 100 m      | < 300 kHz |  |
| < 200 m      | < 200 kHz |  |
| < 400 m      | < 100 kHz |  |

| Signal wiring  | Signal                    | Connector pin no. | Cable color |
|--|---------------------------|-------------------|-------------|
| <b>CONN-CONIN-12F-G</b><br><br>View to the sensor connector | Excitation +              | 8                 | white       |
|  | Excitation GND            | 1                 | brown       |
|  | CLOCK                     | 3                 | yellow      |
|  | $\overline{\text{CLOCK}}$ | 11                | green       |
|  | DATA                      | 2                 | pink        |
|  | $\overline{\text{DATA}}$  | 10                | grey        |
|  | Direction*                | 5                 | blue        |
|  | 0 V Signal output         | 12                | black       |

\* unconnected or Excitation + = cw increasing code  
0 V = cw decreasing code


|   |                              |   |
|---|------------------------------|---|
| <b>HPROF</b><br>Profibus<br> | Interface                    | RS485   |
|   | Excitation voltage           | 10 ... 30 V DC  |
|   | Excitation current           | 250 mA  |
|   | Protocol                     | Profibus DP with encoder profile C2                   |
|   | Resolution                   | 12 (10 ... 14) + 12 bit                               |
|   | Output code                  | Binary  |
|   | Baud rate                    | Automatically selected between 9,6 kBaud and 12 MBaud |
|   | Programmability              | Resolution, preset, direction                         |
|   | Integrated special functions | Velocity, acceleration, operating time                |
|   | Bus terminating resistor     | Selectable via DIP switch                             |
|   | Connection                   | Bus cover with T manifold                             |
|   | EMC                          | Din EN 61326: Class A                                 |

| Signal wiring | Output signals     | Cable terminal no. (bus cover) |
|---------------|--------------------|--------------------------------|
|               | U <sub>b</sub> in  | 1                              |
|               | 0 V in             | 2                              |
|               | U <sub>B</sub> out | 3                              |
|               | 0 V out            | 4                              |
|               | B in               | 5                              |
|               | A in               | 6                              |
|               | B out              | 7                              |
|               | A out              | 8                              |

|  |                    |   |
|--|--------------------|---|
| <b>HINT</b><br>Interbus<br> | Interface          | Interbus, ENCOM profile K3 (configurable), K2 |
|  | Excitation voltage | 10 ... 30 V DC                                |
|  | Excitation current | 250 mA  |
|  | Output code        | 32 Bit binary                                 |
|  | Baud rate          | 500 kBaud                                     |
|  | Data refresh       | Every 600 µs                                  |
|  | Resoution          | 12 (10 ... 14) + 12 bit                       |
|  | Programmability    | Direction, preset, offset, resolution         |
|  | Connection         | Bus cover with T manifold                     |
|  | EMC                | DIN EN 61326-1:2013                           |

| Data format K2 / K3                |   |   |   |   |   |
|------------------------------------|---|---|---|---|---|
|                                    | Differential signals (RS485)<br>ENCOM profile K3, K2, 32 Bit, binary process data |   |   |   |   |
| DÜ-Format                          | Sµpi-Adresse  | 0 | 1 | 2 | 3 |
| (according to the Phoenix company) | Byte no.  | 3 | 2 | 1 | 0 |
| ID-Code K2                         | 36H (=54 dez.)  |   |   |   |   |
| ID-Code K3                         | 37H (=55 dez.)  |   |   |   |   |

| Signal wiring | Output signals   | Cable terminal no. (bus cover) |
|---------------|------------------|--------------------------------|
|               | U <sub>b</sub> + | 1                              |
|               | GND              | 2                              |
|               | DI1              | 4                              |
|               | $\overline{DI1}$ | 6                              |
|               | D01              | 3                              |
|               | $\overline{D01}$ | 5                              |
|               | D02              | 7                              |
|               | $\overline{D02}$ | 8                              |
|               | DI2              | 9                              |
|               | $\overline{D02}$ | 10                             |
|               | RBST             | 11                             |
|               | GND              | 12                             |

|   |                          |   |
|---|--------------------------|---|
| <b>HDEV</b><br>DeviceNet<br> | Interface                | CAN highspeed according to ISO/DIS 11898<br>CAN specification 2.0 A (11 bit identifier) |
|   | Excitation voltage       | 10 ... 30 V DC  |
|   | Excitation current       | 250 mA  |
|   | Protocol                 | DeviceNet according rev. 2.0, programmable encoder                                      |
|   | Resolution               | 12 (10 ... 14) + 12 bit   |
|   | Output code              | Binary  |
|   | MAC-ID                   | Selectable via DIP switch   |
|   | Date refresh             | Every 5 ms  |
|   | Baud rate                | Selectable via DIP switch: 125 kBaud, 250 kBaud, 500 kBaud                              |
|   | Programmability          | Resolution, preset, direction   |
|   | Bus terminating resistor | Selectable via DIP switch   |
|   | Connection               | Bus cover with T manifold   |
|   | EMC                      | DIN EN 61326-1:2013   |

#### Recommended transmission


|                          |                              |
|--------------------------|------------------------------|
| Characteristic impedance | 135 ... 165 Ω (3 ... 20 MHz) |
| Operating capacity       | < 30 pF                      |
| Loop resistance          | < 110 Ω/km                   |
| Wire diameter            | > 0.63 mm                    |
| Wire width               | > 0.34 mm <sup>2</sup>       |

#### Transmission rate

| Segment length | Kbit/s |
|----------------|--------|
| 500 m          | 125    |
| 250 m          | 250    |
| 100 m          | 500    |

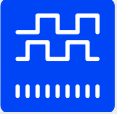
| Signal wiring | Output signals     | Cable terminal no. (bus cover) |
|---------------|--------------------|--------------------------------|
|               | U <sub>b</sub> in  | 1                              |
|               | 0 V in             | 2                              |
|               | CAN-L              | 3                              |
|               | CAN-H              | 4                              |
|               | Drain              | 5                              |
|               | Drain              | 6                              |
|               | CAN-H              | 7                              |
|               | CAN-L              | 8                              |
|               | 0 V out            | 9                              |
|               | U <sub>b</sub> out | 10                             |

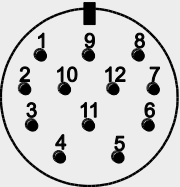


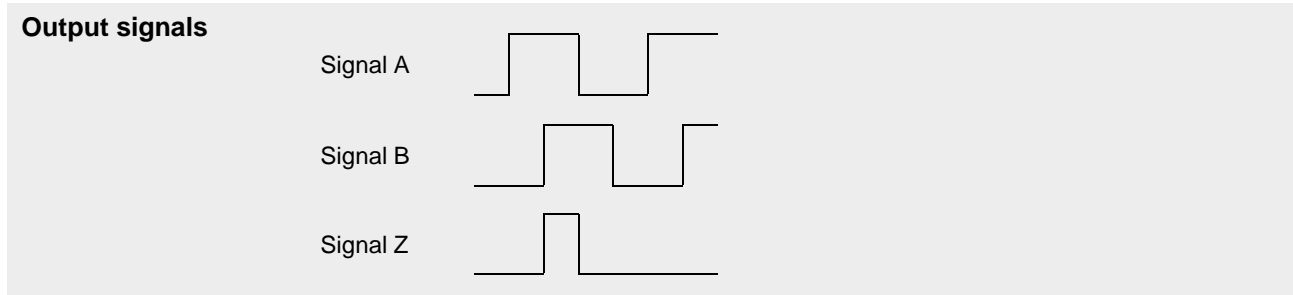
|   |                              |   |
|---|------------------------------|---|
| <b>HCAN / HCANOP</b><br>CANopen /<br>CAN Layer 2<br> | Interface                    | CAN highspeed according to ISO/DIS 11898  |
|   | Excitation voltage           | 10 ... 30 V DC  |
|   | Excitation current           | 250 mA  |
|   | Protocol                     | CANopen according DS301 with encoder profile DSP406, programmable encoder according class C2  |
|   | Resolution                   | 12 (10 ... 14) + 12 bit   |
|   | Output code                  | Binary  |
|   | Data refresh                 | Every millisecond (selectable), on request  |
|   | Baud rate                    | Selectable 10 up to 1000 kbit/s   |
|   | Base identifier              | Selectable via DIP switch   |
|   | Programmability              | CANopen: direction, resolution, preset, offset<br>CAN L2: direction, limit values             |
|   | Integrated special functions | CANopen: velocity, acceleration, rotary axis, limit values<br>CAN L2: direction, limit values |
|   | Connection                   | Bus cover with T manifold   |
|   | EMC                          | DIN EN 61326-1:2013   |

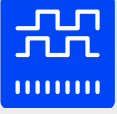
| Signal wiring | Output signals         | Cable terminal no. (bus cover) |
|---------------|------------------------|--------------------------------|
|               | U <sub>b</sub> in      | 1                              |
|               | 0 V in                 | 2                              |
|               | CAN in – (dominant L)  | 3                              |
|               | CAN in + (dominant H)  | 4                              |
|               | CAN GND in             | 5                              |
|               | CAN GND out            | 6                              |
|               | CAN out + (dominant H) | 7                              |
|               | CAN out – (dominant L) | 8                              |
|               | 0 V out                | 9                              |
|               | U <sub>b</sub> out     | 10                             |

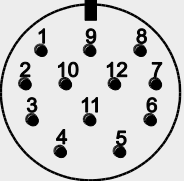
## Incremental output

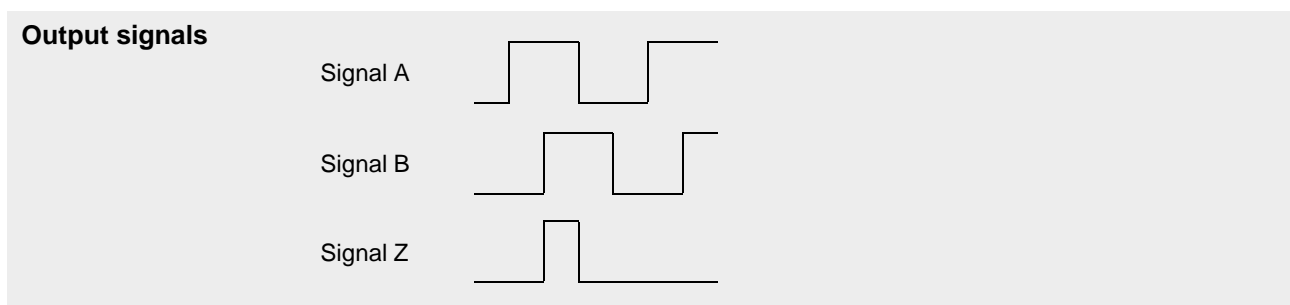
|  |  |   |
|--|--|---|
| <b>LD5VC</b><br>Incremental interface<br> | Excitation voltage                             | 5 V DC ±10 %  |
|  | Excitation current                             | 150 mA max. w/o load                                |
|  | Interface                                      | Line driver RS422                                   |
|  | Output frequency                               | 300 kHz max.  |
|  | Output current                                 | 20 mA per channel                                   |
|  | Signal level                                   |   |
|  | U <sub>d</sub> High bei I <sub>d</sub> = 20 mA | ≥ 2.5 V   |
|  | U <sub>d</sub> Low bei I <sub>d</sub> = 20 mA  | ≥ 0.5 V   |
|  | Transition time positive edge                  | < 100 ns  |
|  | Transition time negative edge                  | < 100 ns  |
|  | Stability (temperature)                        | ±20 x 10 <sup>-6</sup> / °C f.s. (sensor-mechanism) |
|  | Operation temperature                          | -20 ... +85 °C                                      |
|  | Protection                                     | Short circuit, overvoltage                          |
|  | EMC  | DIN EN 61326-1:2013                                 |

| Signal wiring  | Output signals             | Connector pin no. | Cable color |
|--|----------------------------|-------------------|-------------|
| <b>CONN-CONIN-12F-G</b><br><br>View to soldering side of mating connector | Excitation +               | 12                | white       |
|  | Excitation GND             | 10                | brown       |
|  | Signal A                   | 5                 | yellow      |
|  | Signal $\bar{A}$           | 6                 | pink        |
|  | Signal B (A + 90°)         | 8                 | green       |
|  | Signal $\bar{B}$           | 1                 | grey        |
|  | Signal Z (reference pulse) | 3                 | blue        |
|  | Signal $\bar{Z}$           | 4                 | red         |
|  | Fault detection signal     | 7                 | -           |
|  | Shield                     | housing           | -           |



|   |                                  |   |
|---|----------------------------------|---|
| <b>PP24VC</b><br>Incremental interface<br> | Excitation voltage               | 10 ... 30 V DC                                      |
|   | Excitation current               | 150 mA max. w/o load                                |
|   | Interface                        | Push-pull line driver (24 V-HTL)                    |
|   | Output frequency                 | 300 kHz max.  |
|   | Output current                   | 100 mA per channel                                  |
|   | Signal level                     |   |
|   | Ud High at Id = 20 mA, Ub = 24 V | ≥ 21 V  |
|   | Ud Low at Id = 20 mA, Ub = 24 V  | ≥ 2.8 V   |
|   | Transition time positive edge    | < 200 ns  |
|   | Transition time negative edge    | < 200 ns  |
|   | Stability (temperature)          | ±20 x 10 <sup>-6</sup> / °C f.s. (sensor mechanism) |
|   | Operating temperature            | Refer to output specification                       |
|   | Protection                       | Reverse polarity, short circuit, overvoltage        |
|   | EMC                              | DIN EN 61326-1:2013                                 |

| Signal wiring<br>CONN-CONIN-12F-G   | Output signals             | Connector pin no. | Cable color |
|---|----------------------------|-------------------|-------------|
|  <p>View to soldering side of mating connector</p> | Excitation +               | 12                | white       |
|   | Excitation GND             | 10                | brown       |
|   | Signal A                   | 5                 | yellow      |
|   | Signal $\bar{A}$           | 6                 | pink        |
|   | Signal B (A + 90°)         | 8                 | green       |
|   | Signal $\bar{B}$           | 1                 | grey        |
|   | Signal Z (reference pulse) | 3                 | blue        |
|   | Signal $\bar{Z}$           | 4                 | red         |
|   | Fault detection signal     | 7                 | -           |
|   | Shield                     | housing           | -           |



---

**Accessories**  
**Plug-in connector CONIN, 12 pin (straight coupling)**

Order code:

**CONN-CONIN-12F-G**

Cable diameter  
max. 6 ... 8 mm

