# DRAW WIRE SENSOR

*Links to further documents for this series:*
*Installation guide*
*Manual for CANopen*
*Data sheet TEDS connector*

## SX135 SERIES

*Key-Features:*
- *Measurement ranges from 10 to 42.5 m*
- *Analog output: potentiometer, voltage, current*
- *Optional teachable voltage outputs*
- *Digital Output Incremental: RS422 (TTL), Push-Pull*
- *Digital Output Absolute: CANopen, SSI, Profibus, EtherCAT, Profinet*
- *Linearity up to ±0.02% of full scale*
- *Protection class up to IP67*
- *Temperature range: -20...+85 °C (optional -40 °C)*
- *High dynamics and interference immunity factor*
- *Customised versions available*
- *Optional with TEDS connector*

*Content*


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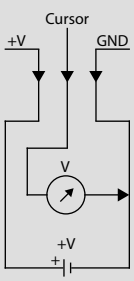
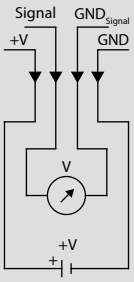
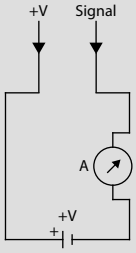
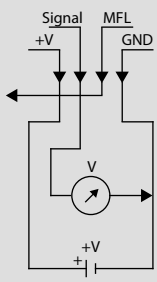
## TECHNICAL DATA ANALOG OUTPUT

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Measurement range MR [1] | [m] | 10 | 12 | 15 | 20 | 25 | 30 | 35 | 40 | 42.5 |
| Linearity [2] | [%] | ±0.1 | | | | | | | | |
| Improved linearity (optional) [2] | [%] | ±0.05 | | | | | | | | |
| Resolution | | see output types below | | | | | | | | |
| Sensor element | | Hybrid Potentiometer | | | | | | | | |
| Connection | | connector output M12 or cable output axial (TPE cable) | | | | | | | | |
| Protection class | | IP65, optional IP67 | | | | | | | | |
| Humidity | | max. 90 % relative, no condensation | | | | | | | | |
| Temperature | | see output types below | | | | | | | | |
| Mechanical data | | extraction force, max. velocity and max. acceleration see „Mechanical Data“ | | | | | | | | |
| Housing | | aluminium, anodised, spring case PA6 | | | | | | | | |
| Draw wire | | stainless steel V2A Ø 0.5 mm | | | | | | | | |
| Weight | [g] | 3200 to 5000, depending on the measurement range | | | | | | | | |

[1] others on request
[2] linearity max. ±0.15 % in combination with outputs 5R and 10R

## ELECTRICAL DATA ANALOG OUTPUT

| **Output type** | **Potentiometer** | | | **Voltage [1]** | | | | **Current** | **Voltage (teachable)** | |
|---|---|---|---|---|---|---|---|---|---|---|
| Order Code | 1R | 5R | 10R | 4,5V | 5V | 55V | 10V | 420A | 5VT | 10VT |
| Output | 1 kΩ | 5 kΩ | 10 kΩ | 0.5...4.5 V | 0...5 V | -5...+5 V | 0...10 V | 4...20 mA | 0...5 V | 0...10 V |
| Supply | max. 30 V | | | 8...30 VDC | | | 12...30 VDC | 12...30 VDC [2] | 8...35 VDC | |
| Recommended cursor current | <1 µA | | | - | | | | | | |
| Current consumption max. | - | | | max. 25 mA (no load) | | | | - | | |
| Power consumption max. | - | | | | | | | | max. 200 mW | |
| Output current | - | | | max. 10 mA, min. load 10 kΩ | | | | max. 50 mA in case of error [3] | max. 10 mA, min. load 1 kΩ | |
| Dynamics | - | | | <3 ms from 0...100 % and 100...0 % | | | | <1 ms from 0...100 % and 100...0 % | 1 ms | |
| Resolution | theoretically unlimited, limited by the noise | | | | | | | | 1 mV | |
| Noise | depends on the quality of the power supply | | | 0.5 $mV_{eff}$ | | | | 1.6 $µA_{eff}$ | 2 $mV_{eff}$ | |
| Inverse-polarity protection | - | | | yes | | | | | - | |
| Short-circuit proof | - | | | yes | | | | - | yes | |
| Operating temperature | -20...+85 °C / optional: -40...+85 °C | | | | | | | | | |
| Temperature coefficient | ±0.0025 %/K | | | 0.0037 %/K | | | | 0.0079 %/K | 0.0016 %/K | |
| EMC | - | | | according to EN 61326-1:2013 | | | | | | |
| Circuit |  | | |  | | | |  |  | |

[1] Galvanically isolated
[2] Load: 250 Ω (max. 500 Ω)
[3] Load max. 0.5 kΩ

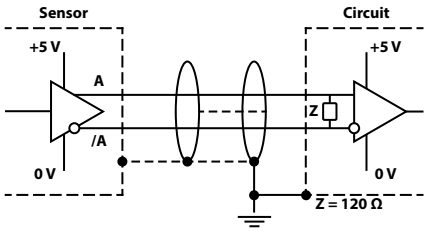
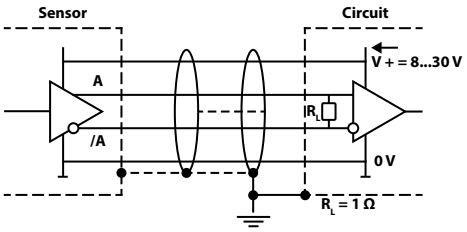
MFL = multi-functional line

## TECHNICAL DATA DIGITAL OUTPUT INCREMENTAL

| Measurement range [1] | [m] | 10 | 12 | 15 | 20 | 25 | 30 | 35 | 40 | 42.5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Linearity | [%] | ±0.05 | | | | | | | | |
| Improved linearity (optional) | [%] | ±0.02 (only in combination with resolution 6 pulses/mm, or higher) | | | | | | | | |
| Resolution [1] | [pulses/mm] | 0.3 / 3 / 6 / 15 (the resolution can be raised by the factor 4 using quadruple edge detection) | | | | | | | | |
| Z-pulse distance | [mm] | 333.33 | | | | | | | | |
| Sensor element | | Incremental-Encoder with optical code disk | | | | | | | | |
| Output signal | | A, B and Z pulse (plus inverted pulses /A, /B and /Z) | | | | | | | | |
| Connection | | connector output M12 radial or cable output radial (PVC cable) | | | | | | | | |
| Protection class | | IP65, optional IP67 | | | | | | | | |
| Humidity | | max. 90 % relative, no condensation | | | | | | | | |
| Operating temperature | [°C] | -20...+85 | | | | | | | | |
| Mechanical data | | extraction force, max. velocity and max. acceleration see „Mechanical Data“ | | | | | | | | |
| Housing | | aluminium, anodised, spring case PA6 | | | | | | | | |
| Draw wire | | stainless steel V2A Ø 0.5 mm | | | | | | | | |
| Weight | [g] | 3200 to 5000, depending on the measurement range | | | | | | | | |

[1] others on request

## ELECTRICAL DATA DIGITAL OUTPUT INCREMENTAL

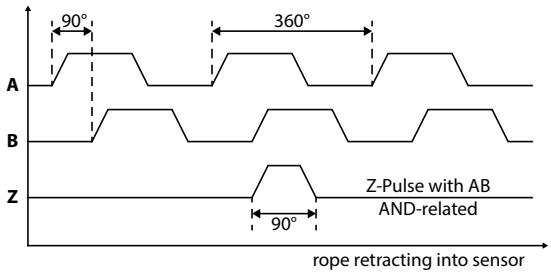
| **Output type** | | **Line driver L<br>RS422 (TTL compatible)** | **Push Pull G (HTL)** |
|---|---|---|---|
| Supply +V | [VDC] | 5 ±5 % | 10...30 |
| Current consumption (no load) | [mA] | max. 90 (typical 40) | max. 100 (typical 50) |
| Load / channel | [mA] | max. ±20 | |
| Pulse frequency | [kHz] | max. 300 | |
| Signal level high | [V] | min. 2.5 | min. +V -1 |
| Signal level low | [V] | max. 0.5 | |
| Recommended circuit | |  |  |



## OUTPUT SIGNAL DIGITAL OUTPUT INCREMENTAL

**Output signal**
Pulses A and B are 90° phase-delayed (detection of direction). The Z-Pulse is emitted once per turn. The Z-Pulse distance is 333.33 mm (= circumference of the rope drum) and can be used as a reference mark.

*(The diagram shows the signal without inverted signals; time line for return of rope.)*



## TECHNICAL DATA DIGITAL OUTPUT ABSOLUTE CANopen (WCAN)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Measurement range | [m] | 10 | 12 | 15 | 20 | 25 | 30 | 35 | 40 | 42.5 |
| Linearity | [%] | ±0.1 | | | | | | | | |
| Improved linearity (optional) | [%] | ±0.05 | | | | | | | | |
| Resolution | | 0.002 % of the measurement range | | | | | | | | |
| Sensor element | | Potentiometer | | | | | | | | |
| Connection | | connector output M12 axial/radial or cable output axial (TPE cable) | | | | | | | | |
| Protection class | | IP65, optional IP67 | | | | | | | | |
| Humidity | | max. 90 % relative, no condensation | | | | | | | | |
| Operating temperature | [°C] | -20...+85 / optional: -40...+85 | | | | | | | | |
| Mechanical data | | extraction force, max. velocity and max. acceleration see „Mechanical Data“ | | | | | | | | |
| Housing | | aluminium, anodised, spring case PA6 | | | | | | | | |
| Draw wire | | stainless steel V2A Ø 0.5 mm | | | | | | | | |
| Weight | [g] | 3200 to 5000, depending on the measurement range | | | | | | | | |

## ELECTRICAL DATA DIGITAL OUTPUT ABSOLUTE CANopen (WCAN)

| | | |
|---|---|---|
| Link to the manual | | CANopen (WCAN) |
| Link to the EDS file | | WayCon EDS zip file |
| CAN specification | | Full CAN 2.0B (ISO11898) |
| Communication profile | | CANopen CiA 301 V 4.2.0 |
| Device profile | | Encoder, absolute linear; CiA 406 V 3.2.0 |
| Error control | | Producer Heartbeat, Emergency Message, Node Guarding |
| Node ID | | Default: 7, configurable via SDO |
| PDO | | 1 x TPDO, static mapping |
| PDO Modes | | Event-triggered, Time-triggered, Sync-cyclic, Sync-acyclic |
| Transmission rate | | 1 Mbps, 800, 500, 250, 125, 50, 20 kbps configurable via SDO |
| Integrated Bus termination resistor | | 120 Ω, connectible via SDO |
| Bus, galvanic separation | | No |
| Supply | [VDC] | 8...30 |
| Current consumption | | 10 mA typical at 24 V, 20 mA typical at 12 V |
| Measurement rate | | 1 kHz with 16-bit resolution |
| Electrical protection | | inverse polarity protection |
| Temperature coefficient | [%/K] | 0.0014 |
| EMC | | DIN EN61326-1:2013, conformity with directive 2014/30/EU |

## TECHNICAL DATA DIGITAL OUTPUT ABSOLUTE

| | | | | | | |
|---|---|---|---|---|---|---|
| Type (Link to the encoder data sheet) | | SSI | CANopen (CAN) | Profibus-DP | EtherCAT | Profinet |
| Link to the manual / file | | - | Manual / EDS | Manual / GSD | Manual / XML | Manual / GSDMI |
| Measurement range | [mm] | 10 / 12 / 15 / 20 / 25 / 30 / 35 / 40 / 42.5 | | | | |
| Linearity | [%] | ±0.05 | | | | |
| Resolution scalable (via software) | | no | yes | | | |
| Resolution standard | [pulses/mm]<br>[bit] | 24.58<br>12 | 24.58<br>13 | | | |
| Resolution max. | [pulses/mm]<br>[bit] | -<br>- | 196.61<br>16 | | | |
| Sensor element | | Multiturn-Absolute-Encoder with optical code disk | | | | |
| Connection | | see order code | | | | |
| Supply | [VDC] | 10...30 (reverse polarity protection of the power supply) | | | | |
| Current consumption (at 24 VDC, no load) | [mA] | max. 50 | max. 100 | max. 120 | | max. 200 |
| Protection class | | IP65, optional IP67 | | | | |
| Humidity | | max. 90 % relative, no condensation | | | | |
| Operating temperature | [°C] | -20...+85 | | | | |
| Mechanical data | | extraction force, maximum velocity and maximum acceleration see „Mechanical Data“ | | | | |
| Housing | | aluminium, anodised, spring case PA6 | | | | |
| Draw wire | | stainless steel V2A Ø 0.5 mm | | | | |
| Weight | [g] | 3200 to 5000, depending on the measurement range | | | | |

## ELECTRICAL DATA DIGITAL OUTPUT ABSOLUTE

| **Parameters of the SSI interface (8.5863.122X.G222)** | |
|---|---|
| Code | Gray |
| Output driver | RS485 Transceiver-Type |
| Permissible load / channel | max. ±20 mA |
| Signal level | HIGH: typical 3.8 V LOW: with $I_{load}$ = 20 mA typical 1.3 V |
| Resolution | 12 bit |
| SSI clock rate | ST-resolution: 50 kHz...2 MHz |
| Monoflop time | ≤15 µs |
| Data refresh rate | ≤1 µs |
| Status and Parity bit | on request |

| **Parameters of the EtherCAT interface (8.5868.12B2.B212)** | |
|---|---|
| Code | Binary |
| Protocol | EtherNet / EtherCAT |
| Modes | Freerun, Distributed Clock |
| Diagnostic LED red | LED is ON with the following fault conditions: Sensor error (internal code or LED error), low voltage, over-temperature |
| Run LED green | LED is ON with the following conditions: Preop-, Safeop and Op-State (EtherCAT Status machine) |
| 2 x Link LEDs yellow | LED is ON with the following conditions (Port IN and Port OUT): Link detected |

| **Parameters of the Profinet interface (8.5868.12C2.C212)** | |
|---|---|
| Code | Binary |
| Protocol | PROFINET 10 |
| LED Link1/Link2 | green = active link / yellow = data transfer |
| Ezturn Software for Profinet (supplied with the encoder) | • Monitoring of cyclic data (e.g. position, speed)<br>• Monitoring of acyclic data (e.g. IMO, electronic name plate, encoder parameters, warnings and error messages, preset)<br>• Setting of preset values<br>• Firmware updates via the bus |

| **Parameters of the CANopen interface (CAN) (8.5868.122X.2122)** | |
|---|---|
| Code | Binary |
| Interface | CAN High-Speed acc. to ISO 11898, Basic- and Full-CAN, CAN Specification 2.0 B |
| Protocol | CANopen profile DS406 V3.2 with manufacturer-specific add-ons |
| Baud rate | 10...1000 kbit/s (can be set via DIP switches or software) |
| Node address | 1...127 (can be set via rotary switches or software) |
| Termination | can be set via DIP switches or software |
| SET Button (Option) | Zero or defined value option |
| LED | LED is ON with the following fault conditions: Sensor error (internal code or LED error) too low voltage, over-temperature |

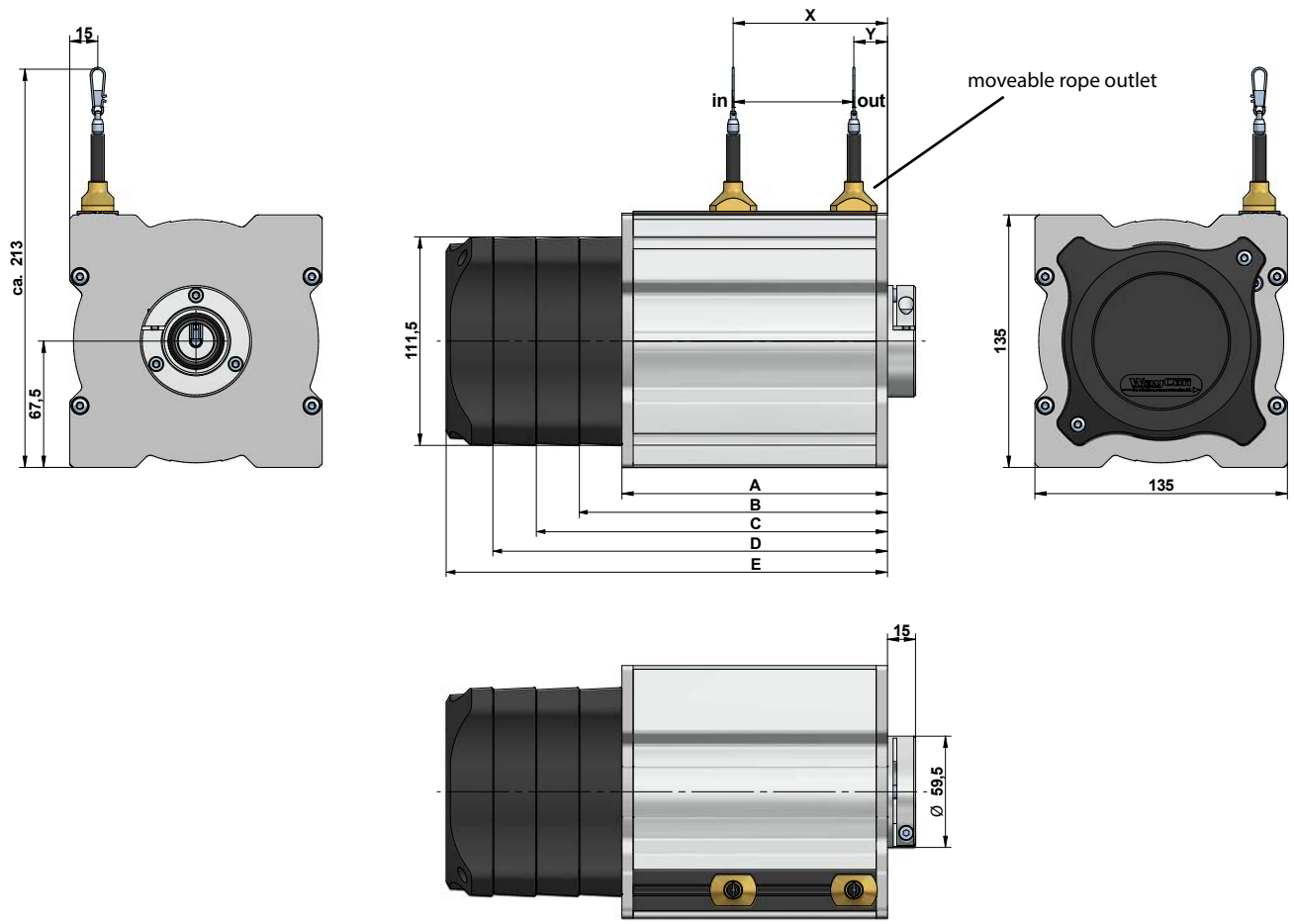
| **Parameters of the Profibus DP interface (8.5868.123X.3112)** | |
|---|---|
| Code | Binary |
| Interface | Profibus DP 2.0 Standard (DIN 19245 Part 3), RS485 Driver galvanically isolated |
| Protocol | Profibus Encoder Profile V1.1 Class1 and Class2 with manufacturer-specific add-ons |
| Baud rate | maximum 12 Mbit/s |
| Device address | 1...127 (set by rotary switches) |
| Termination switchable | set by DIP switches |
| SET Button (Option) | Zero or defined value option |
| LED | LED is ON with the following fault conditions: Sensor error, Profibus error |

## MECHANICAL DATA

| Measurement range [m] | Extraction force $F_{min}$ [N] | Extraction force $F_{max}$ [N] | Velocity $V_{max}$ [m/s] [1] | Acceleration $a_{max}$ [m/s²] [1] |
|---|---|---|---|---|
| 10 | 4.8 | 7.2 | 5 | 80 |
| 12 | 4.8 | 7.2 | 5 | 80 |
| 15 | 6.8 | 11.2 | 5 | 80 |
| 20 | 6.4 | 9.2 | 5 | 60 |
| 25 | 7.8 | 11.4 | 5 | 60 |
| 30 | 6.4 | 9.6 | 5 | 60 |
| 35 | 7.4 | 11.6 | 5 | 60 |
| 40 | 5.4 | 9 | 5 | 60 |
| 42.5 | 5.4 | 9 | 5 | 60 |

[1] reduced to 60 % if option IP67 is used. The max. velocity is reduced to 3 m/s if option SP61 or SP62 is used.

## TECHNICAL DRAWING




| Measurement range [m] | Letter | Length |
|---|---|---|
| 10 / 12 / 15 / 20 | A | 112 |
| 25 / 30 / 35 / 40 / 42.5 | A | 142 |
| 10 / 12 | B | 137 |
| 15 / 20 | C | 160 |
| 25 / 30 | D | 213 |
| 35 / 40 / 42.5 | E | 236 |

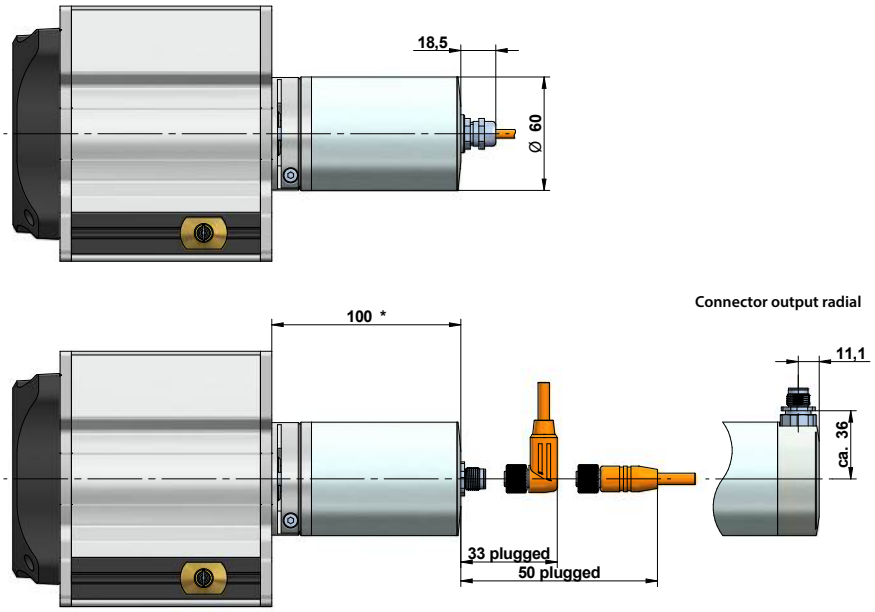
| Position rope outlet at ... | 10 m | 12 m | 15 m | 20 m | 25 m |
|---|---|---|---|---|---|
| ... start of measurement range (X) [1] | 35.5 | 38.5 | 43 | 50.5 | 58 |
| ... end of measurement range (Y) [1] | 20.5 | 20.5 | 20.5 | 20.5 | 20.5 |

| Position rope outlet at ... | 30 m | 35 m | 40 m | 42.5 m |
|---|---|---|---|---|
| ... start of measurement range (X) [1] | 65.5 | 73 | 80.5 | 84 |
| ... end of measurement range (Y) [1] | 20.5 | 20.5 | 20.5 | 20.5 |

| Position rope outlet for options SP61/62 | 10 m | 12 m | 15 m | 20 m | 25 m | 30 m | 35 m | 40 m |
|---|---|---|---|---|---|---|---|---|
| ... start of measurement range (X) [1] | 35.5 | 38.5 | 43 | 50.5 | 58 | 65.5 | 73 | 80.5 |
| ... end of measurement range (Y) [1] | 20.5 | 20.5 | 20.5 | 20.5 | 20.5 | 20.5 | 20.5 | 20.5 |

[1] Dimensions are subject to a tolerance of ±2 mm.

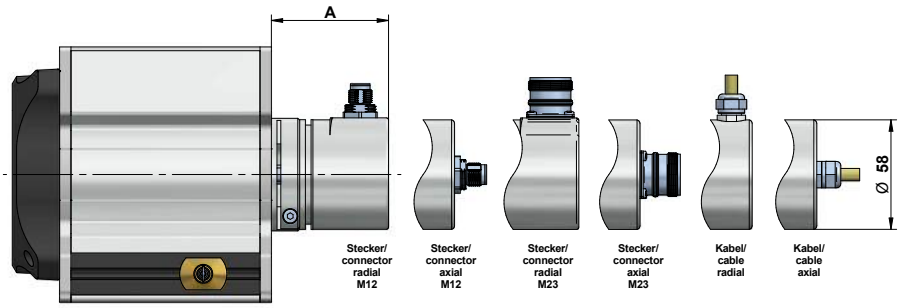
## TECHNICAL DRAWING ANALOG OUTPUT AND DIGITAL OUTPUT WCAN



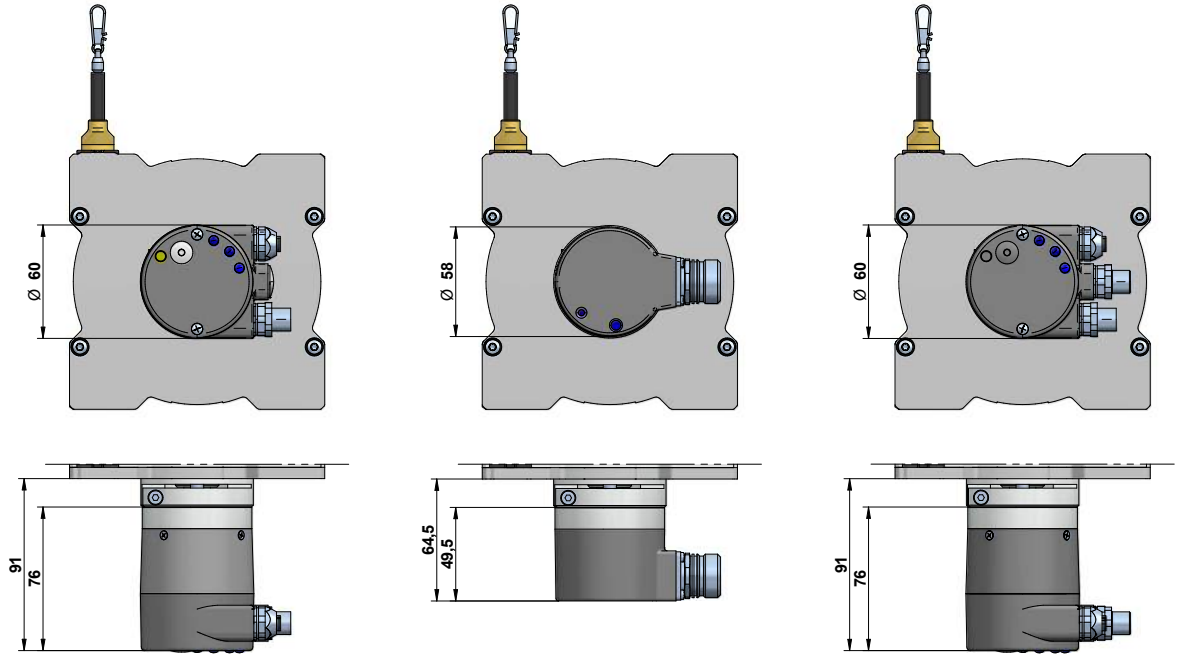

* For sensors with measurement ranges of 30 m or greater and radial connector output the encoder length is 120 mm instead of 100 mm.

## TECHNICAL DRAWING DIGITAL OUTPUT INCREMENTAL

| Connection | A |
|---|---|
| Cable axial / radial, connector axial | 54.3 |
| Connector radial | 64.3 |

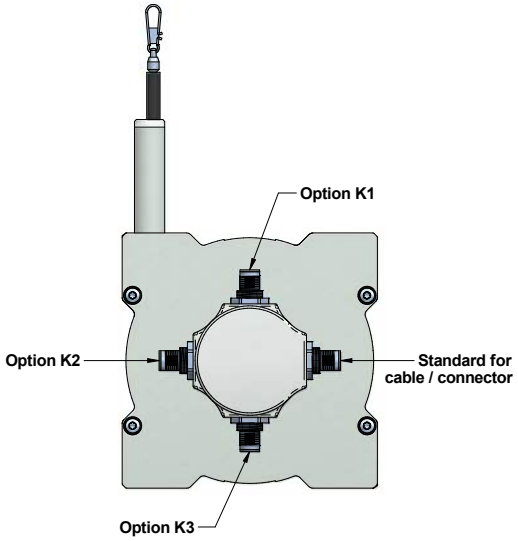



## TECHNICAL DRAWING DIGITAL OUTPUT ABSOLUTE




CANopen | SSI | Profibus, Profinet, EtherCAT

## TECHNICAL DRAWING OPTIONS CHANGED ROPE OUTLET AND CABLE OUTPUT

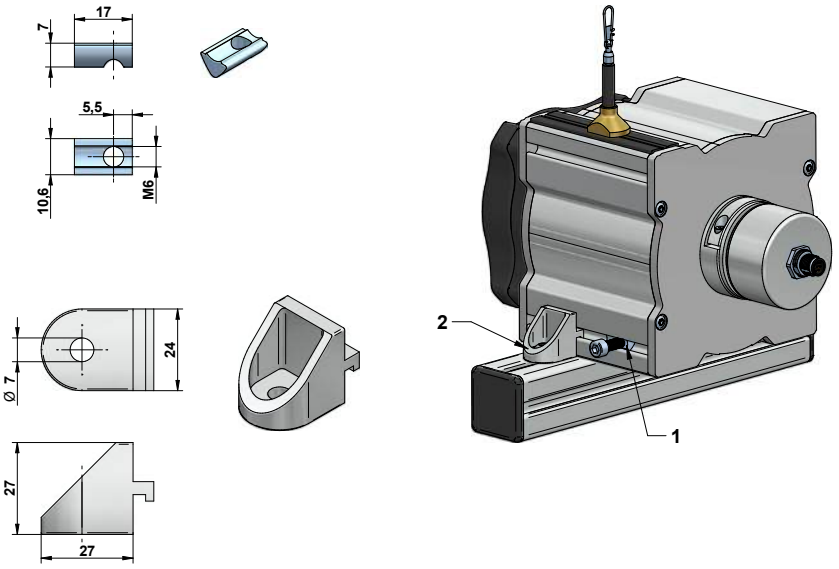



## MOUNTING OPTIONS

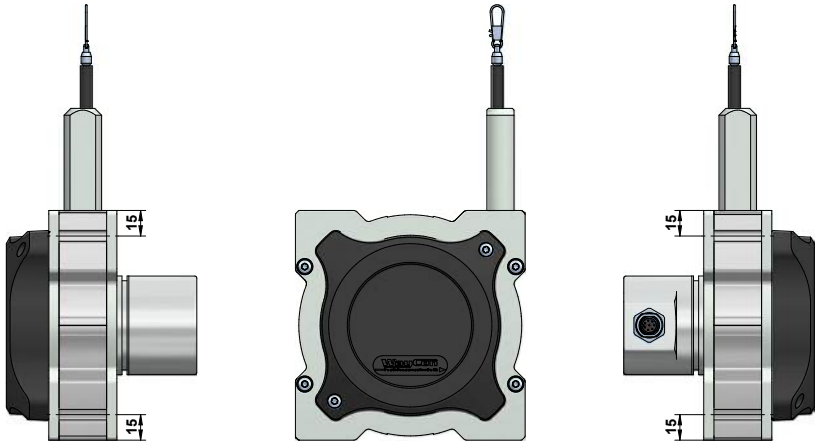
**1. by using the grooves in the sensor housing**
The included slot nuts can be easily inserted into the grooves of the sensor housing. The slot nuts have a metric M6 thread. Each sensor with a measurement range of 20 m or lower is delivered with two slot nuts. Each sensor with a measurement range of 25 m or greater is delivered with four slot nuts.

**2. by angle clamp brackets**
The angle clamp brackets feature a bore for M6 screws to fix it on a plate / slab or a profile. Each sensor with a measurement range of 20 m or lower is delivered with two brackets. Each sensor with a measurement range of 25 m or greater is delivered with four brackets.

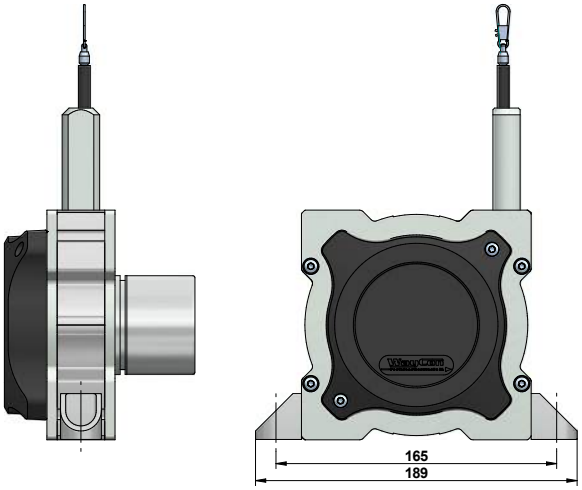
**Note:**
The grooves of the sensor housing, the slot nuts and brackets are compatible to the aluminium building kit system from *item Industrietechnik GmbH*.



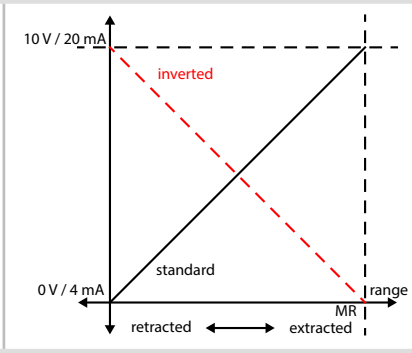
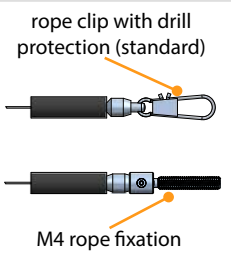
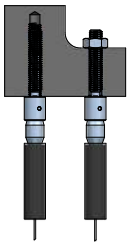
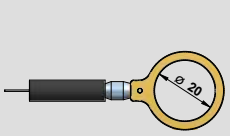
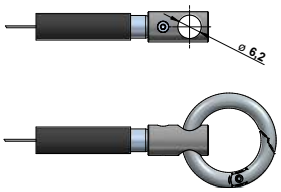

**Position of the grooves**




**Mounting by using brackets**



# OPTIONS

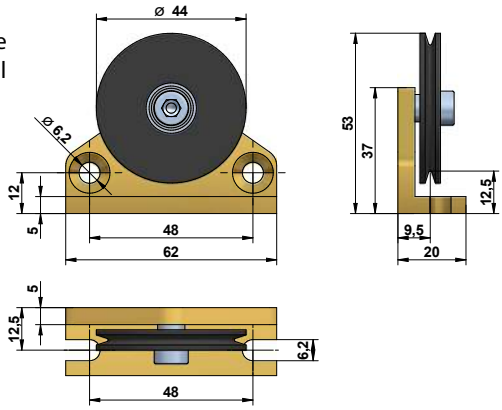
| Option | Order code | Description |
|---|---|---|
| Changed cable or connector orientation (NOT with analog output, drawing see page 8) | K1, K2, K3 | Rope outlet points upwards:<br>Standard: sideways, opposite to the rope outlet<br>K1: at the top<br>K2: sideways, same side as the rope outlet<br>K3: at the bottom |
| Improved linearity | L02, L05 | Improved linearity 0.02 % (L02) or 0.05 % (L05) |
| Inverted output signal (analog output only) | IN | The analog signal of the sensor is increasing by extracting the rope (standard). Option IN inverts the signal, i.e. the signal of the sensor declines by extracting the rope.  |
| Synthetic wire rope | COR | Synthetic wire rope, made out of abrasion resistant and enhanced Coramid.<br>We recommend COR at stable temperatures due to the coefficient of expansion. |
| Rope fixation by M4 thread | M4 | Optional, pivoted rope fixation with screw thread M4, length 22 mm. Ideal for attachment to through holes or thread holes M4.   |
| Rope fixation by eyelet | RI | The end of the wire rope is equipped with a eyelet instead of a rope clip.<br>Inside diameter 20 mm  |
| Rope fixation with cylindrical pin and M6 through bore | ZH, ZR | ZH: cylindrical pin with M6 through bore<br>ZR: cylindrical pin with M6 through bore and carbine ring  |
| Protection class IP67 | IP67 | Use option IP67, if the sensor will operate in a humid environment. Note that with this option there may occur a light hysteresis in the output signal due to the special sealing. The max. acceleration and displacement speed are reduced to 60 % of the specified value. |
| Corrosion protection | CP | Includes a V4A wire rope, stainless steel bearings and option M4. The sensors rope drum gets HARTCOAT® coated. This coating is a hard-anodic oxidation that protects the sensor from corrosion by aggressive media (e. g. sea water) with a hard ceramics-like layer. |
| Increased corrosion protection (analog output only) | ICP | Components of the housing and the rope drum get HARTCOAT® coated. Includes the options CP, IP67 and M4. |
| Increased temperature range Low (analog output only) | T40 | Special components and a low temperature grease make a working temperature down to -40 °C (up to +85 °C) possible. |
| Snapping protection | SP61, SP62 | Through the use of an integrated brake, the dangerous snapping of the rope is prevented. The option includes a Coramid wire rope Ø 0.4 mm. The maximum travel speed is reduced to 2 m/s. SP61 for measurement ranges 10 to 15 m, SP62 for measurement ranges 20 to 40 m. |
| TEDS connector (in combination with analog and cable output only; more information about TEDS) | TD, TDP, TDPS | TD: Assembling<br>TDP: Assembling + programming<br>TDPS: Assembling + programming + 35 measurement points |

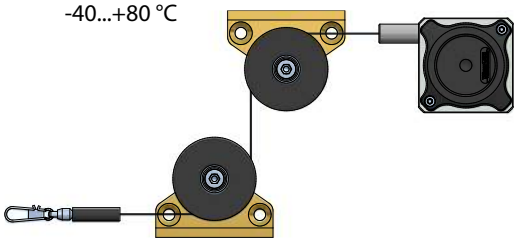
# ACCESSORIES

**Deflection pulley - UR2**

The rope must be extracted from the sensor vertically. The maximum variation from the vertical is 3°. A deflection pulley allows a change in the direction of the wire rope. Several pulleys may be used. The rope clip must not be guided over the deflection pulley.
Suitable for standard wire rope diameter 0.5 mm.

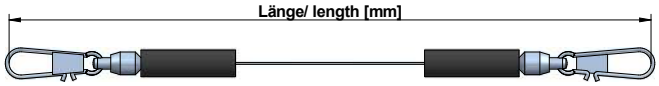
| | |
|---|---|
| Material foot: | anodised aluminium |
| Material rope wheel: | POM-C |
| Mounting: | by 2 hexagon socket or countersunk screws M6, vertical or horizontal mounting possible. Ball bearings: with special low temperature grease and RS-sealing. |
| Temperature: | -40...+80 °C |



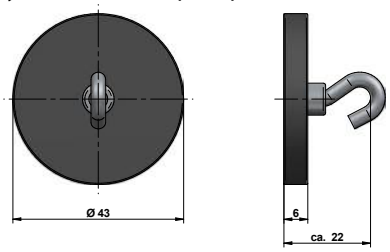
**Rope extension - SV**

For bridging a greater distance between the measuring target and the sensor a rope extension can be applied. The rope clip must not be guided over the deflection pulley.
Please specify the length needed in your order (XXXX). The minimum length is 150 mm:
SV1-XXXX: rope extension (150...4995 mm)
SV2-XXXX: rope extension (5000...19995 mm)
SV3-XXXX: rope extension (20000...40000 mm)



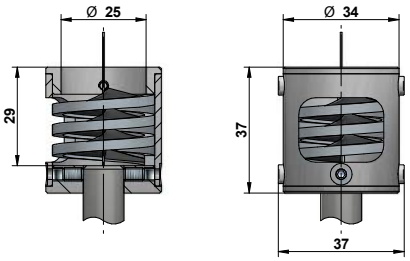

**Magnetic clamp - MGG2**

Use the magnetic clamp to quickly attach the rope to metallic objects without any assembly time. A rubber coating provides gentle contact (e. g. on varnished surfaces) and prevents from slipping due to vibration.
The magnet consists of a neodym core for an increased adhesive force of 100 N. The hook makes it easy to attach the rope clip.




**Rope cleaner - RCS**

Use the RCS rope cleaner to remove dirt from the measuring rope of the sensor. Please note that the maximum measuring range of the sensor is reduced by 29 mm and that the RCS is not compatible with the option RI.



# ORDER CODE ANALOG OUTPUT

**SX135 – □ – □ – □ – □**

| **Measurement range MR [m]** | |
|---|---|
| 10 / 12 / 15 / 20 / 25 / 30 / 35 / 40 / 42.5 | |

| **Output signal** | | |
|---|---|---|
| Potentiometer | 1 kΩ | **1R** |
| Potentiometer | 5 kΩ | 5R |
| Potentiometer | 10 kΩ | 10R |
| Voltage | 0.5...4.5 V | 4,5V |
| Voltage | 0...5 V | 5V |
| Voltage | -5...+5 V | 55V |
| Voltage | 0...10 V | **10V** |
| Voltage | 0...5 V (teachable) | 5VT |
| Voltage | 0...10 V (teachable) | 10VT |
| Current | 4...20 mA | **420A** |

| **Connection** | |
|---|---|
| Connector output M12, axial, 4 poles | **SA12** |
| Connector output M12, radial, 4 poles | SR12 |
| Cable output, axial, 2 m, 4 poles | KA02 |
| Cable output, axial, 5 m, 4 poles | KA05 |
| Cable output, axial, 10 m, 4 poles [1] | KA10 |

| **Version** | |
|---|---|
| Standard | - |
| Sensor with options | O |

[1] larger lengths on request
[2] for more information about TEDS connectors see here
**Bold text:** standard with shorter lead time

| **Option** | **Description (see page 9)** |
|---|---|
| L05 | Improved linearity ±0.05 % |
| IN | Inverted output signal |
| COR | Synthetic wire rope (Coramid) |
| M4 | Rope fixation M4 |
| RI | Rope fixation eyelet |
| ZH | Cylindrical pin |
| ZR | Cylindrical pin with carbine ring |
| IP67 | Protection class IP67 |
| CP | Corrosion protection |
| ICP | Increased corrosion protection |
| T40 | Increased temperature range -40...+85 °C |
| SP61 | Snapping protection (ranges 10 to 15) |
| SP62 | Snapping protection (ranges 20 to 42.5) |
| TD | TEDS: assembling [2] |
| TDP | TEDS: assembling + programming [2] |
| TDPS | TEDS: assembling + programming + 35 measurement points [2] |

| **Option** | **Not combinable with** |
|---|---|
| L05 | 5R, 10R |
| COR | SP61, SP62 |
| M4 | CP, ICP |
| RI | CP, ICP |
| ZH | CP, ICP |
| ZR | CP, ICP |
| IP67 | ICP |
| CP | M4, RI, ZH, ZR, ICP, SP61, SP62 |
| ICP | M4, RI, ZH, ZR, IP67, CP, SP61, SP62 |
| T40 | SP61, SP62 |
| SP61 | MR >15 m, COR, CP, ICP, T40 |
| SP62 | MR <20 m, MR 42.5 m, COR, CP, ICP, T40 |
| TD | 1R, 5R, 10R, SA12, SR12, TDP, TDPS |
| TDP | 1R, 5R, 10R, SA12, SR12, TD, TDPS |
| TDPS | 1R, 5R, 10R, SA12, SR12, TD, TDP |

## ORDER CODE DIGITAL OUTPUT INCREMENTAL

**SX135 – □ – □ – □ – □ – □**

| | |
|---|---|
| **Measurement range MR [m]**<br>10 / 12 / 15 / 20 / 25 / 30 / 35 / 40 / 42.5 | |
| **Resolution [Pulses/mm]**<br>0.3 / 3 / **6** / **15** | |
| **Output signal**<br>Line driver RS422 (TTL)<br>Push-Pull (HTL) | <br>**L**<br>**G** |
| **Connection**<br>Connector output M23, radial, 12 pins<br>Connector output M23, axial, 12 pins<br>Connector output M12, radial, 8 pins<br>Connector output M12, axial, 8 pins<br>Cable output, radial, 2 m [1]<br>Cable output, radial, 5 m [1]<br>Cable output, radial, 10 m [1), 2)]<br>Cable output, axial, 2 m [1]<br>Cable output, axial, 5 m [1]<br>Cable output, axial, 10 m [1), 2)] | <br>SR23<br>SA23<br>**SR12**<br>SA12<br>KR02<br>KR05<br>KR10<br>KA02<br>KA05<br>KA10 |
| **Version**<br>Standard<br>Sensor with options | <br>-<br>O |

| **Option** | **Description (see page 9)** |
|---|---|
| K1 | Cable/connector orientation top |
| K2 | Cable/connector orientation left |
| K3 | Cable/connector orientation bottom |
| L02 | Improved linearity ±0.02 % |
| COR | Synthetic wire rope (Coramid) |
| M4 | Rope fixation M4 thread |
| RI | Rope fixation eyelet |
| ZH | Cylindrical pin |
| ZR | Cylindrical pin with carbine ring |
| IP67 | Protection class IP67 |
| CP | Corrosion protection |
| SP61 | Snapping protection (ranges 10 to 15) |
| SP62 | Snapping protection (ranges 20 to 42.5) |

| **Option** | **Not combinable with** |
|---|---|
| L02 | Resolution 0.3/3 |
| COR | SP61, SP62 |
| M4 | CP |
| RI | CP |
| ZH | CP |
| ZR | CP |
| CP | M4, RI, ZH, ZR, SP61, SP62 |
| SP61 | MR >15 m, COR, CP |
| SP62 | MR <20 m, MR 42.5 m, COR, CP |

[1] Line driver: 10 poles / Push-Pull: 8 poles
[2] larger lengths on request
**Bold text:** standard with shorter lead time

## ORDER CODE DIGITAL OUTPUT ABSOLUTE CANOPEN (WCAN)

**SX135 – □ – □ – □ – □**

| | |
|---|---|
| **Measurement range MR [m]**<br>10 / 12 / 15 / 20 / 25 / 30 / 35 / 40 / 42.5 | |
| **Output signal**<br>CANopen | <br>WCAN |
| **Connection**<br>Connector output M12, axial, 5 poles<br>Connector output M12, radial, 5 poles<br>Cable output, axial, 2 m, 5 poles<br>Cable output, axial, 5 m, 5 poles<br>Cable output, axial, 10 m, 5 poles [1] | <br>SA12<br>SR12<br>KA02<br>KA05<br>KA10 |
| **Version**<br>Standard<br>Sensor with options | <br>-<br>O |

[1] larger lengths on request

| **Option** | **Description (see page 9)** |
|---|---|
| L05 | Improved linearity ±0.05 % |
| COR | Synthetic wire rope (Coramid) |
| M4 | Rope fixation M4 |
| RI | Rope fixation eyelet |
| ZH | Cylindrical pin |
| ZR | Cylindrical pin with carbine ring |
| IP67 | Protection class IP67 |
| CP | Corrosion protection |
| ICP | Increased corrosion protection |
| T40 | Increased temperature range -40...+85 °C |
| SP61 | Snapping protection (ranges 10 to 15) |
| SP62 | Snapping protection (ranges 20 to 42.5) |

| **Option** | **Not combinable with** |
|---|---|
| COR | SP61, SP62 |
| M4 | CP, ICP |
| RI | CP, ICP |
| ZH | CP, ICP |
| ZR | CP, ICP |
| IP67 | ICP |
| CP | M4, RI, ZH, ZR, ICP, SP61, SP62 |
| ICP | M4, RI, ZH, ZR, IP67, CP, SP61, SP62 |
| T40 | SP61, SP62 |
| SP61 | MR >15 m, COR, CP, ICP, T40 |
| SP62 | MR <20 m, MR 42.5 m, COR, CP, ICP, T40 |

# ORDER CODE DIGITAL OUTPUT ABSOLUTE

**SX135 – □ – □ – □ – □**

| **Measurement range MR [m]** | |
|---|---|
| 10 / 12 / 15 / 20 / 25 / 30 / 35 / 40 / 42.5 | |

| **Output signal** | |
|---|---|
| SSI | SSI |
| CANopen | CAN |
| Profibus DP | PRO |
| EtherCAT | CAT |
| Profinet | NET |

| **Connection** | |
|---|---|
| Connector M12, radial, 8 pins (SSI) | SR12 |
| Connector M23, radial, 12 pins (SSI) | SR23 |
| Cable output, radial, 1 m, PVC (SSI) | KR01 |
| Cable output, radial, 5 m, PVC (SSI) | KR05 |
| Cable gland, radial (CAN, PRO) [1] | KVBH |
| Connector 2 x M12, radial, 5 pin (CAN) [1] | SR12 |
| Connector 3 x M12, radial, 5 pin (PRO) [1] | SR12 |
| Connector 3 x M12, radial, 4 pin (CAT, NET) [1] | SR12 |

| **Version** | |
|---|---|
| Standard | - |
| Sensor with options | O |

[1] removable bus terminal cover

| **Option** | **Description (see page 9)** |
|---|---|
| K1 | Cable/connector orientation top |
| K2 | Cable/connector orientation left |
| K3 | Cable/connector orientation bottom |
| COR | Synthetic wire rope (Coramid) |
| M4 | Rope fixation M4 thread |
| RI | Rope fixation eyelet |
| ZH | Cylindrical pin |
| ZR | Cylindrical pin with carbine ring |
| IP67 | Protection class IP67 |
| CP | Corrosion protection |
| SP61 | Snapping protection (ranges 10 to 15) |
| SP62 | Snapping protection (ranges 20 to 42.5) |

| **Option** | **Not combinable with** |
|---|---|
| COR | SP61, SP62 |
| M4 | CP |
| RI | CP |
| ZH | CP |
| ZR | CP |
| CP | M4, RI, ZH, ZR, SP61, SP62 |
| SP61 | MR >15 m, COR, CP |
| SP62 | MR <20 m, MR 42.5 m, COR, CP |

## GENERAL ACCESSORIES

| | |
|---|---|
| UR2 | deflection pulley (for rope diameter 0.5 mm) |
| MGG2 | magnetic clamp |
| RCS-SX135 [1)] | rope cleaner |

| | |
|---|---|
| SV1-XXXX | rope extension (150 mm up to 4995 mm) |
| SV2-XXXX | rope extension (5000 mm up to 19995 mm) |
| SV3-XXXX | rope extension (20000 mm up to 40000 mm) |

[1)] please note that the maximum measuring range is reduced by 29 mm when using the rope cleaner. The RCS is not compatible with the option RI.

## ACCESSORIES ANALOG OUTPUT

| **Cable with connector (female) M12, 4 poles, shielded, IP67** | |
|---|---|
| K4P2M-S-M12 | 2 m, straight connector |
| K4P5M-S-M12 | 5 m, straight connector |
| K4P10M-S-M12 | 10 m, straight connector |
| K4P2M-SW-M12 | 2 m, angular connector |
| K4P5M-SW-M12 | 5 m, angular connector |
| K4P10M-SW-M12 | 10 m, angular connector |

| **Mating connector (female) M12, 4 poles, for self assembly** | |
|---|---|
| D4-G-M12-S | straight connector |
| D4-W-M12-S | angular connector |

| **Digital displays for sensors with analog output, 2 channel** | |
|---|---|
| WAY-AX-S | touch screen, supply: 18...30 VDC |
| WAY-AX-AC | touch screen, supply: 115...230 VAC |

For more information and options please refer to the WAY-AX data sheet.

## ACCESSORIES DIGITAL OUTPUT INCREMENTAL

| **Cable with connector (female) M12, 8 poles, shielded, IP67** | |
|---|---|
| K8P2M-S-M12 | 2 m, straight connector |
| K8P5M-S-M12 | 5 m, straight connector |
| K8P10M-S-M12 | 10 m, straight connector |
| K8P2M-SW-M12 | 2 m, angular connector |
| K8P5M-SW-M12 | 5 m, angular connector |
| K8P10M-SW-M12 | 10 m, angular connector |

| **Cable with connector (female) M23, 12 poles, shielded, IP67** | |
|---|---|
| K12P2M-S-M23 | 2 m, straight connector |
| K12P5M-S-M23 | 5 m, straight connector |
| K12P10M-S-M23 | 10 m, straight connector |

| **Mating connector (female) M12, 8 poles, for self assembly** | |
|---|---|
| D8-G-M12-S | straight connector |
| D8-W-M12-S | angular connector |

| **Mating connector (female) M23, 12 poles, for self assembly** | |
|---|---|
| CON012-S | straight connector, metal housing |

| **Digital displays for sensors with HTL output, 2 channel** | |
|---|---|
| WAY-DX-S | touch screen, supply: 18...30 VDC |
| WAY-DX-AC | touch screen, supply: 115...230 VAC |

For more information and options please refer to the WAY-DX data sheet.

| **Digital displays for sensors with HTL or TTL output, 2 channel** | |
|---|---|
| WAY-DXM-S | touch screen, supply: 18...30 VDC |
| WAY-DXM-AC | touch screen, supply: 115...230 VAC |

For more information and options please refer to the WAY-DXM data sheet.

## ACCESSORIES DIGITAL OUTPUT ABSOLUTE CANOPEN (WCAN)

| **Cable with connector (female) M12, 5 poles, shielded, IP67** | |
|---|---|
| K5P2M-S-M12 | 2 m, straight connector |
| K5P2M-SW-M12 | 2 m, angular connector |

## ACCESSORIES DIGITAL OUTPUT ABSOLUTE SSI

| Cable with connector (female) M12, 8 poles, shielded, IP67 | |
|---|---|
| K8P2M-S-M12 | 2 m, straight connector |
| K8P5M-S-M12 | 5 m, straight connector |
| K8P10M-S-M12 | 10 m, straight connector |
| K8P15M-S-M12 | 15 m, straight connector |

| Cable with connector (female) M23, 12 poles, shielded, IP67 | |
|---|---|
| K12P2M-S-M23 | 2 m, straight connector |
| K12P5M-S-M23 | 5 m, straight connector |
| K12P10M-S-M23 | 10 m, straight connector |
| K12P15M-S-M23 | 15 m, straight connector |

| Mating connector (female) M12, 8 poles, for self assembly | |
|---|---|
| D8-G-M12-S | straight connector |
| D8-W-M12-S | angular connector |

| Mating connector (female) M23, 12 poles, for self assembly | |
|---|---|
| CON012-S | straight connector, metal housing |

| Digital displays for sensors with SSI output, 2 channel | |
|---|---|
| WAY-SX-S | touch screen, supply: 18...30 VDC |
| WAY-SX-AC | touch screen, supply: 115...230 VAC |

For more information and options please refer to the WAY-SX data sheet.

## ACCESSORIES DIGITAL OUTPUT ABSOLUTE CANOPEN (CAN)

| Cable with connector M12, 5 poles, shielded, IP67 | |
|---|---|
| K5P2M-B-M12-CAN | 2 m, female connector to open ends |
| K5P2M-SB-M12-CAN | 2 m, female connector to male connector |
| K5P2M-S-M12-CAN | 2 m, male connector to open ends |

## ACCESSORIES DIGITAL OUTPUT ABSOLUTE PROFIBUS

| Cable with connector M12, 5 poles, shielded, IP67 | |
|---|---|
| K5P2M-B-M12-PROF | 2 m, female connector to open ends |
| K5P2M-SB-M12-PROF | 2 m, female connector to male connector |
| K5P2M-S-M12-PROF | 2 m, male connector to open ends |

| Other | |
|---|---|
| M12-PROF-AW | termination resistor |

## ACCESSORIES DIGITAL OUTPUT ABSOLUTE ETHERCAT AND PROFINET

| Cable with connector (male) M12, 4 poles, shielded, IP67 | |
|---|---|
| K4P2M-S-M12-CAT | 2 m, straight connector |
| K4P5M-S-M12-CAT | 5 m, straight connector |
| K4P10M-S-M12-CAT | 10 m, straight connector |

| Cable with connector M12, 4 poles, shielded, IP67 | |
|---|---|
| K4P2M-SS-M12-CAT | 2 m, male connector to male connector |
| K4P5M-SS-M12-CAT | 5 m, male connector to male connector |
| K4P10M-SS-M12-CAT | 10 m, male connector to male connector |

Please note, that an additional cable is required for the power supply. Appropriate cables can be chosen from the list of the „Accessories Analog Output".

Subject to change without prior notice.

**WayCon Positionsmesstechnik GmbH**
Email: info@waycon.de
Internet: www.waycon.biz

**Headquarters Munich**
Siemensstr. 5
85521 Ottobrunn
Tel. +49 (0)89 67 97 13-0

**Office Cologne**
Auf der Pehle 1
50321 Brühl
Tel. +49 (0)89 67 97 13-100