DRAW WIRE SENSOR

Links to further documents for this series:
Installation guide
Manual for CANopen
Teach electronics Squeezer
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*

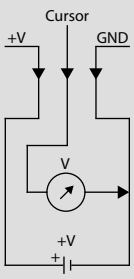
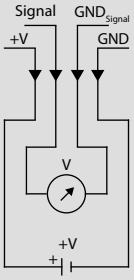
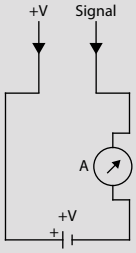
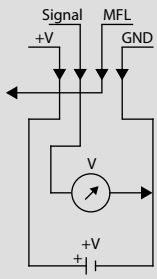
Content

TECHNICAL DATA ANALOG OUTPUT

Measurement range MR [1]	[m]	10	12	15	20	25	30	35	40	42.5
Linearity	[%]	±0.1								
Improved linearity (optional)	[%]	±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

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

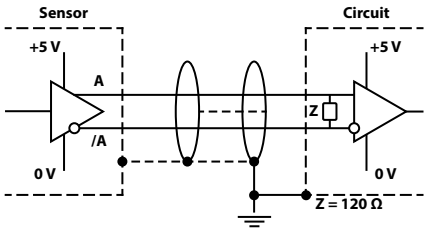
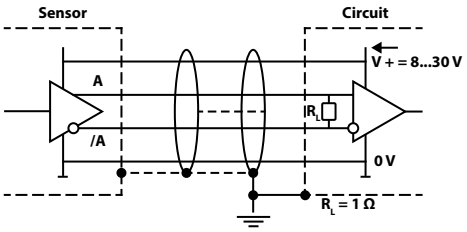
MFL = multi-functional line

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

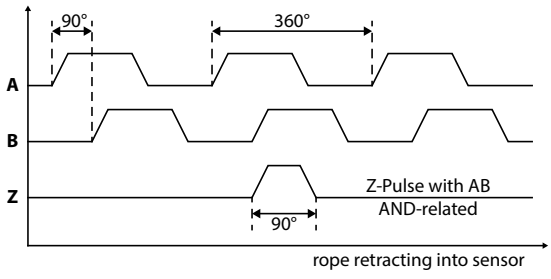
ELECTRICAL DATA DIGITAL OUTPUT INCREMENTAL

Output type		**Line driver L 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								
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)
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] [bit]	24.58 12	24.58 13			
Resolution max.	[pulses/mm] [bit]	- -	196.61 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) • Monitoring of acyclic data (e.g. IMO, electronic name plate, encoder parameters, warnings and error messages, preset) • Setting of preset values • 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

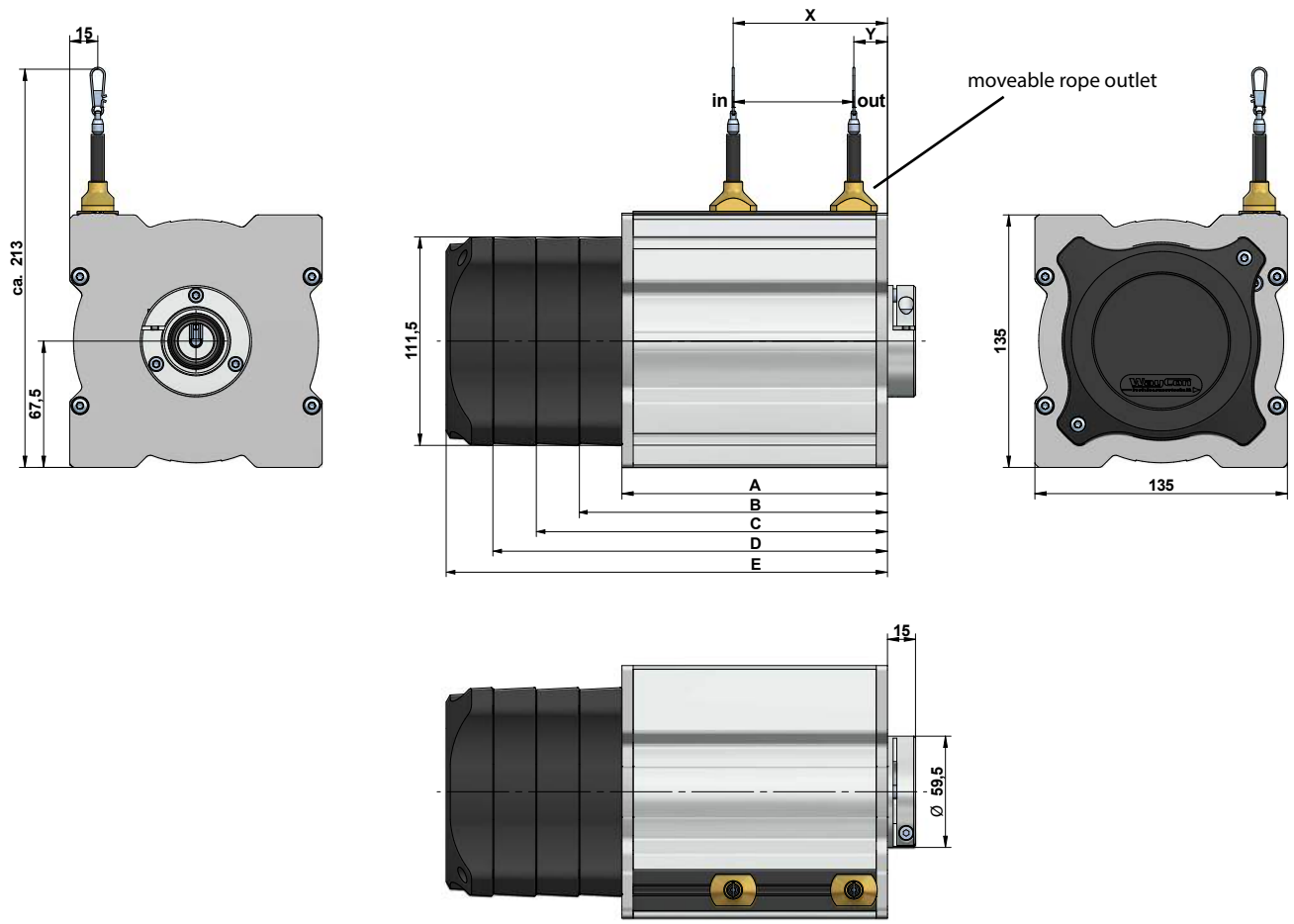
Parameters of the Profibus DP interface (8.5868.123X.3112)	
Code	Binary
Interface	Profibus DP 2.0 Standard (DIN 19245 Part 3), RS485 Driver galvanically isolated
Protocol	Profibus Encoder Profile V1.1 Class1 and Class2 with manufacturer-specific add-ons
Baud rate	maximum 12 Mbit/s
Device address	1...127 (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

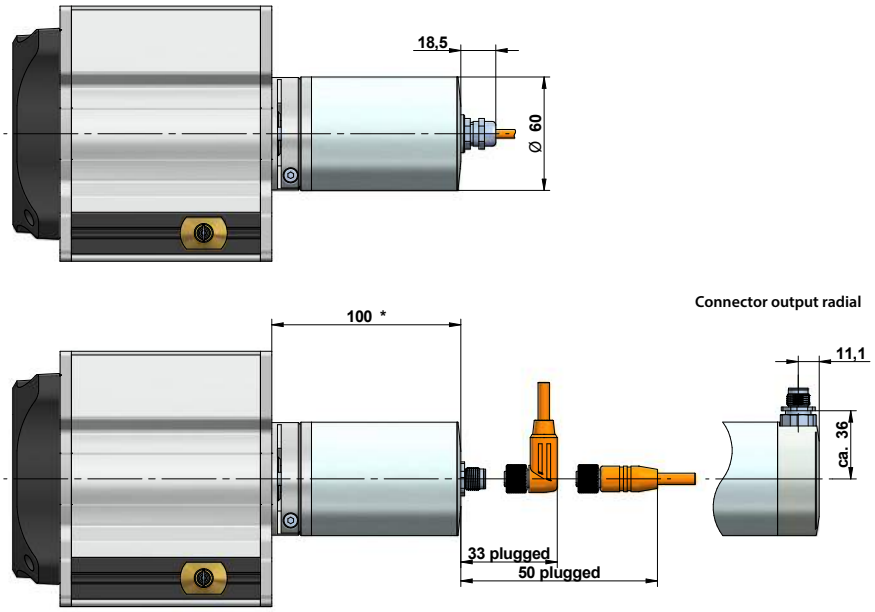
Position rope outlet at ...	10 m	12 m	15 m	20 m	25 m
... start of measurement range (X) [1]	35.5	38.5	43	50.5	58
... end of measurement range (Y) [1]	20.5	20.5	20.5	20.5	20.5

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.

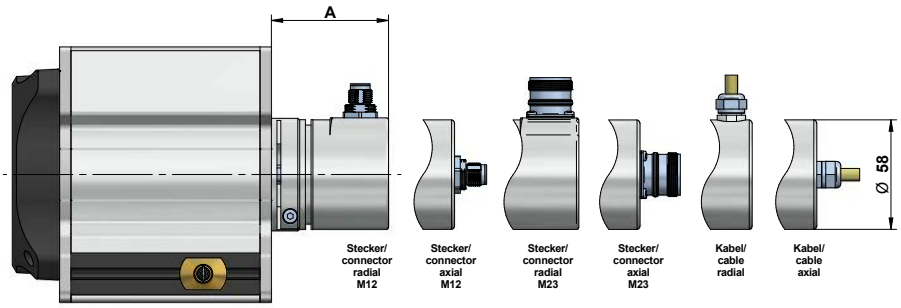
TECHNICAL DRAWING ANALOG OUTPUT AND DIGITAL OUTPUT WCAN



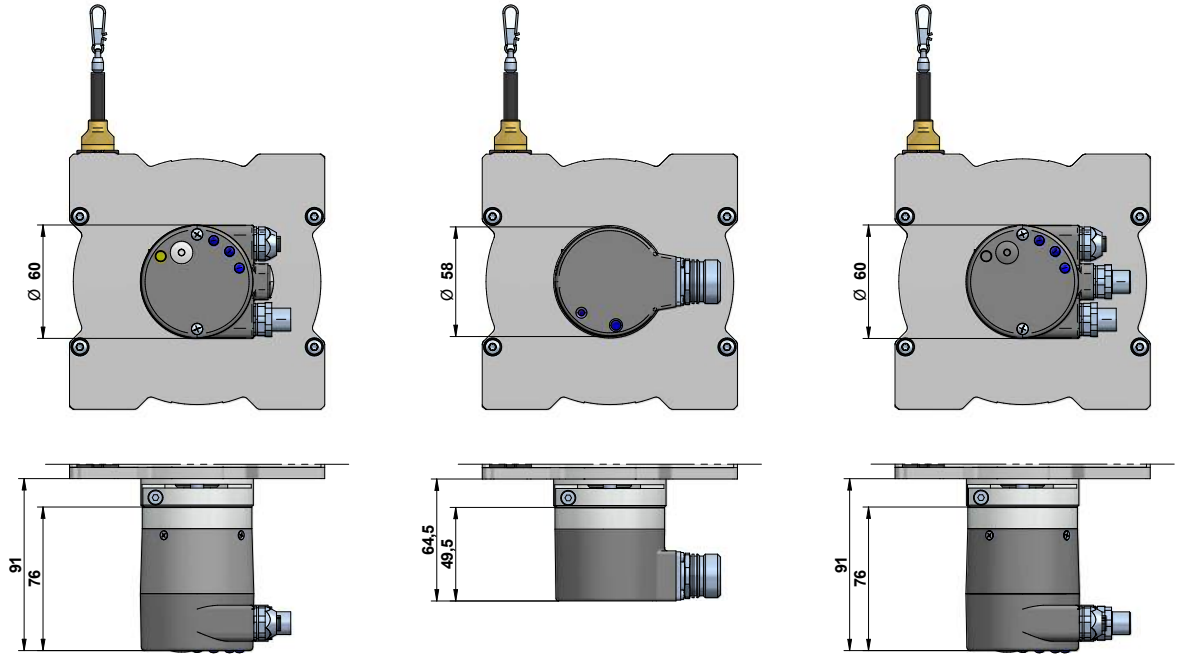
* For sensors with measurement ranges of 30 m or greater and radial connector output the encoder length is 120 mm instead of 100 mm.

TECHNICAL DRAWING DIGITAL OUTPUT INCREMENTAL

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

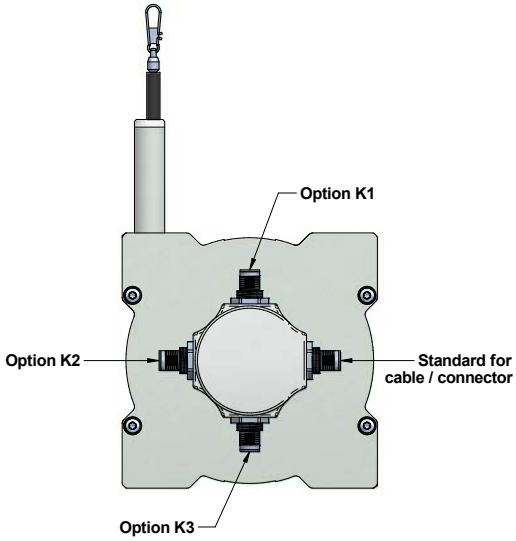


TECHNICAL DRAWING DIGITAL OUTPUT ABSOLUTE



CANopen | SSI | Profibus, Profinet, EtherCAT

TECHNICAL DRAWING OPTIONS CHANGED ROPE OUTLET AND CABLE OUTPUT

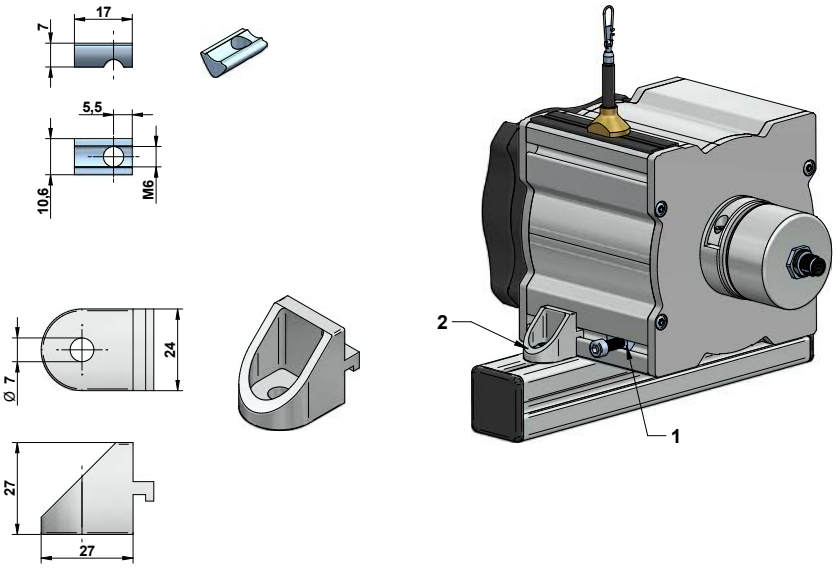


MOUNTING OPTIONS

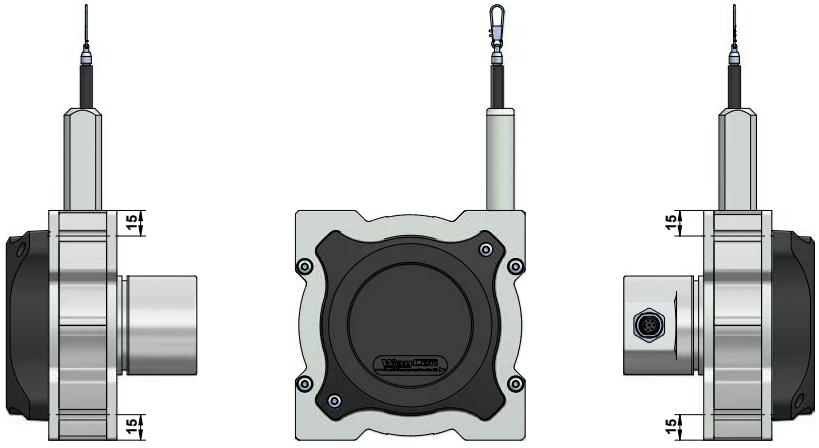
1. by using the grooves in the sensor housing
The included slot nuts can be easily inserted into the grooves of the sensor housing. The slot nuts have a metric M6 thread. Each sensor with a measurement range of 20 m or lower is delivered with two slot nuts. Each sensor with a measurement range of 25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

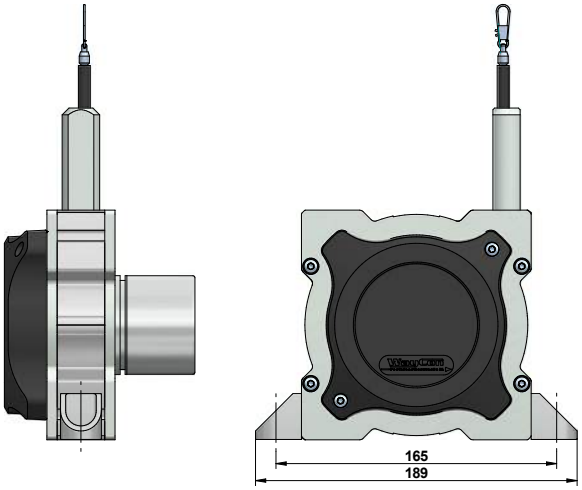
Note:
The grooves of the sensor housing, the slot nuts and brackets are compatible to the aluminium building kit system from *item Industrietechnik GmbH*.



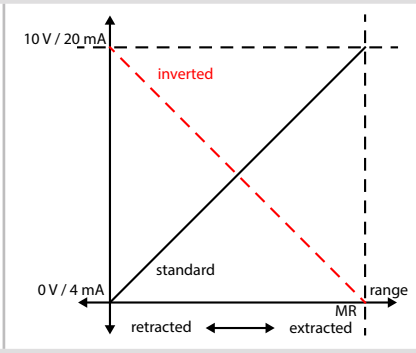
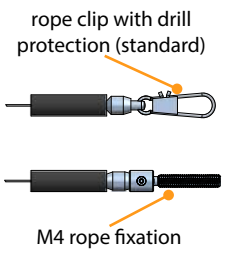
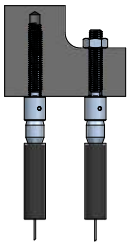
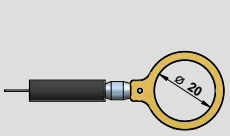
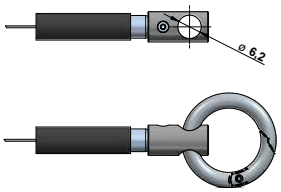
Position of the grooves



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: Standard: sideways, opposite to the rope outlet K1: at the top K2: sideways, same side as the rope outlet 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. 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. Inside diameter 20 mm  
Rope fixation with cylindrical pin and M6 through bore	ZH, ZR	ZH: cylindrical pin with M6 through bore 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 80 % 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 TDP: Assembling + programming TDPS: Assembling + programming + 35 measurement points

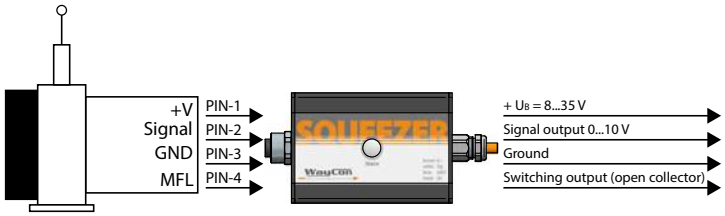
ACCESSORIES

Teach electronics - Squeezer

Draw wire sensors with the analogue output versions 5VT and 10VT are equipped with teachable, internal electronics, called VT-Electronics. The signals provided by the sensor's potentiometer are digitized by the VT-Electronics. This digital information is first processed by the electronics, then transformed back and given out as an analogue output signal 0 to 5 V or 0 to 10 V.

The digitization offers two possibilities of adjustment, by which the sensor can be configured individually using the Squeezer:

- Teaching of the measurement range. After a successful teaching process, the squeezer can be pulled off the sensor and be replaced by a standard cable or connector.
- Setting an individual switching point. The squeezer allows the setting of an individual switching point open collector. The switching signal is emitted through the multi-functional line MFL.



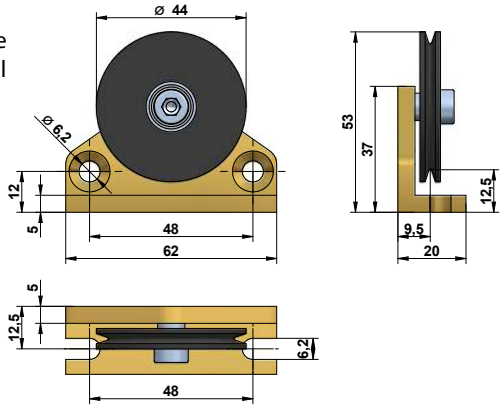
A detailed description of the functions can be found in the Squeezer manual.

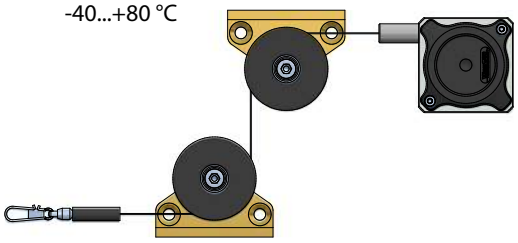
Deflection pulley - UR2

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

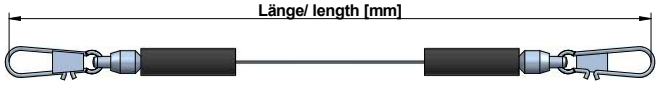
For bridging a greater distance between the measuring target and the sensor a rope extension can be applied. The rope clip must not be guided over the deflection pulley.

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)

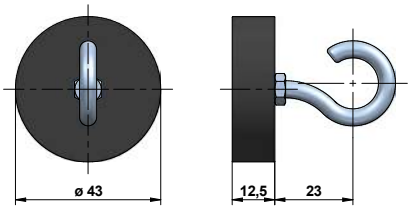
SV3-XXXX: rope extension (20000...40000 mm)



Magnetic clamp - MGG1

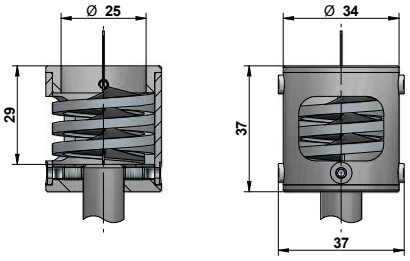
Use the magnetic clamp to quickly attach the rope to metallic objects without any assembly time. A rubber coating provides gentle contact (e. g. on varnished surfaces) and prevents from slipping due to vibration.

The magnet consists of a neodym core for an increased adhesive force of 260 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**
M4	CP, ICP
RI	CP, ICP
ZH	CP, ICP
ZR	CP, ICP
IP67	ICP
CP	M4, RI, ZH, ZR, ICP
ICP	M4, RI, ZH, ZR, IP67, CP
T40	SP61, SP62
SP61	MR >15 m, CP, ICP, T40
SP62	MR <20 m, MR 42.5 m, 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] 10 / 12 / 15 / 20 / 25 / 30 / 35 / 40 / 42.5	
Resolution [Pulses/mm] 0.3 / 3 / **6** / **15**	
Output signal Line driver RS422 (TTL) Push-Pull (HTL)	 **L** **G**
Connection Connector output M23, radial, 12 pins Connector output M23, axial, 12 pins Connector output M12, radial, 8 pins Connector output M12, axial, 8 pins Cable output, radial, 2 m [1] Cable output, radial, 5 m [1] Cable output, radial, 10 m [1), 2)] Cable output, axial, 2 m [1] Cable output, axial, 5 m [1] Cable output, axial, 10 m [1), 2)]	 SR23 SA23 **SR12** SA12 KR02 KR05 KR10 KA02 KA05 KA10
Version Standard Sensor with options	 - 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
M4	CP
RI	CP
ZH	CP
ZR	CP
CP	M4, RI, ZH, ZR
SP61	MR >15 m, CP
SP62	MR <20 m, MR 42.5 m, 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] 10 / 12 / 15 / 20 / 25 / 30 / 35 / 40 / 42.5	
Output signal CANopen	 WCAN
Connection Connector output M12, axial, 5 poles Connector output M12, radial, 5 poles Cable output, axial, 2 m, 5 poles Cable output, axial, 5 m, 5 poles Cable output, axial, 10 m, 5 poles [1]	 SA12 SR12 KA02 KA05 KA10
Version Standard Sensor with options	 - O

[1] larger lengths on request

Option	**Description (see page 9)**
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**
M4	CP, ICP
RI	CP, ICP
ZH	CP, ICP
ZR	CP, ICP
IP67	ICP
CP	M4, RI, ZH, ZR, ICP
ICP	M4, RI, ZH, ZR, IP67, CP
SP61	MR >15 m, CP, ICP, T40
SP62	MR <20 m, MR 42.5 m, 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**
M4	CP
RI	CP
ZH	CP
ZR	CP
CP	M4, RI, ZH, ZR
SP61	MR >15 m, CP
SP62	MR <20 m, MR 42.5 m, CP

GENERAL ACCESSORIES

UR2	deflection pulley (for rope diameter 0.5 mm)
MGG1	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

Connection cable sensor to Squeezer (female to male)	
K4P1,5M-SB-M12	1.5 m, shielded, 4 poles

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.

Teach accessories for VT outputs	
SQUEEZER2M	accessory for VT output, 2 m cable
SQUEEZER5M	accessory for VT output, 5 m cable
SQUEEZER10M	accessory for VT output, 10 m cable

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".

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