

# DRAW WIRE SENSOR

HM 2102



## Series SX draw wire mechanics for encoder assembly

### Key-Features:

- Fast and easy encoder mounting
- Measurement ranges from 1 to 42.5 m
- Linearity  $\pm 0.05$  % of full range (with encoder)
- Optional high corrosion protection
- Temperature range -20...+85 °C (optional -40 °C)
- High dynamics
- Customised versions available

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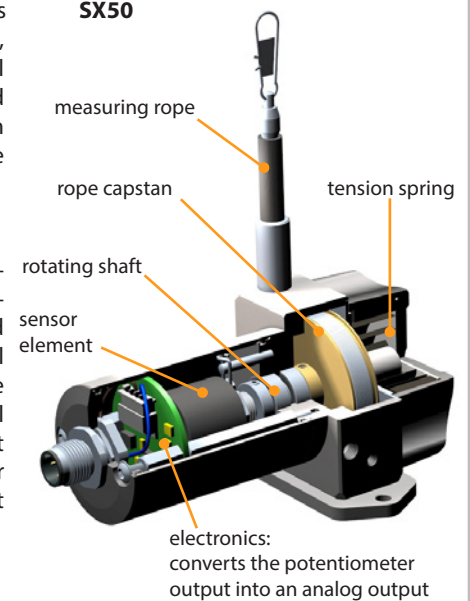
## INTRODUCTION

WayCon Positionsmesstechnik GmbH is a manufacturer of high quality draw wire position sensors for industrial use. Due to its small overall size, its short assembly time and its possible customisation, the SX sensor technology is a cost-effective and flexible solution for a wide range of industrial applications. The dynamics of the draw wire transducer allows a high motion speed and acceleration of the measuring target. Its rugged design and high quality makes applications in harsh industrial environments possible. Special instruments are available with mounting service of encoder on site, as well as customised versions of housing.

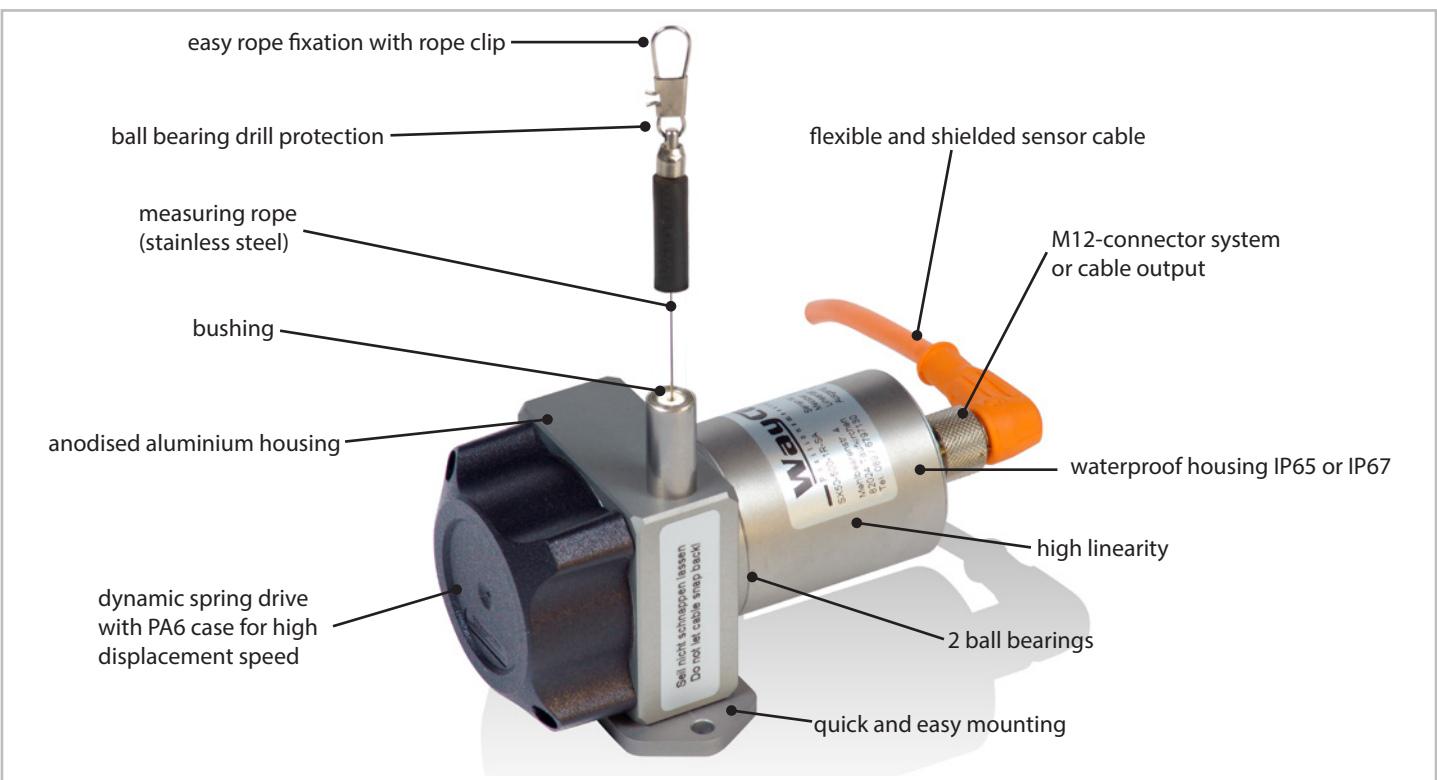
### Sensor principle:

The key component of a draw wire sensor is a highly flexible steel wire rope, that is wound single-layered on an ultra-light capstan. This capstan is connected to the sensor housing by a pre-stressed spring. The end of the steel wire rope, that is equipped with a rope clip gets connected to the target object. As soon as the distance between sensor and target object changes, the steel wire rope gets pulled out of the sensor and is rolled off the capstan (or vice versa). The shaft of the capstan is connected to a potentiometer (for analog output signals), or to an encoder (for digital output signals). If there is a rotation of the capstan due to a change in the distance to the target object, the sensor element will turn proportionally. This way the potentiometer, or the encoder converts a linear movement into a proportional electrical signal. If a standard analog output signal, like 0...10 V or 4...20 mA is needed, the sensor is equipped with additional electronics.

### SX50



## OVERVIEW OF FEATURES



## WARNING NOTICES

- Don't let the rope snap back. If the rope is retracted freely, this may lead to injuries (whiplash effect) and the device may be damaged. Caution when unhooking and retracting the rope into the sensor.
- Never exceed the specified measurement range when extracting the rope!
- Do not try to open the device. The stored energy of the spring drive may lead to injuries when being mishandled.
- Do not touch the rope when operating the sensor.
- Avoid guiding the rope over edges or corners. Use a deflection pulley instead.
- Do not operate the sensor if the rope is buckled or damaged. A ripping of the rope may lead to injuries or a damaging of the sensor.

## TECHNICAL DATA SX80 MECHANICS

Measurement range	[mm]	1000	1500	2000	2500	3000
Linearity	[%]	±0.05 (with encoder output)				
Sheave circumference	[mm]	200				
Temperature	[°C]	-20...+85 / optional: -40...+85				
Extraction force F <sub>min</sub>	[N]	4.2			5	
Extraction force F <sub>max</sub>	[N]	5.4			6.4	
Velocity V <sub>max</sub>	[m/s]	8				
Acceleration a <sub>max</sub>	[m/s²]	120				
Weight	[g]	700 to 900, depending on the measurement range				
Housing		aluminium, anodised, spring case PA6				
Encoder requirements	[mm]	clamping flange diameter: 36, shaft diameter: 10, shaft length: 20				

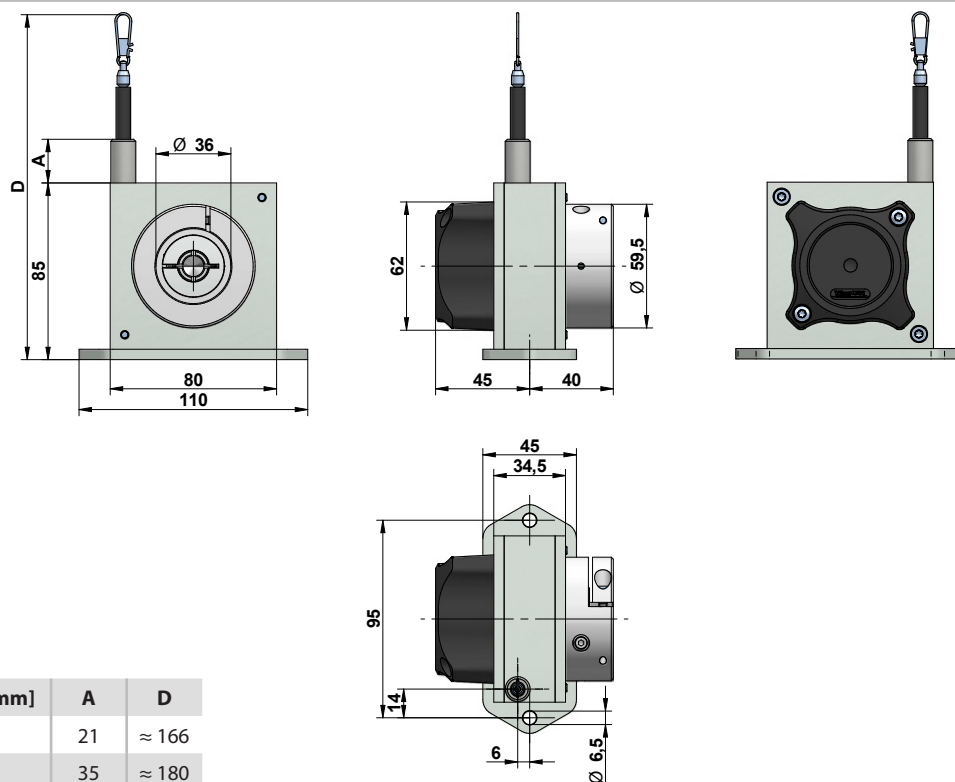
## TECHNICAL DATA SX120 MECHANICS

Measurement range	[mm]	3125	4000	5000
Linearity	[%]	±0.05 (with encoder output)		
Sheave circumference	[mm]	317.68		
Temperature	[°C]	-20...+85 / optional: -40...+85		
Extraction force $F_{min}$	[N]	8		
Extraction force $F_{max}$	[N]	10	11	11.6
Velocity $V_{max}$	[m/s]	8		
Acceleration $a_{max}$	[m/s <sup>2</sup> ]	120		
Weight	[g]	1300 to 1600, depending on the measurement range		
Housing		aluminium, anodised, spring case PA6		
Encoder requirements	[mm]	clamping flange diameter: 36, shaft diameter: 10, shaft length: 20		

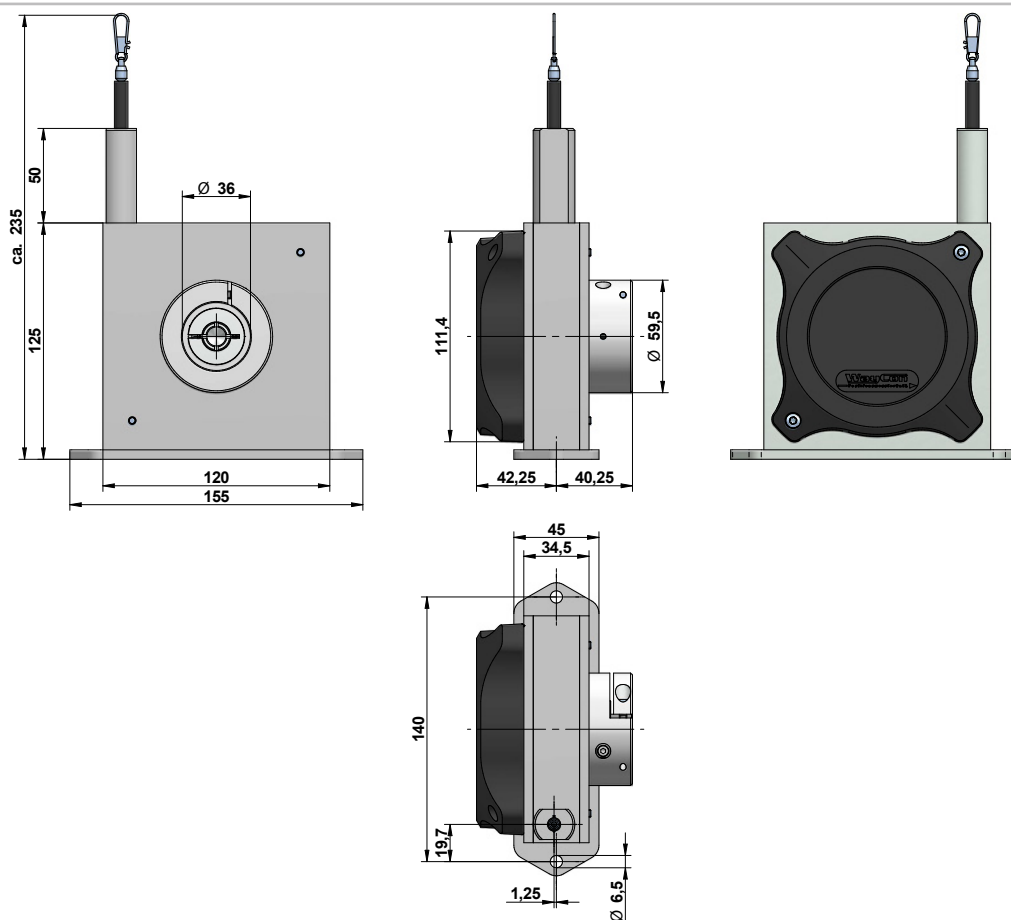
## TECHNICAL DATA SX135 MECHANICS

Measurement range	[m]	6	7	8	10	12	15	20	25	30	35	40	42.5
Linearity	[%]	±0.05 (with encoder output)											
Sheave circumference	[mm]	357.14				333.33							
Temperature	[°C]	-20...+85 / optional: -40...+85											
Extraction force F <sub>min</sub>	[N]	7.8	8.2		4.8		6.8	6.4	7.8	6.4	7.4	5.4	
Extraction force F <sub>max</sub>	[N]	13.6	15	15.2	7.2		11.2	9.2	11.4	9.6	11.6	9	
Velocity V <sub>max</sub>	[m/s]	8			6				5				
Acceleration a <sub>max</sub>	[m/s²]	120			80				60				
Weight	[g]	3200 to 5000, depending on the measurement range											
Housing		aluminium, anodised, spring case PA6											
Encoder requirements	[mm]	clamping flange diameter: 36, shaft diameter: 10, shaft length: 20											

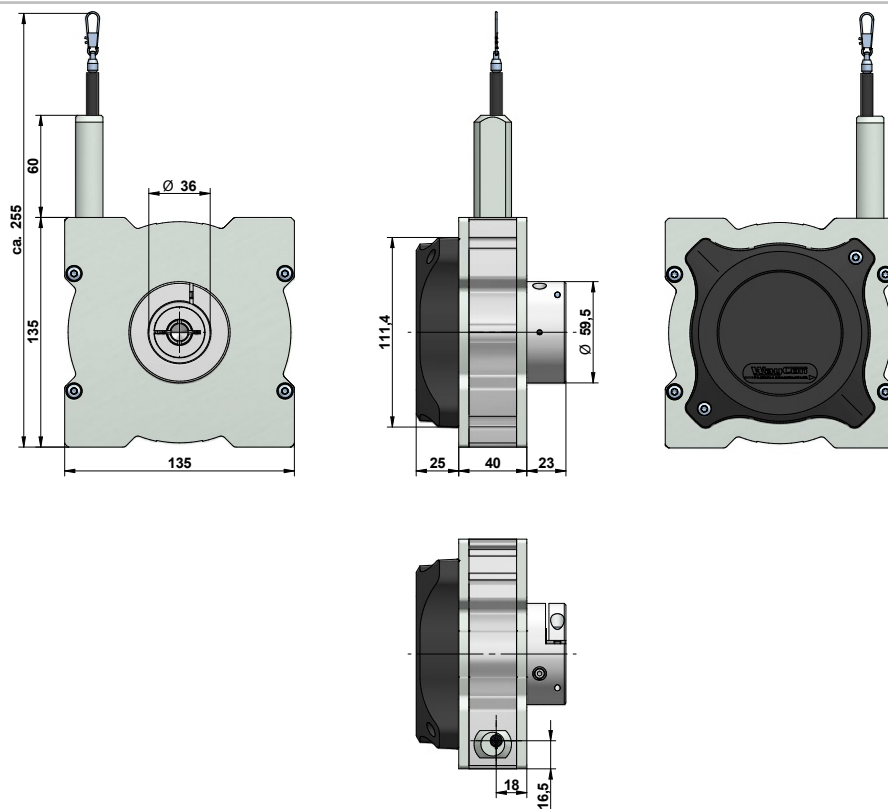
## TECHNICAL DRAWING SX80 MECHANICS



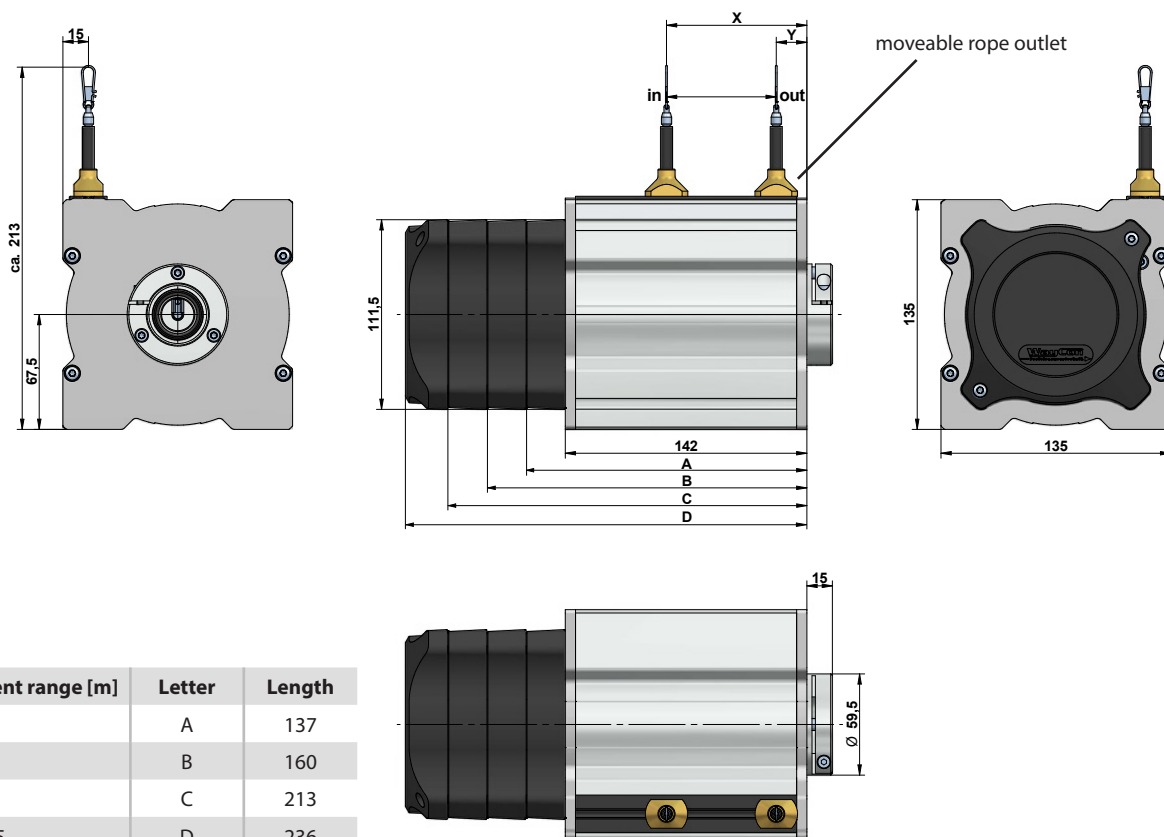
## TECHNICAL DRAWING SX120 MECHANICS



## TECHNICAL DRAWING SX135 MECHANICS MEASUREMENT RANGE UP TO 8 m



## TECHNICAL DRAWING SX135 MECHANICS MEASUREMENT RANGE FROM 10 m



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

Position rope outlet at ...	10 m	12 m	15 m	20 m	25 m	30 m	35 m	40 m	42.5 m
... start of measurement range (X)	33	36	41	48	56	63	71	78	82
... end of measurement range (Y)	18	18	18	18	18	18	18	18	18

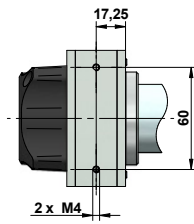
## TECHNICAL DRAWING MOUNTING OPTIONS SX80 AND SX120

### Mounting: standard rope outlet, rope outlet sideways top (S1)

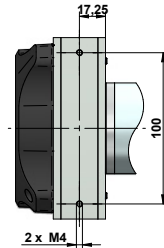
The sensor is usually installed by using the regular mounting plate (see technical drawing above).

By disassembling the mounting plate, there are 2 x M4 threads in the sensor housing for alternative installation.

**SX80**



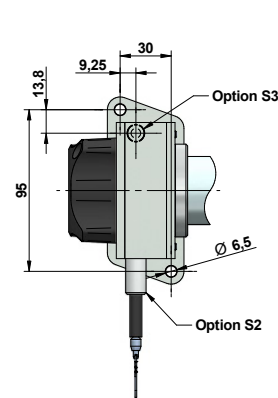
**SX120**



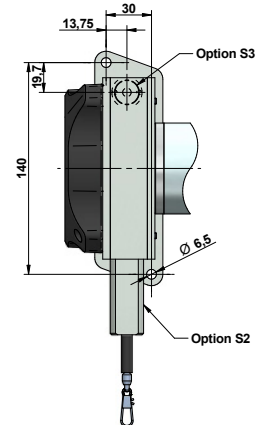
### Mounting: rope outlet sideways bottom (S2), rope outlet bottom (S3)

Sensors with option rope outlet S2 and S3 have a modified base plate:

**SX80**



**SX120**

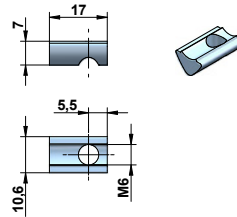


## TECHNICAL DRAWING MOUNTING OPTIONS SX135

### 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.

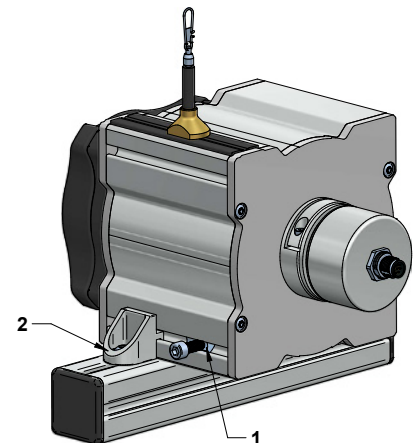
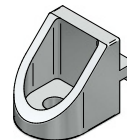
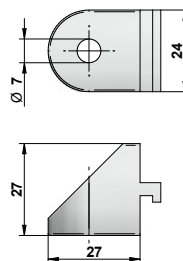
Each sensor with a measurement range of 20 m or lower is delivered with two slot nuts. Each sensor with a measurement range of 25 m or greater is delivered with four slot nuts.



### 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.

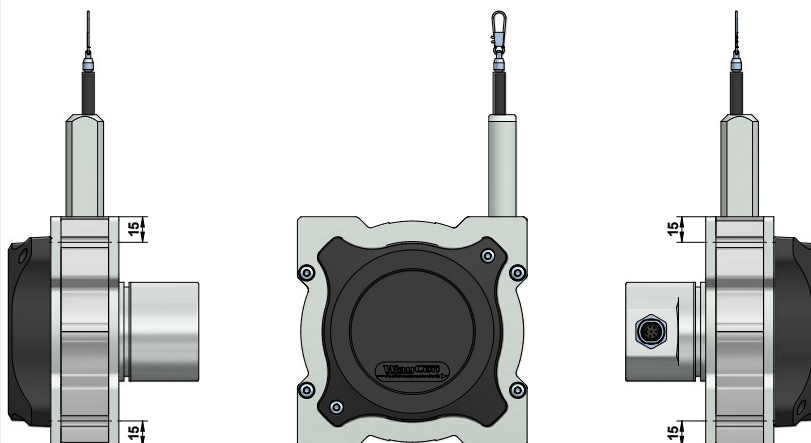
Each sensor with a measurement range of 20 m or lower is delivered with two brackets. Each sensor with a measurement range of 25 m or greater is delivered with four brackets.



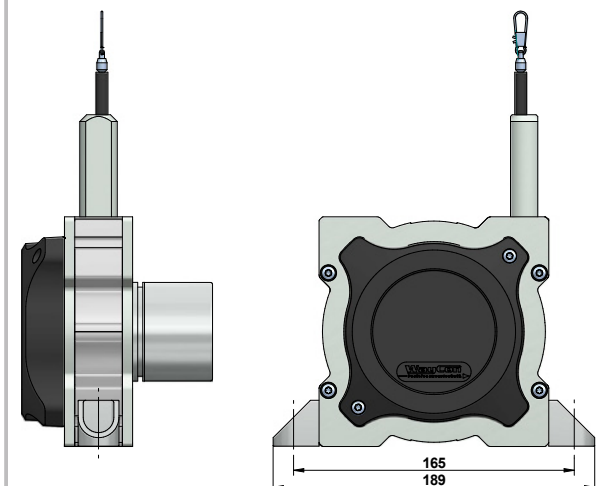
### Note:

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



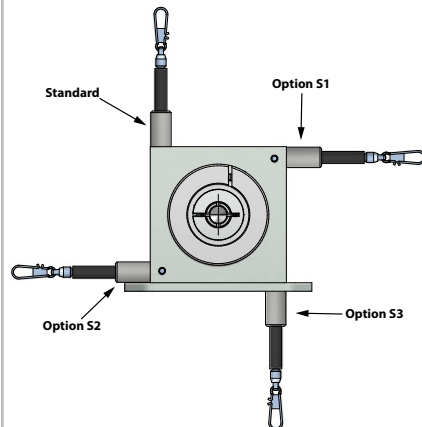
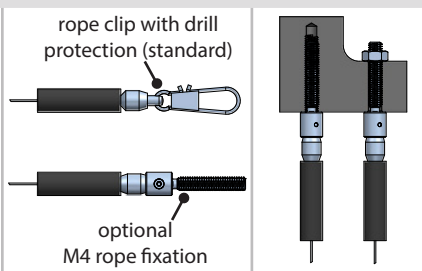
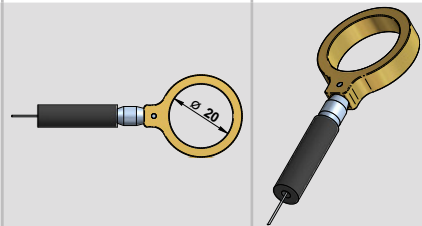
### Mounting by using brackets





## OPTIONS

The following table gives an overview of frequently used options, with which the standard sensors can be equipped. Please pay attention that not all options can be combined. Information on possible combinations can be found in the order codes.

Option	Order code	Description	
Changed rope outlet	S1, S2, S3	Standard: rope outlet at the top S1: rope outlet sideways at the top S2: rope outlet sideways at the bottom S3: rope outlet on the bottom	
Synthetic wire rope (instead of stainless steel wire rope)	COR	Synthetic wire rope, made out of abrasion resistant and enhanced Coramid.	
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	
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 temperature range low	T40	Special components and a low temperature grease make a working temperature down to -40 °C (up to +85 °C) possible.	

## ACCESSORIES

### Deflection pulley - UR2

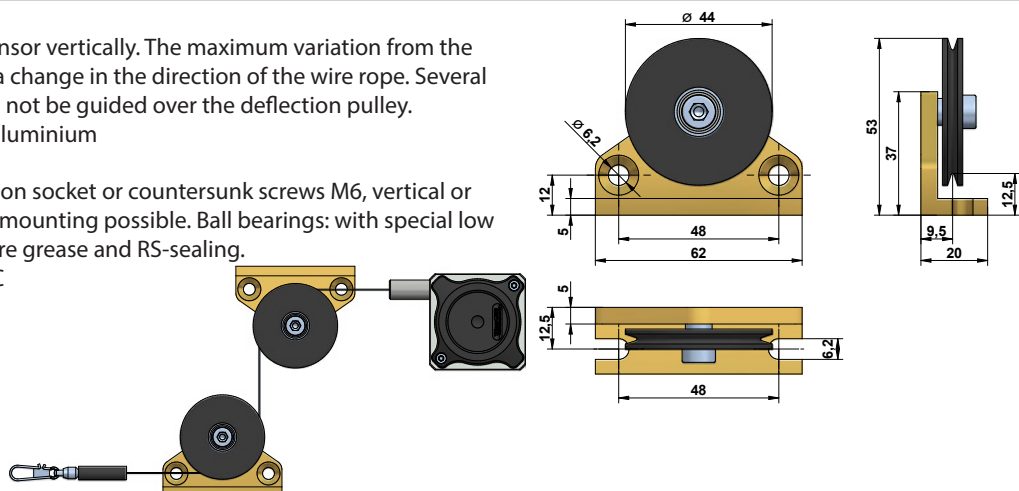
The rope must be extracted from the sensor vertically. The maximum variation from the vertical is 3°. A deflection pulley allows a change in the direction of the wire rope. Several pulleys may be used. The rope clip must not be guided over the deflection pulley.

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



## ACCESSORIES

### Rope extension - SV

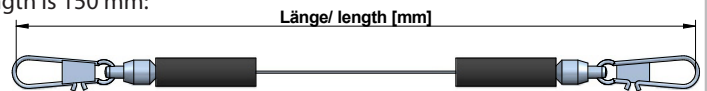
For bridging a greater distance between the measuring target and the sensor a rope extension can be applied. The rope clip must not be guided over the deflection pulley.

Please specify the length needed in your order (XXXX). The minimum length is 150 mm:

SV1-XXXX: rope extension (150...4995 mm)

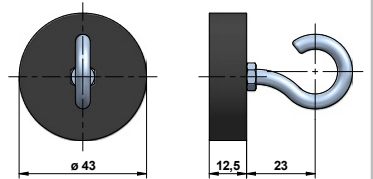
SV2-XXXX: rope extension (5000...19995 mm)

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.



## ORDER CODE SX80 MECHANICS

SX80 —  — F58NK —

#### Measurement range [mm]

1000 / 1500 / 2000 / 2500 / 3000

#### Version

Standard

Sensor with options

-  
O

#### Option

S1

S2

S3

COR

M4

RI

CP

T40

#### Description

rope outlet sideways top

rope outlet sideways bottom

rope outlet bottom

synthetic wire rope (Coramid)

rope fixation M4 thread

rope fixation eyelet

corrosion protection

increased temperature -40...+85 °C

#### Option

COR

M4

RI

CP

#### not combinable with

measurement range 2500 / 3000

CP

CP

M4, RI

## ORDER CODE SX120 MECHANICS

SX120 —  — F58NK —

#### Measurement range [mm]

3125 / 4000 / 5000

#### Version

Standard

Sensor with options

-  
O

#### Option

S1

S2

S3

COR

M4

RI

CP

T40

#### Description

rope outlet sideways top

rope outlet sideways bottom

rope outlet bottom

synthetic wire rope (Coramid)

rope fixation M4 thread

rope fixation eyelet

corrosion protection

increased temperature -40...+85 °C

#### Option

M4

RI

CP

#### not combinable with

CP

CP

M4, RI



## ORDER CODE SX135 MECHANICS MEASUREMENT RANGE UP TO 8 m

SX135 — ☐ — F58NK — ☐

<b>Measurement range [m]</b> 6 / 7 / 8	<input type="checkbox"/>
<b>Version</b> Standard Sensor with options	- O

Option	Description
COR	synthetic wire rope (Coramid)
M4	rope fixation M4 thread
RI	rope fixation eyelet
CP	corrosion protection
T40	increased temperature -40...+85 °C

Option	not combinable with
COR	measurement range 7 / 8
M4	CP
RI	CP
CP	M4, RI

## ORDER CODE SX135 MECHANICS MEASUREMENT RANGE FROM 10 m

SX135 — ☐ — F58K — ☐

<b>Measurement range [m]</b> 10 / 12 / 15 / 20 / 25 / 30 / 35 / 40 / 42.5	<input type="checkbox"/>
<b>Version</b> Standard Sensor with options	- O

Option	Description
M4	rope fixation M4 thread
RI	rope fixation eyelet
CP	corrosion protection
T40	increased temperature -40...+85 °C

Option	not combinable with
M4	CP
RI	CP
CP	M4, RI

## ACCESSORIES

UR2	deflection pulley	SV1-XXXX	rope extension (150 mm up to 4995 mm)
MGG1	magnetic clamp	SV2-XXXX	rope extension (5000 mm up to 19995 mm)
		SV3-XXXX	rope extension (20000 mm up to 40000 mm)



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Subject to change without prior notice.

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