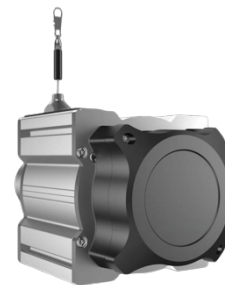


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Features at a glance

Our SGA series **of draw-wire encoders** are a compact and cost-effective position measuring system that is particularly quick and easy to install. Our displacement measuring system is potentiometric, optionally available with a current, voltage or resistance output. They are used in all areas of research and industry due to their high reliability, durability and accuracy.

- Measuring ranges from 10,000 up to 42,500 mm
- Analog Output: Potentiometer, Voltage, Current
- Linearity up to $\pm 0.02\%$ of the measuring range
- Protection class up to IP67
- Temperature range: $-20...+85\text{ }^{\circ}\text{C}$
- High dynamics and immunity to interference
- Customer-specific designs



Please read carefully before commissioning!

Unpacking and checking:

Lift the device out of the packaging by grasping the case. **DO NOT pull on the rope.**

After unpacking, check the device and accessories for completeness and any transport damage. If necessary, please contact the freight forwarder or Willtec Messtechnik directly so that a damage report can be drawn up.

Maintenance



The devices are maintenance-free. However, if the rope becomes dirty due to adverse environmental conditions, this must be cleaned with a slightly oil-soaked cloth as required. To do this, use resin-free machine oil.

Technical features

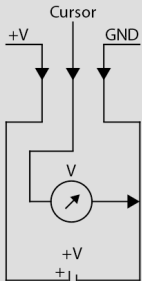
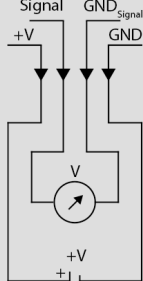
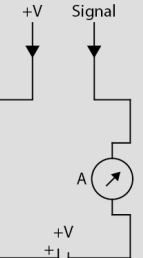
Measurement range MR ¹⁾	[m]	10	12	15	20	25	30	35	40	42.5
Linearity ²⁾	[%]	± 0.1								
Improved linearity (optional) ²⁾	[%]	± 0.05								
Resolution		see output types below								
Sensor element		Hybrid Potentiometer								
Connection		connector output M12 or cable output axial (TPE cable)								
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 $\varnothing 0.5\text{ mm}$								
Weight	[g]	3200 to 5000, depending on the measurement range								

¹⁾ others on request

²⁾ linearity max. $\pm 0.15\%$ in combination with outputs 5R and 10R

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Technical features

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

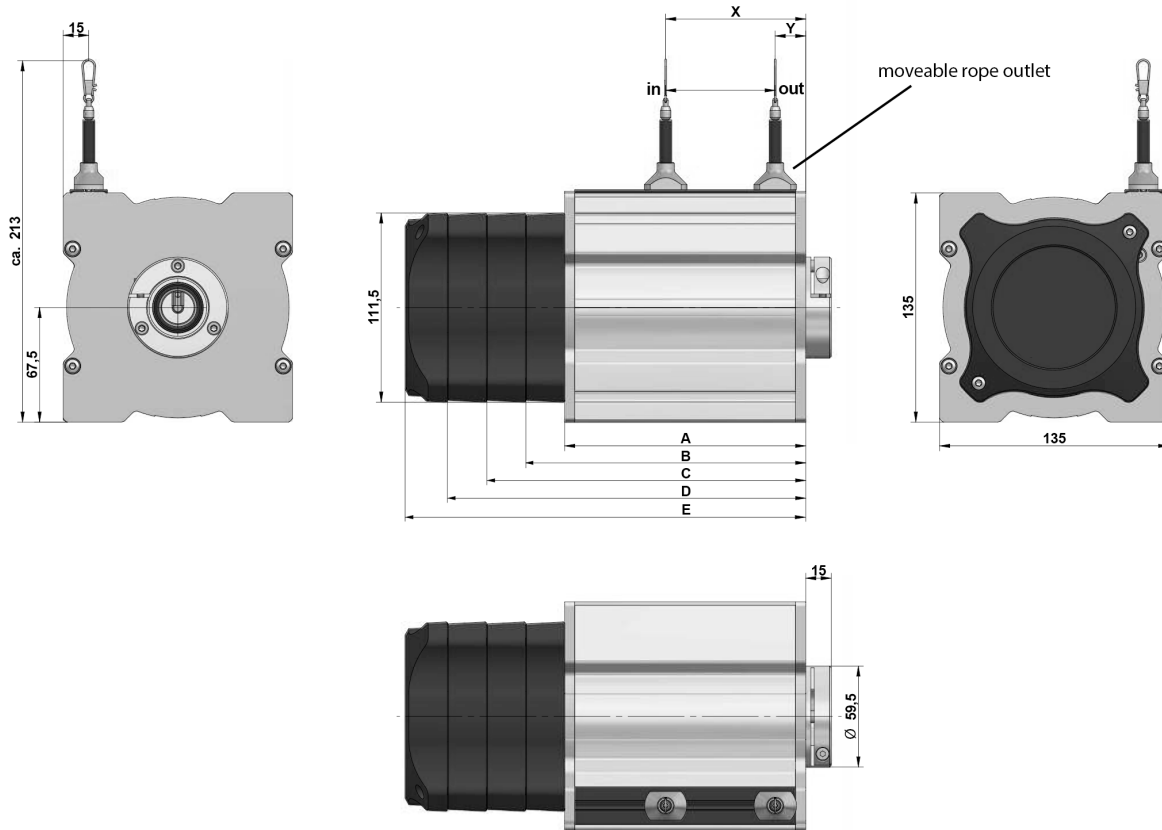
Mechanische Kenndaten

Measurement range [m]	Extraction force F _{min} [N]	Extraction force F _{max} [N]	Velocity V _{max} [m/s] ¹⁾	Acceleration a _{max} [m/s ²] 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.

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Technical drawing



Measurement range [m]	Letter	Length	Position rope outlet at ...	10 m	12 m	15 m	20 m	25 m
10 / 12 / 15 / 20	A	112	... start of measurement range (X) ¹⁾	35.5	38.5	43	50.5	58
25 / 30 / 35 / 40 / 42.5	A	142	... end of measurement range (Y) ¹⁾	20.5	20.5	20.5	20.5	20.5
10 / 12	B	137						
15 / 20	C	160	Position rope outlet at ...	30 m	35 m	40 m	42.5 m	
25 / 30	D	213	... start of measurement range (X) ¹⁾	65.5	73	80.5	84	
35 / 40 / 42.5	E	236	... 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
... 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
				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	20.5

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

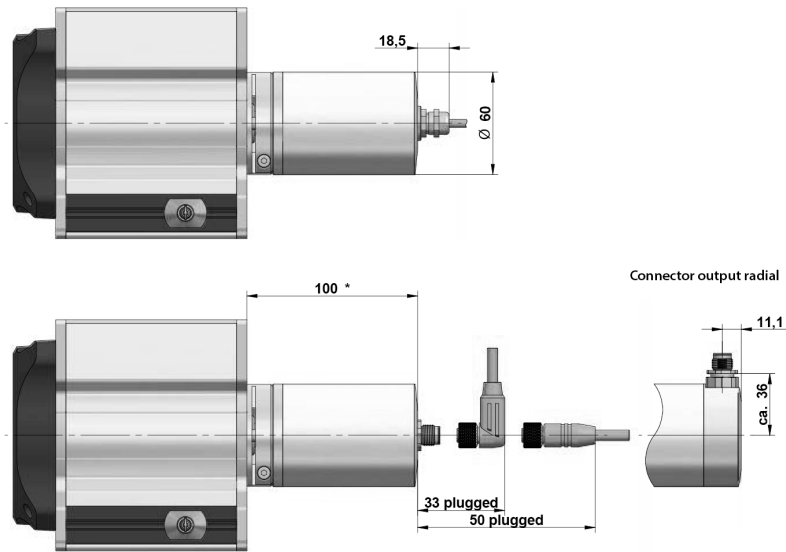
Mounting the Sensors



Attach the sensor to the mounting holes in the designated location before pulling out the rope or before attaching the rope to the target.

- The sensor can be mounted using the mounting plate. By unscrewing the mounting plate, threaded holes are alternatively available for assembly. For rope exit S2 and S3, the sensor has a modified mounting plate.
- Open the rope clip (not with M4 threaded screw) after the sensor has been securely mounted and pull out the measuring rope. Hook the rope clip onto the object and close the bracket of the rope clip. To be on the safe side, use a thin screwdriver and guide it through the rope clip to pull out the rope.

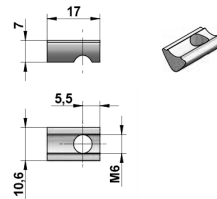
Datasheet



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

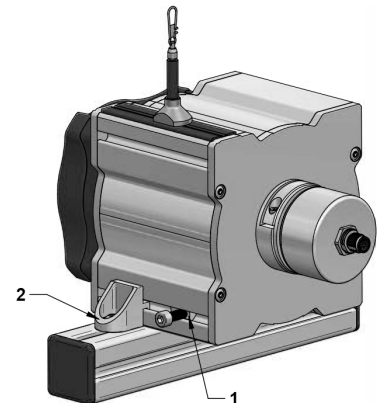
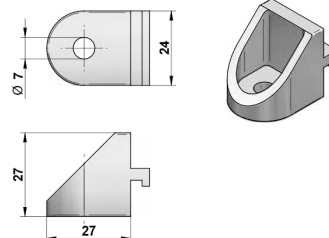
1. by using the grooves in the sensor housing

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

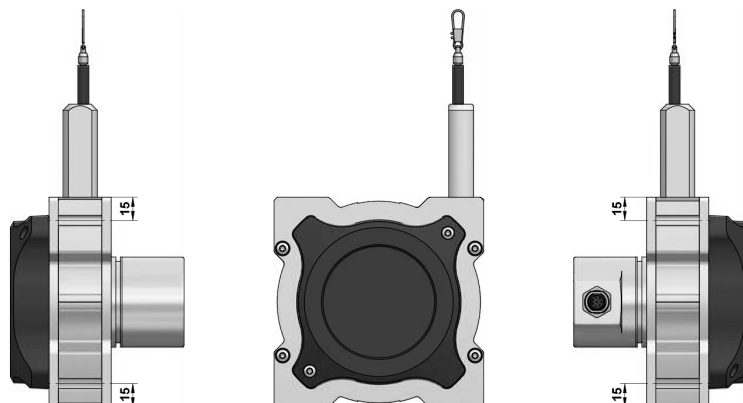
The angle clamp brackets feature a bore for M6 screws to fix it on a plate / slab or a profile. Each sensor with a measurement range of 20 m or lower is delivered with two brackets. Each sensor with a measurement range of 25 m or greater is delivered with four brackets.



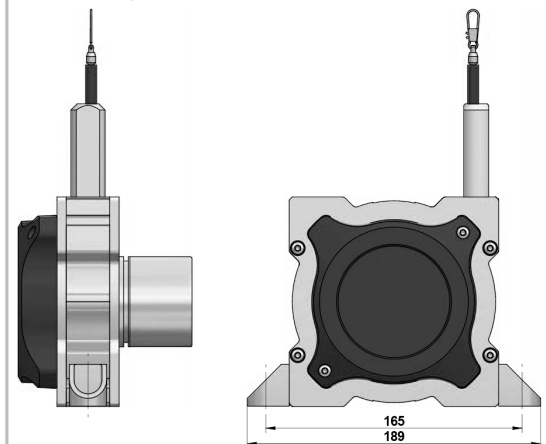
Note:

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

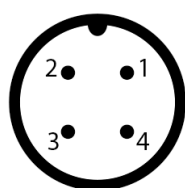


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Elektrischer Anschluss

M12- Flanschstecker, 4-polig

Cable output cable colours	Connector output M12, male	Potentiometer output	Voltage output	Current output
BN	Pin 1	+V	+V	+V
WH	Pin 2	Cursor	Signal	n. c.
BU	Pin 3	GND	GND	Signal
BK	Pin 4	n. c.	GND _{Signal}	n. c.



Datasheet

Options

Option	Order code	Description
Improved linearity	L02, L05	Improved linearity 0.02 % (L02) or 0.05 % (L05)
Inverted output signal	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	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.

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When handling the sensor, make sure that you do not accidentally snap the rope or pull the rope out over the specified measurement range. This can destroy the sensor.

- The rope must be pulled vertically out of the sensor during operation. The maximum deviation from the vertical is 3°. Avoid pulling out the measuring rope at an angle at all costs. The service life of the device would be shortened as a result. If the tolerance limit of 3° cannot be maintained, a pulley must be used.
- Preferably lay the rope in corners or protected under guides to avoid dirt or accidental contact.
- Avoid running the rope over edges or corners. Use the pulley if necessary.
- Do not operate the sensor if there are kinks or damage in the measuring rope.

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Ordering example

Type **SGA-135** - **10000** - **420A** - **SA12** - **IP67**
SGA-135 = Seilzugsensor

Measuring range MR (mm)

10000 = 10.000 mm
12000 = 12.000 mm
15000 = 15.000 mm
20000 = 20.000 mm
25000 = 25.000 mm
30000 = 30.000 mm
35000 = 35.000 mm
40000 = 40.000 mm
42500 = 42.500 mm

Output signal

420A = Current 4 ... 20 mA
1R = Potentiometer 1 k Ω
5R = Potentiometer 5 k Ω
10R = Potentiometer 10 k Ω
4,5 V = Voltage 0.5 ... 4.5 V
5 V = Voltage 0 ... 5 V
55 V = Voltage -5 ... +5 V
10 V = Voltage 0 ... 10 V

Connection

SA12 = M12 connector output, axial, 4-pin
SR12 = M12 connector output, radial, 4-pin
KA02 = Cable output, axial, 2 m, 4-pole
KA05 = Cable output, axial, 5 m, 4-pin
KA10 ¹⁾ = Cable output, axial, 10 m, 4-pole

Version

- = Standard
M4 = Rope attachment with M4 thread
RI = Rope attachment with ring eye
ZH = Cylindrical Pin Rope Attachment
ZR = Cylindrical pin rope attachment with carabiner ring
IP67 = IP67 degree of protection
L05 = Improved linearity $\pm 0,05$ %
T40 = Temperature range -40...+85 °C
IN = Inverted output signal
COR = Plastic measuring rope made of coramide
CP = Corrosion protection
ICP = Increased corrosion protection
SP61 = Snapping protection (ranges 10 to 15 m)
SP62 = Snapping protection (ranges 20 to 42.5 m)

¹⁾ Longer lengths on request



Versions that cannot be generated from the order key may be available as a special version on request.

The manufacturer reserves the right, without prior notice, to make any changes to the products that he deems necessary for their improvement.

Datasheet

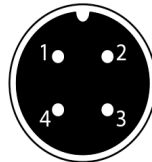
Accessories

Cable with M12 connector

Analog output

Cable with mating connector M12 (female), 4 poles

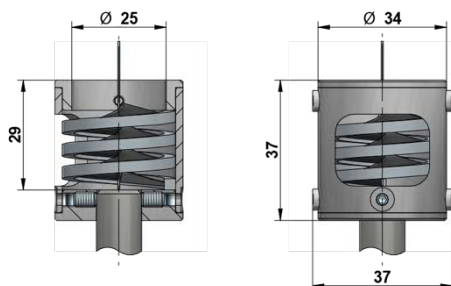
C04-2M-S-M12	2 m, straight connector, IP67, shielded
C04-5M-S-M12	5 m, straight connector, IP67, shielded
C04-10M-S-M12	10 m, straight connector, IP67, shielded
C04-2M-SW-M12	2 m, angular connector, IP67, shielded
C04-5M-SW-M12	5 m, angular connector, IP67, shielded
C04-10M-SW-M12	10 m, angular connector, IP67, shielded



Pin	Cable colour
1	BN
2	WH
3	BU
4	BK

Rope scraper CM-SGA-135

Use the CM-SGA-135 rope scraper 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 the CM-SGA-135 is not compatible with Option RI.



Warning



Do not attempt to open the device. The high stored energy of the drive spring can lead to injuries if handled incorrectly.

- Do not touch the moving rope during operation.
- Protect the sensor and rope from ice build-up when mounting outdoors in sub-zero temperatures. The use of a pulley leads to de-icing of the measuring rope.
- In a humid environment, install a sensor with a rope outlet facing downwards, otherwise water will collect inside the sensor.