



DRAW WIRE SENSORS

Powerful sensors to meet growing demands

Draw Wire Sensor SX Series



Features

- ▶ Measurement ranges from 50 mm to 42.5 m
- ▶ Linearity up to $\pm 0.02\%$ of full scale
- ▶ Protection class up to IP67
- ▶ Temperature $-20...+85\text{ }^{\circ}\text{C}$ (optional $-40\text{ }^{\circ}\text{C}$ or $+120\text{ }^{\circ}\text{C}$)
- ▶ Output: Potentiometer, $0...5\text{ V}$, $0...10\text{ V}$, $4...20\text{ mA}$, RS422 (TTL), HTL, CANopen, SSI, Profibus, EtherCAT, Profinet
- ▶ High dynamic: travel speed up to 10 m/s
- ▶ High interference resistance
- ▶ Optional teachable output $0...5\text{ V}$ and $0...10\text{ V}$



Technical Data

SERIES ▶ CHARACTERISTICS ▼	SX50	SX80	SX120	SX135
Measurement range max.	1250 mm	3000 mm	5000 mm	42500 mm
Linearity max. ¹⁾	$\pm 0.02\%$			
Output analog	$0...5\text{ V}$, $0...10\text{ V}$ (optional teachable), $4...20\text{ mA}$, Potentiometer			
Output digital	TTL, HTL, SSI, CANopen	TTL, HTL, SSI, Profibus, CANopen, EtherCAT, Profinet		
Protection class max.	IP67			
Operating temperature	$-40...+120\text{ }^{\circ}\text{C}$			$-40...+85\text{ }^{\circ}\text{C}$
Travel speed max.	10 m/s			

¹⁾ based on the measurement range

Description

The key component of a draw wire sensor is a highly flexible stainless-steel wire rope, that is single-layered wrapped around an ultra-light capstan. This capstan is connected to the sensor housing by a pre-loaded 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 axle of the capstan is permanently attached to a sensor element. If there is a rotation of the capstan due to a change in the distance to the target object, the sensor element will turn accordingly, and a proportional electric signal is output.

Draw Wire Mechanics F58NK And F58K Series



Features

- ▶ Measurement ranges from 1 to 42.5 m
- ▶ Linearity $\pm 0.05\%$ of full scale (with encoder)
- ▶ Temperature $-20\dots+85\text{ }^{\circ}\text{C}$ (optional $-40\text{ }^{\circ}\text{C}$)
- ▶ Draw Wire Mechanic without sensor element
- ▶ Optional with high corrosion protection
- ▶ High dynamic: travel speed up to 8 m/s
- ▶ Mounting of digital encoder by WayCon, supplied by the customer



Technical Data

SERIES ► CHARACTERISTICS ▼	SX80-F58NK	SX120-F58NK	SX135-F58NK/F58K
Measurement range max.	3000 mm	5000 mm	42500 mm
Linearity max. ¹⁾	$\pm 0.05\%$ (encoder output)		
Encoder requirements	clamping flange 36 mm, shaft diameter 10 mm, shaft length 20 mm		
Travel speed max.	8 m/s		
Extraction force max.	6.4 N	11.6 N	15 N
Acceleration max.	120 m/s ²		
Operating temperature	$-40\dots+85\text{ }^{\circ}\text{C}$ (pay attention to maximum permitted encoder temperature)		

¹⁾ based on the measurement range

Description

The inside of the draw wire sensor mechanics is the same as the SX standard series. The F58NK and F58K versions have a clamping flange where the sensor element is typically located. Any incremental and absolute rotary encoder with a clamping surface 36 mm in diameter and a shaft 10 mm in diameter and 20 mm long can be attached to the sensor housing. Socket head wrenches are the only tools required to fasten the encoder to the wire draw wire mechanism with 2 screws. In addition to detailed installation instructions, they of course include all the required parts, e.g. the coupling for the F58K version.

Mobile Hydraulic Draw Wire Sensor MH Series



Features

- ▶ Special sensor for mobile hydraulic applications
- ▶ Open housing fit for high-pressure cleaning and sea water environment
- ▶ Protection class up to IP69k
- ▶ Output: potentiometer, 0...5 V, 0...10 V, 4...20 mA, CANopen
- ▶ Optional with a redundant output signal
- ▶ Optional with teachable analogue output 0...5 V, 0...10 V
- ▶ Wire ropes with different materials and different diameters

Introduction

Sensors for mobile construction machines must be extremely robust, due to the harsh environmental influences they are exposed to. High demands are placed on low space requirement, high safety performance, shock and vibration resistance, as well as insensitivity to pollution. The MH sensors meet all these requirements. They are the perfect solution for applications in mobile hydraulics.

Technical Data

SERIES ► CHARACTERISTICS ▼	MH60	MH120
Measurement range max.	4000 mm	10000 mm
Linearity max. ¹⁾	±0.1 %	
Output analog	0...5 V, 0...10 V (optional teachable), 4...20 mA, Potentiometer	
Output digital	CANopen	
Travel speed	max. 3 m/s	
Protection class max.	IP69k	
Operating temperature	-40...+80 °C	

¹⁾ based on the measurement range



Description

MH mobile hydraulics series draw wire sensors were developed for the demanding construction machinery and equipment sector. Depending on the application conditions, the sensor can be configured to be optimal for the application. The open MH version makes small adhesive and abrasive particles with a small grain size easy to remove. Safety guards suitable for seawater provide maximum protection from larger particles, e.g. branches. Available safety features include different gauge wires and redundant, absolute outputs. The mobile hydraulics series is an extremely tough and economical option for efficiently carrying out positioning tasks on construction machinery.

Draw Wire Sensor ZX, FX, LX And HX Series



Features

- ▶ ZX as the world's smallest Draw Wire Sensors with potentiometer or a non-contacting internal hall effect sensing device
- ▶ LX as cost-efficient serial under dry conditions
- ▶ FX with non-contacting internal hall effect sensing device, ideal for long term applications
- ▶ HX with position and speed output, version with hazardous area protection (UL, CSA) and version for sea water (IP68)



Technical Data

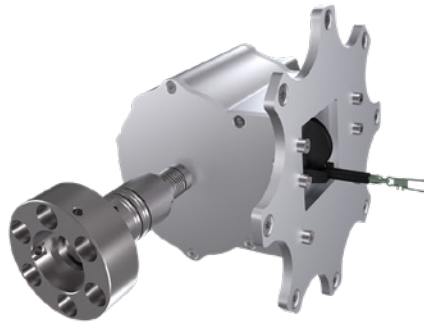
SERIES ► CHARACTERISTICS ▼	ZX	FX	LX	HX
Measurement range max.	38 mm	375 mm	1250 mm	50000 mm
Linearity max. ¹⁾	±1 %	±1 %	±0.1 %	±0.1 %
Output analog	Potentiometer / voltage	0...10 V	Potentiometer	0...10 V, 4...20 mA, Potentiometer
Output digital	-	-	TTL	TTL, HTL
Protection class max.	IP40	IP52	IP40	IP68
Operating temperature	-55...+100 °C	-25...+75 °C	-40...+75 °C	-20...+95 °C

¹⁾ based on the measurement range

Description

The WayCon ZX, FX, LX and HX series offer a solution for virtually any application. From large sensors capable of measuring distances of more than 50 metres, all the way to ultra-compact transducers smaller than a matchbox. The HX series features equipment suitable for permanent submersion or with UL approval (explosion prevention). When high cycle counts are required, ZX or FX series draw wire sensors with contactless Hall effect sensor elements can be used, as they are virtually wear-free. The very economical LX series available with potentiometer output or incremental encoder is suitable for standard applications without any special sensor requirements.

Draw Wire Sensor SX200 For Hydraulic Cylinders



Features

- ▶ Installation directly inside of the cylinder head
- ▶ Suitable for oil-filled cylinders
- ▶ Operating pressure up to 300 bar
- ▶ Simple installation without central piston bore
- ▶ Compact and therefore also suitable for smaller cylinders
- ▶ Measuring element (digital encoder) outside of the pressure area
- ▶ Flexible selection of digital encoder depending on customer requirements (e.g. ATEX)

Introduction

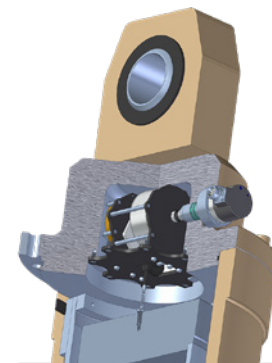
Just like the SX300, the SX200 is designed especially for stroke measurement in hydraulic and telescopic cylinders. However, unlike the SX300, it is not part of the cylinder housing, but is installed directly inside the cylinder head. A digital encoder is flanged on the outside via feedthrough in the pressure-free area, allowing for high-precision measurement of the exact piston position and providing it in the desired output signal.

Technical Data

SERIES ▶ CHARACTERISTICS ▼	SX200
Measurement range max.	12 m
Medium in cylinder	Hydraulic oil
Linearity max. ¹⁾	±0.05 % (depending on the encoder)
Sensor element	digital encoder
Operating pressure max.	300 bar
Travel speed	maximum 3 m/s (in air) ²⁾
Operating temperature	-20...+70 °C

¹⁾ based on the measurement range

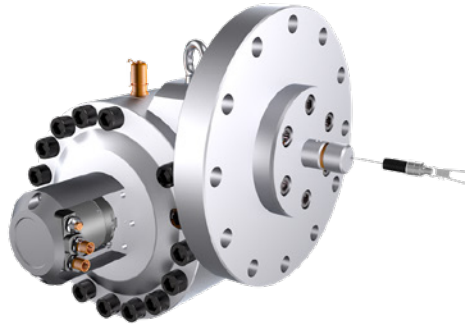
²⁾ identified laboratory value without hydraulic fluid



Description

The functionality and technology of the SX200 is based on the standard series SX135, which has been established and sold around the world for over 10 years. The end of a stainless-steel cable wound up in a single layer on a capstan is attached to the centre of the piston. If the piston moves, the measuring cable is unrolled or rolled up, whilst a spring keeps the cable taut at all times. A sensor element, a digital encoder, which is located outside of the pressure area, converts the resulting rotational movement into an output signal proportional to the piston position. Due to its compact size, the SX200 is also suitable for medium-sized cylinders with stroke ranges such as 6 m and is therefore very versatile.

Draw Wire Sensor SX300 For Hydraulic Cylinders



Features

- ▶ Flange-connectible sensor for large, oil-filled hydraulic cylinders
- ▶ Housing made from quenched and tempered steel 42CrMo4
- ▶ V2A measuring cable
- ▶ Operating pressure up to 300 bar
- ▶ Simple installation without central piston bore
- ▶ Seal with the cylinder by means of piston seal (alternatively, rod seal)
- ▶ Measuring element (digital encoder) outside of the pressure area
- ▶ Flexible selection of digital encoder depending on customer requirements (e.g. ATEX)

Introduction

With the SX300, WayCon has designed an extremely robust draw wire sensor especially for stroke measurement in hydraulic and telescopic cylinders. With a measuring range of up to 15 metre, the SX300 is ideal for use in “large applications”, such as for stroke measurement in hydraulic weir gates or synchronous monitoring of parallel cylinder arrangements.

Technical Data

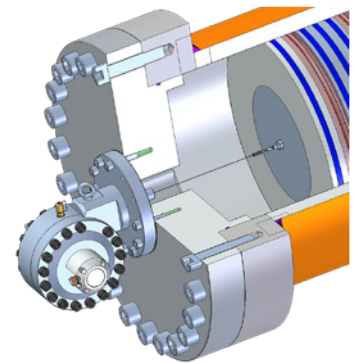
SERIES ▶	SX300
CHARACTERISTICS ▼	
Measurement range max.	15 m
Medium in cylinder	Hydraulic oil
Linearity max. ¹⁾	±0.05 % (depending on the encoder)
Sensor element	digital encoder
Operating pressure max.	300 bar
Test pressure	400 bar
Travel speed	maximum 2 m/s (in air) ²⁾
Operating temperature	-20...+70 °C

¹⁾ based on the measurement range

²⁾ identified laboratory value without hydraulic fluid

Description

The SX300 is flanged directly onto the front of the cylinder via the pressure-proof housing. The measuring cable made of stainless steel is simply attached to the piston and kept permanently taut by a spring in the sensor. The sensor element, a digital encoder, is located outside of the pressure area and provides information on the position of the piston to a high degree of accuracy and resolution. Digital absolute and incremental formats are available as output signals of the encoder. Of course, every SX300 is subjected to a pressure test before delivery and is sent with a corresponding certificate.



Product Overview



Draw Wire Sensors

- ▶ Ranges 50 mm - 42,5 m
- ▶ Linearity up to $\pm 0.02\%$
- ▶ Resolution up to $\pm 0.02\%$
- ▶ Output: potentiometric, analog, digital incremental, digital absolute, Bus



Laser Sensors

- ▶ Ranges 0.5 mm - 500 m
- ▶ Linearity up to $\pm 1\ \mu\text{m}$
- ▶ Resolution up to 0.2 μm
- ▶ Triangulation or optical phase comparison



Linear Potentiometers

- ▶ Ranges 10 mm - 2000 mm
- ▶ Linearity up to $\pm 0.05\%$
- ▶ Output: potentiometric, analog
- ▶ Protection class up to IP67



Magnetic Scales

- ▶ Ranges up to 99.99 m
- ▶ Linearity up to $\pm 2\ \mu\text{m}$
- ▶ Resolution up to 0.5 μm
- ▶ Output: analog, TTL, HTL, SSI, BiSS, 1 Vpp, tachometer



Digital Length Gauges

- ▶ Ranges 12 mm - 30 m
- ▶ Linearity up to $\pm 0.2\ \mu\text{m}$
- ▶ Output: TTL, HTL
- ▶ Protection class up to IP64



Ultrasonic Sensors

- ▶ Ranges 100 mm - 6000 mm
- ▶ Linearity up to $\pm 0.3\%$
- ▶ Resolution up to 0.125 mm
- ▶ Output: analog, proximity switch



Magnetostrictive Transducers

- ▶ Ranges 50 mm - 4000 mm
- ▶ Linearity up to $\pm 0.02\%$
- ▶ Resolution up to 2 μm
- ▶ Output: analog, SSI, CANopen, tachometer



Digital Linear Scales

- ▶ Ranges 150 mm - 2000 mm
- ▶ Linearity up to $\pm 0.5\ \mu\text{m}$
- ▶ Resolution up to 5 μm
- ▶ Output: TTL, HTL



Capacitive Sensors

- ▶ Ranges 50 mm - 42,5 m
- ▶ Linearity up to $\pm 0.2\%$
- ▶ Resolution dynamic up to 0.01 %
- ▶ Output: analog



Encoders/Rotary Transducers

- ▶ Single- and Multiturn
- ▶ Analog Multiturn up to 120 turns
- ▶ Solid-, hollow- and through hollow shaft
- ▶ Output: analog, digital incremental, digital absolute

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