POSITAL
FRABA

ABSOLUTE ROTARY ENCODER
MULTI-TURN BIT PARALLEL

Main Features

- Compact and Heavy-Duty Industrial Model
- Interface: Bit Parallel, Push Pull, Short Circuit Proof
- Input: Preset (optional) and Latch
- Housing: ∅ 58 mm (2.28346 in.)
- Shaft: ∅ 6 or 10 mm (.236 or .394 in), Hollow- ∅ 15 mm (.59 in)
- Max. 65,536 Steps per Revolution (16 Bit)
- Max. 16,384 Revolution (14 Bit)
- Code: Gray / Binary
- EMC: EN61000-6-2, EN61000-6-4, CE

Mechanical Structure

- Aluminum Flange and Housing
- Stainless Steel Shaft
- Precision Ball Bearings with Sealing or Cover Rings
- Code Disc made of unbreakable and Durable Plastic

Applications

Sensing of

- Angles
- Distances
- Tracks
- Inclinations
- Differences between two or more Axes

Electrical Features

- Temperature insensitive IR-Opto-Receiver-ASIC with integrated Signal Conditioning
- Only one IR-Transmitter-Diode per Opto-ASIC
- Highly Integrated Circuit in SMD-Technology
- Polarity Inversion Protection
- Over-Voltage-Peak Protection

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1 Technical Data

1.1 Electrical Data

Outputs	Bit-parallel, push pull
Output level “high”	~ supply voltage (load dependent)
Output current	Max. 20 mA each channel
Cycle time	< 10 µs (< 150 µs with preset version)
Step frequency	Version with Preset: 4,5 kHz Version without Preset: 50 kHz
Turn on time	< 1 s
Accuracy of division	± ½ LSB (12 Bit), ± 2 LSB (16 Bit)
EMC	Emitted interference: EN 61000-6-4, Noise immunity: EN 61000-6-2
Supply voltage	10-30 V DC (absolute limits)[1]
Current consumption	Max. 400 mA (10 V DC), max. 180 mA (24 V DC)
Electrical lifetime	> 10^5 h
Connection	Connector or cable exit 1 meter

1) Supply voltage according to EN 50 178 (safety extra-low voltage)

1.2 Mechanical Data

Housing	Aluminum, optional stainless steel
Lifetime	See next table
Shaft loading	Axial 40 N, radial 110 N
Inertia of rotor	≈ 30 gcm^2
Friction torque	≤ 3 Ncm (version without shaft sealing)
RPM (continuously)	Max. 6,000
Shock (EN 60068-2-27)	≤ 100 g (halfsine, 6 ms)
Permanent shock (EN 60028-2-29)	≤ 10 g (halfsine, 16 ms)
Vibration (EN 60068-2-6)	≤ 10 g (10 Hz – 2,000 Hz)
Weight, multi-turn (stainless steel)	≈ 400 g (14.109 oz) (≈ 800 g)

1.3 Flange

Flange	Synchro	Clamp	Hollow shaft
Shaft diameter	∅ 6 mm / 10 mm (.236 in / .394 in)	∅ 10 mm (.394 in)	∅ 15 mm (.5905 in)
Shaft length or hollow shaft depth	10 mm / 20mm (.394 in/ .787 in)	20 mm (.787 in)	15 – 30 mm (.5905 – 1.181 in)

1.4 Minimal Life Cycle Mechanical

Flange group	Live cycle in 10^8 turns on F_a / F_r		
	40 N / 60 N	40 N / 60 N	40 N / 60 N
C10 (Clamp flange ∅ 10 x 20)	247	104	40
S10 (Synchro flange ∅ 10 x 20)	262	110	42
S6 (Synchro flange ∅ 6 x 10) without shaft sealing	822	347	133

S6 (Synchro flange ø6 x 10) with shaft sealing: maximal 20 N axial, 80 N radial

1.5 Environmental Conditions

Operating temperature	-40 to +85°C1
Storage temperature	-40 to +85°C1
Humidity	98 % (without liquid state)
Protection Class (EN 60529)	Casing side: IP 65
	Shaft side: IP 64 (optional with shaft sealing: IP66)

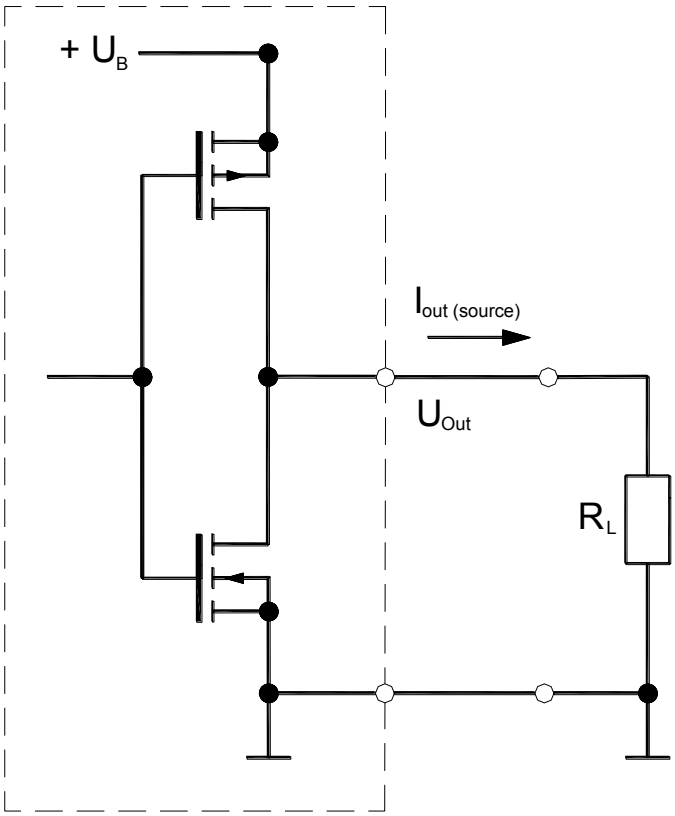
1) Cable eXIT: -30 – +70 °C (stationary cable), -5 – +70°C (moving cable)

2 Interface

Push Pull

Transmission	Data transmission via two transistors in push-pull circuit
Transfer	Transfer distance up to 50 m (164.04 ft.)
Shielded lines	Shielded lines are essential to attain extremely high noise immunity
Connectable	Connectable to all usual PLC concepts with digital I/Os
Optional	Binary code transmission with integrated latch function

Output Circuit



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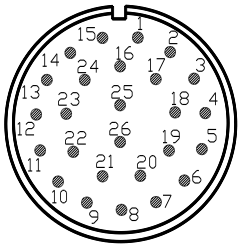
2.1 Electrical Interface

Signals	26 Pin Connector	Cable Color
Bit 1	Pin 1	White
Bit 2	2	Brown
Bit 3	3	Green
Bit 4	4	Yellow
Bit 5	5	Grey
Bit 6	6	Pink
Bit 7	7	Blue
Bit 8	8	Red
Bit 9	9	Black
Bit 10	10	Violet
Bit 11	11	Grey-Pink
Bit 12	12	Blue-Red
Bit 13	13	White-Green
Bit 14	14	Brown-Green
Bit 15	15	White-Yellow
Bit 16	16	Yellow-Brown
Bit 17	17	White-Grey
Bit 18	18	Grey-Brown
Bit 19	19	White-Pink

Signals	26 Pin Connector	Cable Color
Bit 20	20	Pink-Brown
Bit 21	21	White-Blue
Bit 22	–	Brown-Blue
Bit 23	–	White-Red
Bit 24	–	Brown-Red
Bit 25	–	White-Black
Preset (opt.)	22	Brown-Black
Latch	23	Grey-Green
DIR	24	Yellow-Grey
$+U_b$ = 10–30 V	25	Pink-Green
GND	26	Yellow-Pink

26 Pin Connector (Male)



COMPLEMENT- Input		Encoder counting direction at clockwise rotation (as seen on shaft)
Function	Level	
Direction of rotation Switch time < 3 µs	0 (Input = N.C.[1] or GND)	CW counting up
	1 (Input to + U_b or ≥ 4,5 V)	CW counting
Preset-Input (optional, should not used during shaft rotation)		
Function	Level	
Preset	0 (Input = N.C.[1] or GND)	Use the current value
	1 (Input to + U_b or ≥ 4.5 V)	Set preset value to 0 (after 100ms)
Latch-Input		
Function	Level	
Latch Latch time < 3 µs	0 (Input = N.C.[1] or GND)	Use the current value
	1 (Input to + U_b or ≥ 4.5 V)	Latch the value

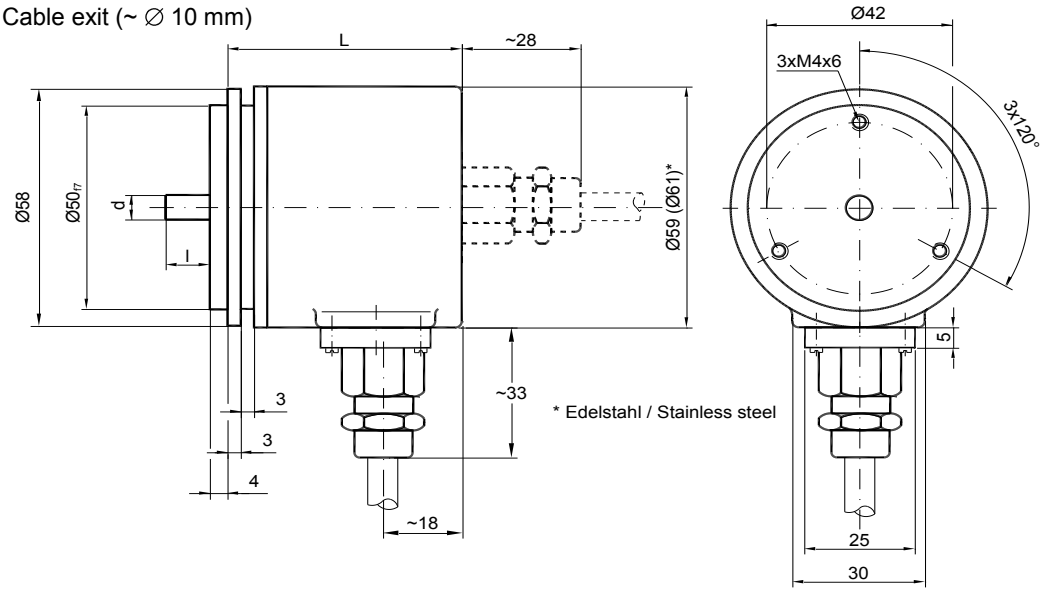
1) No ledge on connector disposed

3 Mechanical Drawings

3.1 Synchro Flange (S) (Two versions available)

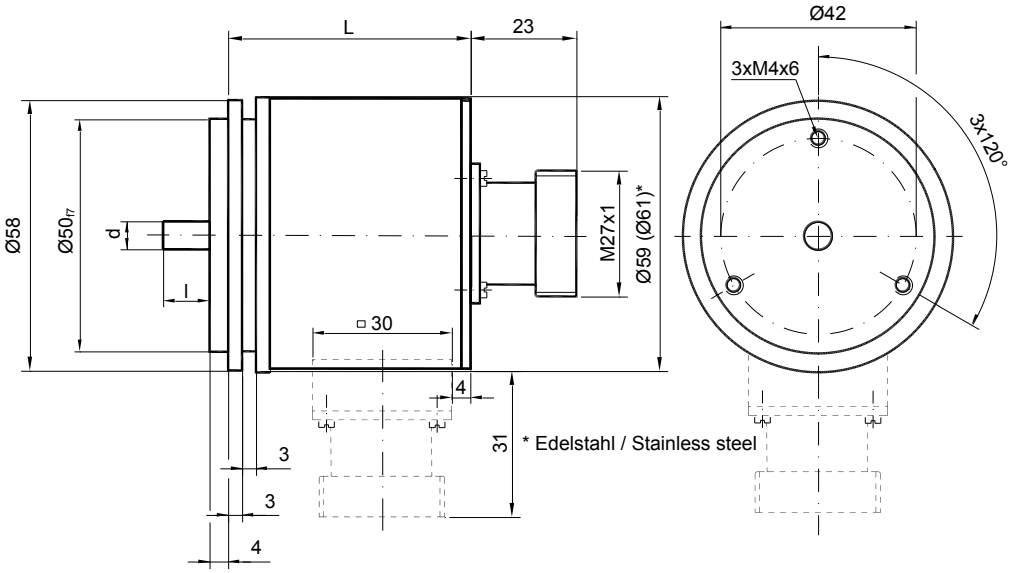
Synchro Flange	d [mm]	l [mm]
Version S06	∅ 6_{f6}	10
Version S10	∅ 10_{h8}	20

Cable exit (~ ∅ 10 mm)



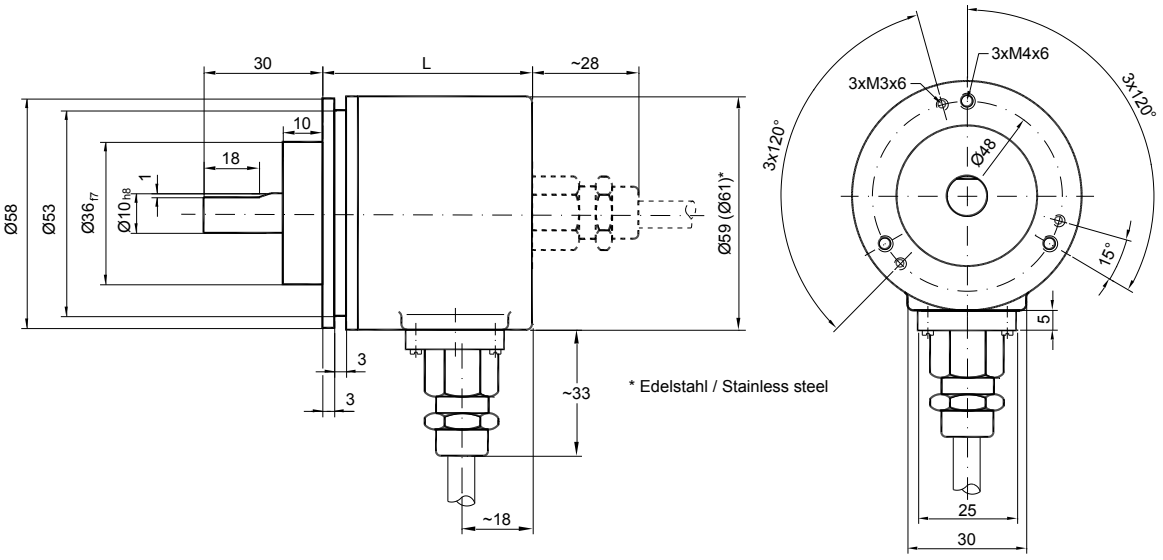
	L	
Cable exit		62
Connector	axial	62
	radial	78

Connector Exit (only for max. 21 Bit)



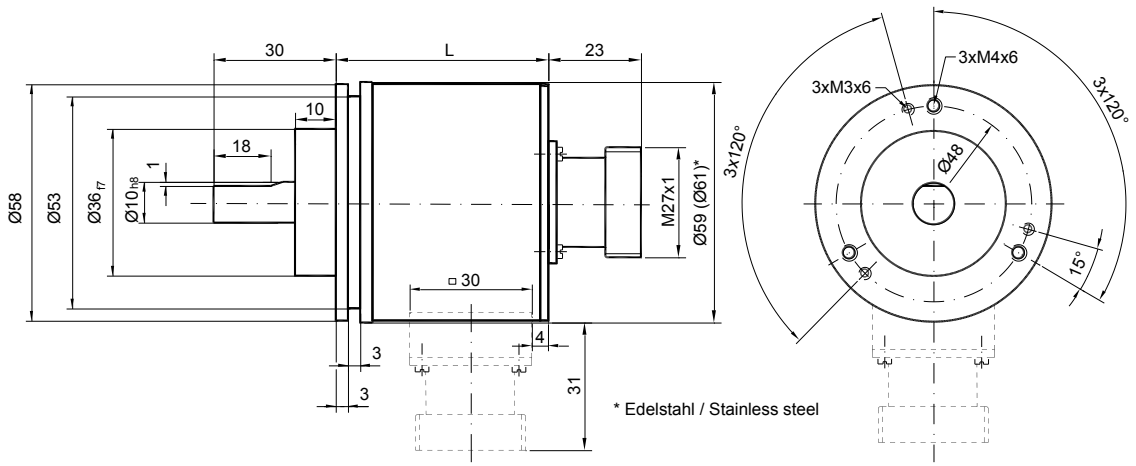
3.2 Clamp Flange (C)

Cable Exit (~ ∅ 10 mm) (~.394 in)



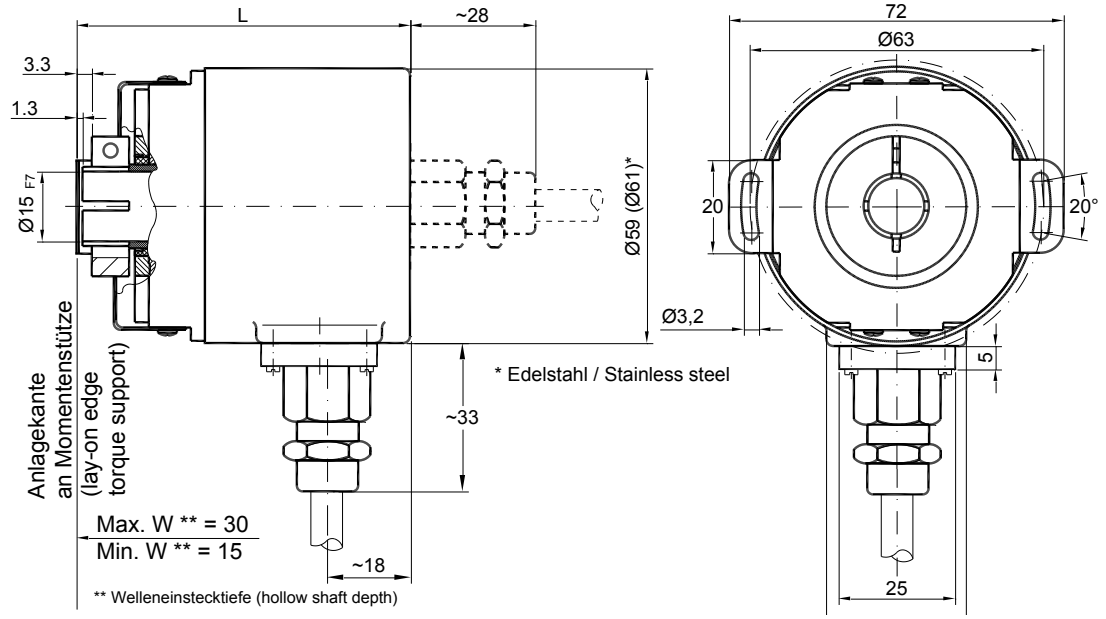
	L	
Cable exit		62
Connector	axial	62
	radial	78

Connector Exit (only for max. 21 Bit)



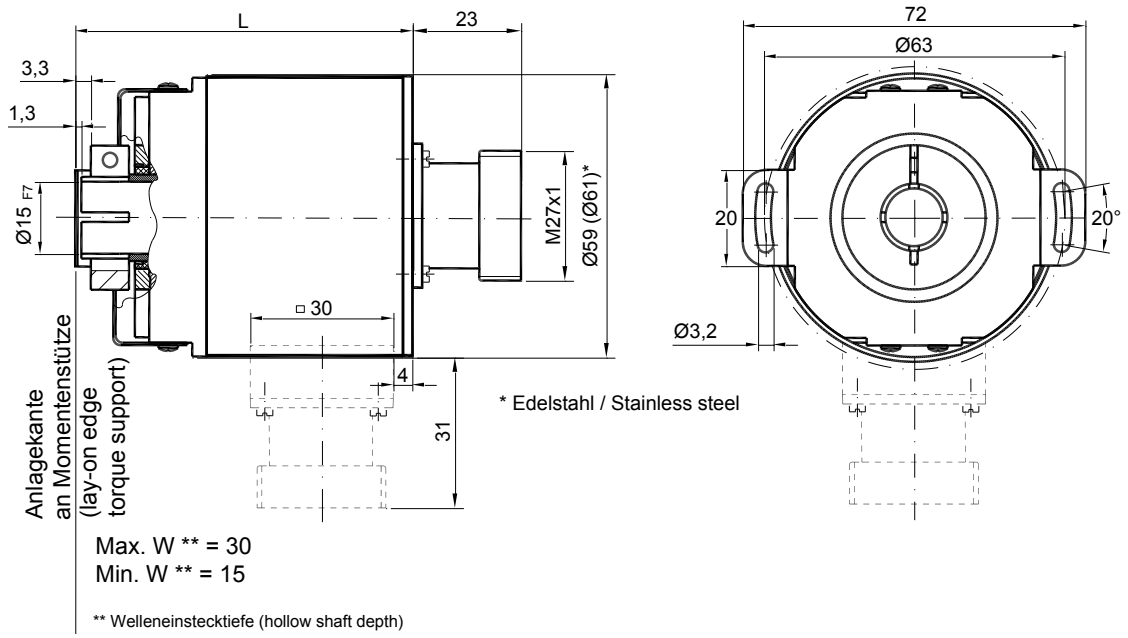
3.3 Hollow Shaft (H)

Cable Exit (~ ø 10 mm) (~.394 in)



	L	
Cable exit		80
Connector	axial	80
	radial	96

Connector Exit (only for max. 21 Bit)



3.4 Mounting Instructions

Do not tighten the clamp ring unless the machine shaft is properly inserted into the bore of the hollow shaft.

The diameter of the hollow shaft can be reduced to 12 mm, 10 mm or 8 mm by using an adapter (this reducing adapter can be pushed into the hollow shaft). Allowed shaft movements of the drive element are listed in the table.

	Axial	Radial
Static	± 0.3 mm (.0118 in)	± 0.5 mm (.0197 in)
Dynamic	± 0.1 mm (.0039 in)	± 0.2 mm (.00787 in)

4 Models / Ordering Description

Description	Type Key									
Optocode	OCD-	_ _	00	_ -	_ _	_ _ -	_	_ _	_ -	_ _ _
Interface Push Pull		**PP**								
With Preset		P1								
Version			**00**							
Code	Gray			**G**						
	Binary			B						
Bits for revolutions[1]	16				**04**					
	256				**08**					
	4096				**12**					
	16384				**14**					
Steps per revolution[1]	4096 (0,09°)					**12**				
	8192 (0,04°)					13				
	65536 (0,005°)					16				
Flange	Clamp Flange						**C**			
	Synchro Flange						**S**			
	Blind Hollow Shaft						**B**			
Shaft	∅ 10 mm (.394 in.)							**10**		
	∅ 06 mm (.236 in.)							**06**		
	∅ 15 mm (only for hollow shaft) (.5905 in.)							**15**		
Mechanical Options	No options								**0**	
	Shaft sealing								S	
	Stainless steel (only axial exit possible)								V	
	Customized								C	
Connection	Connector axial, max. 21 bit									PAT
	Connector radial, max. 21 bit[2]									PRT
	1m cable exit, axial, max. 25 bit									CAW
	1m cable exit, radial, max. 25 bit[2]									CRW

Standard = **bold**, further models on request

1) Total Resolution on connector exit max. 21 bit, on cable exit max. 25 bit

2) Not in stainless version

5 Accessories

Description		Type
Connector, counterpart	Circular connector, 26 pins	PAT
Cable for PAT	28 x 0,14 mm^2 + 2 x 1,5 mm^2	STK-30
Shaft coupling[1]	Drilling: 10 mm (.394 in)	GS 10
	Drilling: 6 mm (.236 in)	GS 06
Clamp disc[1]	4 pcs. / AWC	SP 15
Clamp ring[1]	2 pcs. / AWC	SP H
Reducing adapter[2]	15 mm to 14 mm (.5905 to .5512 in)	RR14
Reducing adapter[2]	15 mm to 12 mm (.5905 to .4724 in)	RR12
Reducing adapter[2]	15 mm to 10 mm (.5905 to .394 in)	RR10
Reducing adapter[2]	15 mm to 8 mm (.5905 to .3149 in)	RR8

1) Not for hollow shaft

2) Only for hollow shaft

6 Check Out Some of the Other POSITAL Products

Absolute Magnetic Encoders for Industrial Environment

To measure rotary movements or rotary displacements, an absolute magnetic rotary encoder can be used. The contact-free measuring sensor stage of the MCD Sensor does not have any abrasion. The Sensor can be connected directly to digital control units via SSI, CANopen or Analog Interface.

More Information

Heavy Duty Stainless steel Magnetic Encoders for the Toughest Environments

Its stainless steel housing and high protection class of IP69K makes the MCD Heavy Duty rotary encoder resistant against active chemical cleaning and corrosion. Combined with the sturdy ball bearings this sensor is an ideal choice for reliable measurement under extreme environmental conditions and outdoor applications.

More Information

Tilt Sensors to Measure Inclinations up to 360°

ACS is developed on advanced MEMS technology based capacitance measurement. The sensor is a pre-calibrated device which can be put into immediate operation, upon simple and easy installation with a three point mount and setting of preset. Its compact design, installation “anywhere” and other versatile features makes it an ideal choice for very accurate measurement.

More Information

7 Disclaimer