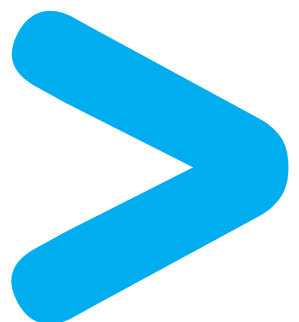


Osisense™ XCC

Rotary Encoders

Catalog



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Encoder type			Incremental encoders			
Applications			Counting indication			
						
Diameter of housing			Ø 40 mm	Ø 58 mm	Ø 58 mm parameterable (multi-resolution) (1)	Ø 90 mm
Shaft	Solid		Ø 6 mm	Ø 6 mm and Ø 10 mm	Ø 10 mm	Ø 12 mm
	Through		Ø 6 mm	Ø 14 mm Ø 6, 8, 10 and 12 mm (with reduction collar)	Ø 14 mm Ø 6, 8, 10 and 12 mm (with reduction collar)	Ø 30 mm Ø 12, 20 and 25 mm (with reduction collar)
Resolution	Incremental encoders	100 ppr	100 ppr	100 ppr	–	100 ppr
		256 ppr	–	–	256–4096 ppr	–
		360 ppr	360 ppr	360 ppr	360–5760 ppr	360 ppr
		500 ppr	500 ppr	500 ppr	500–8000 ppr	500 ppr
		1000 ppr	1000 ppr	1000 ppr	–	1000 ppr
		1024 ppr	1024 ppr	1024 ppr	1024–16,384 ppr	1024 ppr
		2500 ppr	–	2500 ppr	–	2500 ppr
		3600 ppr	–	–	–	3600 ppr
		4096 ppr	–	–	–	–
		5000 ppr	–	5000 ppr	5000–80,000 ppr	5000 ppr
		10,000 ppr	–	–	–	10,000 ppr
	Absolute encoders	4096 ppr/8192 turns (12-bit/13-bit)	–	–	–	–
		8192 ppr	–	–	–	–
		8192 ppr/4096 turns (13-bit/12-bit)	–	–	–	–
Output stage/supply (2)	Incremental encoders	Type R (N)	5 V, RS-422, 4.5–5.5 V	–	–	5 V, RS-422, 4.5–5.5 V
		Type K (N)	Push-pull, 11–30 V	–	–	Push-pull, 11–30 V
		Type X	–	5 V, RS-422, 4.75–30 V	5 V, RS-422, 4.75–30 V	–
		Type Y	–	Push-pull, 5–30 V	Push-pull, 5–30 V	–
	Absolute encoders	Type KB (N) or KG (N)	–	–	–	–
		Type SB (N) or SG (N)	–	–	–	–
		Type C	–	–	–	–
		Type F	–	–	–	–
Connection	Pre-cabled, radial Connector, radial, M23 Terminal block, radial	●	–	–	–	
		–	●	●	●	
		–	–	–	–	
Catalog Numbers			XCC14●●●●●	XCC15●●●●●	XCC15●●●●●M●●	XCC19●●●●●
Pages			12	14	17	18

(1) Parameterable version: multiplication of the basic resolution of the disc using DIP switches. The factory setting is the one with the lowest value.

(2) Specifications of the output stage/supply types:

- Type R (N): 5 V output driver, RS-422, 4.5–5.5 V.
- Type K (N): push-pull output driver, 11–30 V.
- Type X: 5 V output driver, RS-422, 4.75–30 V.
- Type Y: push-pull output driver, 5–30 V.
- Type KB (N) or KG (N) output: push-pull output driver, 11–30 V, binary code KB (N) or Gray code KG (N).

Single turn absolute encoders		Multi-turn absolute encoders			Accessories for encoders
Absolute position indication within a revolution		Absolute position indication within a revolution and indication of the number of revolutions		Fieldbus: CANopen, Profibus-DP	
					
Ø 58 mm	Ø 90 mm	Ø 58 mm	Ø 90 mm	Ø 58 mm	- Shaft couplings with spring - Anti-rotation devices - Reduction collars - Pre-wired connectors
Ø 6 mm and Ø 10 mm Ø 14 mm Ø 6, 8, 10 and 12 mm (with reduction collar)	Ø 12 mm Ø 30 mm Ø 12, 20 and 25 mm (with reduction collar)	Ø 6 mm and Ø 10 mm Ø 14 mm Ø 6, 8, 10 and 12 mm (with reduction collar)	Ø 12 mm Ø 30 mm Ø 16, 20 and 25 mm (with reduction collar)	Ø 10 mm Ø 15 mm (hollow shaft) Ø 6, 8, 10, 12 and 14 mm (with reduction collar)	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	4096 ppr/8192 turns	-	-	
8192 ppr	8192 ppr	-	-	-	
-	-	8192 ppr/4096 turns	8192 ppr/4096 turns	8192 ppr/4096 turns	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
Push-pull, 11–30 V, binary or Gray	Push-pull, 11–30 V, binary or Gray	-	-	-	
SSI, 13-bit, 11–30 V, binary or Gray	SSI, 13-bit, 11–30 V, binary or Gray	SSI, 25-bit, 11–30 V, binary or Gray	SSI, 25-bit, 11–30 V, binary or Gray	-	
-	-	-	-	11–30 V, CANopen	
-	-	-	-	11–30 V, Profibus-DP	
-	-	-	-	-	
•	•	•	•	•	
-	-	-	-	•	
XCC25●●●●●	XCC29●●●●●	XCC35●●●●●	XCC39●●●●●	XCC35●●●●●CBN XCC35●●●●●FBN	XCCR, XCCP, XZC
22	24	28	30	42, 46	34

(2) Specifications of the output stage/supply types (continued):

- Type SB (N) or SG (N): SSI output without parity, 13-bit or 25-bit, 11–30 V, binary code SB (N) or Gray code SG (N).
- Type KB (N) or KG (N): push-pull output driver, 11–30 V, binary code KB (N) or Gray code KG (N) with multi-turn connecting cable.
- Type C: binary CANopen serial link.
- Type F: binary Profibus serial link, RS 485.

Applications

The increase in the power of processing systems, combined with the requirements for high productivity, has created the need for continuous information in all areas of production regarding:

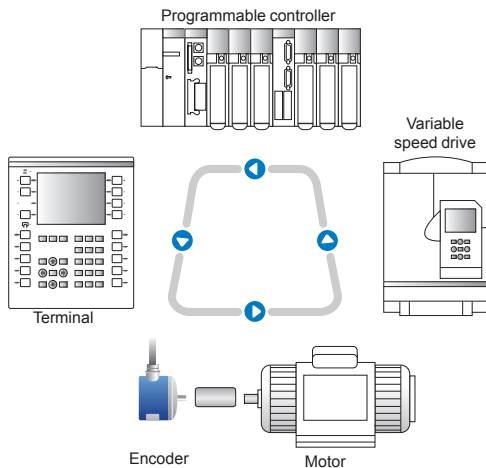
- counting, positioning by counting
- absolute positioning
- speed control

Example

The positioning of a moving part is fully controlled by the processing system via the encoder.

- Processing units
Refer to the catalog, "Premium automation platform."

- Variable speed drives
Refer to the catalog, "Variable speed drives and starters."



Principle of the opto-electronic rotary encoder

The opto-electronic rotary encoder is an angular position sensor.

Mechanically coupled to the driving spindle of a machine, the shaft of the encoder rotates a disc that comprises a succession of opaque and transparent sectors.

Light from light emitting diodes (LEDs) passes through the transparent sectors of the disc as they appear. The light is detected by photosensitive diodes.

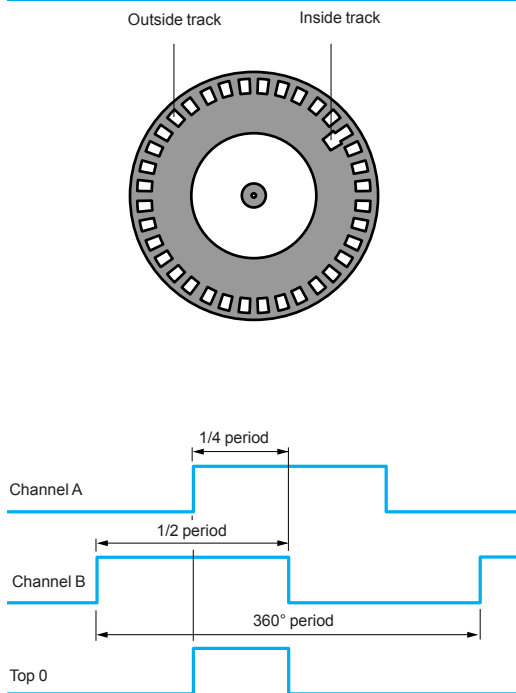
The photosensitive diodes, then generate an electrical signal, which is amplified and converted into a digital signal before being transmitted to a processing system or an electronic variable-speed drive.

The electrical output of the encoder therefore represents, in digital form, the angular position of the input shaft.

Types of opto-electronic rotary encoder

- Incremental encoders:
Counting, positioning by counting, speed.
- Parameterable incremental encoders:
Multiplication of the basic resolution of the disc using DIP switches (the factory setting is the one with the lowest value).
- Single turn and multi-turn absolute encoders:
Absolute positioning.
- Fieldbus multi-turn absolute encoders:
CANopen and Profibus-DP.

Incremental encoder



Principle

The disc of an incremental encoder comprises two types of track:

- one or several outside tracks (channels A and B), comprising “n” equal angular steps that are alternately opaque and transparent, with “n” being the resolution or number of periods of the encoder,
- an inside track comprising a single window, which serves as the reference point within each shaft revolution (top 0 or zero marker).

Wiring and settings

The operation of the photosensitive elements (LEDs + photosensitive diodes) is based on the real-time differential optical reading principle:

- the photosensitive elements of tracks A and B are offset so that each will simultaneously read only its respective slot (channels A and B are 90° electrically offset),
- the electronics operate following the principle of real-time differential measurement.

Channel B (rising edge) arriving before A in the clockwise direction viewed from base side.

Period: 360° electrical.

Cyclic ratio: 180° electrical $\pm 10\%$.

Phase displacement: 90° electrical $\pm 25\%$.

Advantages of real-time differential optical reading

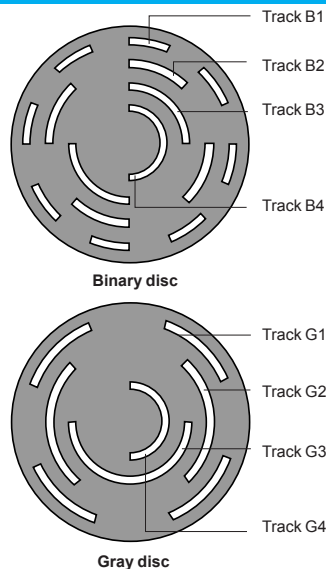
Reading by offset photosensitive elements

- Radial play of encoder shaft greater than 30%, which is higher than traditional optical reading encoders.
- Maintains a phase displacement of channels A and B within the tolerance limits of the unit.

Triple light source emission improves reliability

- Maintains cyclic ratio, even in the event of:
 - failure of one of the 3 light sources,
 - diminishing efficiency of the light sources (up to 30%),
 - fine dust deposit on the optical components, reducing signal strength of the photosensitive elements (up to 30%).

Absolute encoder



Principle

The disc of an absolute encoder comprises “n” concentric tracks, equally divided into alternate opaque and transparent segments, and each track has its own transmitter and receiver.

The inside track is half opaque and half transparent. Reading of this MSB (Most Significant Bit) track determines in which half-turn the encoder is situated.

The next track is divided into 4 quarters, alternately opaque and transparent. The reading of this track, in conjunction with the previous track, determines in which quarter-turn the encoder is situated.

The following tracks enable successive determination of which eighth-turn, sixteenth-turn, etc. the encoder is situated.

The outside track corresponds to the LSB (least significant bit) and provides the final accuracy. It has 2^n pulses per revolution corresponding to the resolution of the encoder. Therefore, for each angular position of the shaft, the disc provides a code. This code can be either binary or Gray.

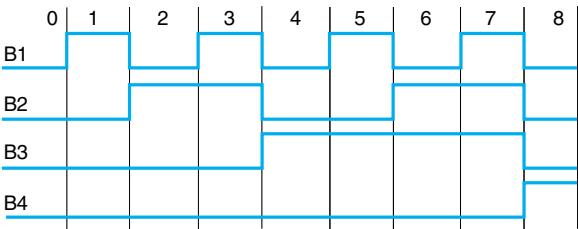
Following one complete revolution of the encoder, the same coded values are repeated.

The multi-turn absolute encoder, in addition to providing the digital position within the revolution, also provides the total number of revolutions.

Absolute encoder (continued)

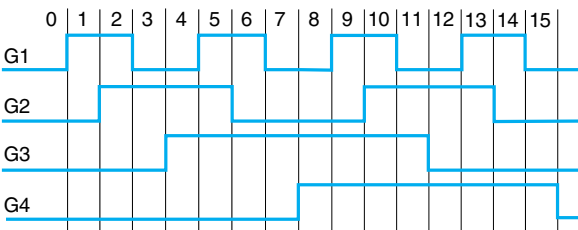
Binary coding

The binary code is directly usable by processing systems (such as programmable controllers) to execute calculations or comparisons, but has the disadvantage of having several bits which change state between 2 positions.



Gray coding

The Gray code offers the advantage of only changing one bit between 2 consecutive numbers.



Example of Gray code disc

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
2 ⁰	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0
2 ²	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0
2 ⁴	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1
2 ⁸	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
2 ¹⁶	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

Representation of the first 24 decimal values corresponding to the reading of the first 5 tracks.

Advantages of position detection by an absolute encoder

An absolute encoder continuously provides a code that is an image of the actual position of the moving object being monitored.

On power-up, or restart following a supply failure, the encoder provides data that is directly exploitable by the processing system.

7 specifications to be established

1 Function

- Incremental encoder
Provides counting indication.
- Single turn absolute encoder
Provides absolute position within each revolution.
- Multi-turn absolute encoder
Provides absolute position within each revolution and indicates total number of revolutions.

2 Diameter of housing

- Incremental encoders
Ø 40, 58 and 90
- Single turn and multi-turn absolute encoders
Ø 58 and 90

3 Diameter of shaft

- Ø 6 mm to 30 mm, depending on model
- Reduction collars
For Ø 58 and 90 mm encoders, with Ø 14, 15 and 30 mm through-shaft, reduction collars are available to reduce the diameters:
 - from 14 to 6, 8, 10 and 12
 - from 15 to 6, 8, 10, 12 and 14
 - from 30 to 12, 16, 20 and 25.

4 Type of shaft

- Solid shaft
The shaft of the encoder is mechanically linked to a drive shaft using a flexible coupling, which eliminates alignment inaccuracies.
- Through-shaft/Hollow shaft
The encoder is mounted directly on the drive shaft. A flexible mounting kit prevents encoder rotation and compensates for alignment inaccuracies.

5 Connection method

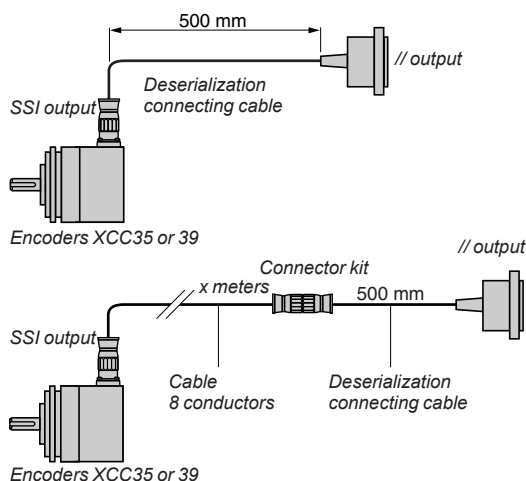
- Pre-cabled with 2 m shielded cable or M23/M12 connector.
- Radial type connection.

6 Resolution

- Number of pulses per revolution.
- Number of revolutions (for multi-turn absolute encoders).
- On Ø 58 parameterable incremental encoders, this resolution can be adjusted using DIP switches (multiplication factor up to 16 times on 9 basic resolutions).

7 Type of output

- Incremental encoders
5 V output driver, RS-422, 4.75–30 V.
Push-pull output driver, 5–30 V, 11–30 V.
- Single-turn absolute encoders (depending on model)
Push-pull output driver, 11–30 V, binary code or Gray code.
SSI output without parity, 13-bit clock, 11–30 V, binary code or Gray code.
- Multi-turn absolute encoders (depending on model)
SSI output without parity, 25-bit clock, 11–30 V, binary code or Gray code.
- Parallel outputs obtainable using converter connecting cables
The SSI versions can be converted to a parallel version by using the deserialization connecting cable (see page 34).
- Multi-turn absolute encoders, communicating version, fieldbus:
 - CANopen: 11–30 V (see page 42).
 - Profibus-DP: 11–30 V (see page 46).



OsiSense™ XCC

Opto-electronic rotary encoders

Specifications required to define an encoder

Installation considerations

Type of cables

In an environment subject to considerable electrical interference, we recommend using cables with several twisted pairs, reinforced by general shielding.

For the signals, we recommend using standard 0.14 mm²/0.22 mm² conductors.

For 5 V supply encoders.

Due to line voltage drops, we recommend that the 0 V and + V supply cables have the following minimum cross-sectional areas:

- 0.14 mm² (26 AWG) if the encoder-supply distance is less than 30 m,
- 0.22 mm² (24 AWG) if the encoder-supply distance is greater than 30 m.

Cabling

Separate as much as possible the connecting cables to encoders and power cables. Also avoid parallel cable runs. Maintain a distance of at least 20 cm and, in the event of cables crossing, ensure that the crossovers are at right-angles.

When using cables with twisted pairs (shielded or nonshielded) group the signal cables in common pairs.

In environments subject to electrical interference, we recommend grounding the encoder base using one of the mounting screws.

Connect the control inputs to a potential (absolute encoder).

Connect all 0 V connections back to a star point, i.e. only one and same referential.

Ground the shielding throughout 360° using tap-off braids at both ends of each cable. To ground the shielding use cable of at least 4 mm².

As much as possible, ground the 0 V of the supply to the encoders on the supply side.

Maximum frequency of signals for SSI depending on distance:

Indicative values that can vary depending on the cable specifications.

Distance (m)	Frequency (kHz)
50	400
100	300
200	200
400	100

Supply

It is imperative to use only regulated and smoothed power supplies (with a ripple factor of 500 mV @ 24 V, and 200 mV @ 5 V) that are specifically for the encoder. The Schneider Electric ABL7 range power supplies are available for this purpose.

Refer to the catalog, "Power supplies, splitter boxes and interfaces."

For 5–30 V encoders, the supply via a transformer with a 24 V rms rectified and smoothed secondary is prohibited, since the DC voltage obtained is higher than the supply voltage limits of the encoder.

Prior to power-up for the first time, ensure that the rated supply voltage of the encoder is suitable for the supply.

OsiSense™ XCC

Opto-electronic rotary encoders

Specifications required to define an encoder, installation, power-up

Connection and power-up considerations

Connection

It is necessary to disconnect the supply before plugging in or unplugging a connector version encoder.

Encoder supplied by central unit:

- disconnect supply to central unit,
- proceed with connection or disconnection,
- re-establish supply to central unit.

Encoder supplied by source external to central unit:

- disconnect supply to central unit, then disconnect supply to encoder,
- proceed with connection or disconnection,
- re-establish supply to encoder, then re-establish supply to central unit.

Power-up

For synchronization reasons, the power-up or switching-off of the encoder must coincide with that of its associated electronics.

Environment

Encoder type			XCC1406P●●●●	XCC1406T●●●●
Conformity			CE	
Temperature	Operation (housing)	°C (°F)	-20 to +80 (-4 to +176)	
	Storage	°C (°F)	-30 to +85 (-22 to +185)	
Degree of protection	Conforming to IEC 60529		IP 54	IP 52
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (10–500 Hz)	
Shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms	
Resistance to electromagnetic interference	Electrostatic discharges		Conforming to IEC 61000-4-2: level 3, 8 kV air; 4 kV contact	
	Radiated electromagnetic fields (electromagnetic waves)		Conforming to IEC 61000-4-3: level 3, 10 V/m	
	Fast transients (Start/Stop interference)		Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs)	
	Surge withstand		Conforming to IEC 61000-4-5: level 2, 1 kV	
Materials	Base		Aluminum or Zamak	
	Housing		Aluminum or Zamak	
	Shaft		Stainless steel or Aluminum	
	Ball bearings		688AZZ1	

Mechanical specifications

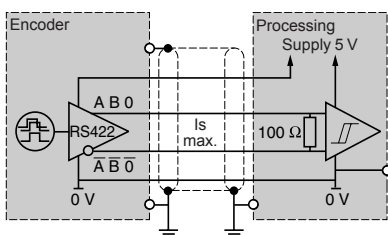
Shaft type		mm	Ø 6, solid shaft (g7)	Ø 6, through-shaft (H7)
Maximum rotational speed	Continuous		9000 rpm	
Shaft moment of inertia		g•cm ²	10 (0.14 oz-in)	5 (0.07 oz-in)
Torque		N•cm	0.2 (0.28 oz-in)	0.25 (0.35 oz-in)
Maximum load	Radial	N	20	
	Axial	N	10	

Electrical specifications

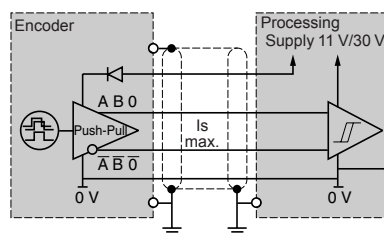
Connection			Radial: pre-cabled, 8 x 0.14 mm ² shielded, Ø ext = 6 mm, length = 2 m Crimped metal cable entry	Pre-cabled 8 x 0.14 mm ² shielded, Ø ext = 6 mm, length = 2 m Crimped metal cable entry
Frequency		kHz	100	
Number of channels			3 channels: A, B, top 0 and complements \bar{A} , \bar{B} , $\bar{0}$	
Encoders with type R output stage: 5 V output driver, RS-422, 4.5–5.5 V supply				
Supply voltage			--- 5 V ±10% Max. ripple: 200 mV	
Current consumption, no-load		mA	100 max.	
Output current		mA	40 max.	
Output levels	Low level		(I _S = 20 mA) 0.5 V max.	
	High level		(I _S = 20 mA) 2.5 V min.	
Encoders with type K output stage: push-pull output driver, 11–30 V supply				
Supply voltage			--- 11–30 V Max. ripple: 500 mV	
Current consumption, no-load		mA	75 max.	
Protection			Against short-circuits and reverse polarity	
Output current		mA	40 max.	
Output levels	Low level		(I _S = 20 mA) 1.5 V max.	
	High level		(I _S = 20 mA) V supply — 3 V min.	

Wiring diagrams

Type R output stage



Type K output stage



OsiSense™ XCC

Incremental encoders

Ø 40 mm encoders



Solid shaft, Ø 6 mm					
Resolution	Connection method	Output stage type (1)	Supply voltage	Catalog number	Weight kg (lb)
100 ppr	Pre-cabled, radial 2 m	5 V, RS-422	4.5–5.5 V	XCC1406PR01R	0.355 (0.787)
		Push-pull	11–30 V	XCC1406PR01K	0.355 (0.787)
360 ppr	Pre-cabled, radial 2 m	5 V, RS-422	4.5–5.5 V	XCC1406PR03R	0.355 (0.787)
		Push-pull	11–30 V	XCC1406PR03K	0.355 (0.787)
500 ppr	Pre-cabled, radial 2 m	5 V, RS-422	4.5–5.5 V	XCC1406PR05R	0.355 (0.787)
		Push-pull	11–30 V	XCC1406PR05K	0.355 (0.787)
1000 ppr	Pre-cabled, radial 2 m	5 V, RS-422	4.5–5.5 V	XCC1406PR10R	0.355 (0.787)
		Push-pull	11–30 V	XCC1406PR10K	0.355 (0.787)
1024 ppr	Pre-cabled, radial 2 m	5 V, RS-422	4.5–5.5 V	XCC1406PR11R	0.355 (0.787)
		Push-pull	11–30 V	XCC1406PR11K	0.355 (0.787)



Through-shaft, Ø 6 mm (2)					
Resolution	Connection method	Output stage type (1)	Supply voltage	Catalog number	Weight kg (lb)
100 ppr	Pre-cabled, radial 2 m	5 V, RS-422	4.5–5.5 V	XCC1406TR01R	0.405 (0.893)
		Push-pull	11–30 V	XCC1406TR01K	0.405 (0.893)
360 ppr	Pre-cabled, radial 2 m	5 V, RS-422	4.5–5.5 V	XCC1406TR03R	0.405 (0.893)
		Push-pull	11–30 V	XCC1406TR03K	0.405 (0.893)
500 ppr	Pre-cabled, radial 2 m	5 V, RS-422	4.5–5.5 V	XCC1406TR05R	0.405 (0.893)
		Push-pull	11–30 V	XCC1406TR05K	0.405 (0.893)
1000 ppr	Pre-cabled, radial 2 m	5 V, RS-422	4.5–5.5 V	XCC1406TR10R	0.405 (0.893)
		Push-pull	11–30 V	XCC1406TR10K	0.405 (0.893)
1024 ppr	Pre-cabled, radial 2 m	5 V, RS-422	4.5–5.5 V	XCC1406TR11R	0.405 (0.893)
		Push-pull	11–30 V	XCC1406TR11K	0.405 (0.893)

(1) For specifications of the output stage type (indicated by last letter of the catalog number). See page 12.
 (2) Anti-rotation device included with encoder.

Environment

Encoder type			XCC1506P●●●●	XCC1510P●●●●	XCC1510S●●●●	XCC1514T●●●●
Conformity			CE			
Temperature	Operation (housing)	°C (°F)	-30 to +100 (-22 to +212), except XCCTSM●●X and XCCTSM●●Y: -30 to +70 (-22 to +158)			
	Storage	°C (°F)	-30 to +85 (-22 to +185) except XCC1510S●●●●: -40 to +100 (-40 to +212)			
Degree of protection	Conforming to IEC 60529		IP 65	IP 65 (IP 67 with collar option XCCRB3)	IP 69K	IP 65
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (55–2000 Hz)			
Shock resistance	Conforming to IEC 60068-2-27		50 gn, duration 6 ms			
Resistance to electromagnetic interference	Electrostatic discharges		Conforming to IEC 61000-4-2: level 3, 8 kV air, 4 kV contact			
	Radiated electromagnetic fields (electromagnetic waves)		Conforming to IEC 61000-4-3: level 3, 10 V/m			
	Fast transients (Start/Stop interference)		Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs)			
	Surge withstand		Conforming to IEC 61000-4-5: level 2, 1 kV			
Materials	Base		Aluminum		Stainless steel 316L	Aluminum
	Housing		Zamak		Stainless steel 316L	Zamak
	Shaft		Stainless steel 303		Stainless steel 316L	Stainless steel 303
	Ball bearings		6000		6000 with teflon sealing ring	6803ZZ

Mechanical specifications

Shaft type			Ø 6, solid shaft (g7)	Ø 10 mm, solid shaft	Ø 10 mm, solid shaft	Ø 14, through-shaft (H7)
Maximum rotational speed	Continuous		9000 rpm	9000 rpm	3000 rpm	6000 rpm
Shaft moment of inertia		g·cm²	10 (0.14 oz-in)	10 (0.14 oz-in)	12 (0.17 oz-in)	22 (0.31 oz-in)
Torque		N·cm	0.4 (0.57 oz-in)	0.4 (0.57 oz-in)	9 (12.7 oz-in)	0.6 (0.85 oz-in)
Maximum load	Radial	N	100	100	250	50
	Axial	N	50	50	500	20

Electrical specifications

Connection	Connector		M23, 12-pin male connector (2 m PUR cable for XCC1510S●●●●)			
Frequency		kHz	300			
Number of channels			3 channels: A, B, top 0 and complements \bar{A} , \bar{B} , $\bar{0}$			

Encoders with type X output stage: 5 V output driver, RS-422, 4.75–30 V supply

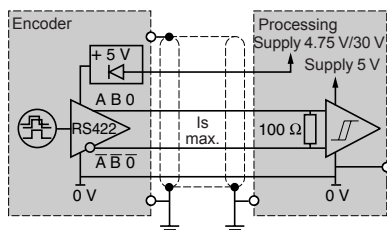
Supply voltage			4.75–30 V Max. ripple: 500 mV			
Current consumption, no-load		mA	75 max.			
Protection			Against short circuits and reverse polarity			
Output current		mA	40 max.			
Output levels	Low level		(I _s = 20 mA) 0.5 V max.			
	High level		(I _s = 20 mA) 4.5 V min.			

Encoders with type Y output stage: push-pull output driver, 5–30 V supply

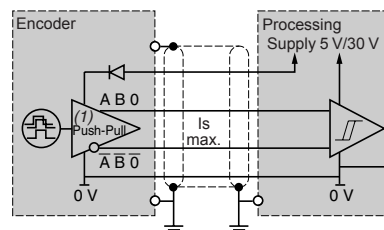
Supply voltage			5–30 V Max. ripple: 500 mV			
Current consumption, no-load		mA	75 max.			
Protection			Against short-circuits and reverse polarity			
Output current		mA	40 max.			
Output levels (for U supply = 30 V) (1)	Low level		(I _s = 20 mA) 0.5 V max.			
	High level		(I _s = 20 mA) V supply — 2.5 V min.			

Wiring diagrams

Type X output stage



Type Y output stage



(1) RS-422 compatible on 5 V supply.

OsiSense™ XCC Incremental encoders

Ø 58 mm encoders aluminum and stainless steel version

105163



XCC1506PS●●●

Solid shaft, Ø 6 mm

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog Number	Weight kg (lb)
100 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1506PS01X	0.495 (1.091)
		Push-pull	5–30 V	XCC1506PS01Y	0.495 (1.091)
360 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1506PS03X	0.495 (1.091)
		Push-pull	5–30 V	XCC1506PS03Y	0.495 (1.091)
500 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1506PS05X	0.495 (1.091)
		Push-pull	5–30 V	XCC1506PS05Y	0.495 (1.091)
1000 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1506PS10X	0.495 (1.091)
		Push-pull	5–30 V	XCC1506PS10Y	0.495 (1.091)
1024 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1506PS11X	0.495 (1.091)
		Push-pull	5–30 V	XCC1506PS11Y	0.495 (1.091)
2500 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1506PS25X	0.495 (1.091)
		Push-pull	5–30 V	XCC1506PS25Y	0.495 (1.091)
5000 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1506PS50X	0.495 (1.091)
		Push-pull	5–30 V	XCC1506PS50Y	0.495 (1.091)



XCC1510SPA●●●

Solid shaft, Ø 10 mm

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog Number	Weight kg (lb)
100 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PS01X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PS01Y	0.465 (1.025)
360 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PS03X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PS03Y	0.465 (1.025)
	Cable 2m	Push-pull	5–30 V	XCC1510SPA03Y (3)	0.600 (1.300)
500 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PS05X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PS05Y	0.465 (1.025)
1000 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PS10X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PS10Y	0.465 (1.025)
1024 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PS11X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PS11Y	0.465 (1.025)
	Cable 2m	Push-pull	5–30 V	XCC1510SPA11Y (3)	0.600 (1.300)
2500 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PS25X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PS25Y	0.465 (1.025)
5000 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PS50X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PS50Y	0.465 (1.025)
	Cable 2m	Push-pull	5–30 V	XCC1510SPA50Y (3)	0.600 (1.300)

105164



XCC1510PS●●●

(1) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.

(2) For specifications of the output stage type (indicated by last letter of the catalog number). See page 14.

(3) Stainless steel 316L version

OsiSense™ XCC

Incremental encoders

Ø 58 mm encoders



XCC1514TS●●●

Through-shaft, Ø 14 mm (1)

Resolution	Connection method (2)	Output stage type (3)	Supply voltage	Catalog Number	Weight kg (lb)
100 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TS01X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TS01Y	0.435 (0.959)
360 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TS03X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TS03Y	0.435 (0.959)
500 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TS05X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TS05Y	0.435 (0.959)
1000 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TS10X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TS10Y	0.435 (0.959)
1024 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TS11X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TS11Y	0.435 (0.959)
2500 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TS25X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TS25Y	0.435 (0.959)
5000 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TS50X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TS50Y	0.435 (0.959)

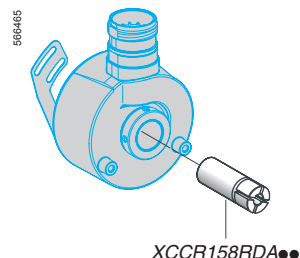
Reduction collars for encoders with through-shaft, Ø 14 mm

For use with	Diameter mm	Catalog Number	Weight kg (lb)
Encoders with through-shaft XCC1514TS●●●	Ø 6	XCCR158RDA06	0.015 (0.033)
	Ø 8	XCCR158RDA08	0.010 (0.022)
	Ø 10	XCCR158RDA10	0.010 (0.022)
	Ø 12	XCCR158RDA12	0.010 (0.022)

(1) Anti-rotation device included with encoder.

(2) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.

(3) For specifications of the output stage type (indicated by last letter of the catalog number). See page 14.



XCCR158RDA●●

OsiSense™ XCC

Incremental encoders

Ø 58 mm encoders

Parameterable versions (1)

105164



XCC1510PSM02X

Parameterable with solid shaft, Ø 10 mm

Resolution	Connection method (2)	Output stage type (3)	Supply voltage	Catalog Number	Weight kg (lb)
256–4096 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PSM02X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PSM02Y	0.465 (1.025)
360–5760 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PSM03X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PSM03Y	0.465 (1.025)
500–8000 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PSM05X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PSM05Y	0.465 (1.025)
1024–16,384 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PSM11X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PSM11Y	0.465 (1.025)
5000–80,000 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1510PSM50X	0.465 (1.025)
		Push-pull	5–30 V	XCC1510PSM50Y	0.465 (1.025)

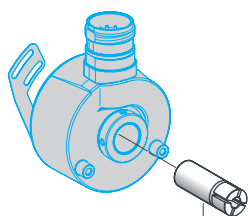
Parameterable with through-shaft, Ø 14 mm (4)

Resolution	Connection method (2)	Output stage type (3)	Supply voltage	Catalog Number	Weight kg (lb)
256–4096 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TSM02X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TSM02Y	0.435 (0.959)
360–5760 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TSM03X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TSM03Y	0.435 (0.959)
500–8000 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TSM05X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TSM05Y	0.435 (0.959)
1024–16,384 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TSM11X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TSM11Y	0.435 (0.959)
5000–80,000 ppr	Connector, radial M23 male	5 V, RS-422	4.75–30 V	XCC1514TSM50X	0.435 (0.959)
		Push-pull	5–30 V	XCC1514TSM50Y	0.435 (0.959)

Reduction collars for parameterable encoders with through-shaft, Ø 14 mm

For use with	Diameter mm	Catalog Number	Weight kg (lb)
Encoders with through-shaft XCC1514TSM●●●	Ø 6	XCCR158RDA06	0.015 (0.033)
	Ø 8	XCCR158RDA08	0.010 (0.022)
	Ø 10	XCCR158RDA10	0.010 (0.022)
	Ø 12	XCCR158RDA12	0.010 (0.022)

560465



XCCR158RDA●●

(1) Parameter configuration: refer to table indicating position of DIP switches on page 17.

(2) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.

(3) For specifications of the output stage type (indicated by last letter of the catalog number). See page 14.

(4) Anti-rotation device included with encoder.

Environment			
Encoder type		XCC1912P●●●●	XCC1930T●●●●
Conformity		CE	
Temperature	Operation (housing)	°C (°F)	–20 to +80 (–4 to +176)
	Storage	°C (°F)	–30 to +85 (–22 to +185)
Degree of protection	Conforming to IEC 60529		IP 66
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (10–1 kHz)
Shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms
Resistance to electromagnetic interference	Electrostatic discharges		Conforming to IEC 61000-4-2: level 3, 8 kV air; 4 kV contact
	Radiated electromagnetic fields (electromagnetic waves)		Conforming to IEC 61000-4-3: level 3, 10 V/m
	Fast transients (Start/Stop interference)		Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs)
	Surge withstand		Conforming to IEC 61000-4-5: level 2, 1 kV
Materials	Base		Aluminum
	Housing		Zamak
	Shaft		Stainless steel
	Ball bearings		6001ZZ

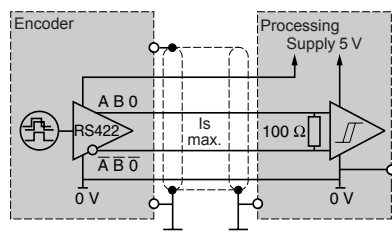
Mechanical specifications			
Shaft type		Ø 12, solid shaft (g6)	Ø 30, through-shaft (H7)
Maximum rotational speed	Continuous		6000 rpm
Shaft moment of inertia		g·cm²	150 (2.08 oz-in)
Torque		N·cm	1 (1.42 oz-in)
Maximum load	Radial	N	200
	Axial	N	100

Electrical specifications			
Connection	Connector		M23, 12-pin male connector
Frequency		kHz	100
Number of channels			3 channels: A, B, top 0 and complements \bar{A} , \bar{B} , $\bar{0}$

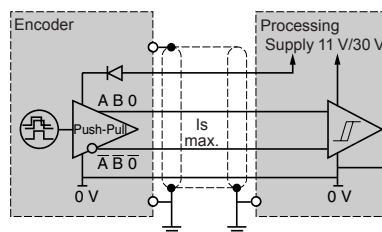
Encoders with type R (N) output stage: 5 V output driver, RS-422, 4.5–5.5 V supply			
Supply voltage			± 5 V ± 10% Max. ripple: 200 mV
Current consumption, no-load		mA	100 max.
Output current		mA	40 max.
Output levels	Low level		(I _s = 20 mA) 0.5 V max.
	High level		(I _s = 20 mA) V supply — 2.5 V min.

Encoders with type K (N) output stage: push-pull output driver, 11–30 V supply			
Supply voltage			± 11–30 V Max. ripple: 500 mV
Current consumption, no-load		mA	75 max.
Protection			Against short-circuits and reverse polarity
Output current		mA	40 max.
Output levels	Low level		(I _s = 20 mA) 1.5 V max.
	High level		(I _s = 20 mA) V supply — 3 V min.

Wiring diagrams
Type R (N) output stage



Type K (N) output stage



OsiSense™ XCC

Incremental encoders

Ø 90 mm encoders

105168



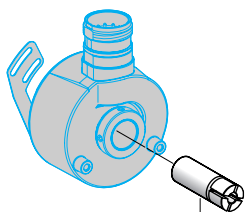
XCC1912PS●●●N

105171



XCC1930TS●●●N

523200



XCCR290RDP●●●N

Solid shaft, Ø 12 mm

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog Number	Weight kg (lb)
100 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1912PS01RN	1.360 (3.000)
		Push-pull	11–30 V	XCC1912PS01KN	1.360 (3.000)
360 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1912PS03RN	1.360 (3.000)
		Push-pull	11–30 V	XCC1912PS03KN	1.360 (3.000)
500 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1912PS05RN	1.360 (3.000)
		Push-pull	11–30 V	XCC1912PS05KN	1.360 (3.000)
1000 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1912PS10RN	1.360 (3.000)
		Push-pull	11–30 V	XCC1912PS10KN	1.360 (3.000)
1024 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1912PS11RN	1.360 (3.000)
		Push-pull	11–30 V	XCC1912PS11KN	1.360 (3.000)
2500 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1912PS25RN	1.360 (3.000)
		Push-pull	11–30 V	XCC1912PS25KN	1.360 (3.000)
3600 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1912PS36RN	1.360 (3.000)
		Push-pull	11–30 V	XCC1912PS36KN	1.360 (3.000)
5000 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1912PS50RN	1.360 (3.000)
		Push-pull	11–30 V	XCC1912PS50KN	1.360 (3.000)
10,000 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1912PS00RN	1.360 (3.000)
		Push-pull	11–30 V	XCC1912PS00KN	1.360 (3.000)

Through-shaft, Ø 30 mm (3)

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog Number	Weight kg (lb)
100 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1930TS01RN	0.960 (2.116)
		Push-pull	11–30 V	XCC1930TS01KN	0.960 (2.116)
360 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1930TS03RN	0.960 (2.116)
		Push-pull	11–30 V	XCC1930TS03KN	0.960 (2.116)
500 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1930TS05RN	0.960 (2.116)
		Push-pull	11–30 V	XCC1930TS05KN	0.960 (2.116)
1000 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1930TS10RN	0.960 (2.116)
		Push-pull	11–30 V	XCC1930TS10KN	0.960 (2.116)
1024 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1930TS11RN	0.960 (2.116)
		Push-pull	11–30 V	XCC1930TS11KN	0.960 (2.116)
2500 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1930TS25RN	0.960 (2.116)
		Push-pull	11–30 V	XCC1930TS25KN	0.960 (2.116)
3600 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1930TS36RN	0.960 (2.116)
		Push-pull	11–30 V	XCC1930TS36KN	0.960 (2.116)
5000 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1930TS50RN	0.960 (2.116)
		Push-pull	11–30 V	XCC1930TS50KN	0.960 (2.116)
10,000 ppr	Connector, radial M23 male	5 V, RS-422	4.5–5.5 V	XCC1930TS00RN	0.960 (2.116)
		Push-pull	11–30 V	XCC1930TS00KN	0.960 (2.116)

Reduction collars for encoders with through-shaft, Ø 30 mm

For use with	Diameter mm	Catalog Number	Weight kg (lb)
Encoders with through-shaft XCC1930TS●●●●N	Ø 12	XCCR290RDP12	0.060 (0.132)
	Ø 16	XCCR290RDP16	0.060 (0.132)
	Ø 20	XCCR290RDP20	0.030 (0.066)
	Ø 25	XCCR290RDP25	0.025 (0.055)

(1) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.

(2) For specifications of the output stage type (indicated by last letter of the catalog number). See page 18.

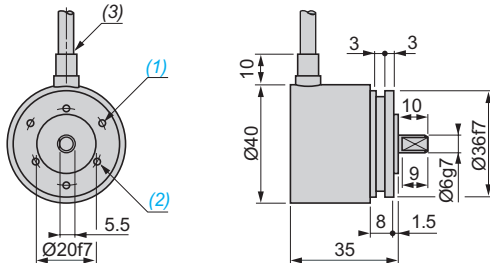
(3) Anti-rotation device included with encoder.

OsiSense™ XCC Incremental encoders

Ø 40 mm, Ø 58 mm and Ø 90 mm encoders

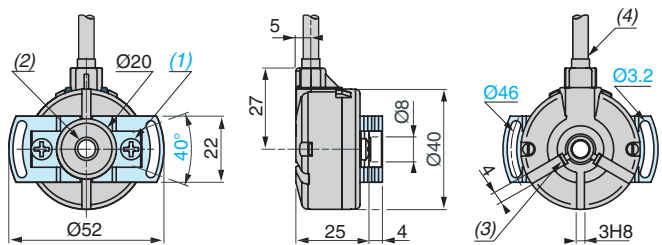
Ø 40 mm encoders

XCC1406PR●●●N



- (1) 3 holes M3 x 0.45 at 120° on 28 PCD, depth: 6 mm.
- (2) 3 holes M3 x 0.45 at 120° on 24 PCD, depth: 6 mm.
- (3) Ø 6 cable, length 2 m, minimum bend radius: 30 mm.

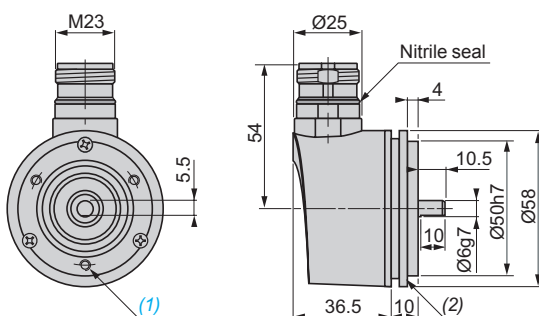
XCC1406TR●●●N



- (1) 2 M4 holes at 120° for cross-headed screws on 30 PCD, depth: 6 mm.
- (2) Through-shaft, Ø 6 (H7).
- (3) 2 M2 x 3 flat cross-headed locking screws.
- (4) Ø 6 cable, length 2 m, minimum bend radius: 30 mm.

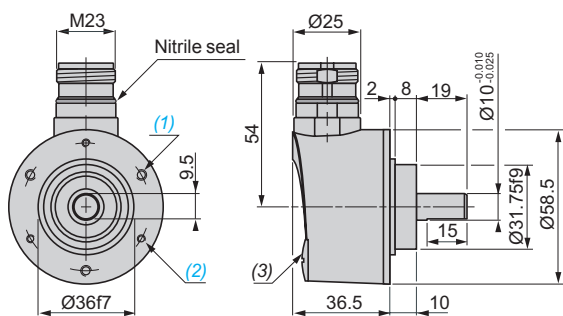
Ø 58 mm encoders

XCC1506PS●●X, XCC1506PS●●Y



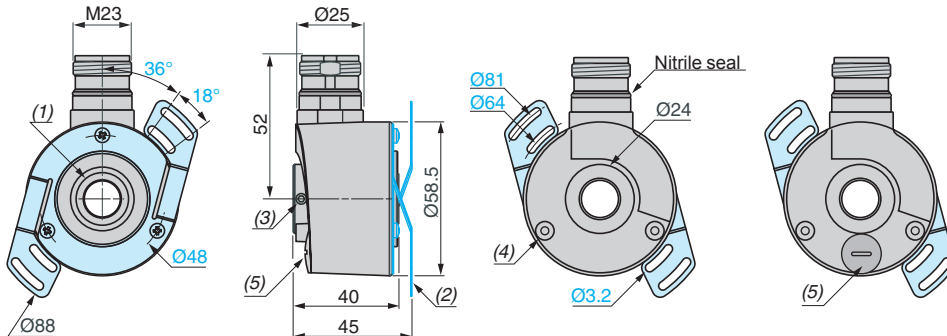
- (1) 3 holes M3 x 4 at 120° on 42 PCD, depth: 10 mm.
- (2) Collar XCCRB1 mounted.

XCC1510PS●●X, 1510PS●●Y / XCC1510PSM●●X, 1510PSM●●Y



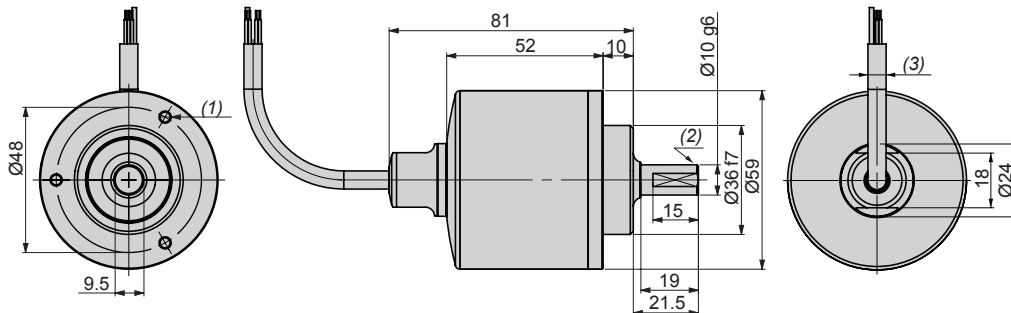
- (1) 3 M4 holes at 120° on 48 PCD, depth: 8 mm.
- (2) 3 M3 holes at 120° on 48 PCD, depth: 8 mm.
- (3) Blanking plug, for encoders XCC1510PSM●●X and 1510PSM●●Y only.

XCC1514TS●●X, 1514TS●●Y / XCC1514TSM●●X, 1514TSM●●Y



- (1) Through-shaft, Ø 14 (H7).
- (2) Flexible mounting kit, 1 x XCCRF5N mounted.
- (3) 2 HC M4 x 4 locking screws.
- (4) Hole for M3 x 6 self-threading screw.
- (5) Blanking plug, for encoders XCC1514TSM●●X and 1514TSM●●Y only.

XCC1510SPA03Y, XCC1510SPA11Y, XCC1510SPA50Y



- (1) 3 holes M4 x 3 at 120° on 48 PCD, depth: 8 mm
- (2) Shaft side protection IP69K
- (3) Ø 6 cable, length 2 m, minimum bend radius: 30 mm.

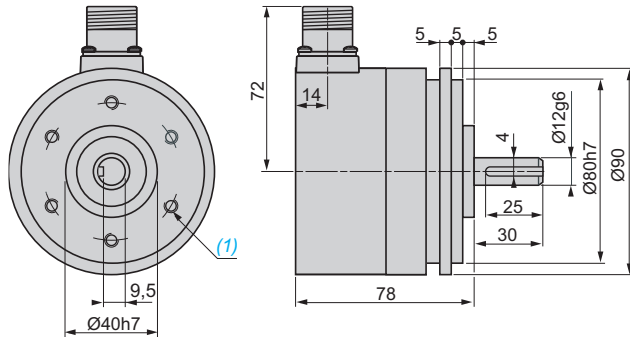
OsiSense™ XCC

Incremental encoders

Ø 40 mm, Ø 58 mm and Ø 90 mm encoders

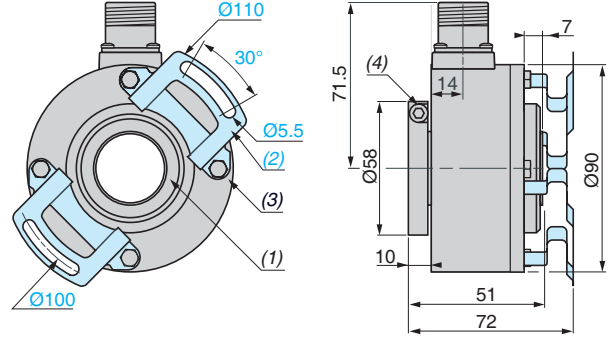
Ø 90 mm encoders

XCC1912PS●●●N



(1) 6 holes M6 x 1 at 120° on 60 PCD, max. depth: 12 mm.

XCC1930TS●●●N



- (1) Through-shaft, Ø 30 (H7).
- (2) Anti-rotation device, 1 x XCCRF9N, mounted.
- (3) 4 M5 x 6 on 78 PCD.
- (4) 1 CHC M5 x 12 stainless steel A2 locking screw.

Pre-cabled version encoders (1)

8 x 0.14 mm² shielded cable connections for Ø 40 encoders

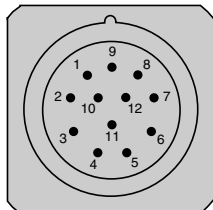
Wire color	BN	RD	VT	BU	YE	OG	GN	BK
Signal Supply	\bar{A}	+V	0	$\bar{0}$	B	\bar{B}	A	0V
	BN = Brown	RD = Red	VT = Violet	BU = Blue	YE = Yellow	OG = Orange	GN = Green	BK = Black

Note: In environments subject to electrical interference, we recommend grounding the encoder base using one of the mounting screws.

Connector version encoders (1)

M23, 12-pin connector connections

Male connector on encoder (pin view)



Pin number	1	2	3	4	5	6	7	8	9	10	11	12
Signal Supply	\bar{A}	+V	0	$\bar{0}$	B	\bar{B}	R	A	R	0V	0V	+V

Note: In environments subject to electrical interference, we recommend grounding the encoder base using one of the mounting screws.
R = reserved. Do not connect.

(1) Connect each unused channel to 0 V in series with a 10 kΩ resistor.

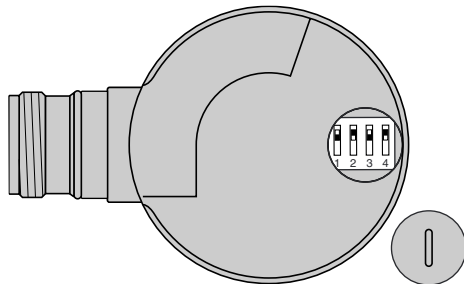
Resolutions

Resolutions for parameterable Ø 58 mm encoders XCC1510PSM●●● and XCC1514TSM●●●

Simple multiplication of the basic resolution of the disc using DIP switches (1)

(Plastic Ø 2.5 screwdriver recommended.)

The factory setting is for factor X1.



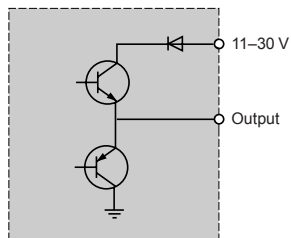
		Basic resolution					Position of DIP switches			
Interpolation factor	Counting Speed	256	360	500	1024	5000	1	2	3	4
x 1	x 1	256	360	500	1024	5000				
x 2	x 2	512	720	1000	2048	10,000				
x 3	x 3	768	1080	1500	3072	15,000				
x 4	x 4	1024	1440	2000	4096	20,000				
x 5	—	1280	1800	2500	5120	25,000				
x 8	—	2048	2880	4000	8192	40,000				
x 10	—	2560	3600	5000	10,240	50,000				
x 12	—	3072	4320	6000	12,288	60,000				
x 16	—	4096	5760	8000	16,384	80,000				

(1) Setting the switches to other configurations will result in the encoder providing an unpredictable resolution.

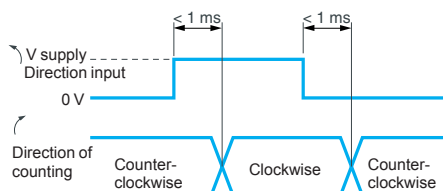
Environment						
Encoder type			XCC2506P●●●●●	XCC2510P●●●●●	XCC2510S●●●●●	XCC2514T●●●●●
Conformity			CE			
Temperature	Operation (housing)	°C (°F)	−20 to +90 (−4 to +194)			
	Storage	°C (°F)	−30 to +95 (−22 to +203) except XCC2510S●●●●●: −40 to +100 (−40 to +212)			
Degree of protection	Conforming to IEC 60529		IP 65	IP 65 (IP 67 with collar option XCCRB3)	IP 69K	IP 65
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (55–2 kHz)			
Shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms			
Resistance to electromagnetic interference	Electrostatic discharges		Conforming to IEC 61000-4-2: level 3, 8 kV air; 4 kV contact			
	Radiated electromagnetic fields (electromagnetic waves)		Conforming to IEC 61000-4-3: level 3, 10 V/m			
	Fast transients (Start/Stop interference)		Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs)			
	Surge withstand		Conforming to IEC 61000-4-5: level 2, 1 kV			
Materials	Base		Aluminum		Stainless steel 316L	Aluminum
	Housing		Zamak		Stainless steel 316L	Zamak
	Shaft		Stainless steel 303		Stainless steel 316L	Stainless steel 303
	Ball bearings		6000		6000 with teflon sealing ring	6803ZZ
Mechanical specifications						
Shaft type			Ø 6, solid shaft (g7)	Ø 10 mm, solid shaft	Ø 10 mm, solid shaft	Ø 14, through-shaft (H7)
Maximum rotational speed		Continuous	9000 rpm	9000 rpm	9000 rpm	6000 rpm
Shaft moment of inertia		g•cm²	10 (0.14 oz-in)	10 (0.14 oz-in)	12 (0.17 oz-in)	22 (0.31 oz-in)
Torque		N•cm	0.4 (0.57 oz-in)	0.4 (0.57 oz-in)	9 (12.7 oz-in)	0.6 (0.85 oz-in)
Maximum load	Radial	N	100	100	25	50
	Axial	N	50	50	50	20
Electrical specifications						
Connection		Connector	Encoders with parallel output stage types KG (N), KB: M23, 16-pin male connector / 2 m PUR cable for XCC2510S●●●●● Encoders with SSI output stage types SB (N), SG (N): M23, 12-pin male connector / 3 m PUR cable for XCC2510S●●●●●			
Frequency		kHz	Encoders with parallel output stage types KG (N), KB: 100 kHz on LSB (least significant bit) Encoders with SSI output stage types SB (N), SG (N): 100 kHz to 1 MHz clock			
Encoders with type KB and KG (N) output stage: push-pull output driver, 11–30 V supply, Gray code						
Supply voltage			11–30 V Max. ripple: 500 mV			
Current consumption, no-load		mA	100 max.			
Protection			Against short-circuits and reverse polarity			
Output current		mA	20 max.			
Output levels (for U supply = 30 V)	Low level		(Is = 20 mA) 0.5 V max.			
	High level		(Is = 20 mA) V supply — 2.5 V min.			

Wiring diagrams

Type KB and KG (N) output stage



KB and KG (N) Direction input

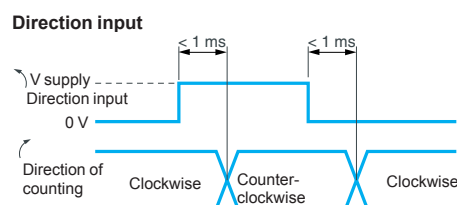
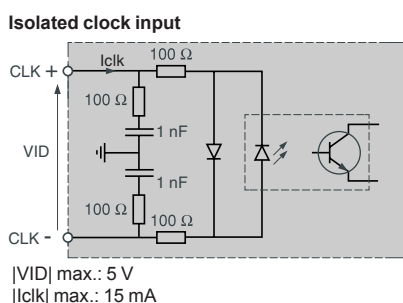
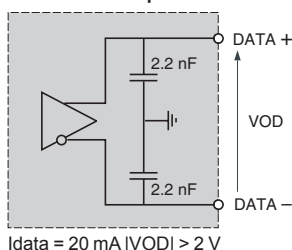


Electrical specifications (continued)

Encoders with type SB (N) or SG (N) output stage: SSI output without parity, 13-bit clock, 11–30 V supply, binary code (SB) or Gray code (SG)

Supply voltage		11–30 V. Max. ripple: 500 mV
Current consumption, no-load	mA	100
Protection		Against short circuits and reverse polarity
Output level		I _{data} = 20 mA V _{OD} > 2 V

Wiring diagrams



Catalog numbers

105173



XCC2506PS81●●●

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog number	Weight kg (lb)
Solid shaft, Ø 6 mm					
8192 ppr	Connector, radial M23 male	Push-pull, binary	11–30 V	XCC2506PS81KB	0.495 (1.091)
		Push-pull, Gray	11–30 V	XCC2506PS81KGN	0.495 (1.091)
		SSI, 13-bit, binary	11–30 V	XCC2506PS81SBN	0.490 (1.080)
		SSI, 13-bit, Gray	11–30 V	XCC2506PS81SGN	0.490 (1.080)

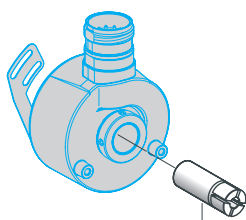
Solid shaft, Ø 10 mm					
8192 ppr	Connector, radial M23 male	Push-pull, binary	11–30 V	XCC2510PS81KB	0.465 (1.025)
		Push-pull, Gray	11–30 V	XCC2510PS81KGN	0.465 (1.025)
		SSI, 13-bit, binary	11–30 V	XCC2510PS81SBN	0.460 (1.014)
		SSI, 13-bit, Gray	11–30 V	XCC2510PS81SGN	0.460 (1.014)

Through-shaft, Ø 14 mm (3)					
8192 ppr	Connector, radial M23 male	Push-pull, binary	11–30 V	XCC2514TS81KB	0.435 (0.959)
		Push-pull, Gray	11–30 V	XCC2514TS81KG	0.435 (0.959)
		SSI, 13-bit, binary	11–30 V	XCC2514TS81SB	0.430 (0.948)
		SSI, 13-bit, Gray	11–30 V	XCC2514TS81SG	0.430 (0.948)
	Cable 2 m	Push Pull, Gray	11–30 V	XCC2510SPA81KGN (4)	0.600 (1.323)
		SSI, 13-bit, Gray	11–30 V	XCC2510SPA81SGN (4)	0.600 (1.323)

Reduction collars for encoders with through-shaft, Ø 14 mm				
For use with	Diameter mm	Catalog Number	Weight kg (lb)	
Encoders with through-shaft XCC2514TS81●●	Ø 6	XCCR158RDA06	0.015	(0.033)
	Ø 8	XCCR158RDA08	0.010	(0.022)
	Ø 10	XCCR158RDA10	0.010	(0.022)
	Ø 12	XCCR158RDA12	0.010	(0.022)

- (1) For female connector use:
- XZCC23FDP120S for encoders type SB (N) and SG (N)
- XZCC23FDP160S for encoders type KB and KG (N), or pre-wired connectors (2, 5 and 10 m). See page 35.
- (2) For specifications of the output stage type (indicated by last letter of the catalog number). See pages 22 and 23.
- (3) Anti-rotation device included with encoder.
- (4) Stainless steel 316L version.

564465

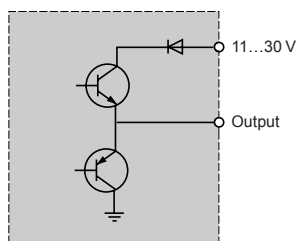


XCCR158RDA●●

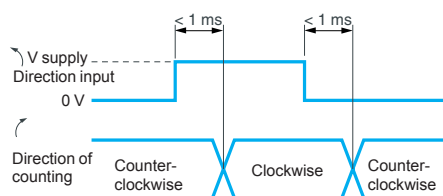
Environment			
Encoder type		XCC2912P●●●●●	XCC2930T●●●●●
Conformity		CE	
Temperature	Operation (housing)	°C (°F)	–20 to +85 (–4 to +185)
	Storage	°C (°F)	–40 to +85 (–40 to +185)
Degree of protection	Conforming to IEC 60529		IP 66
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (10–2 kHz)
Shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms
Resistance to electromagnetic interference	Electrostatic discharges		Conforming to IEC 61000-4-2: level 3, 8 kV air; 4 kV contact
	Radiated electromagnetic fields (electromagnetic waves)		Conforming to IEC 61000-4-3: level 3, 10 V/m
	Fast transients (Start/Stop interference)		Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs)
	Surge withstand		Conforming to IEC 61000-4-5: level 2, 1 kV
	Materials		
Materials	Base		Aluminum
	Housing		Zamak
	Shaft		Stainless steel
	Ball bearings		6001ZZ
Mechanical specifications			
Shaft type			Ø 12, solid shaft (g6)
Maximum rotational speed			6000 rpm
Shaft moment of inertia			150 (2.08 oz-in)
Torque			1 (1.42 oz-in)
Maximum load	Radial		200
	Axial		100
Electrical specifications			
Connection			Encoders with parallel output stage types KB (N), KG (N): M23, 16-pin male connector. Encoders with SSI output stage types SB (N), SG (N): M23, 12-pin male connector
Frequency			Encoders with parallel output stage types KB (N), KG (N): 100 kHz on LSB (least significant bit) Encoders with SSI output stage types SB (N), SG (N): 100 kHz to 1 MHz clock
Encoders with type KB (N) or KG (N) output stage: push-pull output driver, 11–30 V supply, binary code KB (N) or Gray code KG (N)			
Supply voltage			11–30 V. Max. ripple: 500 mV
Current consumption, no-load			100 max.
Protection			Against short-circuits and reverse polarity
Output current			20 max.
Output levels (for U supply = 30 V)	Low level		(I _s = 20 mA) 0.5 V max.
	High level		(I _s = 20 mA) V supply — 3 V min.

Wiring diagrams

Type KB (N) and KG (N) output stage



KB (N) and KG (N) Direction input

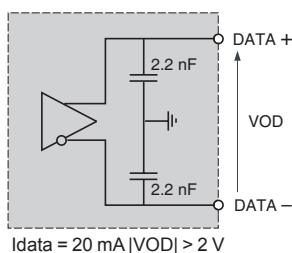


Electrical specifications (continued)

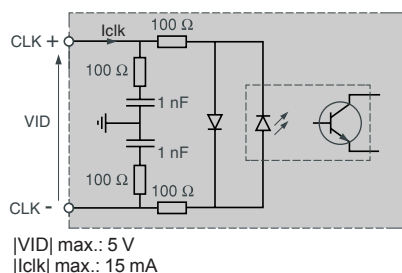
Encoders with type SB (N) or SG (N) output stage: SSI output without parity, 13-bit clock, 11–30 V supply, binary code SB (N) or Gray code SG (N)		
Supply voltage		11–30 V Max. ripple: 500 mV
Current consumption, no-load	mA	100
Protection		Against short-circuits and reverse polarity
Output level		I _{data} = 20 mA V _{OD} > 2 V

Wiring diagrams

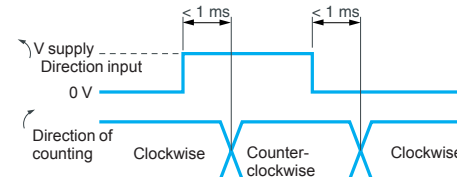
RS-422 data output



Isolated clock input



Direction input



Catalog numbers

105168



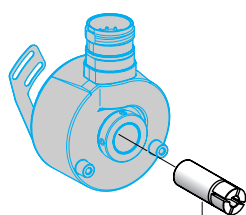
XCC2912PS●●●●

105171



XCC2930TS●●●●

523200



XCCR290RDP●●

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog number	Weight kg (lb)
Solid shaft, Ø 12 mm					
8192 ppr	Connector, radial M23 male	Push-pull, binary	11–30 V	XCC2912PS81KBN	1.365 (3.001)
		Push-pull, Gray	11–30 V	XCC2912PS81KGN	1.365 (3.001)
		SSI, 13-bit, binary	11–30 V	XCC2912PS81SBN	1.370 (3.020)
		SSI, 13-bit, Gray	11–30 V	XCC2912PS81SGN	1.370 (3.020)

Through-shaft, Ø 30 mm (3)

8192 ppr	Connector, radial M23 male	Push-pull, binary	11–30 V	XCC2930TS81KBN	0.975 (2.150)
		Push-pull, Gray	11–30 V	XCC2930TS81KGN	0.975 (2.150)
		SSI, 13-bit, binary	11–30 V	XCC2930TS81SBN	0.980 (2.161)
		SSI, 13-bit, Gray	11–30 V	XCC2930TS81SGN	0.980 (2.161)

Reduction collars for encoders with through-shaft, Ø 30 mm

For use with	Diameter mm	Catalog Number	Weight kg (lb)
Encoders with through-shaft XCC2930TS81●●●	Ø 12	XCCR290RDP12	0.060 (0.132)
	Ø 16	XCCR290RDP16	0.060 (0.132)
	Ø 20	XCCR290RDP20	0.030 (0.066)
	Ø 25	XCCR290RDP25	0.020 (0.044)

(1) For female connector use:

- XZCC23FDP120S for encoders type SB (N) and SG (N)
- XZCC23FDP160S for encoders type KB (N) and KG (N), or pre-wired connectors (2, 5 and 10 m). See page 35.

(2) For specifications of the output stage type (indicated by last letter of the catalog number). See pages 24 and 25.

(3) Anti-rotation device included with encoder.

OsiSense™ XCC

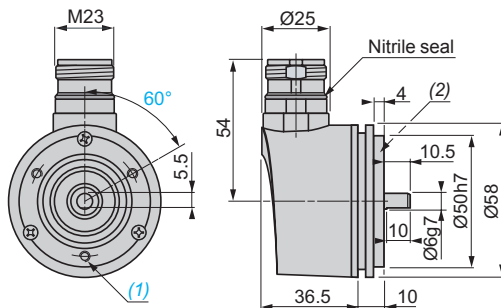
Single turn absolute encoders

Ø 58 mm and Ø 90 mm encoders

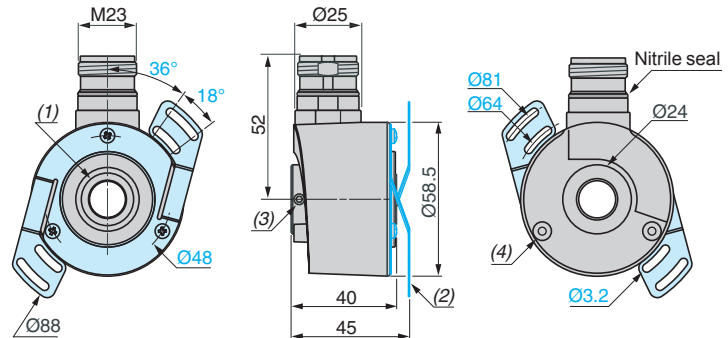
Ø 58 mm encoders

**XCC2506PS81KB, XCC2506PS81KGN,
XCC2506PS81SBN, XCC2506PS81SGN**

**XCC2514TS81KB, XCC2514TS81KGN, XCC2514TS81SB,
XCC2514TS81SG**



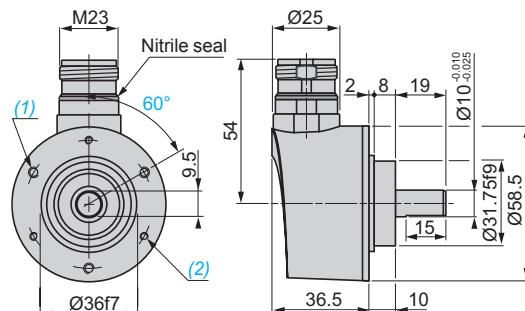
- (1) 3 M4 holes at 120° on 42 PCD, depth: 10 mm.
(2) Collar XCCRB1 mounted.



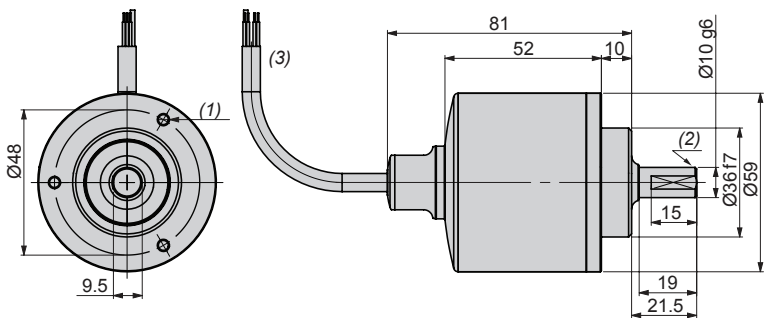
- (1) Through-shaft, Ø 14 (H7).
- (2) Flexible mounting kit, 1 x XCCRF5N mounted.
- (3) 2 HC M4 x 4 locking screws.
- (4) Hole for M3 x 6 self-threading screw.

**XCC2510PS81KB, XCC2510PS81KGN,
XCC2510PS81SBN, XCC2510PS81SGN**

XCC2510SPA81KGN, XCC2510SPA81SGN



- (1) 3 M4 holes at 120° on 48 PCD, depth: 8 mm.
(2) 3 M3 holes at 120° on 48 PCD, depth: 8 mm.

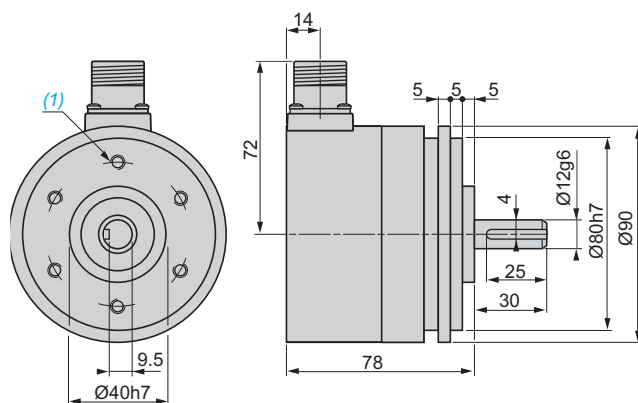


- (1) 3 holes M4 x 3 at 120° on 48 PCD, depth: 8 mm
(2) Shaft side protection IP69K
(3) XCC●●●KGN: Ø 6 x 2 m, minimum bend radius: 30 mm, PUR.
XCC●●●SGN: Ø 9 x 2 m, minimum bend radius: 30 mm, PUR.

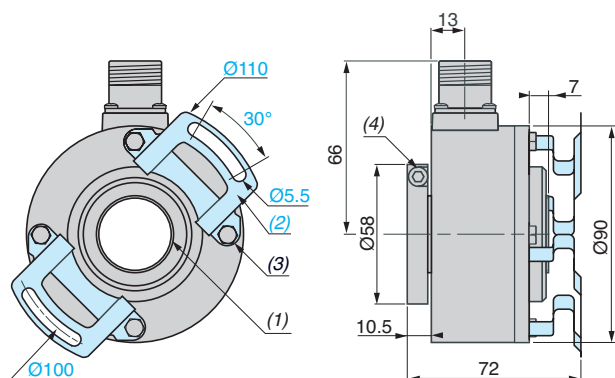
Ø 90 mm encoders

XCC2912PS81KBN, XCC2912PS81KGN

XCC2930TS81SBN, XCC2930TS81SGN



- (1) 6 holes M6 x 1 at 120° on 60 PCD, depth: 12 mm max.



- (1) Through-shaft, Ø 30 (H7).
- (2) Anti-rotation device, 1 x XCCRF9N, mounted.
- (3) 4 M5 x 6 on 78 PCD.
- (4) 1 CHC M5 x 12 stainless steel A2 locking screw.

OsiSense™ XCC

Single turn absolute encoders

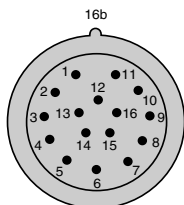
Ø 58 mm and Ø 90 mm encoders

Connector version encoders

Encoders type KB (N) and KG (N)

M23, 16-pin connector, counterclockwise connections

Male connector on encoder (pin view)



Pin number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Signal/Supply	0 V	+ V	d0	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	d12	Direction (1)

If a resolution less than 13 bits (8192 ppr) is required,

only the corresponding number of bits need to be connected:

Example:

- D5 to D12 for 8 bits (256 ppr)
- D3 to D12 for 10 bits (1024 ppr)
- D2 to D12 for 11 bits (2048 ppr)

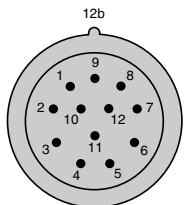
(1) ↻ : Clockwise direction, 16 to + V.

↻ : Counterclockwise direction, 16 to 0 V.

Encoders type SB (N) and SG (N)

M23, 12-pin connector, counterclockwise connections

Male connector on encoder (pin view)



Pin number	1	2	3	4	5	6	7	8	9	10	11	12
Signal/Supply	0 V	Data +	Clk +	R	Direction R (1)	R	R	+ V	R	Data -	Clk -	R

R = Reserved (do not connect).

(1) ↻ : Clockwise direction, 5 to 0 V.

↻ : Counterclockwise direction, 5 to + V.

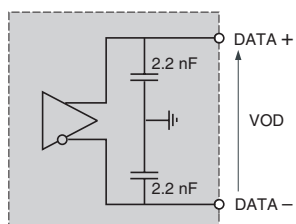
Environment						
Encoder type	Multi-turn absolute		XCC3506P●●●●●	XCC3510P●●●●●	XCC3510S●●●●●	XCC3514T●●●●●
Conformity			CE			
Temperature	Operation (housing)	°C (°F)	−20 to +85 (−4 to +185)			
	Storage	°C (°F)	−20 to +85 (−4 to +185)			
Degree of protection	Conforming to IEC 60529		IP 65	IP 65 (IP 67 with collar option XCCRB3)	IP 69K	IP 65
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (10–2 kHz)			
Shock resistance	Conforming to IEC 60068-2-27		30 gn, duration 11 ms			
Resistance to electromagnetic interference	Electrostatic discharges		Conforming to IEC 61000-4-2: level 3, 8 kV air; 4 kV contact			
	Radiated electromagnetic fields (electromagnetic waves)		Conforming to IEC 61000-4-3: level 3, 10 V/m			
	Fast transients (Start/Stop interference)		Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs)			
	Surge withstand		Conforming to IEC 61000-4-5: level 2, 1 kV			
Materials	Base		Aluminum		Stainless steel 316L	Aluminum
	Housing		Steel		Stainless steel 316L	Steel
	Shaft		Stainless steel 303		Stainless steel 316L	Stainless steel 303
	Ball bearings		6000		6000 with teflon sealing ring	6803ZZ

Mechanical specifications					
Shaft type			Ø 6, solid shaft (g7)	Ø 10 mm, solid shaft	Ø 14, through-shaft (H7)
Maximum rotational speed	Continuous		6000 rpm	3000 rpm	6000 rpm
Shaft moment of inertia		g•cm ²	10 (0.14 oz-in)	12 (0.17 oz-in)	22 (0.31 oz-in)
Torque		N•cm	0.4 (0.57 oz-in)	9 (12.7 oz-in)	0.6 (0.85 oz-in)
Maximum load	Radial	N	100	250	50
	Axial	N	50	250	20

Electrical specifications					
Connection	Connector		Encoders with SSI output stage types SB (N), SG (N): M23, 12-pin male connector / 2m PUR cable for XCC3510S●●●●●		
Frequency			Encoders with SSI output stage types SB (N), SG (N): 100 to 500 kHz clock		
Supply voltage			--- 11–30 V. Max. ripple: 500 mV		
Current consumption, no-load		mA	100 max.		
Protection			Against short-circuits and reverse polarity		
Output level			Idata = 20 mA VOD > 2 V		

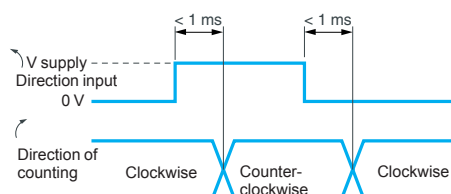
Wiring diagrams

RS-422 data output

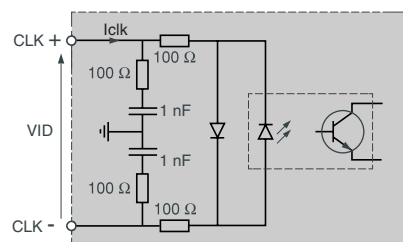


I_{data} = 20 mA |V_{OD}| > 2 V

Direction input

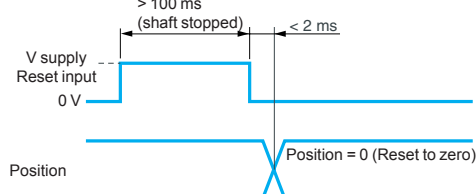


Isolated clock input



|V_{ID}| max.: 5 V
|I_{clk}| max.: 15 mA

Input stage — Reset to zero



OsiSense™ XCC

Multi-turn absolute encoders

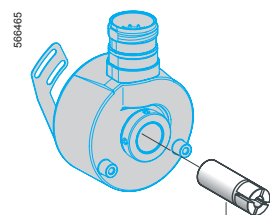
Ø 58 mm encoders



XCC3506PS84SBN



XCC3510SPA●●●●●



XCCR158RDA●●

Ø 58 mm multi-turn absolute encoders with SSI output convertible to parallel output

The SSI versions can be converted to a parallel version using the deserialization connecting cable XCCRM23SUB37●●. See page 35.

Solid shaft, Ø 6 mm

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog number	Weight kg (lb)
4096 ppr 8192 turns	Connector, radial M23 male	SSI, 25-bit, Gray	11–30 V	XCC3506PS48SGN	0.725 (1.598)
		SSI, 25-bit, binary	11–30 V	XCC3506PS48SBN	0.725 (1.598)
8192 ppr 4096 turns	Connector, radial M23 male	SSI, 25-bit, binary	11–30 V	XCC3506PS84SBN	0.725 (1.598)
		SSI, 25-bit, Gray	11–30 V	XCC3506PS84SGN	0.725 (1.598)

Solid shaft, Ø 10 mm

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog number	Weight kg (lb)
4096 ppr 8192 turns	Connector, radial M23 male	SSI, 25-bit, Gray	11–30 V	XCC3510PS48SGN	0.685 (1.510)
		SSI, 25-bit, binary	11–30 V	XCC3510PS48SBN	0.685 (1.510)
	Cable 2m	SSI, 25-bit, binary	11–30 V	XCC3510SPA48SGN (4)	0.600 (1.323)
8192 ppr 4096 turns	Connector, radial M23 male	SSI, 25-bit, binary	11–30 V	XCC3510PS84SBN	0.685 (1.510)
		SSI, 25-bit, Gray	11–30 V	XCC3510PS84SGN	0.685 (1.510)

Through-shaft, Ø 14 mm (3)

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog number	Weight kg (lb)
8192 ppr 4096 turns	Connector, radial M23 male	SSI, 25-bit, binary	11–30 V	XCC3514TS84SB	0.655 (1.444)
		SSI, 25-bit, Gray	11–30 V	XCC3514TS84SG	0.655 (1.444)

Reduction collars for encoders with through-shaft, Ø 14 mm

For use with	Diameter	Catalog number	Weight kg (lb)
Encoder with through-shaft XCC3514TS84●●	Ø 6 mm	XCCR158RDA06	0.015 (0.033)
	Ø 8 mm	XCCR158RDA08	0.010 (0.022)
	Ø 10 mm	XCCR158RDA10	0.010 (0.022)
	Ø 12 mm	XCCR158RDA12	0.010 (0.022)
	0.375 in.	XCCR158RDAU37	0.011 (0.024)
	0.5 in.	XCCR158RDAU50	0.007 (0.015)

(1) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.

(2) For specifications of the output stage type (indicated by last letter of the catalog number). See page 28.

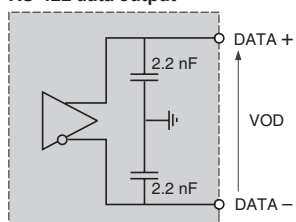
(3) Anti-rotation device included with encoder.

(4) Stainless steel 316L version.

Environment			
Encoder type		XCC3912P●●●●●	XCC3930T●●●●●
Conformity		CE	
Temperature	Operation (housing)	°C (°F) -20 to +85 (-4 to +185)	-10 to +75 (+14 to +167)
	Storage	°C (°F) -30 to +85 (-22 to +185)	-20 to +85 (-4 to +185)
Degree of protection	Conforming to IEC 60529	IP 66	IP 65
Vibration resistance	Conforming to IEC 60068-2-6	10 gn (10–2 kHz)	
Shock resistance	Conforming to IEC 60068-2-27	30 gn, duration 11 ms	
Resistance to electromagnetic interference	Electrostatic discharges	Conforming to IEC 61000-4-2: level 3, 8 kV air; 4 kV contact	
	Radiated electromagnetic fields (electromagnetic waves)	Conforming to IEC 61000-4-3: level 3, 10 V/m	
	Fast transients (Start/Stop interference)	Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs)	
	Surge withstand	Conforming to IEC 61000-4-5: level 2, 1 kV	
Materials	Base	Aluminum	
	Housing	Zamak	
	Shaft	Stainless steel	
	Ball bearings	6001ZZ	6807ZZ
Mechanical specifications			
Shaft type		Ø 12, solid shaft (g6)	Ø 30, through-shaft (H7)
Maximum rotational speed		Continuous	6000 rpm
Shaft moment of inertia		g·cm²	150 (2.08 oz-in)
Torque		N·cm	1 (1.42 oz-in)
Maximum load	Radial	N	200
	Axial	N	100
Electrical specifications			
Connection		Connector	Encoders with SSI output stage types SB (N), SG (N): M23, 12-pin male connector
Frequency			Encoders with SSI output stage types SB (N), SG (N): 100 to 500 kHz clock
Encoders with type SBN or SGN (Gray) output stage: SSI output without parity, 25-bit clock, 11–30 V supply, binary code (SB) or Gray code (SG)			
Supply voltage			11–30 V Max. ripple: 500 mV
Current consumption, no-load		mA	100 max.
Protection			Against short-circuits and reverse polarity
Output level			I _{data} = 20 mA V _{OD} > 2 V

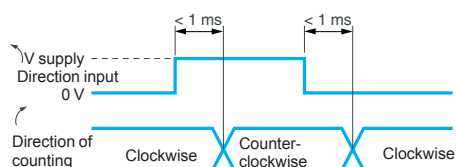
Wiring diagrams

RS-422 data output

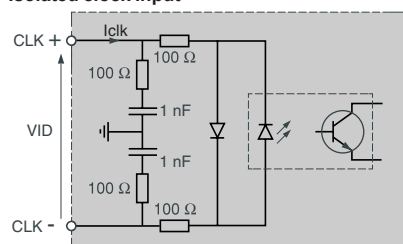


I_{data} = 20 mA |V_{OD}| > 2 V

Direction input



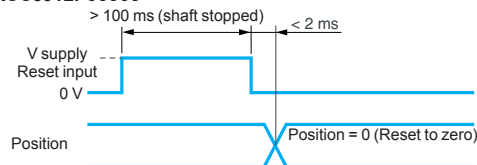
Isolated clock input



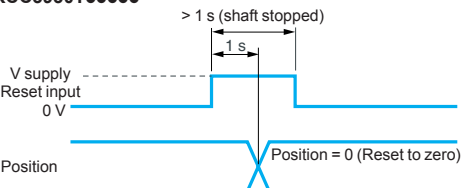
|VID| max.: 5 V
|I_{clk}| max.: 15 mA

Input stage—Reset to zero

XCC3912P●●●●●



XCC3930T●●●●●



OsiSense™ XCC

Multi-turn absolute encoders

Ø 90 mm encoders

Ø 90 mm multi-turn absolute encoders with SSI output convertible to parallel output

The SSI versions can be converted to a parallel version using the deserialization connecting cable XCC RM23SUB37●●. See page 35.



Solid shaft, Ø 12 mm

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog number	Weight kg (lb)
8192 ppr 4096 turns	Connector, radial M23 male	SSI, 25-bit, binary	11–30 V	XCC3912PS84SBN	1.840 (4.057)
		SSI, 25-bit, Gray	11–30 V	XCC3912PS84SGN	1.840 (4.057)

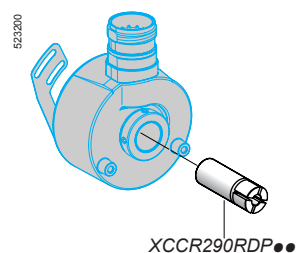


Through-shaft, Ø 30 mm (3)

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Catalog number	Weight kg (lb)
8192 ppr 4096 turns	Connector, radial M23 male	SSI, 25-bit, binary	11–30 V	XCC3930TS84SBN	1.060 (2.337)
		SSI, 25-bit, Gray	11–30 V	XCC3930TS84SGN	1.060 (2.337)

Reduction collars for encoders with through-shaft, Ø 30 mm

Encoder type	Diameter mm	Catalog number	Weight kg (lb)
Encoders with through-shaft XCC3930TS84●●●	Ø 12	XCCR290RDP12	0.060 (0.132)
	Ø 16	XCCR290RDP16	0.060 (0.132)
	Ø 20	XCCR290RDP20	0.030 (0.066)
	Ø 25	XCCR290RDP25	0.020 (0.044)



(1) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.

(2) For specifications of the output stage type (indicated by last letter of the catalog number). See page 30.

(3) Anti-rotation device included with encoder.

OsiSense™ XCC

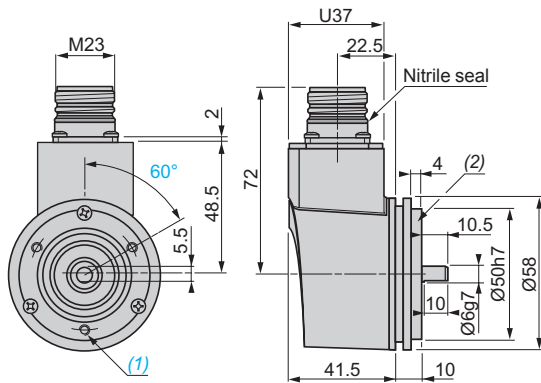
Multi-turn absolute encoders

Ø 58 mm and Ø 90 mm encoders

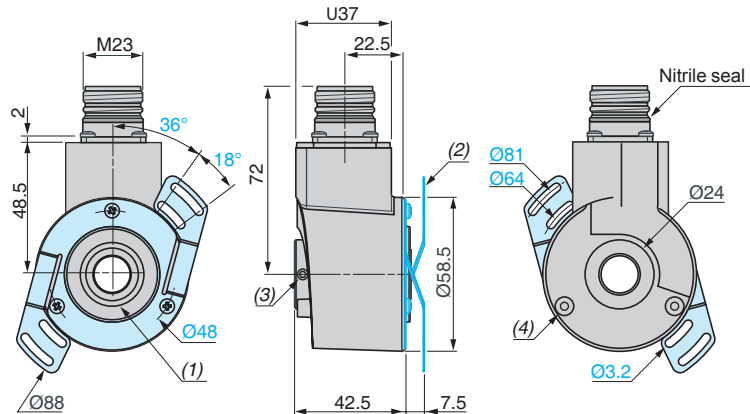
Ø 58 mm encoders

XCC3506PS84SBN, XCC3506PS84SGN

XCC3514TS84SB, XCC3514TS84SG

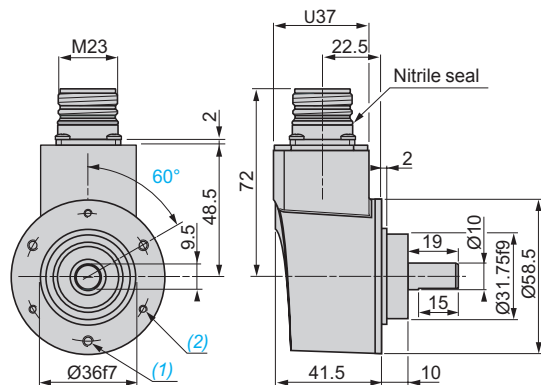


- (1) 3 M4 holes at 120° on 42 PCD, depth: 10 mm.
(2) Collar XCCRB1 mounted.



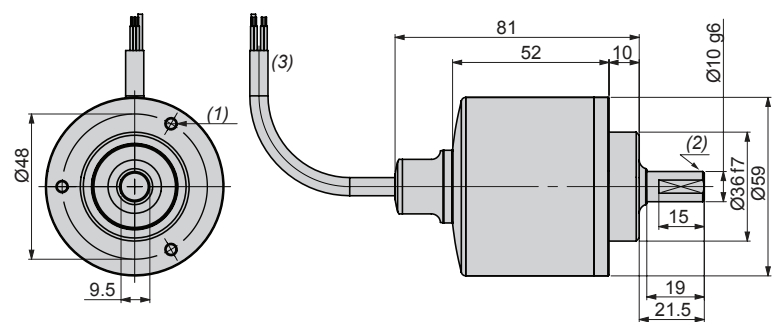
- (1) Through-shaft, Ø 14 (H7).
- (2) Flexible mounting kit, 1 x XCCRF5N mounted.
- (3) 2 HC M4 x 4 locking screws.
- (4) Hole for M3 x 6 self-threading screw.

XCC3510PS84SBN, XCC3510PS84SGN



- (1) 3 M4 holes at 120° on 48 PCD, depth: 8 mm.
(2) 3 M3 holes at 120° on 48 PCD, depth: 8 mm.

XCC3510SPA48SGN

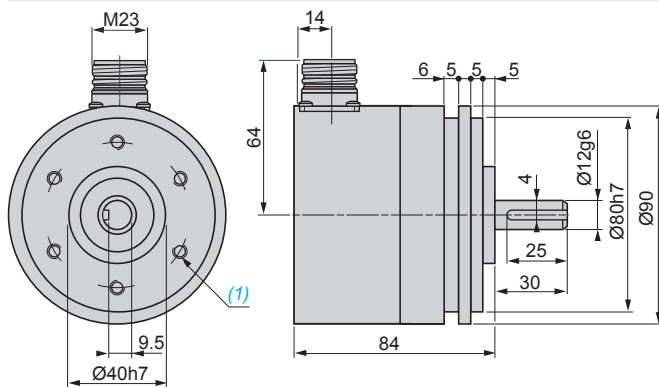


- (1) 3 holes M4 x 3 at 120 (degrees), depth 8 mm
(2) Shaft side protection IP69K
(3) Ø 6 x 2 m cable

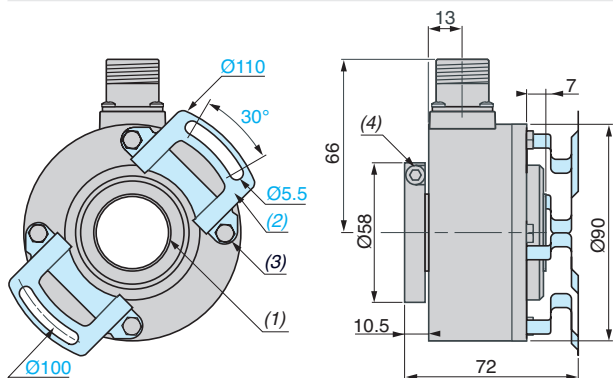
Ø 90 mm encoders

XCC3912PS84S●N

XCC3930TS84S●N



- (1) 6 holes M6 x 1 at 120° on 60 PCD, depth: 12 mm max.



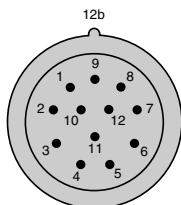
- (1) Through-shaft, Ø 30 (H7).
- (2) Anti-rotation device, 1 x XCCRF9N, mounted.
- (3) 4 M5 x 6 on 78 PCD.
- (4) 3 HC M5 x 6 stainless steel A2 locking screws.

Connector version encoders

Encoder with SSI output (types SBN and SGN)

M23, 12-pin connector, counterclockwise connections

Male connector on encoder (pin view)



Twisted cable pairs + general shielding must be used.

Pin number	1	2	3	4	5	6	7	8	9	10	11	12
Signal/Supply	0 V	Data +	Clk +	R	Direction (1) ↻	Reset	R	+ V	R	Data -	Clk -	R

R = Reserved (do not connect).

(1) ↻ : Clockwise direction, ↺ : Counterclockwise direction.

Selection of code progression direction

The Direction input enables the code progression to match the rotational direction of the encoder shaft (clockwise or counterclockwise).

Clockwise direction: connect pin 5 to 0 V.

Counterclockwise direction: connect pin 5 to + V.

Reset to zero

The Reset input enables the encoder to be set to the zero position.

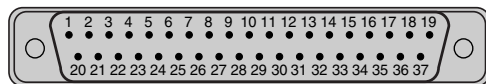
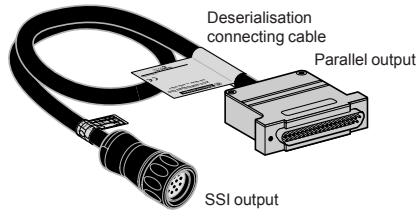
It is actuated by applying an 11–30 Vdc supply to pin 6, while the shaft is stopped, for the following times:

- over 100 ms for XCC3506, XCC3510 and XCC3912,
- over 1 s for XCC3930T.

Following a reset to zero, the pin 6 connection must be re-established to 0 V.

Note: In environments subject to electrical interference, we recommend grounding the encoder base using one of the mounting screws.

Connector version multi-turn absolute encoders



Male connector (pin view)

■ Selection of code progression direction

The Direction input enables the code progression to match the rotational direction of the encoder shaft (clockwise or counterclockwise).

Clockwise direction: connect pin 30 to an 11–30 Vdc supply.
Counterclockwise direction: connect pin 30 to 0 V.

■ Reset to zero

The Reset input enables the encoder to be set to the zero position. It is actuated by applying an 11–30 Vdc supply to pin 27 for more than 1 second.

■ Encoder selection

The Select input enables encoder selection when several units are connected in parallel on the same data bus.

Encoder selected: apply 0 V potential to pin 28.
Encoder not selected: apply 11–30 Vdc to pin 28.

■ Data locking

The Latch input, particularly useful for high speed applications, enables the freezing of the encoder data output while reading the code.

Function not actuated: apply 0 V potential to pin 29.
Function actuated: apply 11–30 Vdc to pin 29.

R = Reserved, do not connect

(1) (↻) : clockwise direction, (↺) : counterclockwise direction.

Note: In environments subject to electrical interference, we recommend grounding the encoder base using one of the mounting screws.

The deserialisation connecting cable XCCRM23SUB37●● (see page 35) enables conversion, by simple connection, of encoders XCC35●● and XCC39●● with SSI output to parallel output.

Specifications

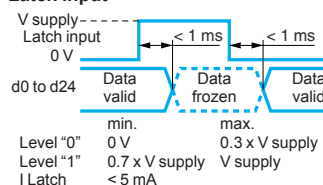
Supply	11–30 V
Encoder input/output	Levels RS-422
Parallel outputs	Push-pull protection against short-circuits
Operating temperature	0 to 50 °C (+32 to +122 °F)

36 x 0.14 mm² shielded cable and SUB-D 37-pin end connector connections

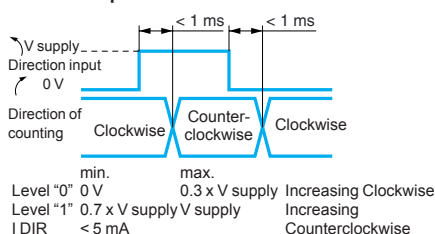
Pin number	Signal	Encoders 4096 ppr 8192 turns	Encoders 8192 ppr 4096 turns
1	2 ⁰ (LSB)	Resolution per revolution	Resolution per revolution
2	2 ¹		
3	2 ²		
4	2 ³		
5	2 ⁴		
6	2 ⁵		
7	2 ⁶		
8	2 ⁷		
9	2 ⁸		
10	2 ⁹		
11	2 ¹⁰	Number of revolutions	Number of revolutions
12	2 ¹¹		
13	2 ¹²		
14	2 ¹³		
15	2 ¹⁴		
16	2 ¹⁵		
17	2 ¹⁶		
18	2 ¹⁷		
19	2 ¹⁸		
20	2 ¹⁹		
21	2 ²⁰	Number of revolutions	Number of revolutions
22	2 ²¹		
23	2 ²²		
24	2 ²³		
25	2 ²⁴ (MSB)		
26	R		
27	Reset to zero		
28	Select		
29	Latch		
30	Direction (1) (↻/↺)		
31, 32, 33, 34, 35	R		
36	+ V		
37	0 V		

Wiring diagrams

Latch input

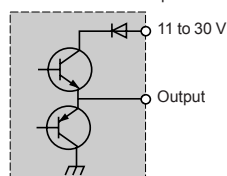


Direction input



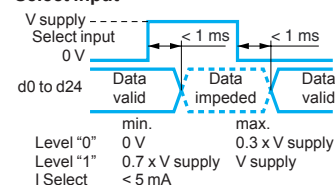
Push-Pull

Supply: 11 to 30 V
Max. ripple: 500 mV
Protection against reverse polarity
Max. no-load consumption: 50 mA (30 mA typical on 24 V)

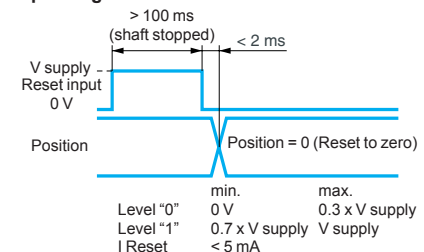


Max. current: 20 mA
Level "0" max.: 1.5 V
Level "1" min.: V supply — 2.5 V
Protection against short-circuits
NPN/PNP compatible

Select input



Input stage — Reset to zero

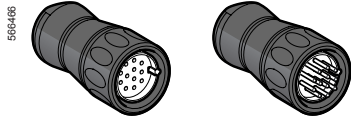


Note: The Latch and Select inputs must be connected to 0 V to become active.

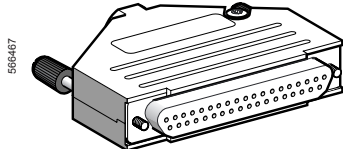
OsiSense™ XCC

Connection and mounting

Connection accessories



XZCC23FMDP120S



XZCCHFDM370S



XCCRM23SUB37PG



XCCPM23161L2

Cables					
Description	For encoders	Number of wires/c.s.a.	Ø mm	Catalog number	Weight kg (lb)
Shielded cables with twisted pairs Length: 100 m UL/CSA	Incremental	10 wires/0.14 mm ²	6	XCCR ^X 10	5.000 (11.023)
	Absolute, single turn //	16 wires/0.14 mm ²	6.8	XCCR ^X 16	5.600 (12.346)
	Absolute, single turn and multi-turn SSI, and incremental	1 pair of 0.50 mm ² wires and 3 pairs of 0.14 mm ² wires	8.6	XCCR ^X S8	11.750 (25.904)

Connectors					
Description	For use with	Number of pins	Type	Catalog number	Weight kg (lb)
M23 female connectors	Encoders Incremental, absolute SSI	12	Straight	XZCC23FDP120S	0.040 (0.088)
	Absolute encoders, single turn parallel	16	Straight	XZCC23FDP160S	0.040 (0.088)
Connector kit 1 female + 1 male	SSI jumper cable or incremental encoders	–	–	XZCC23FMDP120S	0.090 (0.198)
SUB-D 37-pin female connector	Absolute encoders, multi-turn parallel	37	Straight	XZCCHFDM370S	0.115 (0.254)

Deserialization jumper cables (1)				
Description	Type	Catalog number	Weight	
			kg	(lb)
M23 F - SUB-D37 M jumper cables, straight M23, cable length 0.5 m	SSI Gray//Gray PNP (PG)	XCCRM23SUB37PG	0.225	(0.496)
	SSI Gray//Gray NPN (NG)	XCCRM23SUB37NG	0.225	(0.496)
	SSI Binary//Binary PNP (PB)	XCCRM23SUB37PB	0.225	(0.496)
	SSI Binary//Binary NPN (NB)	XCCRM23SUB37NB	0.225	(0.496)

Pre-wired connectors				
Description	Number of wires	Length	Catalog number	Weight kg (lb)
M23 F straight	8 wires Absolute SSI	2 m	XCCPM23122L2	0.190 (0.419)
		5 m	XCCPM23122L5	0.470 (1.036)
		10 m	XCCPM23122L10	0.900 (1.984)
	10 wires Incremental	2 m	XCCPM23121L2	0.160 (0.353)
		5 m	XCCPM23121L5	0.330 (0.728)
		10 m	XCCPM23121L10	0.620 (1.367)
	16 wires Absolute single turn //	2 m	XCCPM23161L2	0.175 (0.386)
		5 m	XCCPM23161L5	0.415 (0.915)
		10 m	XCCPM23161L10	0.790 (0.790)

(1) See Overview, page 6 and Connections, page 33.

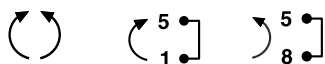
Pre-wired connector connections

XCCPM23122L●		
Pin	Function	Color
1	0V	BK
2	Data (+)	BN
3	Clk (+)	GN
4	R	–
5	C)	VT
6	Reset	BU
7	R	–
8	+V	RD
9	R	–
10	Data (–)	OG
11	Clk (–)	YE
12	R	–

XCCPM23121L●		
Pin	Function	Color
1	A/	BN
2	V Supply	RD
3	Top 0	VT
4	Top 0/	BU
5	B	YE
6	B/	OG
7	R	–
8	A	GN
9	R	–
10	Gnd	BK
11	Gnd	WH
12	V Supply	GY

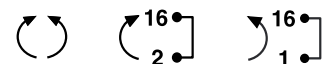
XCCPM23161L●		
Pin	Function	Color
1	Gnd	WH
2	V Supply	BN
3	d0	GN
4	d1	YE
5	d2	GY
6	d3	OG
7	d4	BU
8	d5	RD
9	d6	BK
10	d7	VT
11	d8	WH/BN
12	d9	WH/GN
13	d10	WH/YE
14	d11	WH/BK
15	d12	WH/OG
16	C)	WH/RD

Direction of rotation for pin 5



R: reserved, do not connect

Direction of rotation for pin 16



Shaft couplings with spring (1)

Maximum torque	N•cm	300 (424.83 oz-in)
Maximum angular misalignment		5°
Maximum radial misalignment	mm	±1.5
Materials	Collars	Zamak
	Spring	Nickel plated steel
Compression/Expansion	mm	±1 max.

Homokinetic (flexible) shaft couplings with bellows

Maximum torque	N•cm	80 (113.29 oz-in)
Maximum angular misalignment		4°
Maximum lateral misalignment	mm	±0.3
Maximum axial misalignment	mm	±0.5
Materials	Bellows	Stainless steel
	Mounting collar	Aluminum
	Screws	Stainless steel

Elastic monobloc shaft couplings

Maximum torque	N•cm	20 (28.32 oz-in)
Maximum angular misalignment		±2.5°
Maximum radial misalignment	mm	±0.3
Compression/Expansion	mm	±2 max.
Materials		Glass fiber reinforced polyamide

(1) Not recommended for resolutions higher than 500 pulses per revolution.

Catalog Numbers



Shaft couplings (for encoders with solid shaft)

Type	Bore diameter (encoder side)	Bore diameter (machine side)	Catalog	Weight (kg)	Weight (lb)
With spring (1)	6 mm	6 mm	XCCRAR0606	0.125	(0.276)
		8 mm	XCCRAR0608	0.125	(0.276)
		10 mm	XCCRAR0610	0.125	(0.276)
		12 mm	XCCRAR0612	0.120	(0.265)
		14 mm	XCCRAR0614	0.120	(0.265)
		16 mm	XCCRAR0616	0.120	(0.265)
	10 mm	8 mm	XCCRAR1008	0.120	(0.265)
		10 mm	XCCRAR1010	0.120	(0.265)
		12 mm	XCCRAR1012	0.110	(0.243)
		14 mm	XCCRAR1014	0.110	(0.243)
		16 mm	XCCRAR1016	0.105	(0.231)
	12 mm	8 mm	XCCRAR1208	0.110	(0.243)
		12 mm	XCCRAR1212	0.110	(0.243)
		14 mm	XCCRAR1214	0.105	(0.231)
		16 mm	XCCRAR1216	0.100	(0.220)
Homokinetic (flexible) with bellows	6 mm	6 mm	XCCRAS0606	0.020	(0.044)
		8 mm	XCCRAS0608	0.020	(0.044)
		10 mm	XCCRAS0610	0.020	(0.044)
		12 mm	XCCRAS0612	0.015	(0.033)
		0.25 in	XCCRAS06U25	0.018	(0.040)
		0.375 in	XCCRAS06U37	0.016	(0.035)
	10 mm	8 mm	XCCRAS1008	0.015	(0.033)
		10 mm	XCCRAS1010	0.015	(0.033)
		10 mm	XCCRAS1010S (2)	0.015	(0.033)
		12 mm	XCCRAS1012	0.015	(0.033)
		12 mm	XCCRAS1012S (2)	0.015	(0.033)
		0.25 in	XCCRAS10U25	0.016	(0.035)
		0.375 in	XCCRAS10U37	0.014	(0.031)
	12 mm	8 mm	XCCRAS1208	0.010	(0.022)
		12 mm	XCCRAS1212	0.010	(0.022)
		0.25 in	XCCRAS12U25	0.015	(0.033)
		0.375 in	XCCRAS12U37	0.013	(0.029)
		0.5 in	XCCRAS12U50	0.012	(0.026)
	Elastic, monobloc	6 mm	XCCRAE0606	0.010	(0.022)

(1) Not recommended for resolutions higher than 500 pulses per revolution.

(2) Stainless steel version 316L.

OsiSense™ XCC

Connection and mounting

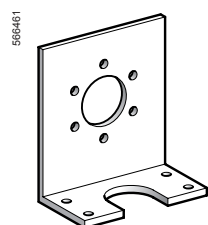
Mounting and installation accessories



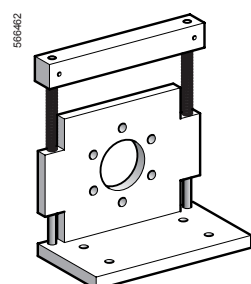
XCCRF●



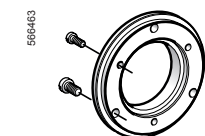
XCCRG●



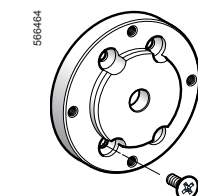
XCCRE9S



XCCRE●R



XCCRB1



XCCRB2



XCCR158RDA08



XCCR●90RDP20

Anti-rotation devices (for encoders with through-shaft)

Description	Features	For encoders	Catalog number	Weight kg (lb)
Flexible mounting kit	Set of 2 flexible mountings + screws	Ø 40 XCC1406T	XCCRF4	0.010 (0.022)
	1 flexible mounting + screws	Ø 58 XCC15●●T, XCC25●●T, XCC3514T	XCCRF5N	0.020 (0.044)
	Set of 2 flexible mountings + screws	Ø 90 XCC19●●T, XCC29●●T, XCC39●●T	XCCRF9	0.030 (0.066)

Mounting and mounting accessories (for encoders with solid shaft)

Description	For encoders	Catalog number	Weight kg (lb)
Set of 3 eccentric clamps + 3 mounting screws (1) + 3 washers	XCC15●●P, XCC25●●P, XCC35●●P	XCCRG5	0.010 (0.022)
	XCC1912P, XCC2912P, XCC3912P	XCCRG9	0.030 (0.066)
Plain brackets for Ø 58 (2)	XCC1506, XCC2506	XCCRE5S	1.300 (2.866)
	XCC1510P, XCC2510P, XCC3510P	XCCRE5SN	0.130 (2.866)
	XCC1510S, XCC2510S, XCC2510S	XCCRE5SNP	0.130 (2.866)
Plain brackets for Ø 90 (2)	XCC1912P, XCC2912P, XCC3912P	XCCRE9SN	0.290 (0.639)
Fixing collar (2") for Ø 58 mm	XCC1510, XCC2510, XCC3510	XCCRB6	0.060 (0.132)
Brackets with play compensator (2)	XCC1510P, XCC2510P, XCC3510PS●●S●●	XCCRE5RN	0.345 (0.761)
	XCC1912P, XCC2912P, XCC3912P	XCCRE9RN	0.890 (1.962)
Collar for synchro mounting, for Ø 58 (2)	XCC1510P, XCC2510P, XCC3510P	XCCRB1	0.040 (0.088)
Substitution interface collar for Ø 90 (2)	XCC1912P, XCC2912P, XCC3912P	XCCRB2	0.175 (0.386)
IP 67 sealed collar for Ø 58 (2)	XCC1510P, XCC2510P, XCC3510PS●●S●●N	XCCRB3	0.030 (0.066)

Reduction collars for encoders with through-shaft

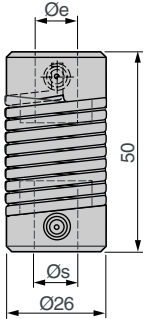
Description	For use with	Reduction	Catalog number	Weight kg (lb)
Reduction collars	Incremental encoders Ø 58	14 mm to 6 mm	XCCR158RDA06	0.015 (0.033)
		14 mm to 8 mm	XCCR158RDA08	0.010 (0.022)
	Absolute single turn encoders Ø 58	14 mm to 10 mm	XCCR158RDA10	0.010 (0.022)
		14 mm to 12 mm	XCCR158RDA12	0.010 (0.022)
	Absolute multi-turn encoders Ø 58	14 mm to 0.375 in.	XCCR158RDAU37	0.011 (0.024)
		14 mm to 0.5 in.	XCCR158RDAU50	0.007 (0.015)
	Incremental encoders Ø 90	30 mm to 12 mm	XCCR290RDP12	0.060 (0.132)
		30 mm to 16 mm	XCCR290RDP16	0.040 (0.088)
	Absolute single turn and multi-turn encoders Ø 90	30 mm to 20 mm	XCCR290RDP20	0.030 (0.066)
		30 mm to 25 mm	XCCR290RDP25	0.020 (0.044)
		30 mm to 0.375 in.	XCCR290RDP37	0.080 (0.176)
		30 mm to 0.5 in.	XCCR290RDP50	0.060 (0.132)
		30 mm to 0.75 in.	XCCR290RDP75	0.030 (0.066)
		30 mm to 1.0 in.	XCCR290RDP1	0.018 (0.040)

(1) 3 M3 x 12 screws for XCCRG5, 3 M4 x 25 screws for XCCRG9.

(2) Screws included with brackets and collars.

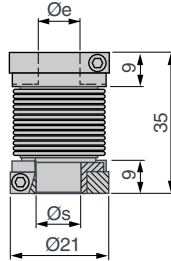
Shaft couplings

XCCRAR●●●●



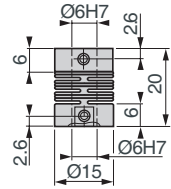
	Ø e	Ø s
XCCRAR0606	6 mm	6 mm
XCCRAR0608	6 mm	8 mm
XCCRAR0610	6 mm	10 mm
XCCRAR0612	6 mm	12 mm
XCCRAR0614	6 mm	14 mm
XCCRAR0616	6 mm	16 mm
XCCRAR1008	10 mm	8 mm
XCCRAR1010	10 mm	10 mm
XCCRAR1012	10 mm	12 mm
XCCRAR1014	10 mm	14 mm
XCCRAR1016	10 mm	16 mm
XCCRAR1208	12 mm	8 mm
XCCRAR1212	12 mm	12 mm
XCCRAR1214	12 mm	14 mm
XCCRAR1216	12 mm	16 mm

XCCRAS●●●●

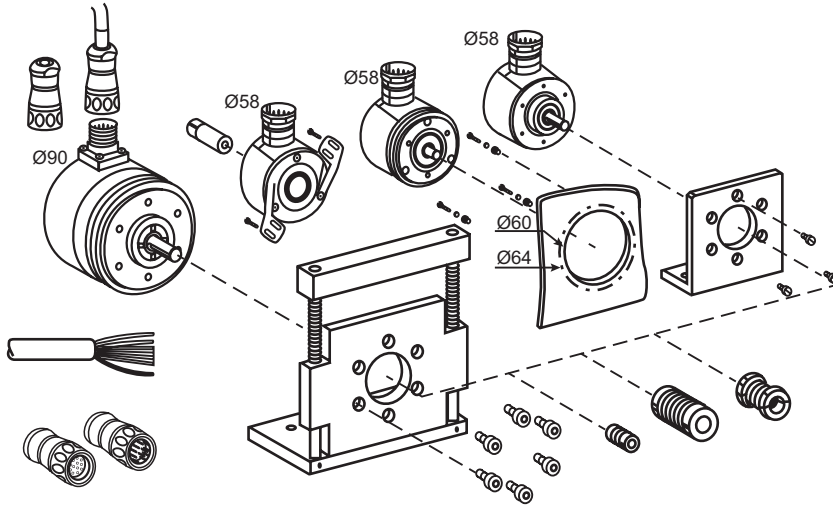


	Ø e	Ø s
XCCRAS0606	6 mm	6 mm
XCCRAS0608	6 mm	8 mm
XCCRAS0610	6 mm	10 mm
XCCRAS0612	6 mm	12 mm
XCCRAS1008	10 mm	8 mm
XCCRAS1010	10 mm	10 mm
XCCRAS1010S	10 mm	10 mm
XCCRAS1012	10 mm	12 mm
XCCRAS1012S	10 mm	12 mm
XCCRAS1208	12 mm	8 mm
XCCRAS1212	12 mm	12 mm
XCCRAS06U25	6 mm to 0.25 in	
XCCRAS06U37	6 mm to 0.375 in	
XCCRAS10U37S	10 mm to 0.375 in	
XCCRAS10U25	10 mm to 0.25 in	
XCCRAS10U37	10 mm to 0.375 in	
XCCRAS12U25	12 mm to 0.25 in	
XCCRAS12U37	12 mm to 0.375 in	
XCCRAS12U50	12 mm to 0.5 in	

XCCRAE0606



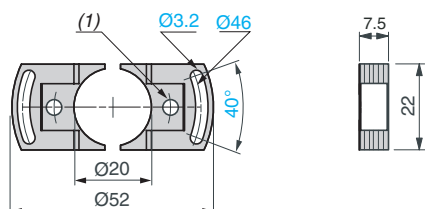
Typical installation



Anti-rotation devices (flexible mounting kit)

XCCRF4

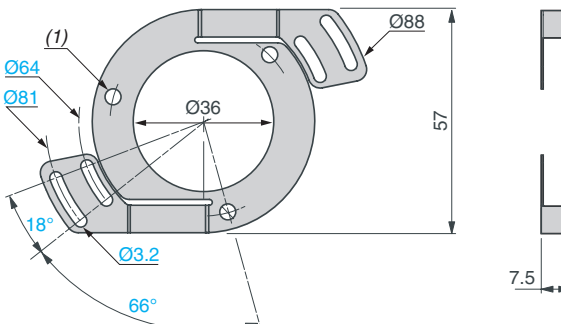
Mounting on Ø 40 mm encoder XCC1406T



(1) 2 holes Ø 4 at 180° on 30 PCD. TC M4 x 5 screw mountings.

XCCRF5N

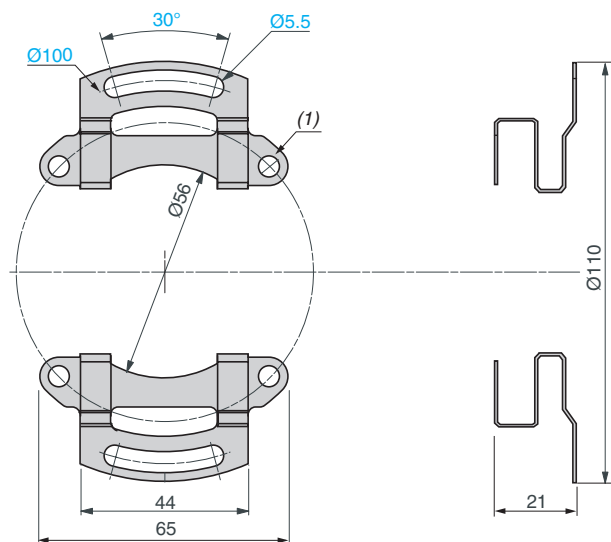
Mounting on Ø 58 mm encoders XCC1514T, XCC2514T and XCC3514T



(1) 3 holes Ø 4.1 at 120° on 48 PCD. TC M3 x 6 screw mountings.

XCCRF9

Mounting on Ø 90 mm encoders XCC1930T, XCC2930T and XCC3930T

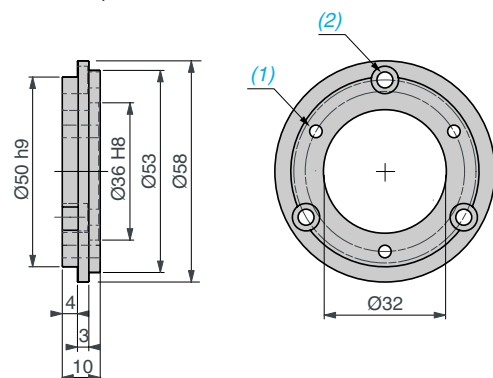


(1) 4 holes Ø 5.2 at 90° on 78 PCD. TH M5 x 6 screw mountings.

Collar kits

XCCRB1

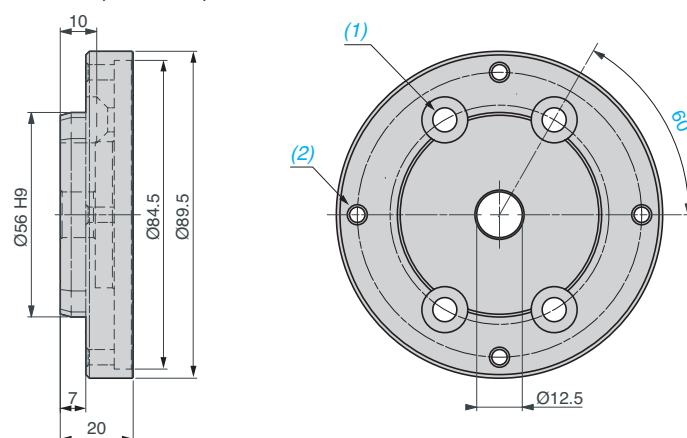
Collar for synchro mounting, for Ø 58 encoders:
XCC15●●P, XCC25●●P and XCC35●●P



(1) 3 holes M4 x 0.7 at 120° on 42 PCD. TC M3 x 8 screw mountings.
(2) 3 counterbored holes for TC M4 x 8 screws at 120° on 48 PCD.

XCCRB2

Interface collar for Ø 90 encoders:
XCC1912P, XCC2912P, XCC3912P

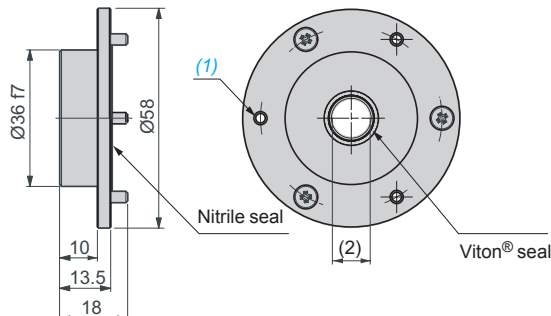


(1) 4 holes Ø 6.6 at 120° on 60 PCD. Countersunk for TZ M6 x 16 screws.
(2) 4 holes M5 x 0.8 at 90° on 78 PCD.

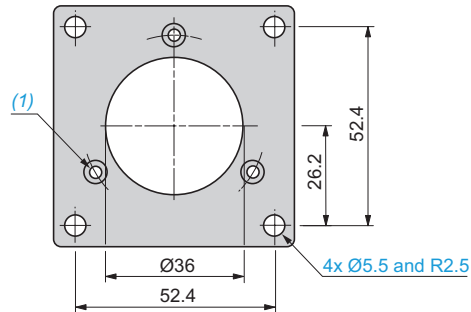
Collar kits (continued)

XCCRB1

IP 67 sealed collar for Ø 58 encoders:
XCC1510P, XCC2510P and XCC3510PS●●S●N



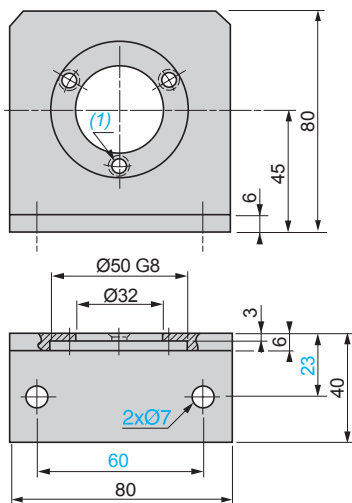
XCCRB2



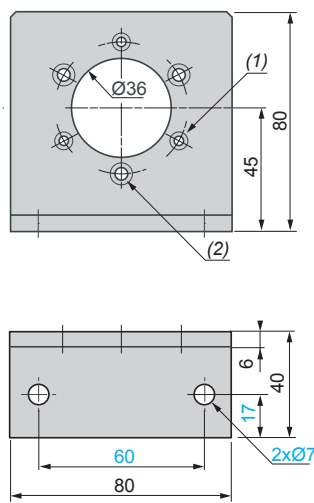
(1) 3 holes M3 x 0.5 at 120° on 48 PCD. TZ M3 x 8 screw mountings.
(2) Shaft Ø 10 mm.

Plain brackets

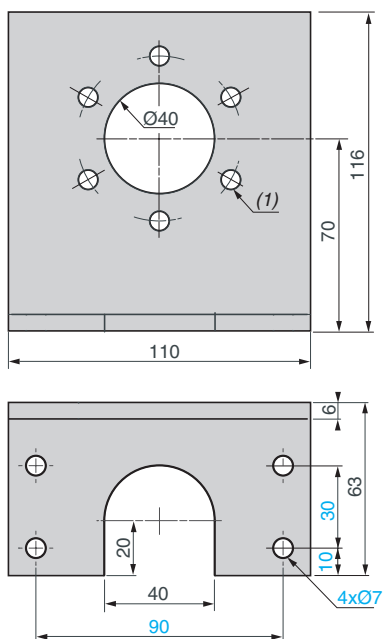
XCCRE5S



XCCRE5SN



XCCRE9SN



(1) 3 holes Ø 4.5 at 120° on 42 PCD.

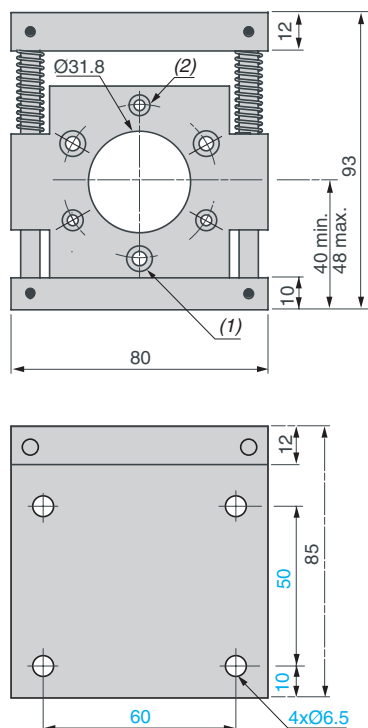
3 CHC M3 x 8 screws included.

(1) 3 counterbored holes for CHC M3 screws at 120° on 48 PCD.
(2) 3 counterbored holes for CHC M4 screws at 120° on 48 PCD.

(1) 6 holes Ø 7 for CHC M6 screws at 60° on 60 PCD.

Brackets with play compensator

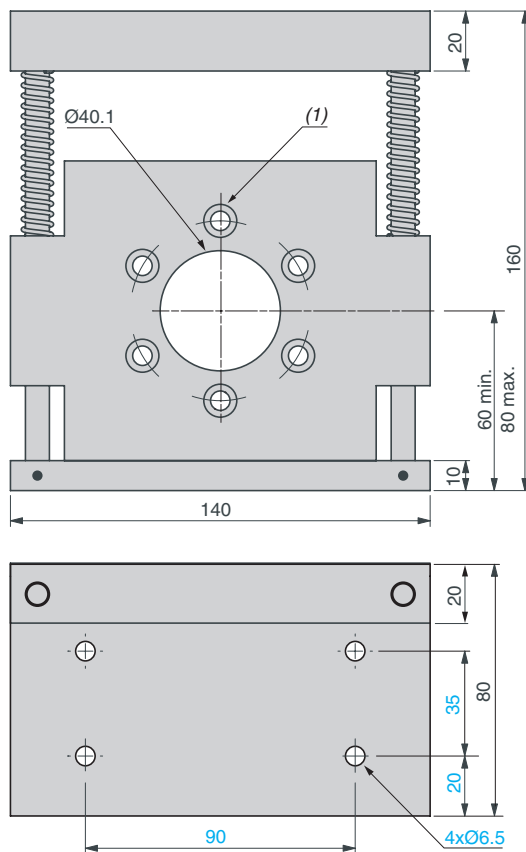
XCCRE5RN



CHC M3 x 12 screws included

(1) 3 counterbored holes for CHC M3 screws at 120° on 48 PCD.
(2) 3 counterbored holes for CHC M4 screws at 120° on 48 PCD.

XCCRE9RN

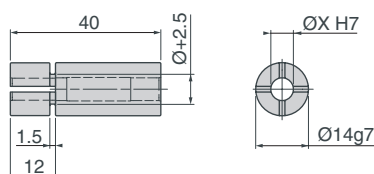


(1) 6 counterbored holes for CHC M6 screws at 120° on 60 PCD.

Reduction collars for through-shaft

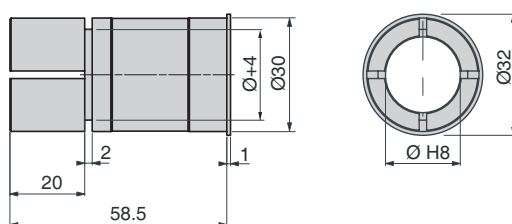
XCCR158RDA●●

For Ø 58 incremental, absolute single turn, and absolute multi-turn encoders



XCCR290RDP●●

For Ø 90 incremental, absolute single turn, and absolute multi-turn encoders



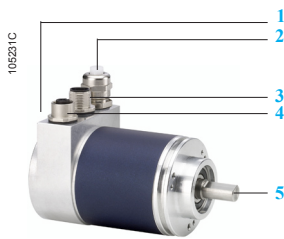
XCC	Ø
XCCR158RDA06	6 mm
XCCR158RDA08	8 mm
XCCR158RDA10	10 mm
XCCR158RDA12	12 mm
R158RDAU37	0.375 in.
R158RDAU50	0.5 in.

XCC	Ø
XCCR290RDP12	12 mm
XCCR290RDP16	16 mm
XCCR290RDP20	20 mm
XCCR290RDP25	25 mm
R290RDP37	0.375 in.
R290RDP50	0.5 in.
R290RDP37	0.75 in.
R290RDP1	1 in.

OsiSense™ XCC

Multi-turn fieldbus encoders

CANopen Ø 58 mm encoders



- 1 2 LEDs
- 2 PG9 cable gland for supply cable
- 3 M12 male connector (CANopen incoming bus)
- 4 M12 female connector (CANopen outgoing bus)
- 5 Encoder shaft

Introduction

The OsiSense XCC CANopen Ø 58 mm multi-turn absolute encoder is designed to meet the requirements for configurations encountered in industrial communication installations. Models XCC3510PS84CBN and XCC3515CS84CBN integrate CANopen communication protocols as standard.

The CAN-Bus interface integrated in the absolute rotary encoder supports all CANopen functions. The following modes can be programmed and made operational or stopped: Pooling mode, Cyclic mode and Sync mode. The application-specific protocol supports the programming of the following additional functions:

- code sequence,
- resolution per revolution,
- global resolution,
- presets,
- bus speed and address.

The connection housing ensures simple assembly and addressing. It performs the function of a T coupler and has M12 connectors for the incoming and outgoing bus signals.

The rotary encoder can be supplied via the CANopen bus or by using the dedicated PG9 cable gland. The address of the equipment is adjusted from the rotary switches. Encoders XCC3510PS84CBN and XCC3515CS84CBN have 2 LEDs located on the rear face of the housing to facilitate monitoring and diagnostics conforming to standard DR303-3 v1.3.0 (CIA). The LEDs provide information regarding the operating mode, bus errors, and supply problems.

Standards

Encoders XCC3510PS84CBN and XCC3515CS84CBN conform to:

- standard ISO 11898,
- specifications DS301 V4.02/CAN2.A, DS406 V3.2, DR303-1 V1.7 (cabling and connector), DR303-3 V1.3 (light indicator).

They are CiA certified and meet the requirements of the Schneider Electric interoperability standards.

Encoder setup/configuration software

The CANopen bus is configured with the aid of SyCon version 2.9 software, reference SYC SPU LF, to be ordered separately.

The EDS file, reference TEXCC35CBN_0101E.eds, required for encoder configuration can be downloaded from our website, www.schneider-electric.com.

Configurable parameters

■ Transmission speed

Default value: 250 Kbaud, configurable from 10 Kbaud (distance 6700 m) to 1 Mbaud (distance 12 m).

■ Address

defines encoder identification on the bus, 1 to 99. Default value: id = 1. It is defined using 2 coding wheels located in the housing.

■ Resolution

defines the number of pulses per revolution (0 to 8191).

■ Global resolution

defines the total number of codes of the encoder (0 to 33,554,431).

■ Direction

enables the defining of the counting direction of the encoder (increasing clockwise or counterclockwise) in relation to its mechanical position.

■ Reset to X

defines the value of its actual position (reset to X or reset to amount).

Communication modes

■ Pooling mode

The encoder responds to requests from the master. This mode enables programming and reading of the encoder parameters while in position.

■ Cyclic mode

The encoder transmits its data cyclically. The transmission period is programmable from 0 to 65,535 ms.

■ Sync mode

The encoder transmits its data when the master sends a synchro.

OsiSense™ XCC

Multi-turn fieldbus encoders

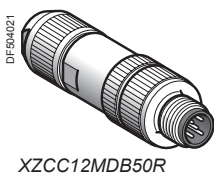
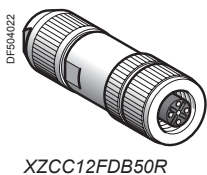
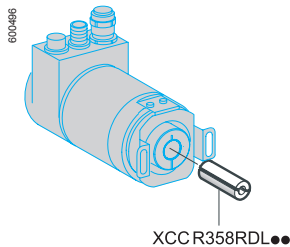
CANopen Ø 58 mm encoders

Specifications				
Encoder type			XCC3510PS84CBN	
Conformity			XCC3515CS84CBN	
			CE	
Temperature	Operation (housing)	°C (°F)	−40 to +85 (−40 to +185)	
	Storage	°C (°F)	−40 to +85 (−40 to +185)	
Degree of protection	Conforming to IEC 60529		IP 64	
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (10–2 kHz)	
Shock resistance	Conforming to IEC 60068-2-27		100 gn (6 ms, 1/2 sine wave)	
Resistance to electromagnetic interference	Electrostatic discharges		Conforming to IEC 61000-4-2: level 2, 4 kV air; 2 kV contact	
	Radiated electromagnetic fields (electromagnetic waves)		Conforming to IEC 61000-4-3: level 3, 10 V/m	
	Fast transients (Start/Stop interference)		Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs)	
	Surge withstand		Conforming to IEC 61000-4-5: level 1, 500 V	
Materials	Base		Aluminum	
	Housing		Aluminum	
	Shaft		Stainless steel	
	Ball bearings		6000ZZ1	6803ZZ
Mechanical specifications				
Shaft type		mm	Ø 10, solid shaft (h8)	Ø 15, hollow shaft (F7)
Maximum rotational speed	Continuous		6000 rpm	
Shaft moment of inertia		g•cm ²	30 (0.16 oz/in ²)	
Torque		N•cm	0.3 (0.44 oz-in)	
Maximum load	Radial	N	110	
Electrical specifications				
Connection	Connector		CANopen bus network by M12 connector (input: male; output: female), 5-pin, A coding. Supply via PG9 of the encoder	
Frequency		kHz	800	
Supply	Nominal voltage	V	--- 24 (10-30) Recommended PELV supply (protective extra low voltage)	
Current consumption, no-load		mA	100 max.	
Protection			Against reverse polarity and voltage surges	
Signaling			Green LED: CAN_RUN; red LED: CAN_ERR	
Communication				
CANopen service	Conformity class		S10 (Transparent Ready)	
	Profile		DS406 V3.1, class C2	
	Specifications		ISO 11898, DS301 V4.02/CAN2.A, DR303-1 V1.7, DR303-3 V1.3.	
Structure	Speed	Kbps	10, 20, 50, 125, 250, 500, 800 and 1000	
Product certification			CiA Schneider Electric interoperability standards	
Distance depending on speed			250 m at 250 kbps, 100 m at 500 kbps, 30 m at 800 kbps, 12 m at 1000 kbps	

OsiSense™ XCC

Multi-turn fieldbus encoders

CANopen Ø 58 mm encoders



CANopen Ø 58 mm encoders

Description	Connection method	Output stage type	Supply voltage	Catalog number	Weight	
					kg	(lb)

Solid shaft, Ø 10 mm

Ø 58 mm multi-turn absolute CANopen bus encoder Resolution 8192 pts/4096 turns	Radial 2 x M12 connectors A coding 1 x PG9	CANopen, 25-bit, binary	11–30 V	XCC3510PS84CBN	0.560	(1.234)
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Hollow shaft, Ø 15 mm (1)

Ø 58 mm multi-turn absolute CANopen bus encoder Resolution 8192 pts/4096 turns	Radial 2 x M12 connectors A coding 1 x PG9	CANopen, 25-bit, binary	11–30 V	XCC3515CS84CBN	0.570	(1.256)
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Reduction collars for encoders with hollow shaft, Ø 15 mm

For use with	Diameter	Catalog number	Weight	
			kg	(lb)
Encoder with hollow shaft XCC3515CS84CBN	Ø 6 mm	XCCR358RDL06	0.040	(0.088)
	Ø 8 mm	XCCR358RDL08	0.030	(0.066)
	Ø 10 mm	XCCR358RDL10	0.025	(0.055)
	Ø 12 mm	XCCR358RDL12	0.020	(0.044)
	Ø 14 mm	XCCR358RDL14	0.010	(0.022)
	0.5 in.	XCCR358RDLU50	0.007	(0.015)
	0.375 in.	XCCR358RDLU37	0.011	(0.024)

Connection accessories for CANopen bus

Connecting cables for CANopen bus

Description	Length m	Catalog number	Weight	
			kg	(lb)
Connecting cables fitted with 2 elbowed type M12 connectors, A coding	0.3	FTXCN3203	0.040	(0.088)
	0.6	FTXCN3206	0.070	(0.154)
	1	FTXCN3210	0.100	(0.220)
	2	FTXCN3220	0.160	(0.352)
	3	FTXCN3230	0.220	(0.485)
	5	FTXCN3250	0.430	(0.947)

CANopen cables

Description	Length	Unit catalog number	Weight	
			kg	(lb)
Standard CANopen cables conforming to IEC 60332-1	50 m	TSXCANCA50	4.930	(10.868)
	100 m	TSXCANCA100	8.800	(19.400)
	300 m	TSXCANCA300	24.560	(54.145)
CANopen cables for severe environments (2) or moving installations, CE marking: low smoke emission. Halogen free. No flame propagation (IEC 60332-1). Resistance to oils.	50 m	TSXCANCD50	3.510	(7.738)
	100 m	TSXCANCD100	7.770	(17.129)
	300 m	TSXCANCD300	21.760	(47.972)

Shielded connectors, cabled by user

Description	Type	Unit catalog number	Weight	
			kg	(lb)
M12 female connector 5 spring terminals	Straight	XZCC12FDB50R	0.020	(0.044)
M12 male connector 5 spring terminals	Straight	XZCC12MDB50R	0.025	(0.055)

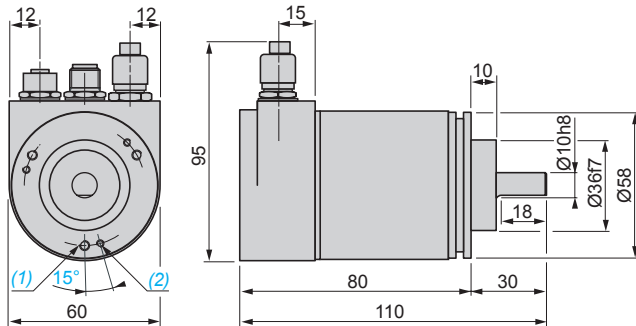
(1) Anti-rotation device included with encoder.

(2) Severe environment:

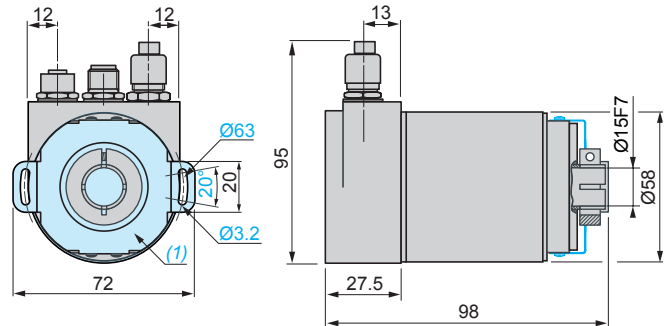
- resistance to hydrocarbons, industrial oils, detergents, weld spatter,
- relative humidity up to 100%,
- saline atmosphere,
- extreme variations in temperature,
- operating temperature between -10 °C and +70 °C (+14 to 158 °F)
- moving installation.

Dimensions

XCC3510PS84CBN



XCC3515CS84CBN

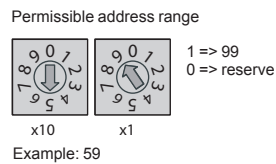
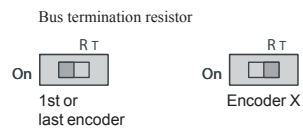
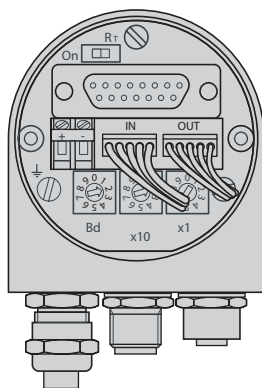


(1) 3 M4 holes at 120° on 48 PCD, depth: 6 mm.
(2) 3 M3 holes at 120° on 48 PCD, depth: 6 mm.

(1) Flexible mounting kit, 1 x XCCRF5B mounted.

Connections

CANopen



Bus In
M12 male connector



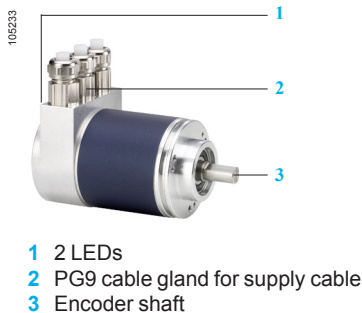
Bus Out
M12 female connector

Pin	1	2	3	4	5
Function	CAN_SHLD	(CAN_V+)	CAN_GND	CAN_H	CAN_L
Terminal	+	-			
Function	24 V	0 V			

OsiSense™ XCC

Multi-turn fieldbus encoders

Profibus-DP Ø 58 mm encoders



Introduction

The OsiSense XCC Profibus-DP Ø 58 mm multi-turn absolute encoder is designed to meet the requirements for configurations encountered in industrial communication installations. Models XCC3510PV84FBN and XCC3515CV84FBN integrate Profibus-DP communication protocols as standard.

The Profibus-DP bus interface integrated in the absolute rotary encoder is based on RS 485 transmission and enables speeds of up to 12 Mbps. Exchanges are possible from the master to the encoder. The application specific protocol DP-V0 conforms to the class 2 profile for encoders and supports the following functions:

- code sequence,
- resolution per revolution,
- global resolution,
- presets,
- soft stops,
- speed and address.

The housing of the encoders provides easy access to 2 coding wheels for configuration of the address. 2 LEDs are integrated to facilitate diagnostics. It performs the function of a T coupler with 3 x PG9 cable glands (2 for the incoming and outgoing bus signals, 1 for the encoder supply).

Profibus-DP encoders have 2 LEDs to indicate the encoder status:

- Green LED: "Sta"
- Red LED: "Err".

Standards

Profibus-DP encoders XCC3510PV84FBN and XCC3515CV84FBN conform to:

- international standards IEC 61158 and IEC 61784 for Profibus-DP communication
- the Profibus-DP standard EN 50170 Class 2 in accordance with profile 3.062 V 1.1 for the encoder application.

They are certified by the PNO organization and meet the requirements of the Schneider Electric interoperability standards.

Encoder setup/configuration software

The Profibus-DP bus is configured with the aid of SyCon version 2.9 software, reference SYCSPULFDCD29M, to be ordered separately.

The GSD "gsd file" required for encoder configuration can be downloaded from our website, www.schneider-electric.com, under reference TELE4711.GSD.

Configurable parameters

■ Speed

defines the instantaneous speed in 16-bit binary. It can be given according to 1 of 4 modes:

- ☐ Steps/10 ms,
- ☐ Steps/100 ms,
- ☐ Steps/s or rpm.

■ Address

Addressing is performed using 2 coding wheels located in the housing. The addresses possible are 1 to 99.

■ Resolution

defines the number of pulses per revolution (0 to 8191)

■ Global resolution

defines the total number of codes of the encoder (0 to 33,554,431)

■ Direction

enables defining of the counting direction of the encoder (increasing clockwise or counterclockwise) in relation to its mechanical position

■ 2 soft stops

one high stop and one low stop can be defined and extracted from the position word

■ Reset to X

defines the value of its actual position (reset to X or reset to amount).

Communication modes

2 communication modes are possible:

- simple and fast, cyclic and deterministic exchanges between the master and the encoder,
- acyclic exchanges.

OsiSense™ XCC

Multi-turn fieldbus encoders

Profibus-DP Ø 58 mm encoders

Specifications				
Encoder type			XCC3510PV84FBN	
Conformity			DIN VDE 0160	
Temperature	Operation (housing)	°C (°F)	−40 to +85 (−40 to +185)	
	Storage	°C (°F)	−40 to +85 (−40 to +185)	
Degree of protection	Conforming to IEC 60529		IP 64	
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (10–2 kHz)	
Shock resistance	Conforming to IEC 60068-2-27		100 gn (6 ms, 1/2 sine wave)	
Resistance to electromagnetic interference	Electrostatic discharges		Conforming to IEC 61000-4-2: level 2, 4 kV air; 2 kV contact	
	Radiated electromagnetic fields (electromagnetic waves)		Conforming to IEC 61000-4-3: level 3, 10 V/m	
	Fast transients (Start/Stop interference)		Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs)	
	Surge withstand		Conforming to IEC 61000-4-5: level 1, 500 V	
Materials	Base		Aluminum	
	Housing		Aluminum	
	Shaft		Stainless steel	
	Ball bearings		6000ZZ1	6803ZZ
Mechanical specifications				
Shaft type		mm	Ø 10, solid shaft (h8)	Ø 15, hollow shaft (F7)
Maximum rotational speed			6000 rpm	
Shaft moment of inertia		g•cm ²	30 (0.16 oz/in ²)	
Torque		N•cm	0.3 (0.44 oz-in)	
Maximum load	Radial	N	110	
Electrical specifications				
Connection	Via PG9		3 x PG9 entries: - 2 x PG9 entries for the Profibus-DP bus - 1 x PG9, positioned in middle, for external supply (10-30 V) Due to the T integrated in the housing, the supply can be distributed on the bus. Connections are made using screw terminals.	
Frequency		kHz	800	
Supply	Nominal voltage	V	⎓ 24 (10–30) Recommended PELV supply (protective extra low voltage)	
Current consumption, no-load		mA	100	
Protection			Against reverse polarity and voltage surges	
Signaling			Green LED: “Sta”; red LED: “Err”	
Communication				
Profibus-DP V0 service	Profile for encoder		3.062 V1.1.	
	Specifications		IEC 61158, IEC 61784, EN 50170 class 2, EN 50254	
Interface			RS 485	
Speed			9.6 Kbps to 12 Mbps max.	
Product certification			PNO Schneider Electric interoperability standards	

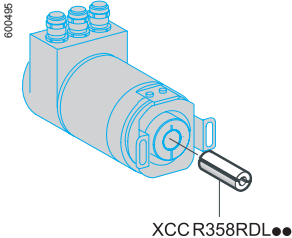
OsiSense™ XCC
Multi-turn fieldbus encoders
Profibus-DP Ø 58 mm encoders



XCC3510PV84FBN



XCC3515CV84FBN



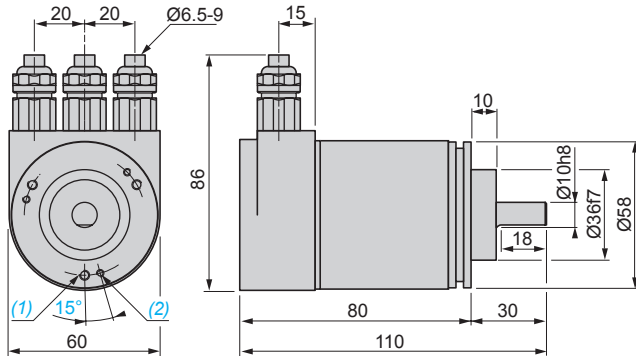
XCCR358RDL●●

Catalog Numbers					
Description	Connection method	Output stage type	Supply voltage	Catalog number	Weight kg (lb)
Solid shaft, Ø 10 mm					
Ø 58 mm multi-turn absolute Profibus-DP encoder Resolution 8192 pts/4096 turns	3 x PG9 radial	Profibus-DP, 11–30 V 25-bit, binary		XCC3510PV84FBN	0.560 (1.234)
Hollow shaft, Ø 15 mm (1)					
Ø 58 mm multi-turn absolute Profibus-DP encoder Resolution 8192 pts/4096 turns	3 x PG9 radial	Profibus-DP, 11–30 V 25-bit, binary		XCC3515CV84FBN	0.570 (1.256)
Reduction collars for encoders with hollow shaft, Ø 15 mm					
For use with	Diameter	Catalog number		Weight kg (lb)	
Encoder with hollow shaft XCC3515CV84FBN	Ø 6 mm	XCCR358RDL06		0.040	(0.088)
	Ø 8 mm	XCCR358RDL08		0.030	(0.066)
	Ø 10 mm	XCCR358RDL10		0.025	(0.055)
	Ø 12 mm	XCCR358RDL12		0.020	(0.044)
	Ø 14 mm	XCCR358RDL14		0.010	(0.022)
	0.5 in.	XCCR358RDLU50		0.007	(0.015)
	0.375 in.	XCCR358RDLU37		0.011	(0.024)

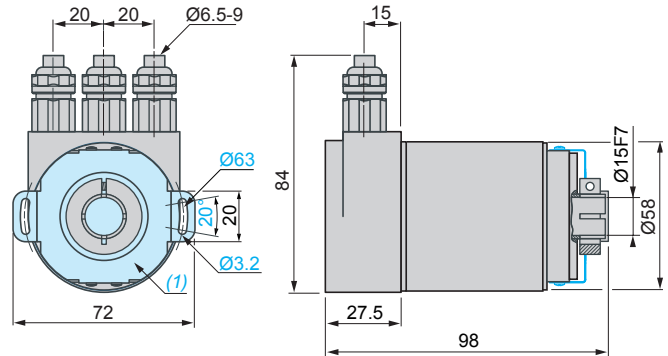
(1) Anti-rotation device included with encoder.

Profibus-DP Ø 58 mm encoders

XCC3510PV84FBN



XCC3515CV84FBN

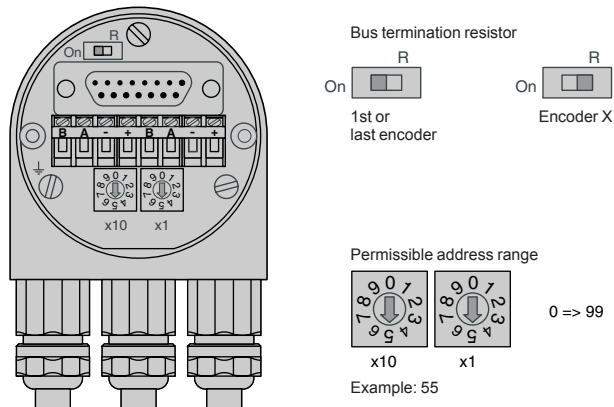


(1) 3 M4 holes at 120° on 48 PCD, depth: 6 mm.
(2) 3 M3 holes at 120° on 48 PCD, depth: 6 mm.

(1) Flexible mounting kit, 1 x XCCRF5B mounted.

Connection

Profibus-DP



Terminal	⏏	B (left)	A (left)	-	+
Function	Ground	Bus line B (Bus in)	Bus line A (Bus in)	0 V	11–30 V

Terminal	B (right)	A (right)	-	+
Function	Bus line B (Bus out)	Bus line A (Bus out)	0 V	11–30 V

Maximum torque	N•cm	80 (113.29 oz-in)
Maximum angular misalignment		4°
Maximum lateral misalignment	mm	±0.3
Maximum axial misalignment	mm	±0.5
Materials		
Bellows		Stainless steel
Mounting collar		Aluminum
Screws		Stainless steel

Shaft couplings (for encoders with solid shaft)

Type	Bore diameter (encoder side)	Bore diameter (machine side)	Catalog number	Weight	
				kg	(lb)
Homokinetic (flexible) with bellows	10 mm	8 mm	XCCRAS1008	0.015	(0.033)
		10 mm	XCCRAS1010	0.015	(0.033)
		12 mm	XCCRAS1012	0.015	(0.033)

Anti-rotation devices (for encoders with hollow shaft)

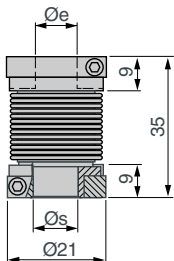
Description	Features	For encoders	Catalog number	Weight kg	(lb)
Flexible mounting kit	1 flexible mounting + screws	CANopen and Profibus-DP	XCCRF5B	0.010	(0.022)

Reduction collars for encoders with hollow shaft

Description	For use with	Reduction	Catalog number	Weight	
				kg	(lb)
Reduction collars	CANopen and Profibus-DP encoders	15 mm to 6 mm	XCCR358RDL06	0.040	(0.088)
		15 mm to 8 mm	XCCR358RDL08	0.030	(0.066)
		15 mm to 10 mm	XCCR358RDL10	0.025	(0.055)
		15 mm to 12 mm	XCCR358RDL12	0.020	(0.044)
		15 mm to 14 mm	XCCR358RDL14	0.010	(0.022)
		15 mm to 0.5 in.	XCCR358RDLU50	0.007	(0.015)
		15 mm to 0.375 in.	XCCR358RDLU37	0.011	(0.024)



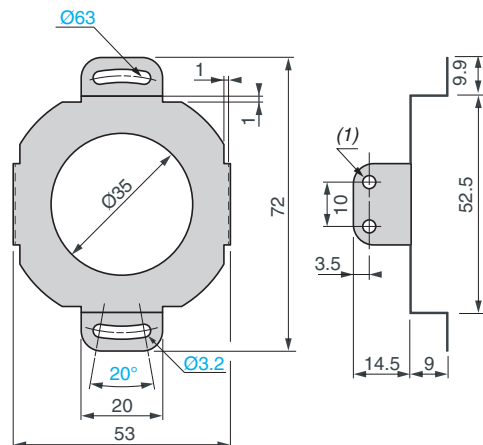
XCCRAS●●●●



XCC	\varnothing_e	\varnothing_s
XCCRAS1008	10	8
XCCRAS1010	10	10
XCCRAS1012	10	12

XCCRF5B

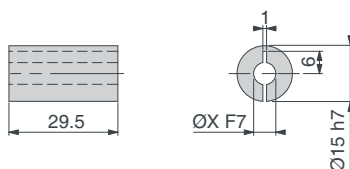
Mounting on Ø 58 mm CANopen and Profibus-DP encoders XCC3510●●●FBN, XCC3510●●●CBN, XCC3515C●●●FBN, XCC3515C●●●CBN



(1) 4 holes Ø 3.2. M3 x 6 screw mountings.

XCCR358RDL●●

For CANopen and Profibus-DP encoders



XCC	Ø
XCCR358RDL06	6 mm
XCCR358RDL08	8 mm
XCCR358RDL10	10 mm
XCCR358RDL12	12 mm
XCCR358RDL14	14 mm
XCCR358RDLU37	0.375 in.
XCCR358RDLU50	0.5 in.

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