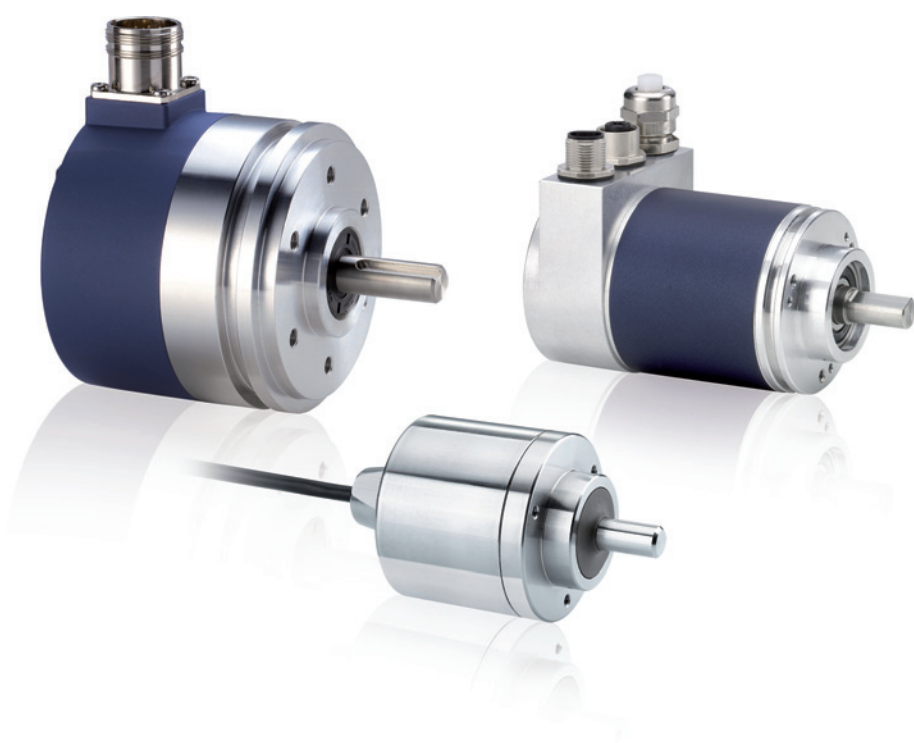

Opto-electronic rotary encoders OsiSense XCC

Catalogue



Simply easy!™

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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 (3)	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 points	100 points	100 points	–	100 points
		256 points	–	–	256 to 4096 points	–
		360 points	360 points	360 points (3)	360 to 5760 points	360 points
		500 points	500 points	500 points	500 to 8000 points	500 points
		1000 points	1000 points	1000 points	–	1000 points
		1024 points	1024 points	1024 points (3)	1024 to 16,384 points	1024 points
		2500 points	–	2500 points	–	2500 points
		3600 points	–	–	–	3600 points
		4096 points	–	–	–	–
		5000 points	–	5000 points (3)	5000 to 80,000 points	5000 points
		10,000 points	–	–	–	10,000 points
	Absolute encoders	4096 points/8192 turns (12-bit/13-bit)	–	–	–	–
		8192 points (13-bit)	–	–	–	–
		8192 points/4096 turns (13-bit/12-bit)	–	–	–	–
Output stage Supply (2)	Incremental encoders	Type R (N)	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 (3)	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 or axial		●	● (for stainless steel versions only)	–	–
	Connector, radial, M23		–	●	●	●
	Terminal block, radial		–	–	–	–
Type reference			XCC14●●●●●	XCC15●●●●●	XCC15●●●●●M●●	XCC19●●●●●
Pages			11	13 to 15		17

(1) Parameterable version: multiplication of the basic resolution of the disc using dip switches, the factory setting being that of the lowest value.

(2) Characteristics 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.
- **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

Multiturn 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

Ø 6 mm and Ø 10 mm (3)
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 (3)
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)

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4096 points/8192 turns
(3)

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8192 points (3)

8192 points

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8192 points/4096 turns

8192 points/4096 turns

8192 points/4096 turns

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Push-pull, binary or Gray,
5...30 V or 11...30 V (3)

Push-pull, binary or Gray,
11...30 V

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SSI, 13-bit, binary or Gray
5...30 V or 11...30 V (3)

SSI, 13-bit, binary or Gray
11...30 V

SSI, 25-bit, binary or Gray
5...30 V or 11...30 V (3)

SSI, 25-bit, binary or Gray
11...30 V

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11...30 V, CANopen

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11...30 V, PROFIBUS-DP

● (for stainless steel
encoders only)

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● (for stainless steel
encoders only)

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XCC25●●●●●

XCC29●●●●●

XCC35●●●●●

XCC39●●●●●

XCC35●●●●●CBN
XCC35●●●●●FBN

XCCR, XCCP, XZC

23

25

29

31

44 and 48

35 to 37,
50 and 51

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

- **Type SB (N)** or **SG (N)**: SSI output without parity, 13-bit or 25-bit, 5...30 V or 11...30 V, binary code SB (N) or Gray code SG (N).
- **Type KB (N)** or **KG (N)**: push-pull output driver, 5...30 V or 11...30 V, binary code KB (N) or Gray code KG (N) with multiturn connecting cable.
- **Type C**: binary CANopen serial link. **Type F**: binary PROFIBUS serial link, RS 485.

(3) For all encoders versions (including stainless steel versions).

Applications

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

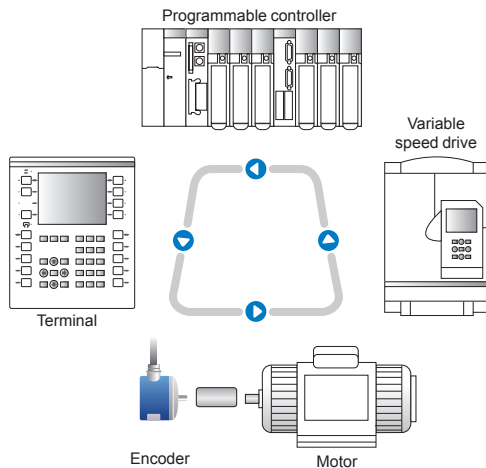
- counting, positioning by counting,
- absolute positioning,
- speed control.

Example

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

■ Processing units
please refer to our “Premium automation platform” catalogue.

■ Variable speed drives
please refer to our “Variable speed drives and starters” catalogue.



Principle of the opto-electronic rotary encoder

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

Mechanically coupled to a 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 and is detected by photosensitive diodes.

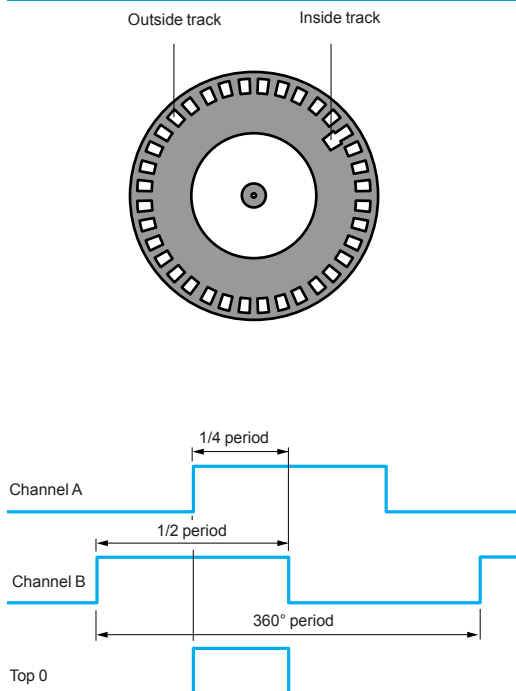
The photosensitive diodes, in turn, generate an electrical signal which is amplified and converted into a digital signal before being transmitted to a processing system or an electronic variable speed drive.

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 being that of the lowest value).
- Single turn and multiturn absolute encoders:
Absolute positioning.
- Fieldbus multiturn absolute encoders:
CANopen and PROFIBUS-DP.

Incremental encoder



Principle

The disc of an incremental encoder comprises 2 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 and enables reinitialisation at each revolution (top 0).

Schemes 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

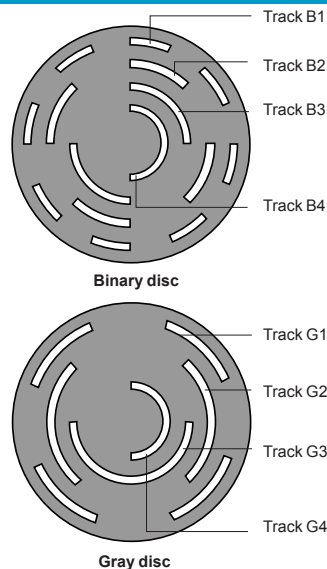
- Radial play of encoder shaft greater than 30%, which is higher than traditional optical reading encoders.
- Maintains a phase displacement of channels A and B within the tolerance limits of the unit.

Triple light source emission

- 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%).

These advantages are the reliability factors of the XCC encoders.

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 points corresponding to the resolution of the encoder.

Therefore, for each angular position of the shaft, the disc provides a code. This code can either be binary or Gray.

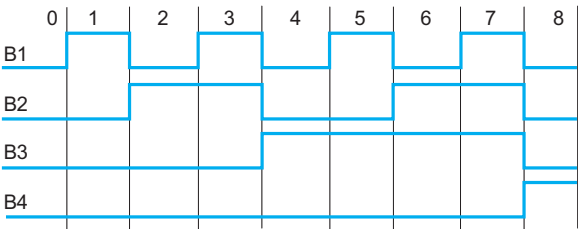
Following one complete revolution of the encoder, the same coded values are repeated.

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

Absolute encoder (continued)

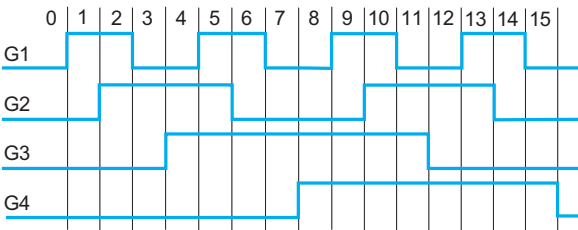
Binary coding

The binary code is directly usable by processing systems (programmable controllers for example) in order 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	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0
2 ⁴	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1
2 ⁸	0	0	0	0	0	0	0	0	1	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	1	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 characteristics to be established

1 Function

- Incremental encoder
Provides counting indication.
- Single turn absolute encoder
Provides absolute position within each revolution.
- Multiturn 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 multiturn 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

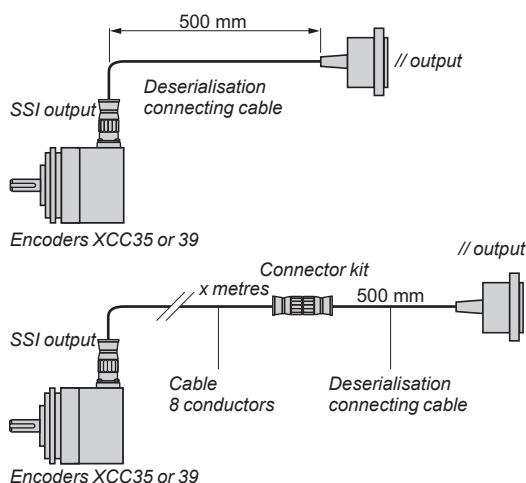
- Pre-cabled with 2 m long shielded cable or M23/M12 connector.
- Radial type connection.

6 Resolution

- Number of points per revolution.
- Number of revolutions (for multiturn 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.
- Multiturn 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 deserialisation connecting cable (see page 35).
- Multiturn absolute encoders, communicating version, fieldbus:
 - CANopen: 11...30 V (see page 42).
 - PROFIBUS-DP: 11...30 V (see page 46).



Installation precautions

Type of cables

In an environment subject to considerable electrical interference, it is recommended that cables with several twisted pairs, reinforced by general shielding, be used.

For the signals, it is recommended that standard 0.14 mm²/0.22 mm² conductors be used.

For 5 V supply encoders.

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

- 0.14 mm² if the encoder-supply distance is less than 30 m,
- 0.22 mm² if the encoder-supply distance is greater than 30 m.

Cabling

Separate, by 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 non shielded) group signal cables in common pairs.

In environments subject to electrical interference, it is recommended to earth the encoder base using one of the fixing 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. Earth the shielding throughout 360° using tap-off braids. This is to be done at both ends of each cable. To earth the shielding use at least 4 mm² cable.

As much as possible, earth 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 characteristics.

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

Supply

It is imperative that regulated and smoothed power supplies, with a ripple factor on 24 V of 500 mV and on 5 V of 200 mV, are used that are specifically for the encoder. Schneider Electric ABL7 range power supplies are available. Please refer to the website: www.schneider-electric.com.

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

Opto-electronic rotary encoders

Characteristics required to define an encoder,
installation, powering-up

Connection and powering-up precautions

Connection

The plugging-in or unplugging of a connector version encoder must only be done whilst the supply is disconnected.

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.

Powering-up

For synchronisation reasons, the powering-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	- 20...+ 80	
	Storage	°C	- 30...+ 85	
Degree of protection	Conforming to IEC 60529		IP 54	IP 52
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (f = 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		Aluminium or Zamak	
	Housing		Aluminium or Zamak	
	Shaft		Stainless steel or aluminium	
	Ball bearings		688AZZ1	

Mechanical characteristics

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	5
Torque		N.cm	0.2	0.25
Maximum load	Radial	daN	2	
	Axial	daN	1	

Electrical characteristics

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

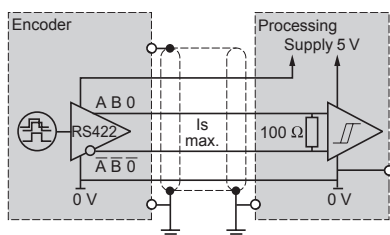
Supply voltage			5 V ± 10% Maximum ripple: 200 mV	
Current consumption, no-load		mA	100 maximum	
Output current		mA	40 maximum	
Output levels	Low level		0.5 V maximum (Is = 20 mA)	
	High level		2.5 V minimum (Is = 20 mA)	

Encoders with type K output stage: push-pull output driver, 11...30 V supply

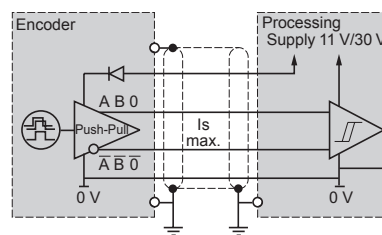
Supply voltage			11 V...30 V. Maximum ripple: 500 mV	
Current consumption, no-load		mA	75 maximum	
Protection			Against short-circuits and reverse polarity	
Output current		mA	40 maximum	
Output levels	Low level		1.5 V maximum (Is = 20 mA)	
	High level		V supply - 3 V minimum (Is = 20 mA)	

Schemes

Type R output stage



Type K output stage



Incremental encoders

OsiSense XCC

Ø 40 mm encoders



Solid shaft, Ø 6 mm

Resolution	Connection method	Output stage type (1)	Supply voltage	Reference	Weight kg
100 points	Pre-cabled, radial L = 2 m	5 V, RS 422	4.5...5.5 V	XCC1406PR01R	0.355
		Push-pull	11...30 V	XCC1406PR01K	0.355
360 points	Pre-cabled, radial L = 2 m	5 V, RS 422	4.5...5.5 V	XCC1406PR03R	0.355
		Push-pull	11...30 V	XCC1406PR03K	0.355
500 points	Pre-cabled, radial L = 2 m	5 V, RS 422	4.5...5.5 V	XCC1406PR05R	0.355
		Push-pull	11...30 V	XCC1406PR05K	0.355
1000 points	Pre-cabled, radial L = 2 m	5 V, RS 422	4.5...5.5 V	XCC1406PR10R	0.355
		Push-pull	11...30 V	XCC1406PR10K	0.355
1024 points	Pre-cabled, radial L = 2 m	5 V, RS 422	4.5...5.5 V	XCC1406PR11R	0.355
		Push-pull	11...30 V	XCC1406PR11K	0.355



Through shaft, Ø 6 mm (2)

Resolution	Connection method	Output stage type (1)	Supply voltage	Reference	Weight kg
100 points	Pre-cabled, radial L = 2 m	5 V, RS 422	4.5...5.5 V	XCC1406TR01R	0.405
		Push-pull	11...30 V	XCC1406TR01K	0.405
360 points	Pre-cabled, radial L = 2 m	5 V, RS 422	4.5...5.5 V	XCC1406TR03R	0.405
		Push-pull	11...30 V	XCC1406TR03K	0.405
500 points	Pre-cabled, radial L = 2 m	5 V, RS 422	4.5...5.5 V	XCC1406TR05R	0.405
		Push-pull	11...30 V	XCC1406TR05K	0.405
1000 points	Pre-cabled, radial L = 2 m	5 V, RS 422	4.5...5.5 V	XCC1406TR10R	0.405
		Push-pull	11...30 V	XCC1406TR10K	0.405
1024 points	Pre-cabled, radial L = 2 m	5 V, RS 422	4.5...5.5 V	XCC1406TR11R	0.405
		Push-pull	11...30 V	XCC1406TR11K	0.405

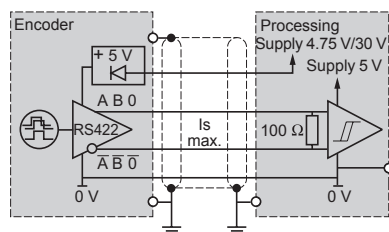
(1) For characteristics of the output stage type (indicated by last letter of the reference), see page 10.

(2) Anti-rotation device included with encoder.

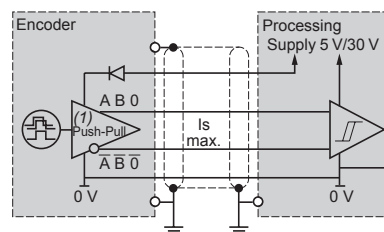
Environment						
Encoder type			XCC1506P●●●●	XCC1510P●●●●	XCC1510S●●●●	XCC1514T●●●●
Conformity			CE			
Temperature	Operation (housing)	°C	- 30...+ 100 (except XCCTSM●●X and XCCTSM●●Y: - 30...+ 70)			
	Storage	°C	- 30...+ 85	- 30...+ 85	- 40...+ 100	- 30...+ 85
Degree of protection	Conforming to IEC 60529		IP 65	IP 65 (IP 67 with collar option XCCRB3)	IP 68 / IP 69K	IP 65
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (f = 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		Aluminium		Stainless steel 316L	Aluminium
	Housing		Zamak		Stainless steel 316L	Zamak
	Shaft		Stainless steel 303		Stainless steel 316L	Stainless steel 303
	Ball bearings		6000			6803ZZ
	Shaft seal		–		Teflon ring	–
Mechanical characteristics						
Shaft type			Ø 6, solid shaft (g7)	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	10	12	22
Torque		N.cm	0.4	0.4	9	0.6
Maximum load	Radial	daN	10	10	25	5
	Axial	daN	5	5	50	2
Electrical characteristics						
Connection		Connector	M23, 12-pin male connector (2 m silicone 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 Maximum ripple: 500 mV			
Current consumption, no-load		mA	75 maximum			
Protection			Against short-circuits and reverse polarity			
Output current		mA	40 maximum			
Output levels	Low level		0.5 V maximum (Is = 20 mA)			
	High level		4.5 V minimum (Is = 20 mA)			
Encoders with type Y output stage: push-pull output driver, 5...30 V supply						
Supply voltage			5...30 V Maximum ripple: 500 mV			
Current consumption, no-load		mA	75 maximum			
Protection			Against short-circuits and reverse polarity			
Output current		mA	40 maximum			
Output levels (for U supply = 30 V) (1)	Low level		0.5 V maximum (Is = 20 mA)			
	High level		V supply - 2.5 V minimum (Is = 20 mA)			

Schemes

Type X output stage



Type Y output stage



(1) RS 422 compatible on 5 V supply.

Incremental encoders

OsiSense XCC

Ø 58 mm encoders, aluminium and stainless steel versions



Solid shaft, Ø 6 mm					
Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
100 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1506PS01X	0.495
		Push-pull	5...30 V	XCC1506PS01Y	0.495
360 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1506PS03X	0.495
		Push-pull	5...30 V	XCC1506PS03Y	0.495
500 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1506PS05X	0.495
		Push-pull	5...30 V	XCC1506PS05Y	0.495
1000 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1506PS10X	0.495
		Push-pull	5...30 V	XCC1506PS10Y	0.495
1024 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1506PS11X	0.495
		Push-pull	5...30 V	XCC1506PS11Y	0.495
2500 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1506PS25X	0.495
		Push-pull	5...30 V	XCC1506PS25Y	0.495
5000 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1506PS50X	0.495
		Push-pull	5...30 V	XCC1506PS50Y	0.495



Solid shaft, Ø 10 mm					
Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
100 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1510PS01X	0.465
		Push-pull	5...30 V	XCC1510PS01Y	0.465
360 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1510PS03X	0.465
		Push-pull	5...30 V	XCC1510PS03Y	0.465
	Cable (2 m)	Push-pull	5...30 V	XCC1510SPA03Y (3)	0.860
500 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1510PS05X	0.465
		Push-pull	5...30 V	XCC1510PS05Y	0.465
1000 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1510PS10X	0.465
		Push-pull	5...30 V	XCC1510PS10Y	0.465
1024 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1510PS11X	0.465
		Push-pull	5...30 V	XCC1510PS11Y	0.465
	Cable (2 m)	Push-pull	5...30 V	XCC1510SPA11Y (3)	0.860
2500 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1510PS25X	0.465
		Push-pull	5...30 V	XCC1510PS25Y	0.465
5000 points	Connector, radial M23 male	5 V, RS 422	4.75...30 V	XCC1510PS50X	0.465
		Push-pull	5...30 V	XCC1510PS50Y	0.465
	Cable (2 m)	Push-pull	5...30 V	XCC1510SPA50Y (3)	0.860

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

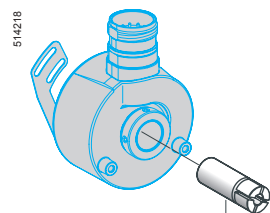
(2) For characteristics of the output stage type (indicated by last letter of the reference), see page 12.

(3) Stainless steel 316L version.





XCC1514TS●●●



XCCR158RDA●●

Through shaft, Ø 14 mm (1)

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

Reduction collars for encoders with through shaft, Ø 14 mm

For use with	Diameter	Reference	Weight kg
Encoders with through shaft XCC1514TS●●●	Ø 6 mm	XCCR158RDA06	0.015
	Ø 8 mm	XCCR158RDA08	0.010
	Ø 10 mm	XCCR158RDA10	0.010
	Ø 12 mm	XCCR158RDA12	0.010

(1) Anti-rotation device included with encoder.

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

(3) For characteristics of the output stage type (indicated by last letter of the reference), see page 12.

Incremental encoders

OsiSense XCC

Ø 58 mm encoders

Parameterable versions (1)

105194



XCC1510PSM02X

Parameterable with solid shaft, Ø 10 mm

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

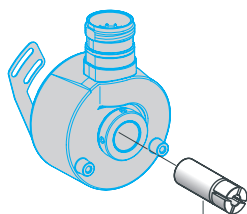
Parameterable with through shaft, Ø 14 mm (4)

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

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

For use with	Diameter	Reference	Weight kg
Encoders with through shaft XCC1514TSM●●●	Ø 6	XCCR158RDA06	0.015
	Ø 8	XCCR158RDA08	0.010
	Ø 10	XCCR158RDA10	0.010
	Ø 12	XCCR158RDA12	0.010

514214



XCCR158RDA●●

(1) Parameter configuration: refer to table indicating position of dip switches on page 21.

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

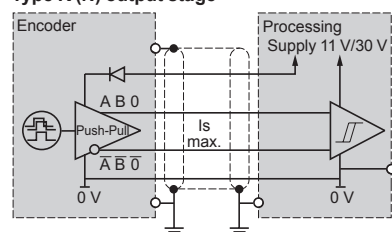
(3) For characteristics of the output stage type (indicated by last letter of the reference), see page 12.

(4) Anti-rotation device included with encoder.

Environment			
Encoder type		XCC1912P●●●●	XCC1930T●●●●
Conformity		CE	
Temperature	Operation (housing)	°C	- 20...+ 80
	Storage	°C	- 30...+ 85
Degree of protection	Conforming to IEC 60529	IP 66	
Vibration resistance	Conforming to IEC 60068-2-6	10 gn (f = 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	Aluminium	
	Housing	Zamak	
	Shaft	Stainless steel	
	Ball bearings	6001ZZ	6807
Mechanical characteristics			
Shaft type		Ø 12, solid shaft (g6)	Ø 30, through shaft (H7)
Maximum rotational speed	Continuous	6000 rpm	3600 rpm
Shaft moment of inertia		g.cm ²	500
Torque		N.cm	2.5
Maximum load	Radial	daN	8
	Axial	daN	5
Electrical characteristics			
Encoders with type K (N) output stage: push-pull output driver, 11...30 V supply			
Connection	Connector	M23, 12-pin male connector	
Frequency		kHz	100
Number of channels		3 channels: A, B, top 0 and complements $\bar{A}$, $\bar{B}$, $\bar{0}$	
Supply voltage		--- 11 V...30 V Maximum ripple: 500 mV	
Current consumption, no-load		mA	75 maximum
Protection		Against short-circuits and reverse polarity	
Output current		mA	40 maximum
Output levels	Low level	1.5 V maximum (Is = 20 mA)	
	High level	V supply - 3 V minimum (Is = 20 mA)	

Scheme

Type K (N) output stage



Incremental encoders

OsiSense XCC

Ø 90 mm encoders

105168



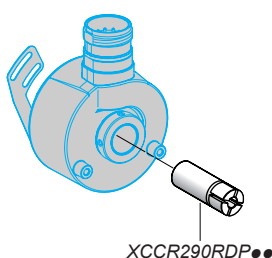
XCC1912PS●●KN

105171



XCC1930TS●●KN

523200



XCCR290RDP●●

Solid shaft, Ø 12 mm

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
360 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1912PS03KN	1.360
500 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1912PS05KN	1.360
1000 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1912PS10KN	1.360
1024 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1912PS11KN	1.360
2500 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1912PS25KN	1.360
3600 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1912PS36KN	1.360
5000 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1912PS50KN	1.360
10,000 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1912PS00KN	1.360

Through shaft, Ø 30 mm (3)

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
360 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1930TS03KN	0.960
500 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1930TS05KN	0.960
1000 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1930TS10KN	0.960
1024 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1930TS11KN	0.960
2500 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1930TS25KN	0.960
3600 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1930TS36KN	0.960
5000 points	Connector, radial M23 male	Push-pull	11...30 V	XCC1930TS50KN	0.960

Reduction collars for encoders with through shaft, Ø 30 mm

For use with	Diameter	Reference	Weight kg
Encoders with through shaft XCC1930TS●●●●N	Ø 12 mm	XCCR290RDP12	0.060
	Ø 16 mm	XCCR290RDP16	0.060
	Ø 20 mm	XCCR290RDP20	0.030
	Ø 25 mm	XCCR290RDP25	0.025

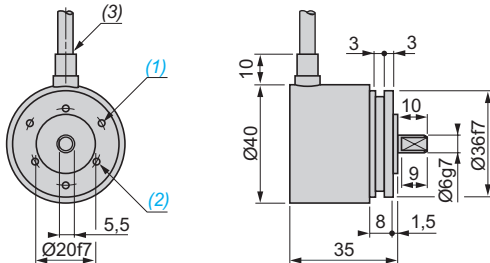
(1) For female connector use **XZCC23FDP120S** or pre-wired connectors (L = 2, 5 or 10 m), see page 35.

(2) For characteristics of the output stage type (indicated by last letter of the reference), see page 16.

(3) Anti-rotation device included with encoder.

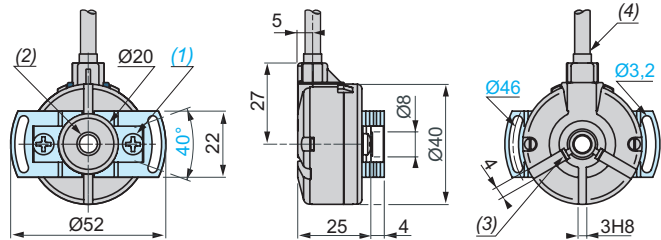
Ø 40 mm encoders

XCC1406PR●●●N



- (1) 3 holes M3 x 0.5 at 120° on 28 PCD, depth: 5 mm.
- (2) 3 holes M3 x 0.5 at 120° on 24 PCD, depth: 5 mm.
- (3) Ø 6 cable, length 2 m, minimum bend radius: 30 mm.

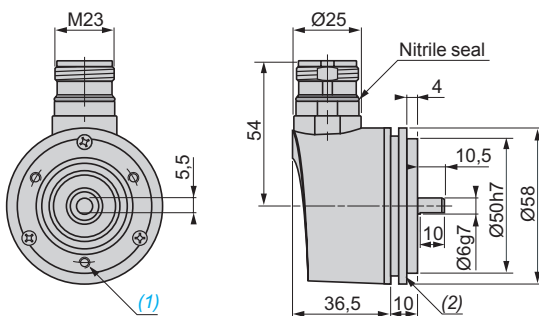
XCC1406TR●●●N



- (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.

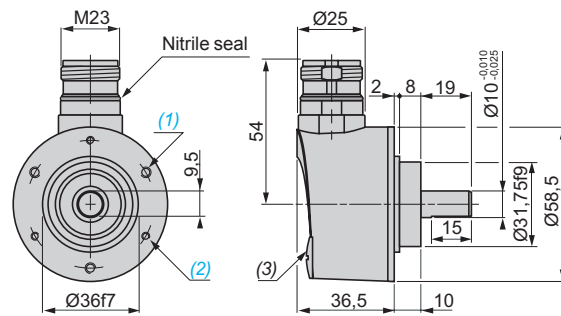
Ø 58 mm encoders

XCC1506PS●●X, XCC1506PS●●Y



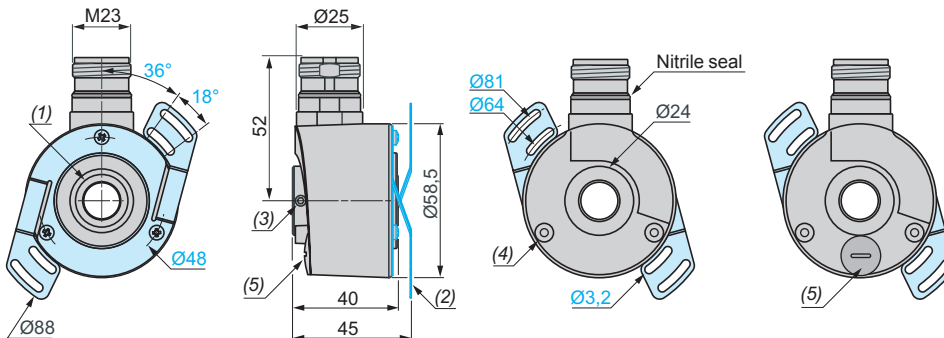
- (1) 3 holes M3 x 4 at 120° on 42 PCD, depth: 10 mm.
- (2) Collar XCCRB1 mounted.

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.

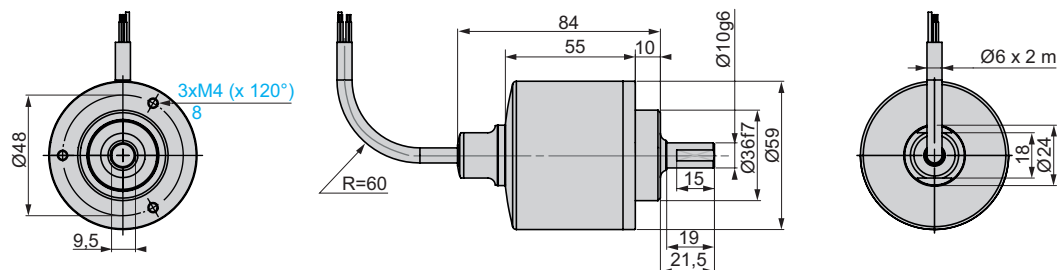
XCC1514TS●●X, 1514TS●●Y / XCC1514TSM●●X, 1514TSM●●Y



- (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.

Ø 58 mm encoders (continued)

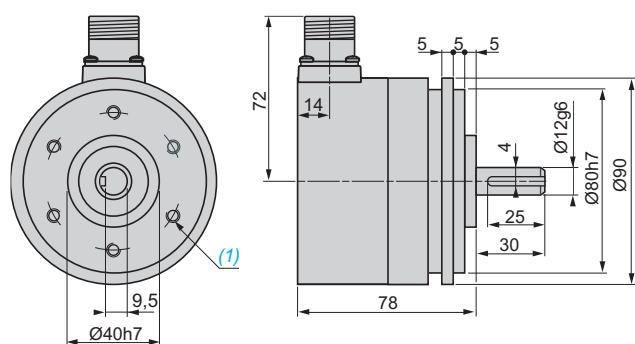
XCC1510SPA●●Y



R: minimum bend radius = 60 mm.

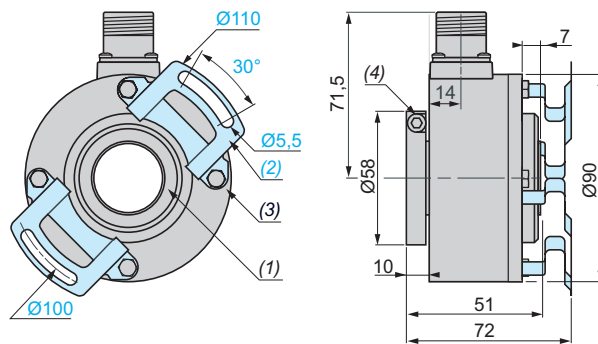
Ø 90 mm encoders

XCC1912PS●●●N



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

XCC1930TS●●●N



- (1) Through shaft, Ø 30 (H7).
- (2) Anti-rotation device, 1 x XCCRF9, mounted.
- (3) 4 M5 x 6 on 78 PCD.
- (4) 1 CHC M5 x 12 stainless steel A2 locking screw.

Incremental encoders

OsiSense XCC
Ø 40 mm, Ø 58 mm and Ø 90 mm encoders

Pre-cabled version encoders (1)

8 x 0.14 mm² shielded cable connections for Ø 58 encoders stainless steel version

Wire colour	PK	BN	GY	RD	YE	BU	GN	WH
Signal Supply	A ⁻	+ V	0	0 ⁻	B	B ⁻	A	0 V

PK = Pink
BN = Brown
GY = Grey
RD = Red
YE = Yellow
BU = Blue
GN = Green
WH = White

8 x 0.14 mm² shielded cable connections for Ø 40 encoders

Wire colour	BN	RD	VT	BU	YE	OG	GN	BK
Signal Supply	A	+ V	0	0 ⁻	B	B ⁻	A	0 V

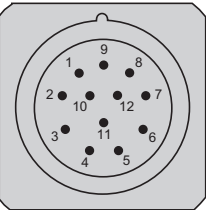
BN = Brown
RD = Red
VT = Violet
BU = Blue
YE = Yellow
OG = Orange
GN = Green
BK = Black

Note: In environments subject to electrical interference, it is recommended to earth the encoder base using one of the fixing 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	A	+ V	0	0	B	B	R	A	R	0 V	0 V	+ V

Note: In environments subject to electrical interference, it is recommended to earth the encoder base using one of the fixing screws.
R = reserved, do not connect.

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

Incremental encoders

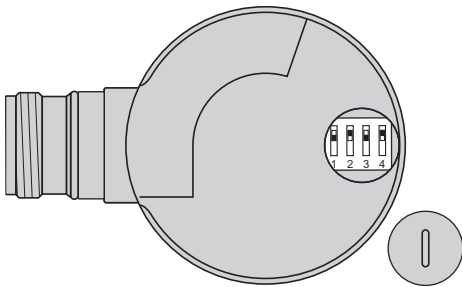
OsiSense XCC
Ø 40 mm, Ø 58 mm and Ø 90 mm encoders

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.



on

Interpolation factor		Basic resolution					Position of dip switches			
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	- 20...+ 90	- 20...+ 90	- 20...+ 90	- 20...+ 90
	Storage	°C	- 30...+ 95	- 30...+ 95	- 40...+ 100	- 30...+ 95
Degree of protection			IP 65	IP 65 (IP 67 with collar option XCCRB3)	IP 68 / IP 69K	IP 65
Vibration resistance			10 gn (f = 55...2 kHz)			
Shock resistance			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		Aluminium		Stainless steel 316L	Aluminium
	Housing		Zamak		Stainless steel 316L	Zamak
	Shaft		Stainless steel 303		Stainless steel 316L	Stainless steel 303
	Ball bearings		6000			6803ZZ
	Shaft seal		-		Teflon ring	-

Mechanical characteristics

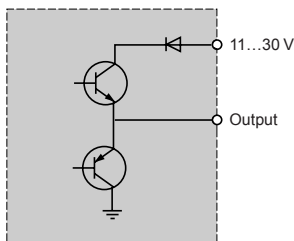
Shaft type			Ø 6, solid shaft (g7)	Ø 10 mm, solid shaft	Ø 10 mm, solid shaft	Ø 14, through shaft (H7)
Maximum rotational speed		Continuous	9000 rpm	9000 rpm	3000 rpm	6000 rpm
Shaft moment of inertia		g.cm ²	10	10	12	22
Torque		N.cm	0.4	0.4	9	0.6
Maximum load	Radial	daN	10	10	25	5
	Axial	daN	5	5	50	2

Electrical characteristics

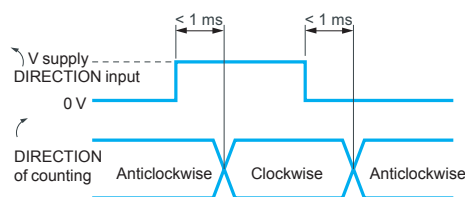
Connection	Connector		Encoders with parallel output stage types KG (N), KB: M23, 16-pin male connector (2 m TPU cable for XCC2510S●●●). Encoders with SSI output stage types SB (N), SG (N): M23, 12-pin male connector. (2 m PUR cable for XCC2510S●●●).
Frequency		kHz	Encoders with parallel output stage 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, Gray code			
Supply voltage			--- 11...30 V Maximum ripple: 500 mV. (For XCC2510SPA81●●●: 5...30 V. Maximum ripple 200 mV, if supply voltage < 6 V; 500 mV, if supply voltage ≥ 6V).
Current consumption, no-load		mA	100 maximum
Protection			Against short-circuits and reverse polarity
Output current		mA	20 maximum
Output levels (for U supply = 30 V)	Low level		0.5 V maximum (Is = 20 mA)
	High level		V supply - 2.5 V minimum (Is = 20 mA)

Schemes

Type KB and KG (N) output stage



KB and KG (N) DIRECTION input



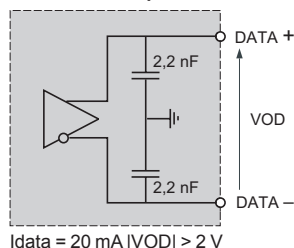
Electrical characteristics (continued)

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)

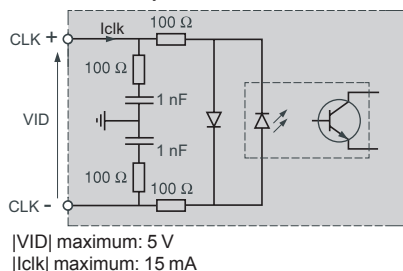
Supply voltage		11...30 V. Maximum ripple: 500 mV
Current consumption, no-load	mA	100
Protection		Against short-circuits and reverse polarity
Output level		I _{data} = 20 mA V _{OD} > 2 V

Schemes

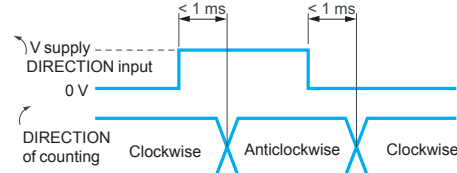
RS 422 data output



Isolated clock input



DIRECTION input



References

105173



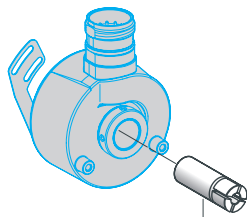
XCC2506PS81●●●

120311B



XCC2510SPA81●GN

514214



XCCR158RDA●●

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
Solid shaft, Ø 6 mm					
8192 points	Connector, radial M23 male	Push-pull, 13-bit, binary	11...30 V	XCC2506PS81KB	0.495
		Push-pull, 13-bit, Gray	11...30 V	XCC2506PS81KGN	0.495
		SSI, 13-bit, binary	11...30 V	XCC2506PS81SBN	0.490
		SSI, 13-bit, Gray	11...30 V	XCC2506PS81SGN	0.490
Solid shaft, Ø 10 mm					
8192 points	Connector, radial M23 male	Push-pull, 13-bit, binary	11...30 V	XCC2510PS81KB	0.465
		Push-pull, 13-bit, Gray	11...30 V	XCC2510PS81KGN	0.465
		SSI, 13-bit, binary	11...30 V	XCC2510PS81SBN	0.460
		SSI, 13-bit, Gray	11...30 V	XCC2510PS81SGN	0.460
	Cable (2 m)	Push-pull, Gray	5...30 V	XCC2510SPA81KGN (4)	0.915
		SSI, 13-bit, Gray	5...30 V	XCC2510SPA81SGN (4)	0.925
Through shaft, Ø 14 mm (3)					
8192 points	Connector, radial M23 male	Push-pull, 13-bit, binary	11...30 V	XCC2514TS81KB	0.435
		Push-pull, 13-bit, Gray	11...30 V	XCC2514TS81KG	0.435
		SSI, 13-bit, binary	11...30 V	XCC2514TS81SB	0.430
		SSI, 13-bit, Gray	11...30 V	XCC2514TS81SG	0.430
Reduction collars for encoders with through shaft, Ø 14 mm					
For use with			Diameter	Reference	Weight kg
Encoders with through shaft XCC2514TS81●●			Ø 6 mm	XCCR158RDA06	0.015
			Ø 8 mm	XCCR158RDA08	0.010
			Ø 10 mm	XCCR158RDA10	0.010
			Ø 12 mm	XCCR158RDA12	0.010

(1) For female connector use:

- XZCC23FDP120S for encoders type SBN and SGN
- XZCC23FDP160S for encoders type KB and KGN, or pre-wired connectors (L = 2, 5 and 10 m), see page 35.

(2) For characteristics of the output stage type (indicated by last letter of the reference), see page 22.

(3) Anti-rotation device included with encoder.

(4) Stainless steel 316L version.

Environment

Encoder type			XCC2912P●●●●●	XCC2930T●●●●●
Conformity			CE	
Temperature	Operation (housing)	°C	- 20...+ 85	
	Storage	°C	- 40...+ 85	
Degree of protection	Conforming to IEC 60529		IP 66	IP 65
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (f = 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		Aluminium	
	Housing		Zamak	
	Shaft		Stainless steel	
	Ball bearings		6001ZZ	6807

Mechanical characteristics

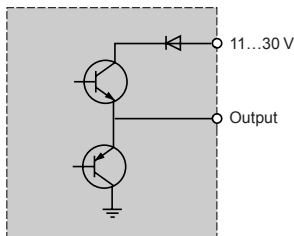
Shaft type			Ø 12, solid shaft (g6)	Ø 30, through shaft (H7)
Maximum rotational speed	Continuous		6000 rpm	3600 rpm
Shaft moment of inertia		g.cm ²	150	500
Torque		N.cm	1	2.5
Maximum load	Radial	daN	20	8
	Axial	daN	10	5

Electrical characteristics

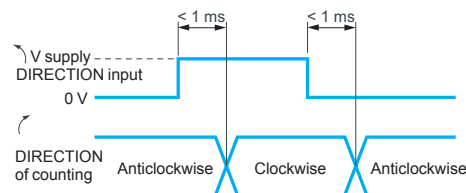
Connection	Connector		Encoders with parallel output stage types KB (N), KG (N): M23, 16-pin male connector. Encoders with SSI output stage types SB (N), SG (N): M23, 12-pin male connector
Frequency			Encoders with parallel output stage types KB (N), KG (N): 100 kHz on LSB (Least Significant Bit) Encoders 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. Maximum ripple: 500 mV (For XCC2510S●●●: 5...30 V. Maximum ripple 200 mV, if supply voltage < 6 V; 500 mV, if supply voltage ≥ 6V).
Current consumption, no-load		mA	100 maximum
Protection			Against short-circuits and reverse polarity
Output current		mA	20 maximum
Output levels (for U supply = 30 V)	Low level		0.5 V maximum (I _s = 20 mA)
	High level		V supply - 3 V minimum (I _s = 20 mA)

Schemes

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



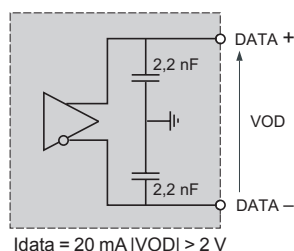
KB (N) and KG (N) DIRECTION input



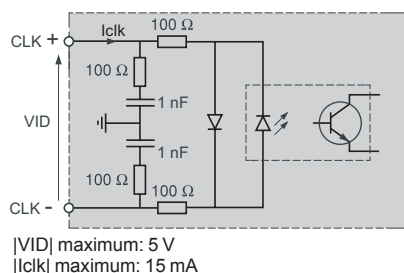
Electrical characteristics (continued)

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 Maximum 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

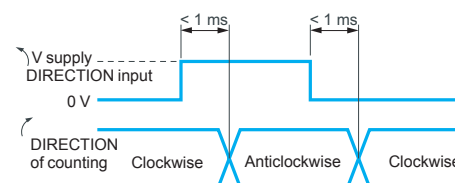
Schemes RS 422 data output



Isolated clock input



DIRECTION input



References

105168



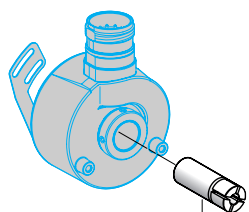
XCC2912PS●●●●

105171



XCC2930TS●●●●

5232001



XCCR290RDP●●

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
Solid shaft, Ø 12 mm					
8192 points	Connector, radial M23 male	Push-pull, 13-bit, binary	11...30 V	XCC2912PS81KBN	1.365
		Push-pull, 13-bit, Gray	11...30 V	XCC2912PS81KGN	1.365
		SSI, 13-bit, Gray	11...30 V	XCC2912PS81SGN	1.370
Through shaft, Ø 30 mm (3)					
8192 points	Connector, radial M23 male	Push-pull, 13-bit, binary	11...30 V	XCC2930TS81KBN	0.975
		Push-pull, 13-bit, Gray	11...30 V	XCC2930TS81KGN	0.975
		SSI, 13-bit, binary	11...30 V	XCC2930TS81SBN	0.980
		SSI, 13-bit, Gray	11...30 V	XCC2930TS81SGN	0.980
Reduction collars for encoders with through shaft, Ø 30 mm					
For use with	Diameter	Reference	Weight kg		
Encoders with through shaft XCC2930TS81●●●	Ø 12 mm	XCCR290RDP12	0.060		
	Ø 16 mm	XCCR290RDP16	0.060		
	Ø 20 mm	XCCR290RDP20	0.030		
	Ø 25 mm	XCCR290RDP25	0.020		

(1) For female connector use:

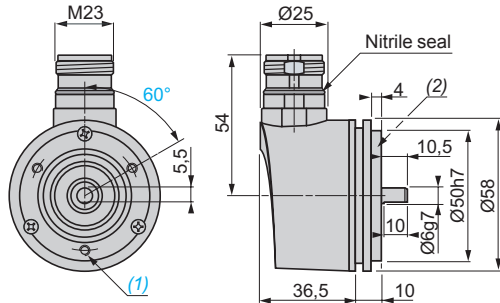
- XZCC23FDP120S for encoders type SB (N) and SG (N)
- XZCC23FDP160S for encoders type KB (N) and KG (N), or pre-wired connectors (L = 2, 5 and 10 m), see page 35.

(2) For characteristics of the output stage type (indicated by last letter of the reference), see page 24.

(3) Anti-rotation device included with encoder.

Ø 58 mm encoders

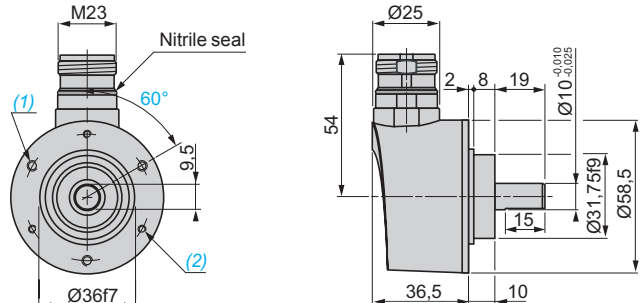
XCC2506PS81KB, XCC2506PS81KGN, XCC2506PS81SBN, XCC2506PS81SGN



(1) 3 M4 holes at 120° on 42 PCD, depth: 10 mm.

(2) Collar XCCRB1 mounted.

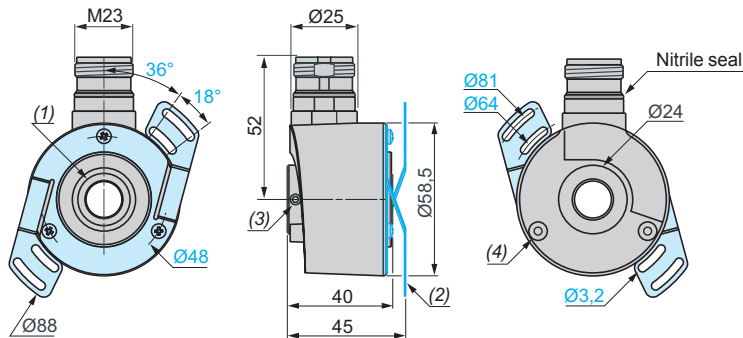
XCC2510PS81KB, XCC2510PS81KGN, XCC2510PS81SBN, XCC2510PS81SGN



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

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

XCC2514TS81KB, XCC2514TS81KGN, XCC2514TS81SB, XCC2514TS81SG



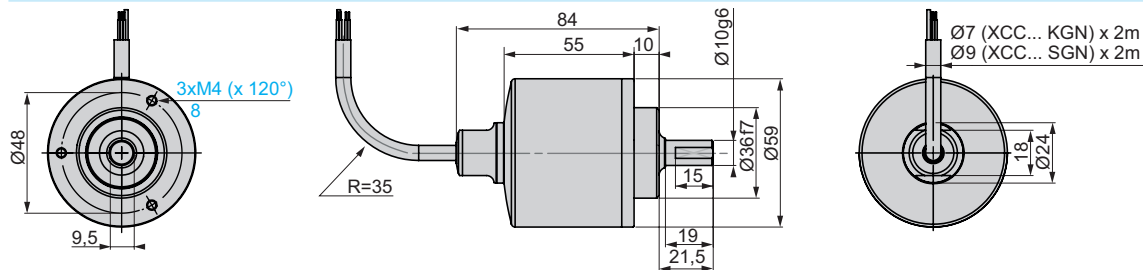
(1) Through shaft, Ø 14 (H7).

(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.

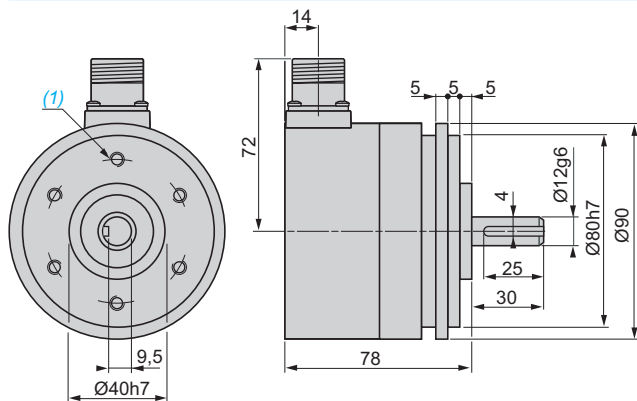
XCC2510SPA81KGN, XCC2510SPA81SGN



R: minimum bend radius = 35 mm for XCC2510SPA81KGN, 65 mm for XCC2510SPA81SGN.

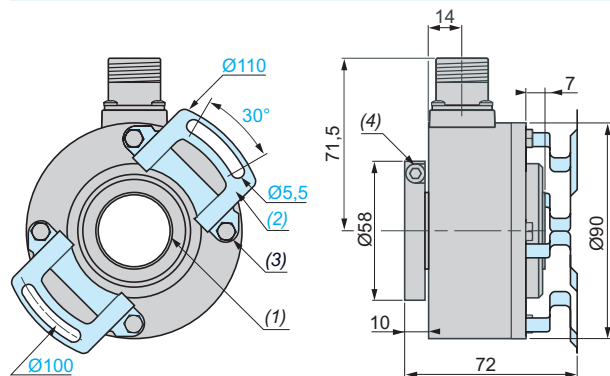
Ø 90 mm encoders

XCC2912PS81KBN, XCC2912PS81KGN



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

XCC2930TS81SBN, XCC2930TS81SGN



(1) Through shaft, Ø 30 (H7).

(2) Anti-rotation device, 1 x XCCRF9, mounted.

(3) 4 M5 x 6 on 78 PCD.

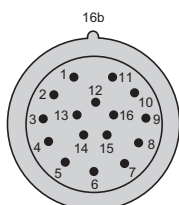
(4) 1 CHC M5 x 12 stainless steel A2 locking screw.

Connector version encoders

Encoders type KB (N) and KG (N)

M23, 16-pin connector, anticlockwise 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)

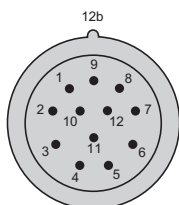
If a resolution less than 13 bits (8192 points) is required, only the corresponding number of bits need to be connected:
 Example:
 - D5 to D12 for 8 bits (256 points)
 - D3 to D12 for 10 bits (1024 points)
 - D2 to D12 for 11 bits (2048 points)

(1) ↻ : Clockwise direction, 16 to + V.
 ↻ : Anticlockwise direction, 16 to 0 V.

Encoders type SB (N) and SG (N)

M23, 12-pin connector, anticlockwise 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 (2)	R	+ V	R	Data -	Clk -	R	

R = Reserved (do not connect).

(2) ↻ : Clockwise direction, 5 to 0 V.
 ↻ : Anticlockwise direction, 5 to + V.

Cable version encoders

XCC2510SPA81KGN

Wire colour	WH White	BN Brown	GN Green	YE Yellow	GY Grey	OG Orange	BU Blue	RD Red
Signal/Supply	0 V	+ V	d0	d1	d2	d3	d4	d5
	BK Black	VT Violet	WH/BN White/ brown	WH/GN White/ green	WH/YE White/ yellow	WH/BK White/ black	WH/OG White/ orange	WH/RD White/ red
	d6	d7	d8	d9	d10	d11	d12	Direction (3)

(3) ↻ : Clockwise direction, to + V.
 ↻ : Anticlockwise direction, to 0 V.

XCC2510SPA81SGN

Wire colour	BK Black	BN Brown	GN Green	VT Violet	BU Blue	RD Red	OG Orange	YE Yellow
Signal/Supply	0 V	Data +	Clock +	Direction (4)	Reset to zero	+ V	Data -	Clock -

(4) ↻ : Clockwise direction, to 0 V.
 ↻ : Anticlockwise direction, to + V.

Environment

Encoder type	Multiturn absolute		XCC3506P●●●●●	XCC3510P●●●●●	XCC3510SPA48●●●	XCC3514T●●●●●
Conformity			CE			
Temperature	Operation (housing)	°C	- 20...+ 85			
	Storage	°C	- 20...+ 85			
Degree of protection	Conforming to IEC 60529		IP 65	IP 65 (IP 67 with collar option XCCRB3)	IP 68 / IP 69K	IP 65
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (f = 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		Aluminium		Stainless steel 316L	Aluminium
	Housing		Steel		Stainless steel 316L	Steel
	Shaft		Stainless steel 303		Stainless steel 316L	Stainless steel 303
	Ball bearings		6000		6000	6803ZZ
	Shaft seal		—		Teflon ring	—

Mechanical characteristics

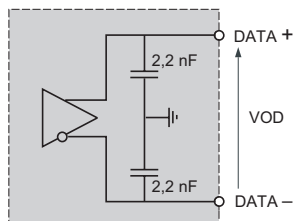
Shaft type			Ø 6, solid shaft (g7)	Ø 10 mm, solid shaft	Ø 14, through shaft (H7)
Maximum rotational speed	Continuous		6000 rpm	3000 rpm	6000 rpm
Shaft moment of inertia		g.cm ²	10	12	22
Torque		N.cm	0.4	9	0.6
Maximum load	Radial	daN	10	25	5
	Axial	daN	5	25	2

Electrical characteristics

Connection	Connector		Encoders with SSI output stage types SB (N), SG (N): M23, 12-pin male connector, (2 m PUR cable for XCC3510SPA48●●●).		
Frequency			Encoders with SSI output stage types SB (N), SG (N): 100 to 500 kHz clock		
Supply voltage			--- 11...30 V. Maximum ripple: 500 mV (For XCC3510SPA48●●●: 5...30 V. Maximum ripple 200 mV, if supply voltage < 6 V; 500 mV, if supply voltage ≥ 6V).		
Current consumption, no-load		mA	100 maximum		
Protection			Against short-circuits and reverse polarity		
Output level			I _{data} = 20 mA VOD > 2 V		

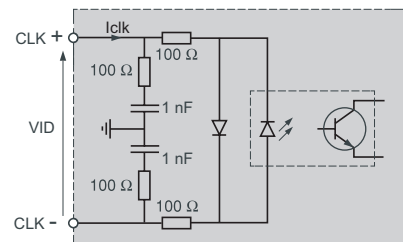
Schemes

RS 422 data output



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

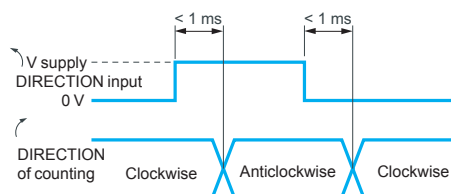
Isolated clock input



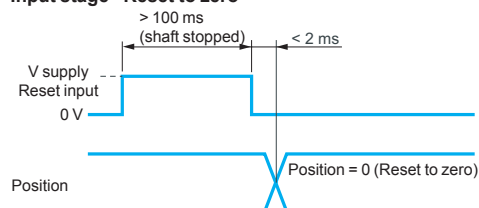
$$|V_{ID}| \text{ maximum: } 5 \text{ V}$$

$$|I_{clk}| \text{ maximum: } 15 \text{ mA}$$

DIRECTION input



Input stage - Reset to zero



Multiturn absolute encoders

OsiSense XCC

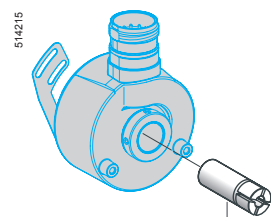
Ø 58 mm encoders, aluminium and stainless steel versions



XCC3506PS84SBN



XCC3510SPA48SGN



XCCR158RDA●●

Ø 58 mm multiturn absolute encoders with SSI output convertible to parallel output

The SSI versions can be converted to a parallel version using the deserialisation connecting cable XCCRM23SUB37●●, see pages 34 and 35.

Solid shaft, Ø 6 mm

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
4096 points 8192 turns	Connector, radial M23 male	SSI, 25-bit, binary	11...30 V	XCC3506PS48SBN	0.725
8192 points 4096 turns	Connector, radial M23 male	SSI, 25-bit, binary	11...30 V	XCC3506PS84SBN	0.725
		SSI, 25-bit, Gray	11...30 V	XCC3506PS84SGN	0.725

Solid shaft, Ø 10 mm

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
4096 points 8192 turns	Connector, radial M23 male	SSI, 25-bit, binary	11...30 V	XCC3510PS48SBN	0.685
	Cable (2 m)	SSI, 25-bit, binary	5...30 V	XCC3510SPA48SGN (3)	0.935
8192 points 4096 turns	Connector, radial M23 male	SSI, 25-bit, binary	11...30 V	XCC3510PS84SBN	0.685
		SSI, 25-bit, Gray	11...30 V	XCC3510PS84SGN	0.685

Through shaft, Ø 14 mm (4)

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
8192 points 4096 turns	Connector, radial M23 male	SSI, 25-bit, binary	11...30 V	XCC3514TS84SB	0.655

Reduction collars for encoders with through shaft, Ø 14 mm

For use with	Diameter	Reference	Weight kg
Encoders with through shaft XCC3514TS84●●	Ø 6 mm	XCCR158RDA06	0.015
	Ø 8 mm	XCCR158RDA08	0.010
	Ø 10 mm	XCCR158RDA10	0.010
	Ø 12 mm	XCCR158RDA12	0.010
	0.375"	XCCR158RDAU37	0.011
	0.5"	XCCR158RDAU50	0.007

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

(2) For characteristics of the output stage type (indicated by last letter of the reference), see page 28.

(3) Stainless steel 316L version.

(4) Anti-rotation device included with encoder.

Environment

Encoder type			XCC3912P●●●●●	XCC3930T●●●●●
Conformity			CE	
Temperature	Operation (housing)	°C	-20...+85	-10...+75
	Storage	°C	-30...+85	-20...+85
Degree of protection	Conforming to IEC 60529		IP 66	IP 65
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (f = 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		Aluminium	
	Housing		Zamak	
	Shaft		Stainless steel	
	Ball bearings		6001ZZ	6807ZZ

Mechanical characteristics

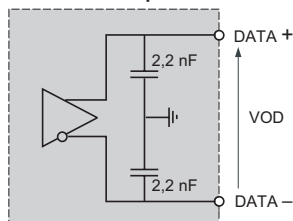
Shaft type			Ø 12, solid shaft (g6)	Ø 30, through shaft (H7)
Maximum rotational speed	Continuous		6000 rpm	3600 rpm
Shaft moment of inertia		g.cm ²	150	56
Torque		N.cm	1	0.8
Maximum load	Radial	daN	20	8
	Axial	daN	10	5

Electrical characteristics

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 Maximum ripple: 500 mV
Current consumption, no-load		mA	100 maximum
Protection			Against short-circuits and reverse polarity
Output level			I _{data} = 20 mA V _{OD} > 2 V

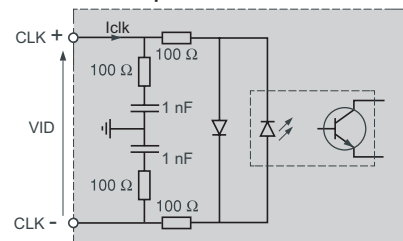
Schemes

RS 422 data output



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

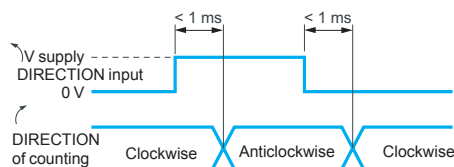
Isolated clock input



$$|V_{ID}| \text{ maximum: } 5 \text{ V}$$

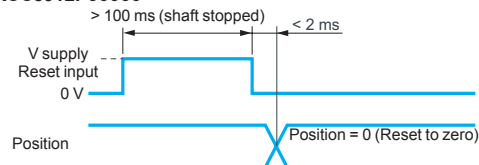
$$|I_{clk}| \text{ maximum: } 15 \text{ mA}$$

DIRECTION input

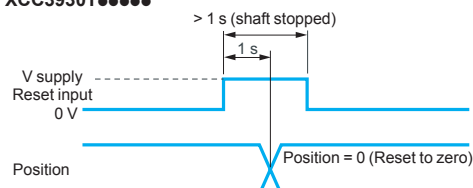


Input stage - Reset to zero

XCC3912P●●●●●



XCC3930T●●●●●



Multiturn absolute encoders

OsiSense XCC

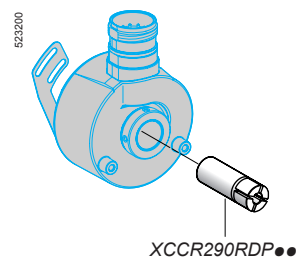
Ø 90 mm encoders



XCC3912PS●●●●●



XCC3930TS●●●●●



XCCR290RDP●●

Ø 90 mm multiturn absolute encoders with SSI output convertible to parallel output

The SSI versions can be converted to a parallel version using the deserialisation connecting cable **XCCRM23SUB37●●**, see pages 34 and 35.

Solid shaft, Ø 12 mm

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
8192 points 4096 turns	Connector, radial M23 male	SSI, 25-bit, binary	11...30 V	XCC3912PS84SBN	1.840
		SSI, 25-bit, Gray	11...30 V	XCC3912PS84SGN	1.840

Through shaft, Ø 30 mm (3)

Resolution	Connection method (1)	Output stage type (2)	Supply voltage	Reference	Weight kg
8192 points 4096 turns	Connector, radial M23 male	SSI, 25-bit, binary	11...30 V	XCC3930TS84SBN	1.060
		SSI, 25-bit, Gray	11...30 V	XCC3930TS84SGN	1.060

Reduction collars for encoders with through shaft, Ø 30 mm

For use with	Diameter	Reference	Weight kg
Encoders with through shaft XCC3930TS84●●●	Ø 12 mm	XCCR290RDP12	0.060
	Ø 16 mm	XCCR290RDP16	0.060
	Ø 20 mm	XCCR290RDP20	0.030
	Ø 25 mm	XCCR290RDP25	0.020

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

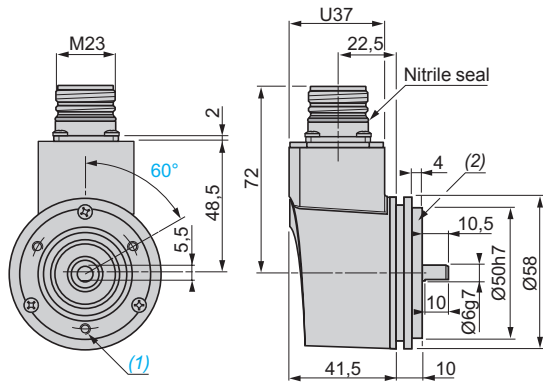
(2) For characteristics of the output stage type (indicated by last letter of the reference), see page 30.

(3) Anti-rotation device included with encoder.

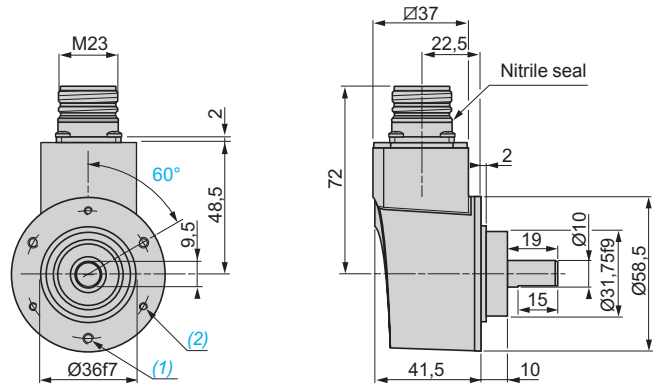
Ø 58 mm encoders

XCC3506PS84SBN, XCC3506PS84SGN

XCC3510PS84SBN, XCC3510PS84SGN

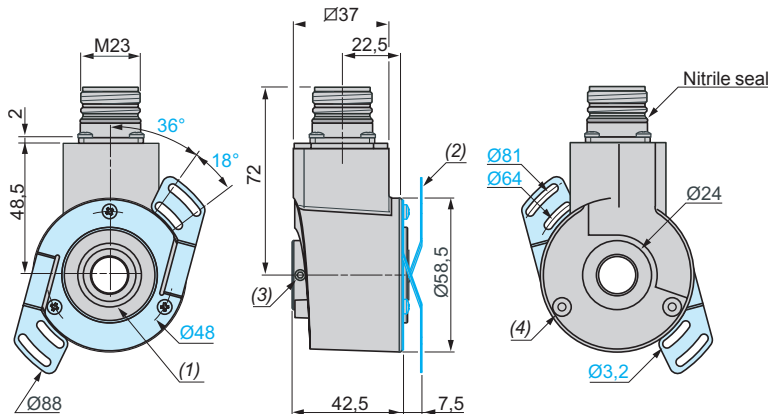


(1) 3 M4 holes at 120° on 42 PCD, depth: 10 mm.
(2) Collar XCCRB1 mounted.



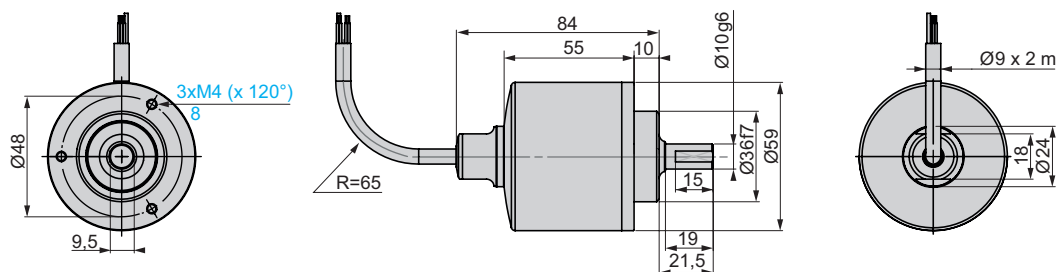
(1) 3 M4 holes at 120° on 48 PCD, depth: 8 mm.
(2) 3 M3 holes at 120° on 48 PCD, depth: 8 mm.

XCC3514TS84SB, XCC3514TS84SG



(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.

XCC3510SPA48SGN

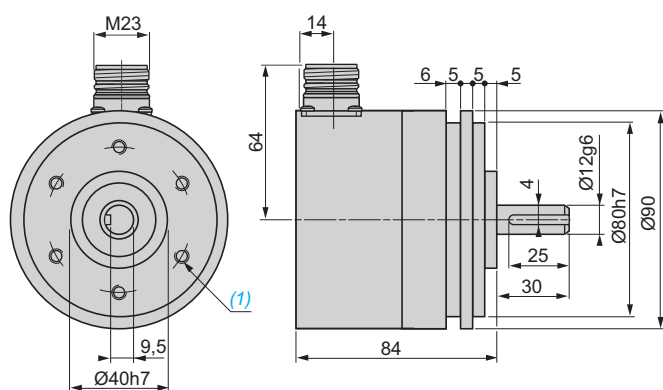


R: minimum bend radius = 65 mm.

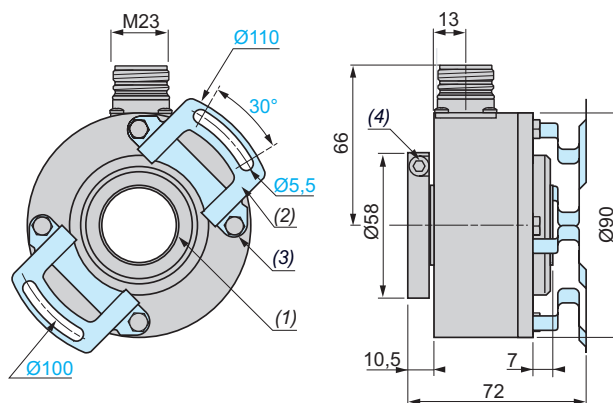
Ø 90 mm encoders

XCC3912PS84S●N

XCC3930TS84S●N



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



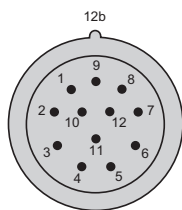
(1) Through shaft, Ø 30 (H7).
(2) Anti-rotation device, 1 x XCCRF9, mounted.
(3) 4 M5 x 6 on 78 PCD.
(4) 3 HC M5 x 6 stainless steel A2 locking screws.

Connector version encoders

Encoder with SSI output (types SBN and SGN)

M23, 12-pin connector, anticlockwise 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	Reset	R	+ V	R	Data -	Clk -	R

R = Reserved (do not connect).

(1) ⤴ : Clockwise direction, ⤵ : Anticlockwise direction.

Selection of code progression direction

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

Clockwise direction: connect pin 5 to 0 V.

Anticlockwise 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 V DC supply to pin 6, whilst 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, it is recommended to earth the encoder base using one of the fixing screws.

Cable version encoder

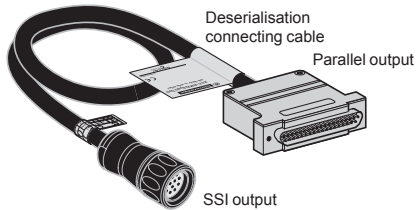
XCC3510SPA48SGN

Wire colour	BK Black	BN Brown	GN Green	VT Violet	BU Blue	RD Red	OG Orange	YE Yellow
Signal/Supply	0 V	Data +	Clock +	Direction	Reset to zero	+ V	Data -	Clock -

(2) ⤴ : Clockwise direction, to 0 V.

⤵ : Anticlockwise direction, to + V.

Connector version multiturn 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 anticlockwise).

Clockwise direction: connect pin 30 to an 11...30 V DC supply.
Anticlockwise 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 V DC 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 V DC to pin 28.

■ Data locking

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

Function not actuated: apply 0 V potential to pin 29.

Function actuated: apply 11...30 V DC to pin 29.

R = Reserved, do not connect

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

Note: In environments subject to electrical interference, it is recommended to earth the encoder base using one of the fixing 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.

Characteristics

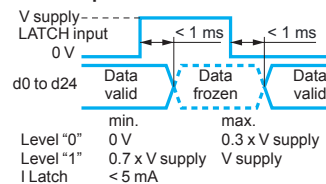
Supply	11 to 30 V
Encoder input/output	Levels RS 422
Parallel outputs	Push-pull protection against short-circuits
Operating temperature	0 to 50 °C

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

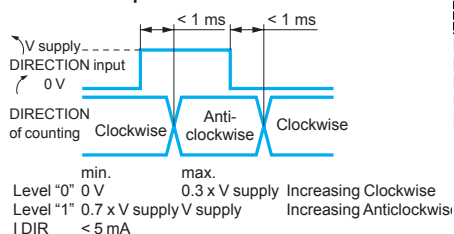
Pin number	Signal	Encoders 4096 points 8192 turns	Encoders 8192 points 4096 turns
1	2 ⁰ (LSB)	Resolution per revolution	Resolution per revolution
2	2 ¹		
3	2 ²		
4	2 ³		
5	2 ⁴		
6	2 ⁵		
7	2 ⁶		
8	2 ⁷		
9	2 ⁸		
10	2 ⁹		
11	2 ¹⁰	Number of revolutions	Number of revolutions
12	2 ¹¹		
13	2 ¹²		
14	2 ¹³		
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		

Schemes

LATCH input

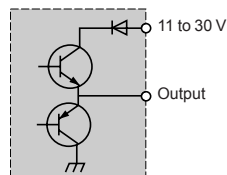


DIRECTION input



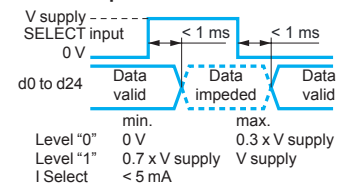
PUSH-PULL

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

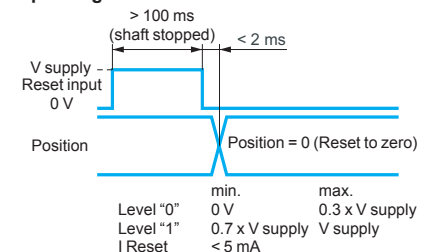


Max. current: 20 mA
Level "0" max.: 1.5 V
Level "1" min.: V supply - 2.5 V
Protection against short-circuits
NPN/PNP compatible

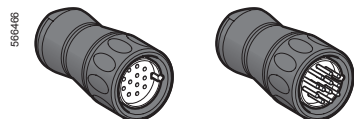
SELECT input



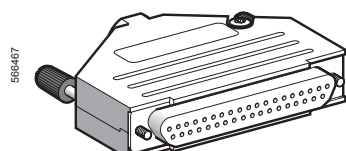
Input stage - Reset to zero



Note: Do not neglect the LATCH and SELECT inputs. Connecting them to 0 V makes the outputs active.



XZCC23FMDP120S



XZCCHFDM370S



XCCRM23SUB37PG



XCCPM23161L2

Cables					
Description	For encoders	Number of wires/c.s.a.	Ø mm	Reference	Weight kg
Shielded cables Length: 100 m UL/CSA	Incremental	10 wires/0.14 mm ²	6	XCCR ¹ X10	5.000
	Absolute, single turn //	16 wires/0.14 mm ²	6.8	XCCR ¹ X16	5.600
	Absolute, single turn and multiturn SSI, and incremental	1 twisted pair of 0.50 mm ² wires and 3 twisted pairs of 0.14 mm ² wires	8.6	XCCR ¹ XS8	11.750

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

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

Pre-wired connectors				
Description	Number of wires	Length	Reference	Weight kg
M23 F straight	8 wires Absolute SSI	2 m	XCCPM23122L2	0.190
		5 m	XCCPM23122L5	0.470
		10 m	XCCPM23122L10	0.900
	10 wires Incremental	2 m	XCCPM23121L2	0.160
		5 m	XCCPM23121L5	0.330
		10 m	XCCPM23121L10	0.620
	16 wires Absolute single turn //	2 m	XCCPM23161L2	0.175
		5 m	XCCPM23161L5	0.415
		10 m	XCCPM23161L10	0.790

(1) See General, page 7.

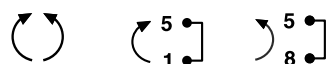
Pre-wired connector connections

XCCPM23122L●		
Pin	Function	Colour
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	Colour
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	Colour
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		
Maximum angular misalignment			5°		
Maximum radial misalignment		mm	± 1.5		
Materials	Collars		Zamak		
	Spring		Nickel plated steel		
Compression/Expansion		mm	± 1 maximum		
Homokinetic (flexible) shaft couplings with bellows					
Maximum torque		N.cm	80		
Maximum angular misalignment			4°		
Maximum lateral misalignment		mm	± 0.3		
Maximum axial misalignment		mm	± 0.5		
Materials	Bellows		Stainless steel		
	Fixing collar		Aluminium		
	Screws		Stainless steel		
Elastic monobloc shaft couplings					
Maximum torque		N.cm	20		
Maximum angular misalignment			± 2.5°		
Maximum radial misalignment		mm	± 0.3		
Compression/Expansion		mm	± 2 maximum		
Materials			Glass fibre reinforced polyamide		
References					
Shaft couplings (for encoders with solid shaft)					
	Type	Bore diameter (encoder side)	Bore diameter (machine side)	Reference	Weight kg
 XCCRAR●●●	With spring ⁽¹⁾	6 mm	6 mm	XCCRAR0606	0.125
			8 mm	XCCRAR0608	0.125
			10 mm	XCCRAR0610	0.125
			12 mm	XCCRAR0612	0.120
			14 mm	XCCRAR0614	0.120
			16 mm	XCCRAR0616	0.120
		10 mm	8 mm	XCCRAR1008	0.120
			10 mm	XCCRAR1010	0.120
			12 mm	XCCRAR1012	0.110
			14 mm	XCCRAR1014	0.110
			16 mm	XCCRAR1016	0.105
		12 mm	8 mm	XCCRAR1208	0.110
			12 mm	XCCRAR1212	0.110
			14 mm	XCCRAR1214	0.105
			16 mm	XCCRAR1216	0.100
 XCCRAS●●●●	Homokinetic (flexible) with bellows	6 mm	6 mm	XCCRAS0606	0.020
			8 mm	XCCRAS0608	0.020
			10 mm	XCCRAS0610	0.020
			12 mm	XCCRAS0612	0.015
			0.25"	XCCRAS06U25	0.018
			0.375"	XCCRAS06U37	0.016
		10 mm	8 mm	XCCRAS1008	0.015
			10 mm	XCCRAS1010	0.015
				XCCRAS1010S ⁽²⁾	0.015
			12 mm	XCCRAS1012	0.015
				XCCRAS1012S ⁽²⁾	0.015
			0.25"	XCCRAS10U25	0.016
			0.375"	XCCRAS10U37	0.014
				XCCRAS10U37S ⁽²⁾	0.014
		12 mm	8 mm	XCCRAS1208	0.010
			12 mm	XCCRAS1212	0.010
			0.25"	XCCRAS12U25	0.015
			0.375"	XCCRAS12U37	0.013
			0.5"	XCCRAS12U50	0.012
 XCCRAE0606	Elastic, monobloc	6 mm	6 mm	XCCRAE0606	0.010

(1) Not recommended for resolutions higher than 500 points.
(2) Stainless steel 316L version.

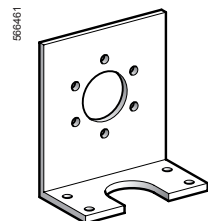
Rotary encoders

OsiSense XCC

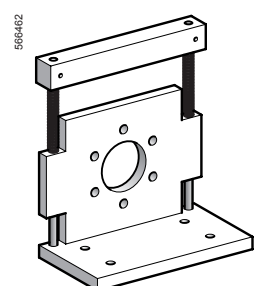
Mounting and fixing accessories



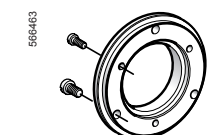
XCCRF4



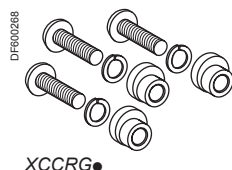
XCCRE9SN



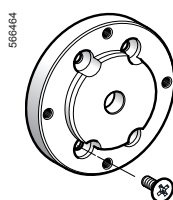
XCCRE9R



XCCRB1



XCCRG5



XCCRB2



XCCR158RDA08



XCCR290RDP20

Anti-rotation devices (for encoders with through shaft)

Description	Features	For encoders	Reference	Weight kg
Flexible mounting kit	Set of 2 flexible fixings + screws	Ø 40 XCC1406T	XCCRF4	0.010
	1 flexible fixing + screws	Ø 58 XCC15●●T, XCC25●●T, XCC3514T	XCCRF5N	0.020
	Set of 2 flexible fixings + screws	Ø 90 XCC19●●T, XCC29●●T, XCC39●●T	XCCRF9	0.030

Mounting and fixing accessories (for encoders with solid shaft)

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

Reduction collars for encoders with through shaft

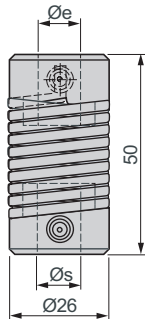
Description	For use with	Reduction	Reference	Weight kg
Reduction collars	Incremental encoders Ø 58 Absolute single turn encoders Ø 58 Absolute multiturn encoders Ø 58	14 mm to 6 mm	XCCR158RDA06	0.015
		14 mm to 8 mm	XCCR158RDA08	0.010
		14 mm to 10 mm	XCCR158RDA10	0.010
		14 mm to 12 mm	XCCR158RDA12	0.010
		14 mm to 0.375"	XCCR158RDAU37	0.011
		14 mm to 0.5"	XCCR158RDAU50	0.007
	Incremental encoders Ø 90 Absolute single turn and multiturn encoders Ø 90	30 mm to 12 mm	XCCR290RDP12	0.060
		30 mm to 16 mm	XCCR290RDP16	0.060
		30 mm to 20 mm	XCCR290RDP20	0.030
		30 mm to 25 mm	XCCR290RDP25	0.020
		30 mm to 0.375"	XCCR290RDPU37	0.080
		30 mm to 0.5"	XCCR290RDPU50	0.060
		30 mm to 0.75"	XCCR290RDPU75	0.030
		30 mm to 1"	XCCR290RDPU1	0.018

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

(2) Screws included with brackets and collars.

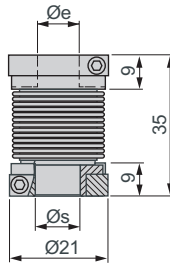
Shaft couplings

XCCRAR●●●●



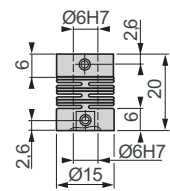
Reference	Ø e	Ø s
XCCRAR0606	6 mm	6 mm
XCCRAR0608	6 mm	8 mm
XCCRAR0610	6 mm	10 mm
XCCRAR0612	6 mm	12 mm
XCCRAR0614	6 mm	14 mm
XCCRAR0616	6 mm	16 mm
XCCRAR1008	10 mm	8 mm
XCCRAR1010	10 mm	10 mm
XCCRAR1012	10 mm	12 mm
XCCRAR1014	10 mm	14 mm
XCCRAR1016	10 mm	16 mm
XCCRAR1208	12 mm	8 mm
XCCRAR1212	12 mm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

XCCRAS●●●●



Reference	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"	
XCCRAS06U37	6 mm to 0.375"	
XCCRAS10U25	10 mm to 0.25"	
XCCRAS10U37	10 mm to 0.375"	
XCCRAS10U37S	10 mm to 0.375"	
XCCRAS12U25	12 mm to 0.25"	
XCCRAS12U37	12 mm to 0.375"	
XCCRAS12U50	12 mm to 0.5"	

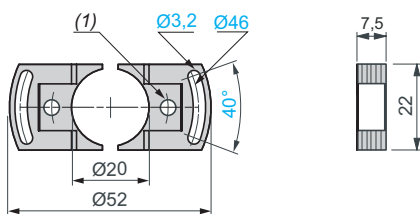
XCCRAE0606



Anti-rotation devices (flexible mounting kit)

XCCRF4

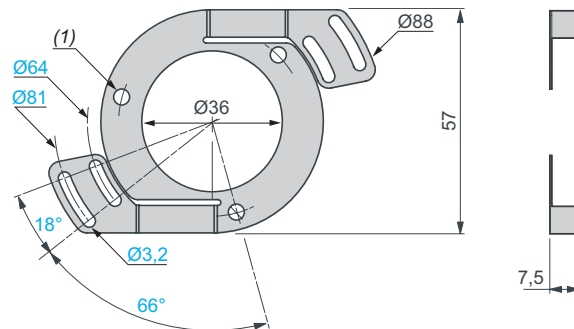
Mounting on Ø 40 mm encoder XCC1406T



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

XCCRF5N

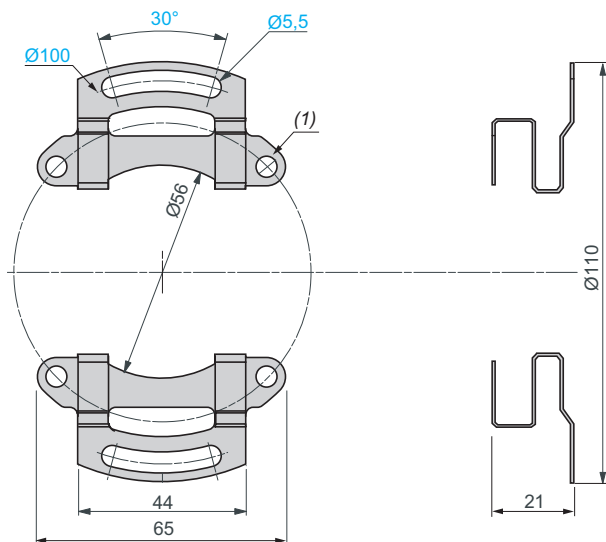
Mounting on Ø 58 mm encoders XCC1514T, XCC2514T and XCC3514T



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

XCCRF9

Mounting on Ø 90 mm encoders XCC1930T, XCC2930T and XCC3930T

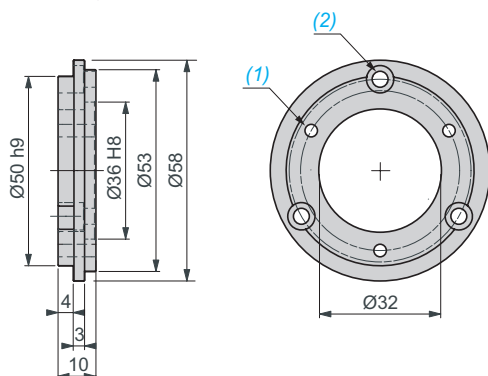


(1) 4 holes Ø 5.2 at 90° on 78 PCD. TH M5 x 6 screw fixings.

Collar kits

XCCRB1

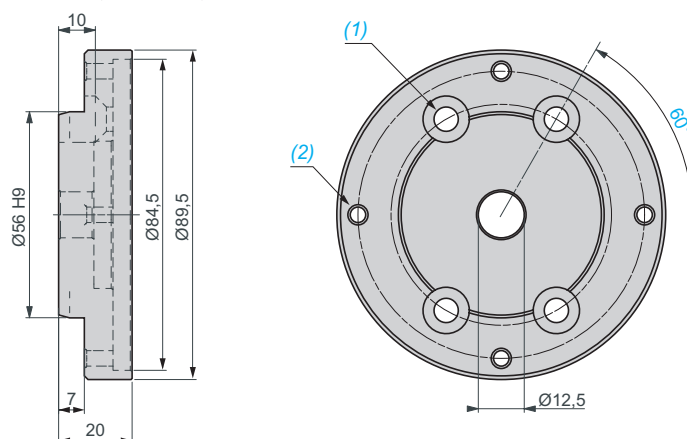
Collar for synchro mounting, for Ø 58 encoders:
XCC15●●P, XCC25●●P and XCC35●●P



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

XCCRB2

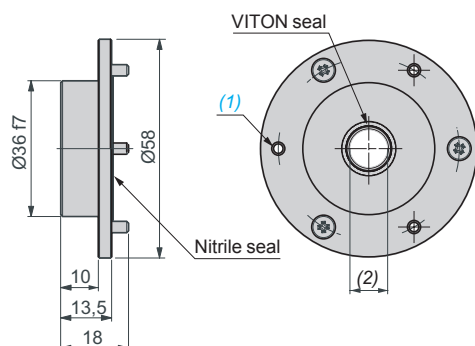
Interface collar for Ø 90 encoders:
XCC1912P, XCC2912P, XCC3912P



- (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.

XCCRB3

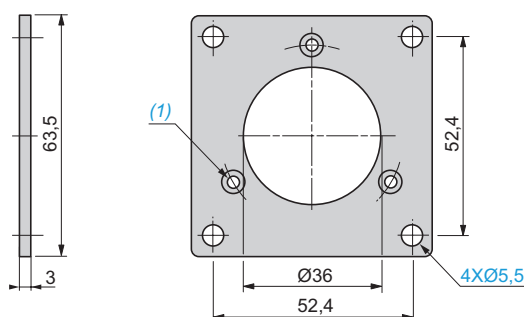
IP 67 sealed collar for Ø 58 encoders:
XCC1510P, XCC2510P and XCC3510PS●●S●N



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

Fixing collar XCCRB6

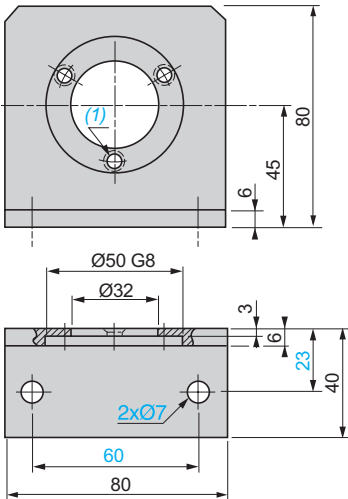
Fixing collar fixation 2" for Ø 58 encoders:
XCC1510, XCC2510 and XCC3510



- (1) 3 holes M3.2 at 120° on Ø 48 mm.

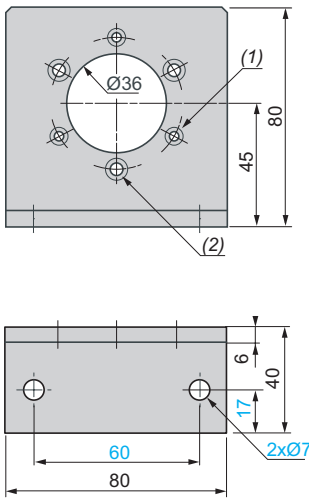
Plain brackets

XCCRE5S



(1) 3 holes Ø 4.5 at 120° on 42 PCD.

XCCRE5SN

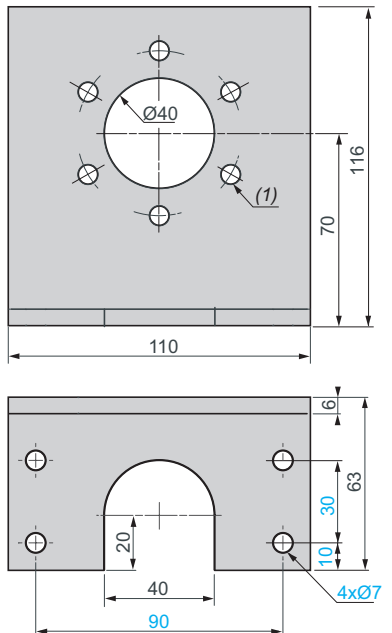


3 CHC M3 x 8 screws included.

(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.

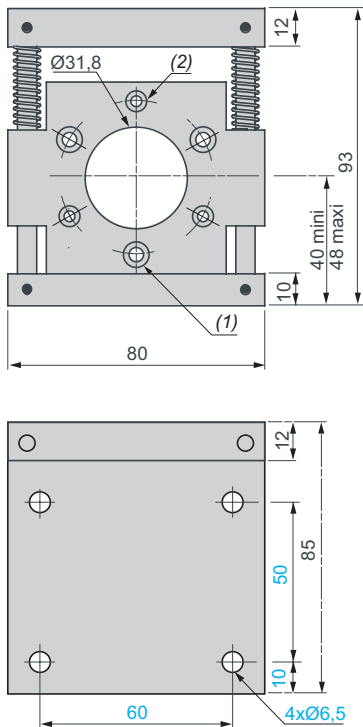
XCCRE9SN



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

Brackets with play compensator

XCCRE5RN

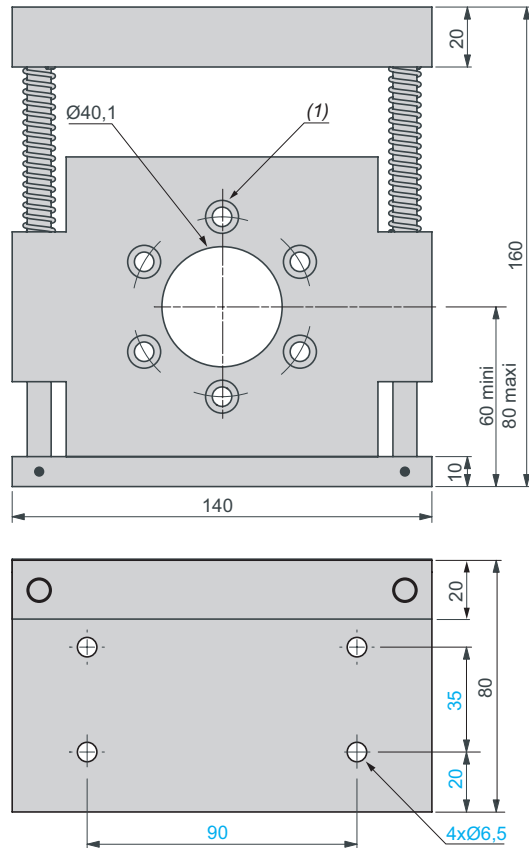


CHC M3 x 12 screws included

(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

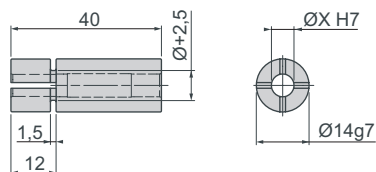


(1) 6 counterbored holes for CHC M6 screws at 120° on 60 PCD.

Reduction collars for through shaft

XCCR158RDA●●

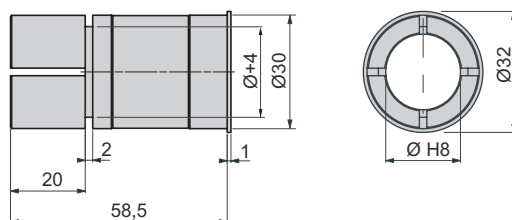
For Ø 58 incremental and absolute single turn and multiturn encoders



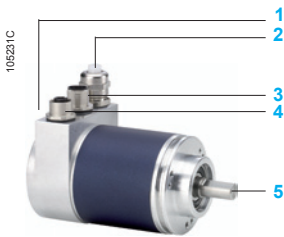
Reference	Ø
XCCR158RDA06	6 mm
XCCR158RDA08	8 mm
XCCR158RDA10	10 mm
XCCR158RDA12	12 mm
XCCR158RDAU37	0.375"
XCCR158RDAU50	0.5"

XCCR290RDP●●

For Ø 90 incremental and absolute single turn and multiturn encoders



Reference	Ø
XCCR290RDP12	12 mm
XCCR290RDP16	16 mm
XCCR290RDP20	20 mm
XCCR290RDP25	25 mm
XCCR290RDPU37	0.375"
XCCR290RDPU50	0.5"
XCCR290RDPU75	0.75"
XCCR290RDPU1	1"



- 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

Presentation

The OsiSense XCC CANopen multiturn absolute Ø 58 mm encoder is designed to meet the requirements for configurations encountered in communicating industrial 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,
- 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 bus incoming and outgoing 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 operative mode, bus errors, 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 setting-up/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.tesensors.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 points 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 anticlockwise) 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 to the encoder parameters whilst 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.

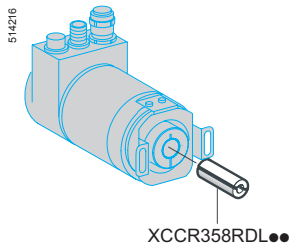
Characteristics				
Encoder type			XCC3510PS84CBN	
Conformity			XCC3515CS84CBN	
Temperature	Operation (housing)	°C	- 40...+ 85	
	Storage	°C	- 40...+ 85	
Degree of protection	Conforming to IEC 60529		IP 64	
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (f = 10...2 kHz)	
Shock resistance	Conforming 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		Aluminium	
	Housing		Aluminium	
	Shaft		Stainless steel	
	Ball bearings		6000ZZ1	6803ZZ
Mechanical characteristics				
Shaft type		mm	Ø 10, solid shaft (h8)	Ø 15, hollow shaft (F7)
Maximum rotational speed	Continuous		6000 rpm	
Shaft moment of inertia		g.cm²	30	
Torque		N.cm	3	
Maximum load	Radial	daN	11	
Electrical characteristics				
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 maximum	
Protection			Against reverse polarity and voltage surges	
Signalling			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	



XCC3510PS84CBN



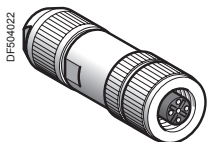
XCC3515CS84CBN



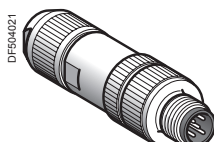
XCCR358RDL●●



TSXCANCA●●



XZCC12FDB50R



XZCC12MDB50R

CANopen Ø 58 mm encoders

Description	Connection method	Output stage type	Supply voltage	Reference	Weight kg
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Solid shaft, Ø 10 mm

Ø 58 mm multiturn 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
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Hollow shaft, Ø 15 mm (1)

Ø 58 mm multiturn 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
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Reduction collars for encoders with hollow shaft, Ø 15 mm

For use with	Diameter	Reference	Weight kg
Encoder with hollow shaft XCC3515CS84CBN	Ø 6 mm	XCCR358RDL06	0.040
	Ø 8 mm	XCCR358RDL08	0.030
	Ø 10 mm	XCCR358RDL10	0.025
	Ø 12 mm	XCCR358RDL12	0.020
	Ø 14 mm	XCCR358RDL14	0.010
	0.375"	XCCR358RDLU37	0.011
	0.5"	XCCR358RDLU50	0.007

Connection accessories for CANopen bus

Connecting cables for CANopen bus

Description	Length m	Reference	Weight kg
Connecting cables fitted with 2 straight type M12 connectors, A coding	1	TCSMCN1M1F1	0.080
	2	TCSMCN1M1F2	0.115
	5	TCSMCN1M1F5	0.520
	10	TCSMCN1M1F10	0.520

CANopen cables

Description	Length	Unit reference	Weight kg
Standard CANopen cables conforming to IEC 60332-1	50 m	TSXCANCA50	4.930
	100 m	TSXCANCA100	8.800
	300 m	TSXCANCA300	24.560
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
	100 m	TSXCANCD100	7.770
	300 m	TSXCANCD300	21.760

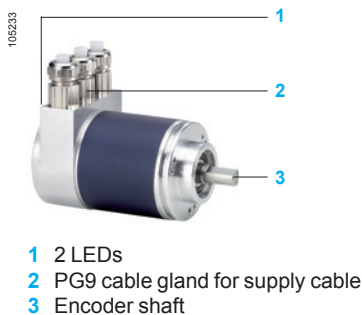
Shielded connectors, cabled by user

Description	Type	Unit reference	Weight kg
M12 female connector 5 spring terminals	Straight	XZCC12FDB50R	0.020
M12 male connector 5 spring terminals	Straight	XZCC12MDB50R	0.025

(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,
- moving installation.



Presentation

The OsiSense XCC PROFIBUS-DP multiturn absolute Ø 58 mm encoder is designed to meet the requirements for configurations encountered in communicating industrial 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 bus incoming and outgoing 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 organisation and meet the requirements of the Schneider Electric interoperability standards.

Encoder setting-up/configuration software

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

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

Configurable parameters

■ Speed

defines the instantaneous speed in 16-bit binary. It can be data 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 points 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 anticlockwise) 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.

Characteristics				
Encoder type			XCC3510PV84FBN	
Conformity			DIN VDE 0160	
Temperature	Operation (housing)	°C	- 40...+ 85	
	Storage	°C	- 40...+ 85	
Degree of protection	Conforming to IEC 60529		IP 64	
Vibration resistance	Conforming to IEC 60068-2-6		10 gn (f = 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		Aluminium	
	Housing		Aluminium	
	Shaft		Stainless steel	
	Ball bearings		6000ZZ1	6803ZZ
Mechanical characteristics				
Shaft type		mm	Ø 10, solid shaft (h8)	Ø 15, hollow shaft (F7)
Maximum rotational speed			6000 rpm	
Shaft moment of inertia		g.cm²	30	
Torque		N.cm	3	
Maximum load	Radial	daN	11	
Electrical characteristics				
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	
Signalling			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...12 Mbps maximum	
Product certification			PNO Schneider Electric interoperability standards	

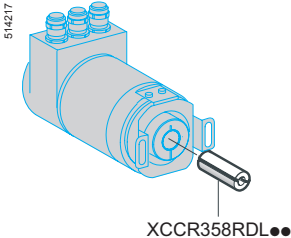
Multiturn absolute encoders on bus
OsiSense XCC
PROFIBUS-DP Ø 58 mm encoders



XCC3510PV84FBN



XCC3515CV84FBN



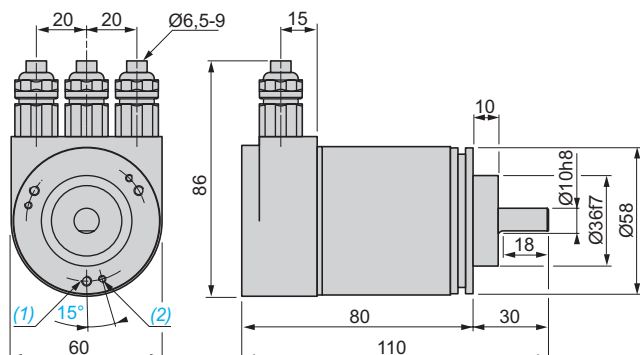
XCCR358RDL●●

References					
Description	Connection method	Output stage type	Supply voltage	Reference	Weight kg
Solid shaft, Ø 10 mm					
Ø 58 mm multiturn absolute PROFIBUS-DP encoder Resolution 8192 pts/4096 turns	3 x PG9 radial	PROFIBUS-DP, 25-bit, binary	11...30 V	XCC3510PV84FBN	0.560
Hollow shaft, Ø 15 mm (1)					
Ø 58 mm multiturn absolute PROFIBUS-DP encoder Resolution 8192 pts/4096 turns	3 x PG9 radial	PROFIBUS-DP, 25-bit, binary	11...30 V	XCC3515CV84FBN	0.570
Reduction collars for encoders with hollow shaft, Ø 15 mm					
For use with	Diameter		Reference		Weight kg
Encoder with hollow shaft XCC3515CV84FBN	Ø 6 mm		XCCR358RDL06		0.040
	Ø 8 mm		XCCR358RDL08		0.030
	Ø 10 mm		XCCR358RDL10		0.025
	Ø 12 mm		XCCR358RDL12		0.020
	Ø 14 mm		XCCR358RDL14		0.010
	Ø 0.375"		XCCR358RDLU37		0.011
	Ø 0.5"		XCCR358RDLU50		0.007

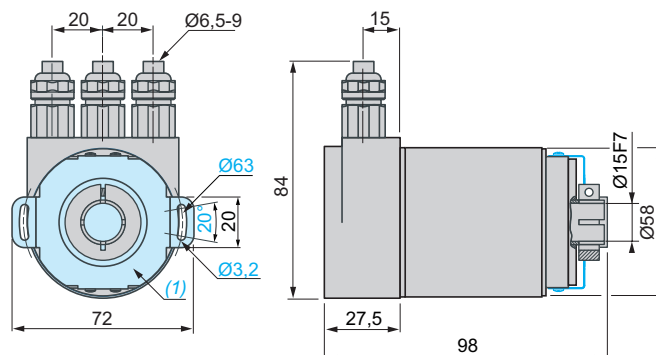
(1) Anti-rotation device included with encoder.

PROFIBUS-DP Ø 58 mm encoders

XCC3510PV84FBN



XCC3515CV84FBN

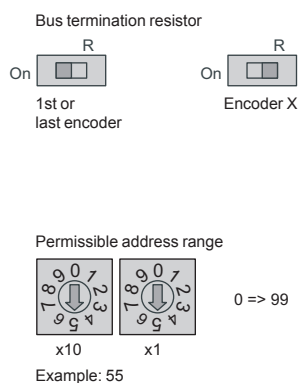
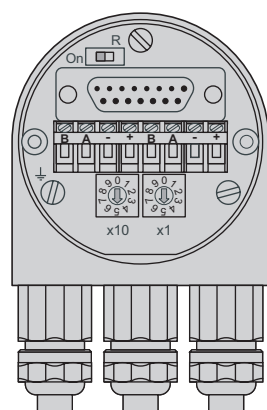


(1) 3 M4 holes at 120° on 48 PCD, depth: 6 mm.
(2) 3 M3 holes at 120° on 48 PCD, depth: 6 mm.

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

Connections

PROFIBUS-DP



Terminal	⏏	B (left)	A (left)	-	+
Function	Earth	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

Homokinetic (flexible) shaft couplings with bellows

Maximum torque	N.cm	80
Maximum angular misalignment		4°
Maximum lateral misalignment	mm	± 0.3
Maximum axial misalignment	mm	± 0.5
Materials	Bellows	Stainless steel
	Fixing collar	Aluminium
	Screws	Stainless steel

References

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XCCRAS●●●●●

Shaft couplings (for encoders with solid shaft)

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

Anti-rotation devices (for encoders with hollow shaft)

Description	Features	For encoders	Reference	Weight kg
Flexible mounting kit	1 flexible fixing + screws	CANopen and PROFIBUS-DP	XCCRF5B	0.010

Reduction collars for encoders with hollow shaft

Description	For use with	Reduction	Reference	Weight kg
Reduction collars	CANopen and PROFIBUS-DP encoders	15 mm to 6 mm	XCCR358RDL06	0.040
		15 mm to 8 mm	XCCR358RDL08	0.030
		15 mm to 10 mm	XCCR358RDL10	0.025
		15 mm to 12 mm	XCCR358RDL12	0.020
		15 mm to 14 mm	XCCR358RDL14	0.010
		15 mm to 0.375"	XCCR358RDLU37	0.011
		15 mm to 0.5"	XCCR358RDLU50	0.007

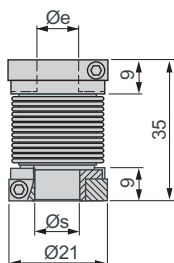
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XCCR358RDL06

Shaft couplings

XCCRAS●●●●

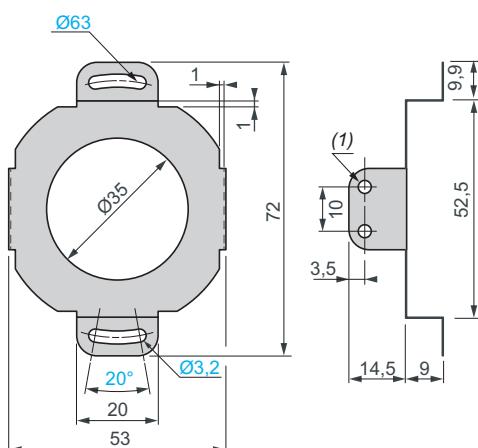


Reference	Ø e	Ø s
XCCRAS1008	10	8
XCCRAS1010	10	10
XCCRAS1012	10	12

Anti-rotation device

XCCRF5B

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

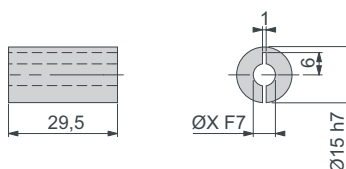


(1) 4 holes Ø 3.2. M3 x 6 screw fixings.

Reduction collars

XCCR358RDL●●

For CANopen and PROFIBUS-DP encoders



Reference	Ø
XCCR358RDL06	6 mm
XCCR358RDL08	8 mm
XCCR358RDL10	10 mm
XCCR358RDL12	12 mm
XCCR358RDL14	14 mm
XCCR358RDLU37	0.375"
XCCR358RDLU50	0.5"

T		XCC1510PSM03X	15	XCC2514TS81SG	23	XCCR290RDP25	17	XCCRB2	37
TCSMCN1M1F1	44	XCC1510PSM03Y	15	XCC2912PS81KBN	25		25	XCCRB3	37
TCSMCN1M1F2	44	XCC1510PSM05X	15	XCC2912PS81KGN	25		31	XCCRB6	37
TCSMCN1M1F5	44	XCC1510PSM05Y	15	XCC2912PS81SGN	25	XCCR290RDPU1	37	XCCRE5RN	37
TCSMCN1M1F10	44	XCC1510PSM11X	15	XCC2930TS81KBN	25	XCCR290RDPU37	37	XCCRE5S	37
TSXCANCA50	44	XCC1510PSM11Y	15	XCC2930TS81KGN	25	XCCR290RDPU50	37	XCCRE5SN	37
TSXCANCA100	44	XCC1510PSM50X	15	XCC2930TS81SBN	25	XCCR290RDPU75	37	XCCRE9RN	37
TSXCANCA300	44	XCC1510PSM50Y	15	XCC2930TS81SGN	25	XCCR358RDL06	44	XCCRE9SN	37
TSXCANCD50	44	XCC1510SPA03Y	13	XCC3506PS48SBN	29		48	XCCRF4	37
TSXCANCD100	44	XCC1510SPA11Y	13	XCC3506PS84SBN	29		50	XCCRF5B	50
TSXCANCD300	44	XCC1510SPA50Y	13	XCC3506PS84SGN	29	XCCR358RDL08	44	XCCRF5N	37
		XCC1514TS01X	14	XCC3510PS48SBN	29		48	XCCRF9	37
X		XCC1514TS01Y	14	XCC3510PS84CBN	44	XCCR358RDL10	44	XCCRG5	37
XCC1406PR01K	11	XCC1514TS03X	14	XCC3510PS84SBN	29		48	XCCRG9	37
XCC1406PR01R	11	XCC1514TS03Y	14	XCC3510PS84SGN	29		50	XCCRM23SUB37NB	35
XCC1406PR03K	11	XCC1514TS05X	14	XCC3510PV84FBN	48	XCCR358RDL12	44	XCCRM23SUB37NG	35
XCC1406PR03R	11	XCC1514TS05Y	14	XCC3510SPA48SGN	29		48	XCCRM23SUB37PB	35
XCC1406PR05K	11	XCC1514TS10X	14	XCC3514TS84SB	29	XCCR358RDL14	44	XCCRM23SUB37PG	35
XCC1406PR05R	11	XCC1514TS10Y	14	XCC3515CS84CBN	44		48	XCCRX10	35
XCC1406PR10K	11	XCC1514TS11X	14	XCC3515CV84FBN	48		50	XCCRX16	35
XCC1406PR10R	11	XCC1514TS11Y	14	XCC3912PS84SBN	31	XCCR358RDLU37	44	XCCRXS8	35
XCC1406PR11K	11	XCC1514TS25X	14	XCC3912PS84SGN	31		48	XZCC12FDB50R	44
XCC1406PR11R	11	XCC1514TS25Y	14	XCC3930TS84SBN	31		50	XZCC12MDB50R	44
XCC1406TR01K	11	XCC1514TS50X	14	XCC3930TS84SGN	31	XCCR358RDLU50	44	XZCC23FDP120S	35
XCC1406TR01R	11	XCC1514TS50Y	14	XCCCPM23121L2	35		48	XZCC23FDP160S	35
XCC1406TR03K	11	XCC1514TSM02X	15	XCCCPM23121L5	35	XCCRAE0606	36	XZCC23FMDP120S	35
XCC1406TR03R	11	XCC1514TSM02Y	15	XCCCPM23121L10	35	XCCRAR0606	36	XZCCHFDM370S	35
XCC1406TR05K	11	XCC1514TSM03X	15	XCCCPM23122L2	35	XCCRAR0608	36		
XCC1406TR05R	11	XCC1514TSM03Y	15	XCCCPM23122L5	35	XCCRAR0610	36		
XCC1406TR10K	11	XCC1514TSM05X	15	XCCCPM23122L10	35	XCCRAR0612	36		
XCC1406TR10R	11	XCC1514TSM05Y	15	XCCCPM23161L2	35	XCCRAR0614	36		
XCC1406TR11K	11	XCC1514TSM11X	15	XCCCPM23161L5	35	XCCRAR0616	36		
XCC1406TR11R	11	XCC1514TSM11Y	15	XCCCPM23161L10	35	XCCRAR1008	36		
XCC1506PS01X	13	XCC1514TSM50X	15	XCCCPM23161L10	35	XCCRAR1010	36		
XCC1506PS01Y	13	XCC1514TSM50Y	15	XCCR158RDA06	14	XCCRAR1012	36		
XCC1506PS03X	13	XCC1912PS00KN	17		15	XCCRAR1014	36		
XCC1506PS03Y	13	XCC1912PS03KN	17		23	XCCRAR1016	36		
XCC1506PS05X	13	XCC1912PS05KN	17		29	XCCRAR1208	36		
XCC1506PS05Y	13	XCC1912PS10KN	17	XCCR158RDA08	14	XCCRAR1212	36		
XCC1506PS10X	13	XCC1912PS11KN	17		15	XCCRAR1214	36		
XCC1506PS10Y	13	XCC1912PS25KN	17		23	XCCRAR1216	36		
XCC1506PS11X	13	XCC1912PS36KN	17		29	XCCRAS06U25	36		
XCC1506PS11Y	13	XCC1912PS50KN	17		37	XCCRAS06U37	36		
XCC1506PS25X	13	XCC1930TS03KN	17	XCCR158RDA10	14	XCCRAS10U25	36		
XCC1506PS25Y	13	XCC1930TS05KN	17		15	XCCRAS10U37	36		
XCC1506PS50X	13	XCC1930TS10KN	17		23	XCCRAS10U37S	36		
XCC1506PS50Y	13	XCC1930TS11KN	17		29	XCCRAS12U25	36		
XCC1510PS01X	13	XCC1930TS25KN	17	XCCR158RDA12	14	XCCRAS12U37	36		
XCC1510PS01Y	13	XCC1930TS36KN	17		15	XCCRAS12U50	36		
XCC1510PS03X	13	XCC1930TS50KN	17		23	XCCRAS0606	36		
XCC1510PS03Y	13	XCC2506PS81KB	23		29	XCCRAS0608	36		
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XCC1510PS05Y	13	XCC2506PS81SBN	23		37	XCCRAS0612	36		
XCC1510PS10X	13	XCC2506PS81SGN	23	XCCR158RDAU50	29	XCCRAS1008	36		
XCC1510PS10Y	13	XCC2510PS81KB	23		37		50		
XCC1510PS11X	13	XCC2510PS81KGN	23	XCCR290RDP12	17	XCCRAS1010	36		
XCC1510PS11Y	13	XCC2510PS81SBN	23		25		50		
XCC1510PS25X	13	XCC2510PS81SGN	23		31	XCCRAS1010S	36		
XCC1510PS25Y	13	XCC2510SPA81KGN	23		37	XCCRAS1012	36		
XCC1510PS50X	13	XCC2510SPA81SGN	23	XCCR290RDP16	17		50		
XCC1510PS50Y	13	XCC2514TS81KB	23		25	XCCRAS1012S	36		
XCC1510PSM02X	15	XCC2514TS81KG	23	XCCR290RDP20	17	XCCRAS1208	36		
XCC1510PSM02Y	15	XCC2514TS81SB	23		25	XCCRAS1212	36		
					31	XCCRB1	37		

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