# Osisense™ XCC

## Rotary Encoders

## Catalog



Telemecanique Sensors

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# OsiSense™ XCC
# Opto-electronic rotary encoders


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# OsiSense™ XCC
# Opto-electronic rotary encoders

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

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

*(2) Specifications of the output stage/supply types:*
- *Type R (N): 5 V output driver, RS-422, 4.5–5,5 V.*
- *Type K (N): push-pull output driver, 11–30 V.*
- *Type X: 5 V output driver, RS-422, 4.75–30 V.*
- *Type Y: push-pull output driver, 5–30 V.*
- *Type KB (N) or KG (N) output: push-pull output driver, 11–30 V, binary code KB (N) or Gray code KG (N).*

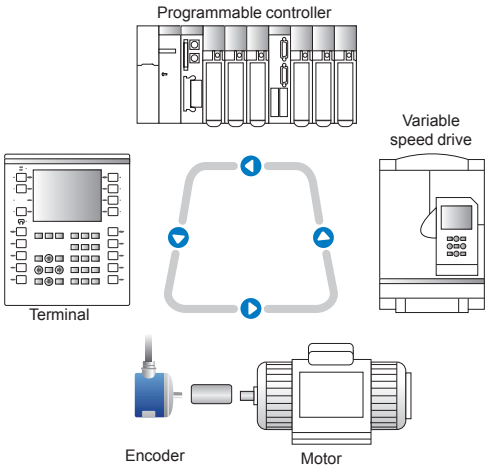
| Single turn absolute encoders | | Multi-turn absolute encoders | | | Accessories for encoders |
|---|---|---|---|---|---|
| Absolute position indication within a revolution | | Absolute position indication within a revolution and indication of the number of revolutions | | Fieldbus: CANopen, Profibus-DP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

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

# OsiSense™ XCC
# Opto-electronic rotary encoders

## Applications

The increase in the power of processing systems, combined with the requirements for high productivity, has created the need for continuous information in all areas of production regarding:
- counting, positioning by counting
- absolute positioning
- speed control




### Example

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

- Processing units

Refer to the catalog, “Premium automation platform.”

- Variable speed drives

Refer to the catalog, “Variable speed drives and starters.”

## Principle of the opto-electronic rotary encoder

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

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

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

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

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

## Types of opto-electronic rotary encoder

- Incremental encoders:

Counting, positioning by counting, speed.
- Parameterable incremental encoders:

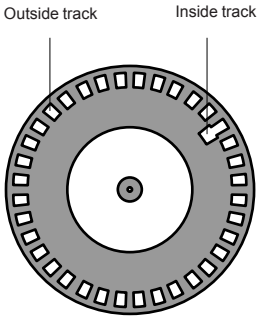
Multiplication of the basic resolution of the disc using DIP switches (the factory setting is the one with the lowest value).
- Single turn and multi-turn absolute encoders:

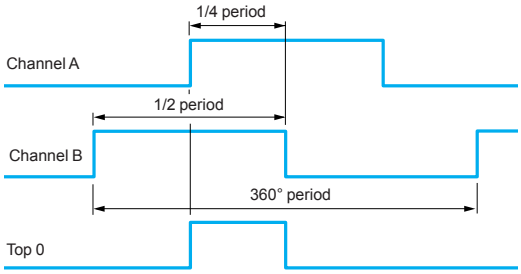
Absolute positioning.
- Fieldbus multi-turn absolute encoders:

CANopen and Profibus-DP.

# OsiSense™ XCC
# Opto-electronic rotary encoders

## Incremental encoder




### Principle

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

### Wiring and settings

The operation of the photosensitive elements (LEDs + photosensitive diodes) is based on the real-time differential optical reading principle:
- the photosensitive elements of tracks A and B are offset so that each will simultaneously read only its respective slot (channels A and B are 90° electrically offset),
- the electronics operate following the principle of real-time differential measurement.

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

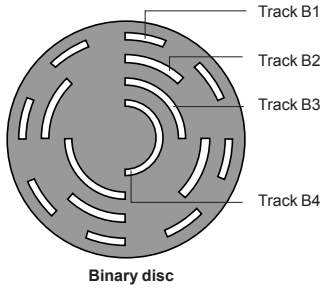
Period: 360° electrical.
Cyclic ratio: 180° electrical ±10%.
Phase displacement: 90° electrical ±25%.

### Advantages of real-time differential optical reading

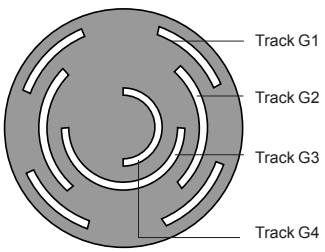
**Reading by offset photosensitive elements**
- Radial play of encoder shaft greater than 30%, which is higher than traditional optical reading encoders.
- Maintains a phase displacement of channels A and B within the tolerance limits of the unit.

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

## Absolute encoder




**Binary disc**




**Gray disc**

### Principle

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

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

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

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

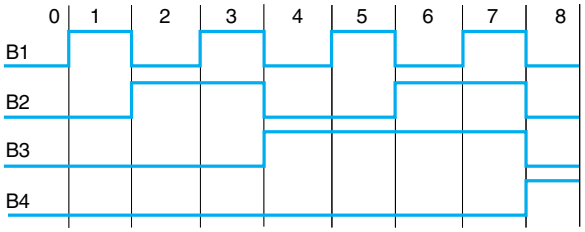
The outside track corresponds to the LSB (least significant bit) and provides the final accuracy. It has $2^n$ pulses per revolution corresponding to the resolution of the encoder. Therefore, for each angular position of the shaft, the disc provides a code. This code can be either binary or Gray.
Following one complete revolution of the encoder, the same coded values are repeated.
The multi-turn absolute encoder, in addition to providing the digital position within the revolution, also provides the total number of revolutions.

# OsiSense™ XCC
# Opto-electronic rotary encoders

## Absolute encoder (continued)

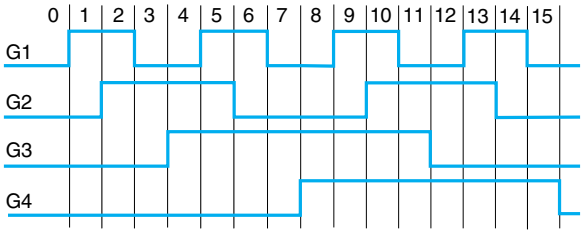
### Binary coding

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




### Gray coding

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




**Example of Gray code disc**

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

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

### Advantages of position detection by an absolute encoder

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

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

# OsiSense™ XCC
# Opto-electronic rotary encoders
## Specifications required to define an encoder

**7 specifications to be established**

### 1 Function

■ Incremental encoder
Provides counting indication.

■ Single turn absolute encoder
Provides absolute position within each revolution.

■ Multi-turn absolute encoder
Provides absolute position within each revolution and indicates total number of revolutions.

### 2 Diameter of housing

■ Incremental encoders
Ø 40, 58 and 90

■ Single turn and multi-turn absolute encoders
Ø 58 and 90

### 3 Diameter of shaft

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

### 4 Type of shaft

■ Solid shaft
The shaft of the encoder is mechanically linked to a drive shaft using a flexible coupling, which eliminates alignment inaccuracies.

■ Through-shaft/Hollow shaft
The encoder is mounted directly on the drive shaft. A flexible mounting kit prevents encoder rotation and compensates for alignment inaccuracies.

### 5 Connection method

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

### 6 Resolution

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

### 7 Type of output

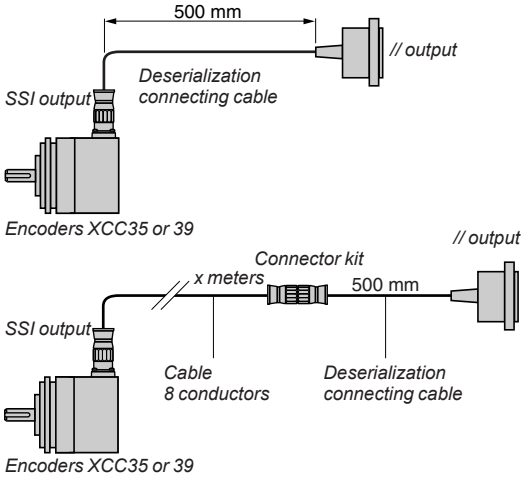
■ Incremental encoders
5 V output driver, RS-422, 4.75–30 V.
Push-pull output driver, 5–30 V, 11–30 V.

■ Single-turn absolute encoders (depending on model)
Push-pull output driver, 11–30 V, binary code or Gray code.
SSI output without parity, 13-bit clock, 11–30 V, binary code or Gray code.

■ Multi-turn absolute encoders (depending on model)
SSI output without parity, 25-bit clock, 11–30 V, binary code or Gray code.

■ Parallel outputs obtainable using converter connecting cables
The SSI versions can be converted to a parallel version by using the deserialization connecting cable (see page 34).

■ Multi-turn absolute encoders, communicating version, fieldbus:
□ CANopen: 11–30 V (see page 42).
□ Profibus-DP: 11–30 V (see page 46).



# OsiSense™ XCC
# Opto-electronic rotary encoders
## Specifications required to define an encoder

## Installation considerations

### Type of cables

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

For the signals, we recommend using standard 0.14 $mm^2$/0.22 $mm^2$ conductors.

For 5 V supply encoders.
Due to line voltage drops, we recommend that the 0 V and + V supply cables have the following minimum cross-sectional areas:
- 0.14 $mm^2$ (26 AWG) if the encoder-supply distance is less than 30 m,
- 0.22 $mm^2$ (24 AWG) if the encoder-supply distance is greater than 30 m.

### Cabling

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

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

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

Connect the control inputs to a potential (absolute encoder).
Connect all 0 V connections back to a star point, i.e. only one and same referential.
Ground the shielding throughout 360° using tap-off braids at both ends of each cable. To ground the shielding use cable of at least 4 $mm^2$.
As much as possible, ground the 0 V of the supply to the encoders on the supply side.
Maximum frequency of signals for SSI depending on distance:
Indicative values that can vary depending on the cable specifications.

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

### Supply

It is imperative to use only regulated and smoothed power supplies (with a ripple factor of 500 mV @ 24 V, and 200 mV @ 5 V) that are specifically for the encoder. The Schneider Electric ABL7 range power supplies are available for this purpose. Refer to the catalog, “Power supplies, splitter boxes and interfaces.”
For 5–30 V encoders, the supply via a transformer with a 24 V rms rectified and smoothed secondary is prohibited, since the DC voltage obtained is higher than the supply voltage limits of the encoder.
Prior to power-up for the first time, ensure that the rated supply voltage of the encoder is suitable for the supply.

# OsiSense™ XCC
# Opto-electronic rotary encoders
## Specifications required to define an encoder, installation, power-up

## Connection and power-up considerations

### Connection

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

Encoder supplied by central unit:
- disconnect supply to central unit,
- proceed with connection or disconnection,
- re-establish supply to central unit.

Encoder supplied by source external to central unit:
- disconnect supply to central unit, then disconnect supply to encoder,
- proceed with connection or disconnection,
- re-establish supply to encoder, then re-establish supply to central unit.

### Power-up

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

# OsiSense™ XCC Incremental encoders

Ø 40 mm encoders

## Environment

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

## Mechanical specifications

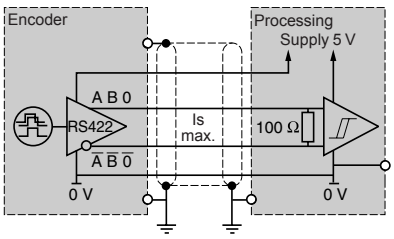
| | | | | |
|---|---|---|---|---|
| **Shaft type** | | **mm** | Ø 6, solid shaft (g7) | Ø 6, through-shaft (H7) |
| **Maximum rotational speed** | Continuous | | 9000 rpm | |
| **Shaft moment of inertia** | | **g•cm²** | 10 (0.14 oz-in) | 5 (0.07 oz-in) |
| **Torque** | | **N•cm** | 0.2 (0.28 oz-in) | 0.25 (0.35 oz-in) |
| **Maximum load** | Radial | **N** | 20 | |
| | Axial | **N** | 10 | |

## Electrical specifications

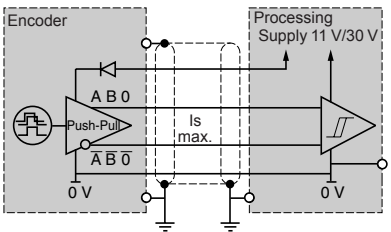
| | | | | |
|---|---|---|---|---|
| **Connection** | | | Radial: pre-cabled, 8 x 0.14 mm² shielded, Ø ext = 6 mm, length = 2 m<br>Crimped metal cable entry | Pre-cabled 8 x 0.14 mm² shielded, Ø ext = 6 mm, length = 2 m<br>Crimped metal cable entry |
| **Frequency** | | **kHz** | 100 | |
| **Number of channels** | | | 3 channels: A, B, top 0 and complements $\overline{A}$, $\overline{B}$, $\overline{0}$ | |
| **Encoders with type R output stage: 5 V output driver, RS-422, 4.5–5.5 V supply** | | | | |
| **Supply voltage** | | | ⎓ 5 V ±10%<br>Max. ripple: 200 mV | |
| **Current consumption, no-load** | | **mA** | 100 max. | |
| **Output current** | | **mA** | 40 max. | |
| **Output levels** | Low level | | (Is = 20 mA) 0.5 V max. | |
| | High level | | (Is = 20 mA) 2.5 V min. | |
| **Encoders with type K output stage: push-pull output driver, 11–30 V supply** | | | | |
| **Supply voltage** | | | ⎓ 11–30 V<br>Max. ripple: 500 mV | |
| **Current consumption, no-load** | | **mA** | 75 max. | |
| **Protection** | | | Against short-circuits and reverse polarity | |
| **Output current** | | **mA** | 40 max. | |
| **Output levels** | Low level | | (Is = 20 mA) 1.5 V max. | |
| | High level | | (Is = 20 mA) V supply — 3 V min. | |

**Wiring diagrams**

**Type R output stage**




**Type K output stage**



# OsiSense™ XCC Incremental encoders

Ø 40 mm encoders

105160



*XCC1406PR●●●*

## Solid shaft, Ø 6 mm

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

105161



*XCC1406TR●●●*

## Through-shaft, Ø 6 mm *(2)*

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

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

# OsiSense™ XCC
# Incremental encoders
Ø 58 mm encoders

## Environment

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

## Mechanical specifications

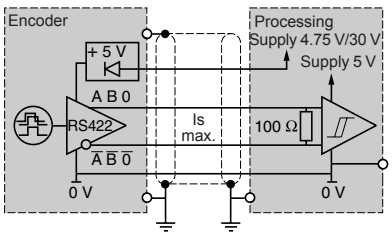
| | | | | | | |
|---|---|---|---|---|---|---|
| **Shaft type** | | | Ø 6, solid shaft (g7) | Ø 10 mm, solid shaft | Ø 10 mm, solid shaft | Ø 14, through-shaft (H7) |
| **Maximum rotational speed** | Continuous | | 9000 rpm | 9000 rpm | 3000 rpm | 6000 rpm |
| **Shaft moment of inertia** | | **g•cm²**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

## Electrical specifications

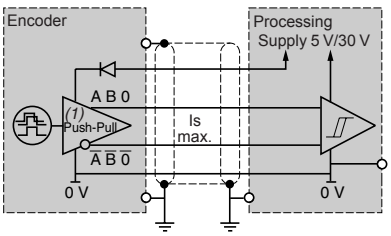
| | | | |
|---|---|---|---|
| **Connection** | Connector | | M23, 12-pin male connector (2 m PUR cable for XCC1510S●●●●) |
| **Frequency** | | **kHz** | 300 |
| **Number of channels** | | | 3 channels: A, B, top 0 and complements $\overline{A}$, $\overline{B}$, $\overline{0}$ |
| **Encoders with type X output stage: 5 V output driver, RS-422, 4.75–30 V supply** | | | |
| **Supply voltage** | | | ⎓ 4.75–30 V<br>Max. ripple: 500 mV |
| **Current consumption, no-load** | | **mA** | 75 max. |
| **Protection** | | | Against short circuits and reverse polarity |
| **Output current** | | **mA** | 40 max. |
| **Output levels** | Low level | | (Is = 20 mA) 0.5 V max. |
| | High level | | (Is = 20 mA) 4.5 V min. |
| **Encoders with type Y output stage: push-pull output driver, 5–30 V supply** | | | |
| **Supply voltage** | | | ⎓ 5–30 V<br>Max. ripple: 500 mV |
| **Current consumption, no-load** | | **mA** | 75 max. |
| **Protection** | | | Against short-circuits and reverse polarity |
| **Output current** | | **mA** | 40 max. |
| **Output levels** (for U supply = 30 V) *(1)* | Low level | | (Is = 20 mA) 0.5 V max. |
| | High level | | (Is = 20 mA) V supply — 2.5 V min. |

**Wiring diagrams**

**Type X output stage**




**Type Y output stage**




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

# OsiSense™ XCC
# Incremental encoders
## Ø 58 mm encoders aluminum and stainless steel version

105163



*XCC1506PS●●●*

### Solid shaft, Ø 6 mm

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



*XCC1510SPA●●●*

### Solid shaft, Ø 10 mm

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

105164



*XCC1510PS●●●*

*(1) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.*
*(2) For specifications of the output stage type (indicated by last letter of the catalog number). See page 14.*
*(3) Stainless steel 316L version*

# OsiSense™ XCC Incremental encoders

## Ø 58 mm encoders

105166

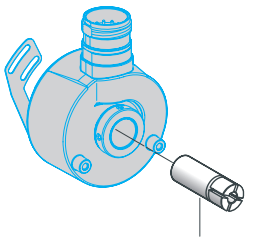


XCC1514TS●●●

### Through-shaft, Ø 14 mm (1)

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

566465



XCCR158RDA●●

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

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

*(1) Anti-rotation device included with encoder.*
*(2) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.*
*(3) For specifications of the output stage type (indicated by last letter of the catalog number). See page 14.*

# OsiSense™ XCC Incremental encoders

Ø 58 mm encoders

Parameterable versions *(1)*

105184



*XCC1510PSM02X*

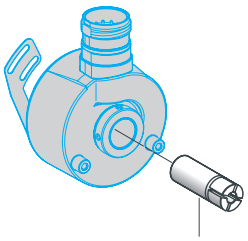
## Parameterable with solid shaft, Ø 10 mm

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

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

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

566465



*XCCR158RDA●●*

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

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

*(1) Parameter configuration: refer to table indicating position of DIP switches on page 17.*
*(2) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.*
*(3) For specifications of the output stage type (indicated by last letter of the catalog number). See page 14.*
*(4) Anti-rotation device included with encoder.*

# OsiSense™ XCC Incremental encoders

Ø 90 mm encoders

## Environment

| Encoder type | | | XCC1912P●●●● | XCC1930T●●●● |
|---|---|---|---|---|
| **Conformity** | | | CE | |
| **Temperature** | Operation (housing) | **°C (°F)** | –20 to +80 (–4 to +176) | |
| | Storage | **°C (°F)** | –30 to +85 (–22 to +185) | |
| **Degree of protection** | Conforming to IEC 60529 | | IP 66 | IP 65 |
| **Vibration resistance** | Conforming to IEC 60068-2-6 | | 10 gn (10–1 kHz) | |
| **Shock resistance** | Conforming to IEC 60068-2-27 | | 30 gn, duration 11 ms | |
| **Resistance to electromagnetic interference** | Electrostatic discharges | | Conforming to IEC 61000-4-2: level 3, 8 kV air; 4 kV contact | |
| | Radiated electromagnetic fields (electromagnetic waves) | | Conforming to IEC 61000-4-3: level 3, 10 V/m | |
| | Fast transients (Start/Stop interference) | | Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs) | |
| | Surge withstand | | Conforming to IEC 61000-4-5: level 2, 1 kV | |
| **Materials** | Base | | Aluminum | |
| | Housing | | Zamak | |
| | Shaft | | Stainless steel | |
| | Ball bearings | | 6001ZZ | 6807 |

## Mechanical specifications

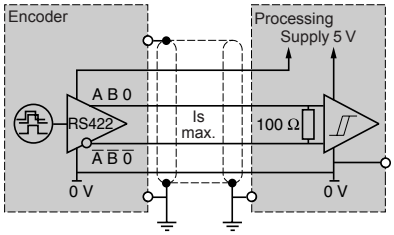
| | | | | |
|---|---|---|---|---|
| **Shaft type** | | | Ø 12, solid shaft (g6) | Ø 30, through-shaft (H7) |
| **Maximum rotational speed** | Continuous | | 6000 rpm | 3600 rpm |
| **Shaft moment of inertia** | | **g•cm²** | 150 (2.08 oz-in) | 500 (6.94 oz-in) |
| **Torque** | | **N•cm** | 1 (1.42 oz-in) | 2.5 (2.5 oz-in) |
| **Maximum load** | Radial | **N** | 200 | 80 |
| | Axial | **N** | 100 | 50 |

## Electrical specifications

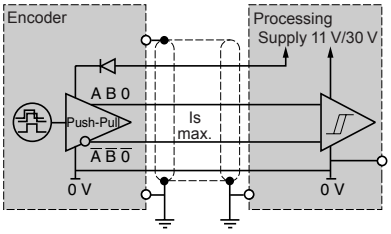
| | | | |
|---|---|---|---|
| **Connection** | Connector | | M23, 12-pin male connector |
| **Frequency** | | **kHz** | 100 |
| **Number of channels** | | | 3 channels: A, B, top 0 and complements $\overline{A}$, $\overline{B}$, $\overline{0}$ |
| **Encoders with type R (N) output stage: 5 V output driver, RS-422, 4.5–5.5 V supply** | | | |
| **Supply voltage** | | | ⎓ 5 V ±10%<br>Max. ripple: 200 mV |
| **Current consumption, no-load** | | **mA** | 100 max. |
| **Output current** | | **mA** | 40 max. |
| **Output levels** | Low level | | (Is = 20 mA) 0.5 V max. |
| | High level | | (Is = 20 mA) V supply — 2.5 V min. |
| **Encoders with type K (N) output stage: push-pull output driver, 11–30 V supply** | | | |
| **Supply voltage** | | | ⎓ 11–30 V<br>Max. ripple: 500 mV |
| **Current consumption, no-load** | | **mA** | 75 max. |
| **Protection** | | | Against short-circuits and reverse polarity |
| **Output current** | | **mA** | 40 max. |
| **Output levels** | Low level | | (Is = 20 mA) 1.5 V max. |
| | High level | | (Is = 20 mA) V supply — 3 V min. |

**Wiring diagrams**

**Type R (N) output stage**




**Type K (N) output stage**



# OsiSense™ XCC Incremental encoders

Ø 90 mm encoders

105168



*XCC1912PS●●●N*

## Solid shaft, Ø 12 mm

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

105171

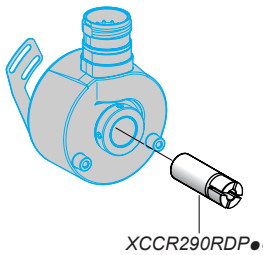


*XCC1930TS●●●N*

## Through-shaft, Ø 30 mm *(3)*

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

523200



*XCCR290RDP●●N*

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

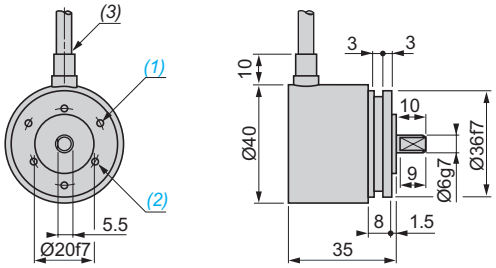
| For use with | Diameter mm | Catalog Number | Weight kg | (lb) |
|---|---|---|---|---|
| **Encoders with through-shaft** XCC1930TS●●●●N | Ø 12 | **XCCR290RDP12** | 0.060 | (0.132) |
| | Ø 16 | **XCCR290RDP16** | 0.060 | (0.132) |
| | Ø 20 | **XCCR290RDP20** | 0.030 | (0.066) |
| | Ø 25 | **XCCR290RDP25**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

*(1) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.*
*(2) For specifications of the output stage type (indicated by last letter of the catalog number). See page 18.*
*(3) Anti-rotation device included with encoder.*

# OsiSense™ XCC
# Incremental encoders
Ø 40 mm, Ø 58 mm and Ø 90 mm encoders

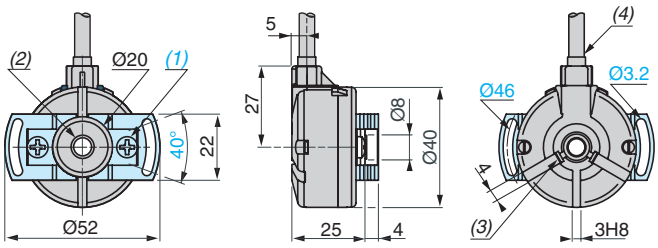
## Ø 40 mm encoders

### XCC1406PR●●●N




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

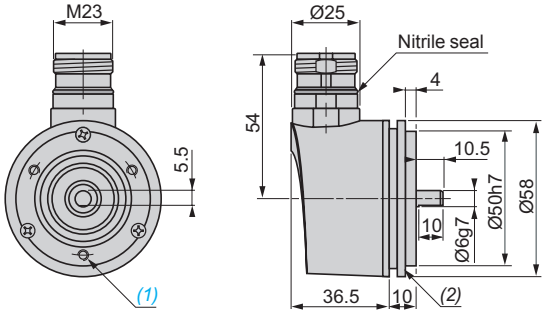
### XCC1406TR●●●N




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

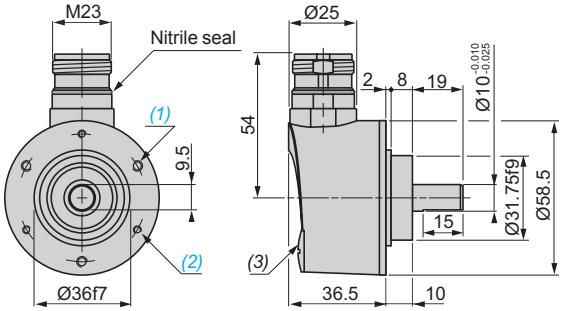
## Ø 58 mm encoders

### XCC1506PS●●X, XCC1506PS●●Y



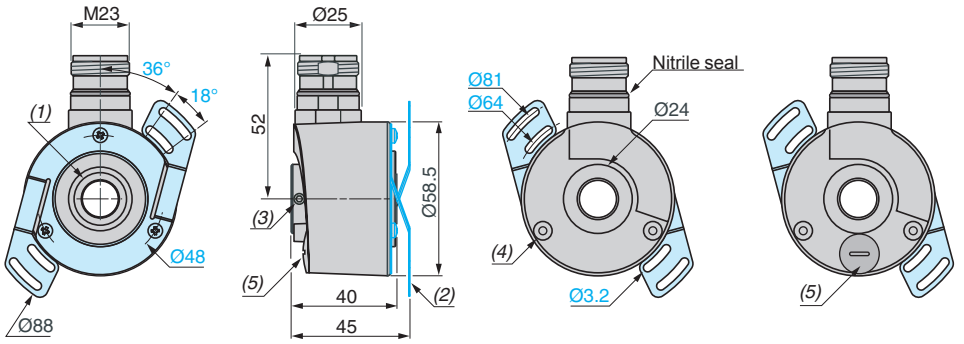

*(1) 3 holes M3 x 4 at 120° on 42 PCD, depth: 10 mm.*
*(2) Collar XCCRB1 mounted.*

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



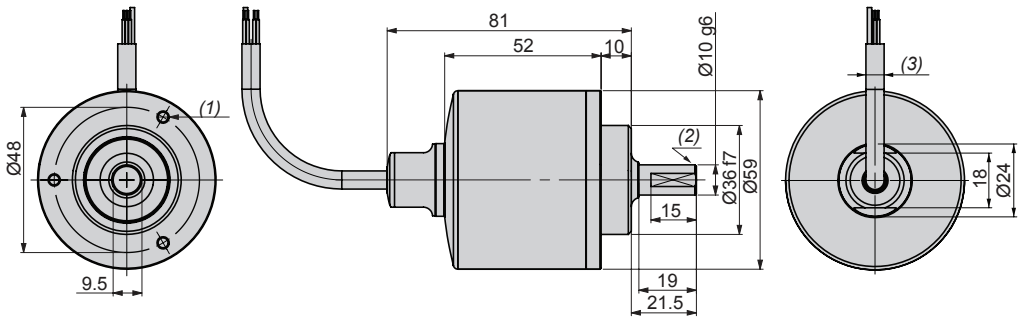

*(1) 3 M4 holes at 120° on 48 PCD, depth: 8 mm.*
*(2) 3 M3 holes at 120° on 48 PCD, depth: 8 mm.*
*(3) Blanking plug, for encoders XCC1510PSM●●X and 1510PSM●●Y only.*

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




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

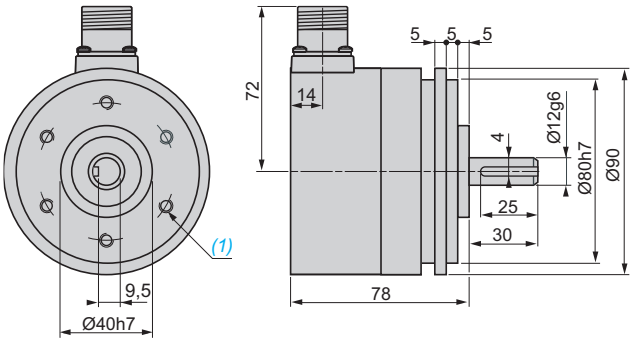
### XCC1510SPA03Y, XCC1510SPA11Y, XCC1510SPA50Y




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

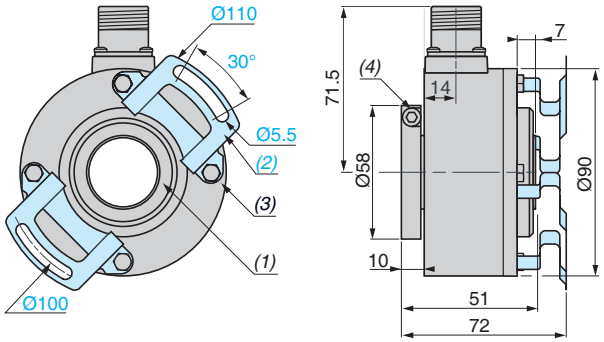
## Ø 90 mm encoders

### XCC1912PS●●●N




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

### XCC1930TS●●●N




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

## Pre-cabled version encoders *(1)*

**8 x 0.14 mm² shielded cable connections for Ø 40 encoders**

| Wire color | BN | RD | VT | BU | YE | OG | GN | BK |
|---|---|---|---|---|---|---|---|---|
| Signal Supply | $\overline{A}$ | + V | 0 | $\overline{0}$ | B | $\overline{B}$ | A | 0 V |

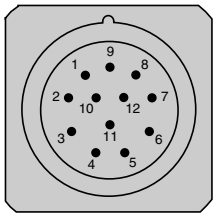
BN = Brown
RD = Red
VT = Violet
BU = Blue
YE = Yellow
OG = Orange
GN = Green
BK = Black

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

## Connector version encoders *(1)*

**M23, 12-pin connector connections**

**Male connector on encoder (pin view)**




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

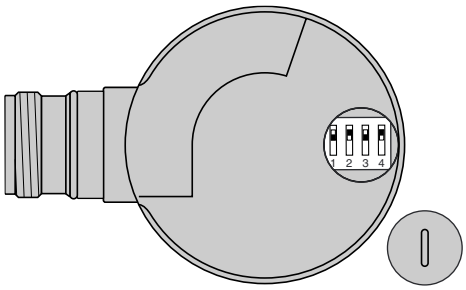
***Note:*** *In environments subject to electrical interference, we recommend grounding the encoder base using one of the mounting screws.*
*R = reserved. Do not connect.*

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

## Resolutions

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

Simple multiplication of the basic resolution of the disc using DIP switches *(1)*
(Plastic Ø 2.5 screwdriver recommended.)
**The factory setting** is for factor X1.




| 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 | on | | | |
| x 2 | x 2 | 512 | 720 | 1000 | 2048 | 10,000 | on | on | | |
| x 3 | x 3 | 768 | 1080 | 1500 | 3072 | 15,000 | on | | on | |
| x 4 | x 4 | 1024 | 1440 | 2000 | 4096 | 20,000 | | on | on | |
| x 5 | – | 1280 | 1800 | 2500 | 5120 | 25,000 | on | on | on | |
| x 8 | – | 2048 | 2880 | 4000 | 8192 | 40,000 | on | | on | |
| x 10 | – | 2560 | 3600 | 5000 | 10,240 | 50,000 | | on | on | |
| x 12 | – | 3072 | 4320 | 6000 | 12,288 | 60,000 | on | on | | |
| x 16 | – | 4096 | 5760 | 8000 | 16,384 | 80,000 | on | | | |

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

# OsiSense™ XCC
# Single turn absolute encoders
Ø 58 mm encoders

## Environment

| Encoder type | | | XCC2506P●●●●● | XCC2510P●●●●● | XCC2510S●●●●● | XCC2514T●●●●● |
|---|---|---|---|---|---|---|
| **Conformity** | | | CE | | | |
| **Temperature** | Operation (housing) | **°C (°F)** | –20 to +90 (–4 to +194) | | | |
| | Storage | **°C (°F)** | –30 to +95 ( –22 to +203) except XCC2510S●●●●●: –40 to +100 (–40 to +212) | | | |
| **Degree of protection** | Conforming to IEC 60529 | | IP 65 | IP 65 (IP 67 with collar option XCCRB3) | IP 69K | IP 65 |
| **Vibration resistance** | Conforming to IEC 60068-2-6 | | 10 gn (55–2 kHz) | | | |
| **Shock resistance** | Conforming to IEC 60068-2-27 | | 30 gn, duration 11 ms | | | |
| **Resistance to electromagnetic interference** | Electrostatic discharges | | Conforming to IEC 61000-4-2: level 3, 8 kV air; 4 kV contact | | | |
| | Radiated electromagnetic fields (electromagnetic waves) | | Conforming to IEC 61000-4-3: level 3, 10 V/m | | | |
| | Fast transients (Start/Stop interference) | | Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs) | | | |
| | Surge withstand | | Conforming to IEC 61000-4-5: level 2, 1 kV | | | |
| **Materials** | Base | | Aluminum | | Stainless steel 316L | Aluminum |
| | Housing | | Zamak | | Stainless steel 316L | Zamak |
| | Shaft | | Stainless steel 303 | | Stainless steel 316L | Stainless steel 303 |
| | Ball bearings | | 6000 | | 6000 with teflon sealing ring | 6803ZZ |

## Mechanical specifications

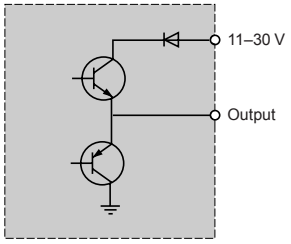
| | | | | | | |
|---|---|---|---|---|---|---|
| **Shaft type** | | | Ø 6, solid shaft (g7) | Ø 10 mm, solid shaft | Ø 10 mm, solid shaft | Ø 14, through-shaft (H7) |
| **Maximum rotational speed** | Continuous | | 9000 rpm | 9000 rpm | 9000 rpm | 6000 rpm |
| **Shaft moment of inertia** | | **g•cm²** | 10 (0.14 oz-in) | 10 (0.14 oz-in) | 12 (0.17 oz-in) | 22 (0.31 oz-in) |
| **Torque** | | **N•cm** | 0.4 (0.57 oz-in) | 0.4 (0.57 oz-in) | 9 (12.7 oz-in) | 0.6 (0.85 oz-in) |
| **Maximum load** | Radial | **N** | 100 | 100 | 25 | 50 |
| | Axial | **N** | 50 | 50 | 50 | 20 |

## Electrical specifications

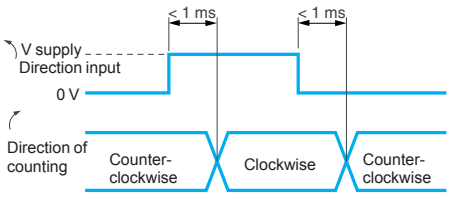
| | | | |
|---|---|---|---|
| **Connection** | Connector | | **Encoders with parallel output stage types KG (N), KB:**<br>M23, 16-pin male connector / 2 m PUR cable for XCC2510S●●●●●<br>**Encoders with SSI output stage types SB (N), SG (N):**<br>M23, 12-pin male connector / 3 m PUR cable for XCC2510S●●●●● |
| **Frequency** | | **kHz** | **Encoders with parallel output stage types KG (N), KB:**<br>100 kHz on LSB (least significant bit)<br>**Encoders with SSI output stage types SB (N), SG (N):**<br>100 kHz to 1 MHz clock |
| **Encoders with type KB and KG (N) output stage: push-pull output driver, 11–30 V supply, Gray code** | | | |
| **Supply voltage** | | | ⎓ 11–30 V<br>Max. ripple: 500 mV |
| **Current consumption, no-load** | | **mA** | 100 max. |
| **Protection** | | | Against short-circuits and reverse polarity |
| **Output current** | | **mA** | 20 max. |
| **Output levels** (for U supply = 30 V) | Low level | | (Is = 20 mA) 0.5 V max. |
| | High level | | (Is = 20 mA) V supply — 2.5 V min. |

**Wiring diagrams**

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




**KB and KG (N) Direction input**



# OsiSense™ XCC
# Single turn absolute encoders
Ø 58 mm encoders

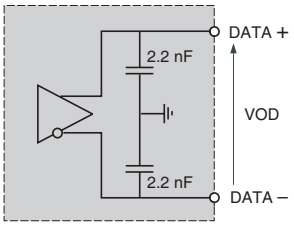
## Electrical specifications *(continued)*

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

| | | |
|---|---|---|
| **Supply voltage** | | ⎓ 11–30 V. Max. ripple: 500 mV |
| **Current consumption, no-load** | **mA** | 100 |
| **Protection** | | Against short circuits and reverse polarity |
| **Output level** | | Idata = 20 mA \|VOD\| > 2 V |

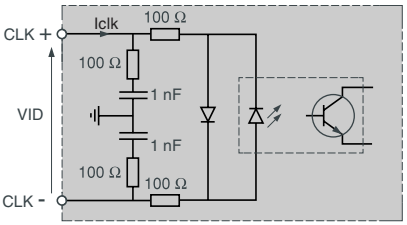
**Wiring diagrams**

**RS-422 data output**



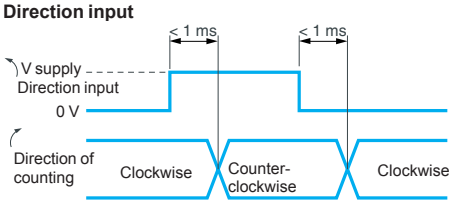

Idata = 20 mA |VOD| > 2 V

**Isolated clock input**




|VID| max.: 5 V
|Iclk| max.: 15 mA

**Direction input**




## Catalog numbers



105173

*XCC2506PS81●●●*

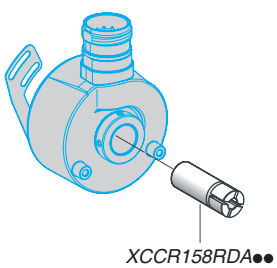
| Resolution | Connection method *(1)* | Output stage type *(2)* | Supply voltage | Catalog number | Weight kg | (lb) |
|---|---|---|---|---|---|---|
| **Solid shaft, Ø 6 mm** | | | | | | |
| **8192 ppr** | Connector, radial M23 male | Push-pull, binary | 11–30 V | **XCC2506PS81KB** | 0.495 | (1.091) |
| | | Push-pull, Gray | 11–30 V | **XCC2506PS81KGN** | 0.495 | (1.091) |
| | | SSI, 13-bit, binary | 11–30 V | **XCC2506PS81SBN** | 0.490 | (1.080) |
| | | SSI, 13-bit, Gray | 11–30 V | **XCC2506PS81SGN** | 0.490 | (1.080) |
| **Solid shaft, Ø 10 mm** | | | | | | |
| **8192 ppr** | Connector, radial M23 male | Push-pull, binary | 11–30 V | **XCC2510PS81KB** | 0.465 | (1.025) |
| | | Push-pull, Gray | 11–30 V | **XCC2510PS81KGN** | 0.465 | (1.025) |
| | | SSI, 13-bit, binary | 11–30 V | **XCC2510PS81SBN** | 0.460 | (1.014) |
| | | SSI, 13-bit, Gray | 11–30 V | **XCC2510PS81SGN** | 0.460 | (1.014) |
| **Through-shaft, Ø 14 mm** *(3)* | | | | | | |
| **8192 ppr** | Connector, radial M23 male | Push-pull, binary | 11–30 V | **XCC2514TS81KB** | 0.435 | (0.959) |
| | | Push-pull, Gray | 11–30 V | **XCC2514TS81KG** | 0.435 | (0.959) |
| | | SSI, 13-bit, binary | 11–30 V | **XCC2514TS81SB** | 0.430 | (0.948) |
| | | SSI, 13-bit, Gray | 11–30 V | **XCC2514TS81SG** | 0.430 | (0.948) |
| | Cable 2 m | Push Pull, Gray | 11–30 V | **XCC2510SPA81KGN** *(4)* | 0.600 | (1.323) |
| | | SSI, 13-bit, Gray | 11–30 V | **XCC2510SPA81SGN** *(4)* | 0.600 | (1.323) |



*XCC2510SPA●●●●●*

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

| For use with | Diameter mm | Catalog Number | Weight kg | (lb) |
|---|---|---|---|---|
| **Encoders with through-shaft** XCC2514TS81●● | Ø 6 | **XCCR158RDA06** | 0.015 | (0.033) |
| | Ø 8 | **XCCR158RDA08** | 0.010 | (0.022) |
| | Ø 10 | **XCCR158RDA10** | 0.010 | (0.022) |
| | Ø 12 | **XCCR158RDA12** | 0.010 | (0.022) |



566465

*XCCR158RDA●●*

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

# OsiSense™ XCC
# Single turn absolute encoders
Ø 90 mm encoders

## Environment

| Encoder type | | | XCC2912P●●●●● | XCC2930T●●●●● |
|---|---|---|---|---|
| **Conformity** | | | CE | |
| **Temperature** | Operation (housing) | **°C (°F)** | –20 to +85 (–4 to +185) | |
| | Storage | **°C (°F)** | –40 to +85 (–40 to +185) | |
| **Degree of protection** | Conforming to IEC 60529 | | IP 66 | IP 65 |
| **Vibration resistance** | Conforming to IEC 60068-2-6 | | 10 gn (10–2 kHz) | |
| **Shock resistance** | Conforming to IEC 60068-2-27 | | 30 gn, duration 11 ms | |
| **Resistance to electromagnetic interference** | Electrostatic discharges | | Conforming to IEC 61000-4-2: level 3, 8 kV air; 4 kV contact | |
| | Radiated electromagnetic fields (electromagnetic waves) | | Conforming to IEC 61000-4-3: level 3, 10 V/m | |
| | Fast transients (Start/Stop interference) | | Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs) | |
| | Surge withstand | | Conforming to IEC 61000-4-5: level 2, 1 kV | |
| **Materials** | Base | | Aluminum | |
| | Housing | | Zamak | |
| | Shaft | | Stainless steel | |
| | Ball bearings | | 6001ZZ | 6807 |

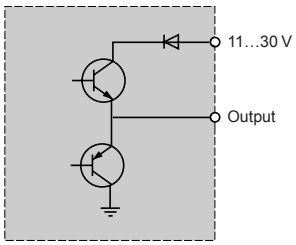
## Mechanical specifications

| | | | | |
|---|---|---|---|---|
| **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•cm²** | 150 (2.08 oz-in) | 500 (6.94 oz-in) |
| **Torque** | | **N•cm** | 1 (1.42 oz-in) | 2.5 (3.54 oz-in) |
| **Maximum load** | Radial | **N** | 200 | 80 |
| | Axial | **N** | 100 | 50 |

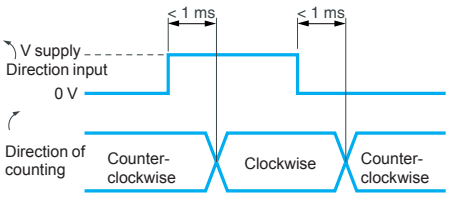
## Electrical specifications

| | | | |
|---|---|---|---|
| **Connection** | Connector | | **Encoders with parallel output stage types KB (N), KG (N):**<br>M23, 16-pin male connector.<br>**Encoders with SSI output stage types SB (N), SG (N):**<br>M23, 12-pin male connector |
| **Frequency** | | | **Encoders with parallel output stage types KB (N), KG (N):**<br>100 kHz on LSB (least significant bit)<br>**Encoders with SSI output stage types SB (N), SG (N):**<br>100 kHz to 1 MHz clock |
| **Encoders with type KB (N) or KG (N) output stage: push-pull output driver, 11–30 V supply, binary code KB (N) or Gray code KG (N)** | | | |
| **Supply voltage** | | | ⎓ 11–30 V. Max. ripple: 500 mV |
| **Current consumption, no-load** | | **mA** | 100 max. |
| **Protection** | | | Against short-circuits and reverse polarity |
| **Output current** | | **mA** | 20 max. |
| **Output levels** (for U supply = 30 V) | Low level | | (Is = 20 mA) 0.5 V max. |
| | High level | | (Is = 20 mA) V supply — 3 V min. |

**Wiring diagrams**
**Type KB (N) and KG (N) output stage**




**KB (N) and KG (N) Direction input**



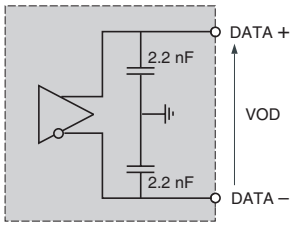
# OsiSense™ XCC
# Single turn absolute encoders
Ø 90 mm encoders

## Electrical specifications (continued)

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

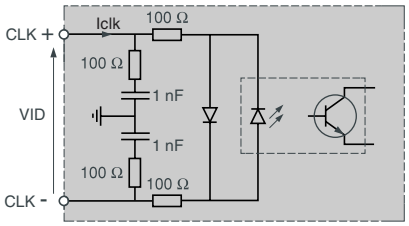
| | | |
|---|---|---|
| **Supply voltage** | | ⎓ 11–30 V<br>Max. ripple: 500 mV |
| **Current consumption, no-load** | **mA** | 100 |
| **Protection** | | Against short-circuits and reverse polarity |
| **Output level** | | Idata = 20 mA \|VOD\| > 2 V |

**Wiring diagrams**
**RS-422 data output**



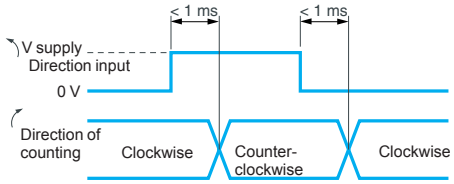

Idata = 20 mA |VOD| > 2 V

**Isolated clock input**




|VID| max.: 5 V
|Iclk| max.: 15 mA

**Direction input**




## Catalog numbers

105168



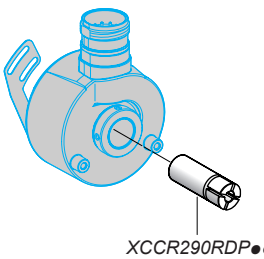
*XCC2912PS●●●●*

105171



*XCC2930TS●●●●*

523200



*XCCR290RDP●●*

| Resolution | Connection method *(1)* | Output stage type *(2)* | Supply voltage | Catalog number | Weight kg | (lb) |
|---|---|---|---|---|---|---|
| **Solid shaft, Ø 12 mm** | | | | | | |
| **8192 ppr** | Connector, radial M23 male | Push-pull, binary | 11–30 V | **XCC2912PS81KBN** | 1.365 | (3.001) |
| | | Push-pull, Gray | 11–30 V | **XCC2912PS81KGN** | 1.365 | (3.001) |
| | | SSI, 13-bit, binary | 11–30 V | **XCC2912PS81SBN** | 1.370 | (3.020) |
| | | SSI, 13-bit, Gray | 11–30 V | **XCC2912PS81SGN** | 1.370 | (3.020) |
| **Through-shaft, Ø 30 mm** *(3)* | | | | | | |
| **8192 ppr** | Connector, radial M23 male | Push-pull, binary | 11–30 V | **XCC2930TS81KBN** | 0.975 | (2.150) |
| | | Push-pull, Gray | 11–30 V | **XCC2930TS81KGN** | 0.975 | (2.150) |
| | | SSI, 13-bit, binary | 11–30 V | **XCC2930TS81SBN** | 0.980 | (2.161) |
| | | SSI, 13-bit, Gray | 11–30 V | **XCC2930TS81SGN** | 0.980 | 2.161) |

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

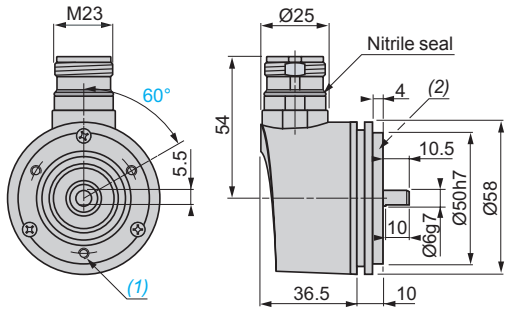
| For use with | Diameter mm | Catalog Number | Weight kg | (lb) |
|---|---|---|---|---|
| **Encoders with through-shaft** XCC2930TS81●●● | Ø 12 | **XCCR290RDP12** | 0.060 | (0.132) |
| | Ø 16 | **XCCR290RDP16** | 0.060 | (0.132) |
| | Ø 20 | **XCCR290RDP20** | 0.030 | (0.066) |
| | Ø 25 | **XCCR290RDP25**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

*(1) For female connector use:*
*- XZCC23FDP120S for encoders type SB (N) and SG (N)*
*- XZCC23FDP160S for encoders type KB (N) and KG (N),*
*or pre-wired connectors (2, 5 and 10 m). See page 35.*
*(2) For specifications of the output stage type (indicated by last letter of the catalog number). See pages 24 and 25.*
*(3) Anti-rotation device included with encoder.*

# OsiSense™ XCC
# Single turn absolute encoders
Ø 58 mm and Ø 90 mm encoders

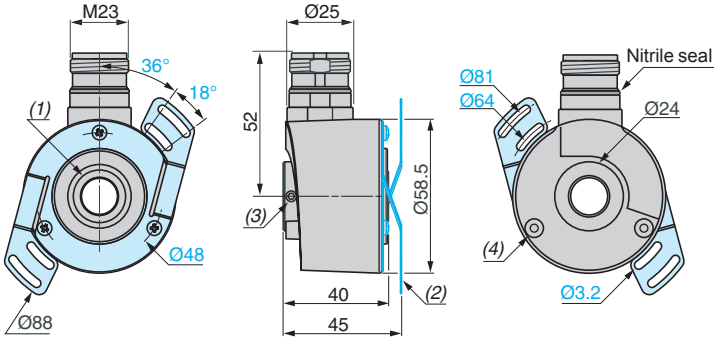
## Ø 58 mm encoders

### XCC2506PS81KB, XCC2506PS81KGN, XCC2506PS81SBN, XCC2506PS81SGN



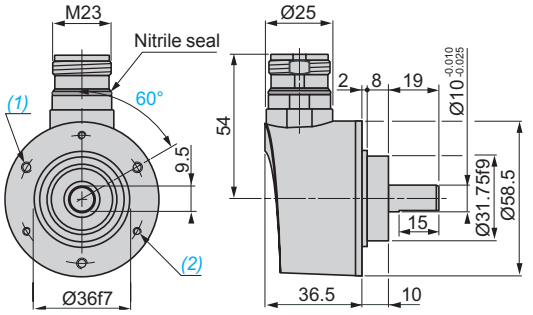

*(1) 3 M4 holes at 120° on 42 PCD, depth: 10 mm.*
*(2) Collar XCCRB1 mounted.*

### XCC2514TS81KB, XCC2514TS81KGN, XCC2514TS81SB, XCC2514TS81SG



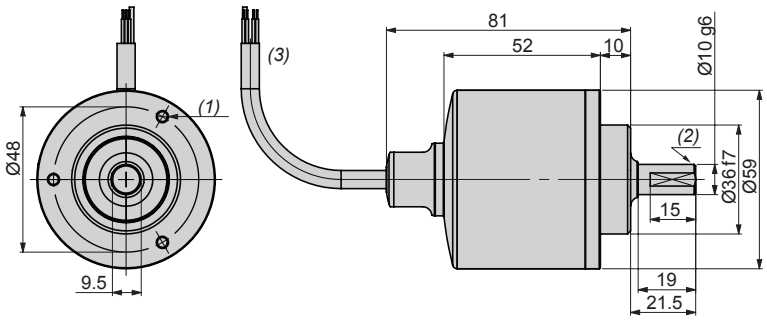

*(1) Through-shaft, Ø 14 (H7).*
*(2) Flexible mounting kit, 1 x XCCRF5N mounted.*
*(3) 2 HC M4 x 4 locking screws.*
*(4) Hole for M3 x 6 self-threading screw.*

### 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.*

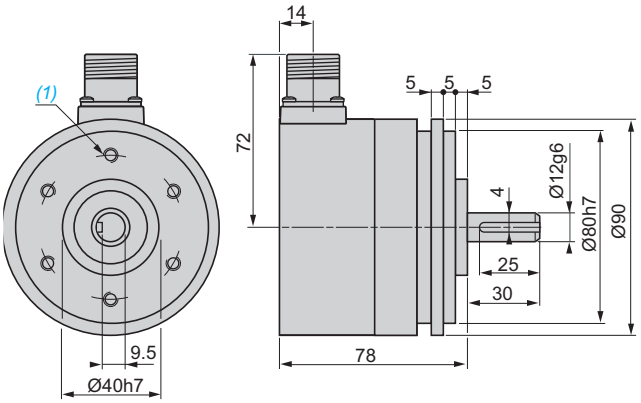
### XCC2510SPA81KGN, XCC2510SPA81SGN




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

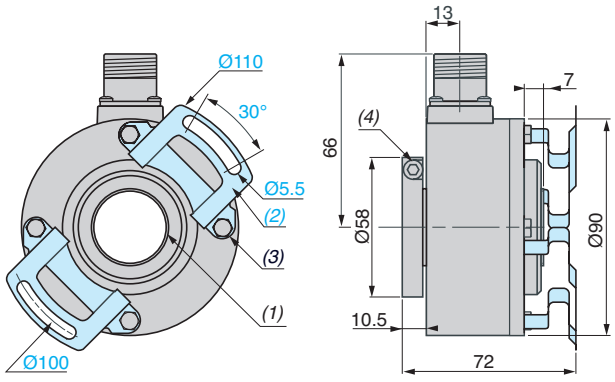
## Ø 90 mm encoders

### XCC2912PS81KBN, XCC2912PS81KGN




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

### XCC2930TS81SBN, XCC2930TS81SGN



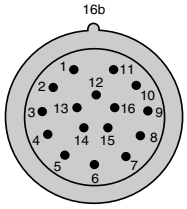

*(1) Through-shaft, Ø 30 (H7).*
*(2) Anti-rotation device, 1 x XCCRF9N, mounted.*
*(3) 4 M5 x 6 on 78 PCD.*
*(4) 1 CHC M5 x 12 stainless steel A2 locking screw.*

# OsiSense™ XCC
# Single turn absolute encoders
Ø 58 mm and Ø 90 mm encoders

## Connector version encoders

### Encoders type KB (N) and KG (N)
### M23, 16-pin connector, counterclockwise connections

**Male connector on encoder (pin view)**

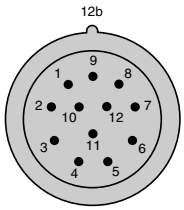



| Pin number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Signal/Supply**<br>If a resolution less than 13 bits (8192 ppr) is required, only the corresponding number of bits need to be connected:<br>Example:<br>- D5 to D12 for 8 bits (256 ppr)<br>- D3 to D12 for 10 bits (1024 ppr)<br>- D2 to D12 for 11 bits (2048 ppr) | 0 V | + V | d0 | d1 | d2 | d3 | d4 | d5 | d6 | d7 | d8 | d9 | d10 | d11 | d12 | Direction (1) |

*(1) ↻ : Clockwise direction, 16 to + V.*
*↺ : Counterclockwise direction, 16 to 0 V.*

### Encoders type SB (N) and SG (N)
### M23, 12-pin connector, counterclockwise connections

**Male connector on encoder (pin view)**




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

R = Reserved (do not connect).
*(1) ↻ : Clockwise direction, 5 to 0 V.*
*↺ : Counterclockwise direction, 5 to + V.*

# OsiSense™ XCC
# Multi-turn absolute encoders
Ø 58 mm encoders

## Environment

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

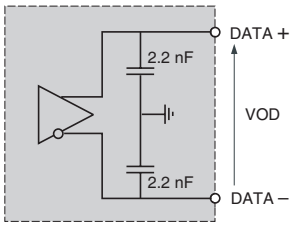
## Mechanical specifications

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

## Electrical specifications

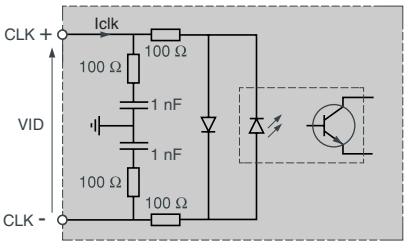
| | | | | | | |
|---|---|---|---|---|---|---|
| **Connection** | Connector | | **Encoders with SSI output stage types SB (N), SG (N):** M23, 12-pin male connector / 2m PUR cable for XCC3510S●●●● | | | |
| **Frequency** | | | **Encoders with SSI output stage types SB (N), SG (N):** 100 to 500 kHz clock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

**Wiring diagrams**
**RS-422 data output**



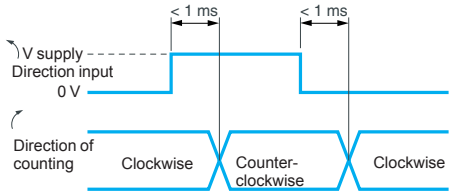

Idata = 20 mA |VOD| > 2 V

**Isolated clock input**

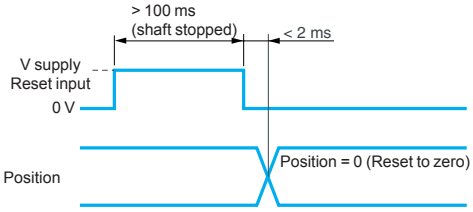



|VID| max.: 5 V
|Iclk| max.: 15 mA

**Direction input**




**Input stage — Reset to zero**



# OsiSense™ XCC
# Multi-turn absolute encoders
Ø 58 mm encoders

105174

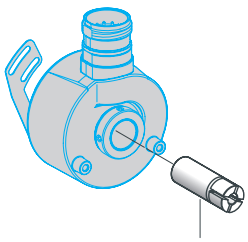


*XCC3506PS84SBN*



*XCC3510SPA●●●●●*

566465



*XCCR158RDA●●*

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

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

### Solid shaft, Ø 6 mm

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

### Solid shaft, Ø 10 mm

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

### Through-shaft, Ø 14 mm *(3)*

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

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

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

*(1) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.*
*(2) For specifications of the output stage type (indicated by last letter of the catalog number). See page 28.*
*(3) Anti-rotation device included with encoder.*
*(4) Stainless steel 316L version.*

# OsiSense™ XCC
# Multi-turn absolute encoders
Ø 90 mm encoders

## Environment

| Encoder type | | | XCC3912P●●●●● | XCC3930T●●●●● |
|---|---|---|---|---|
| **Conformity** | | | CE | |
| **Temperature** | Operation (housing) | **°C (°F)** | –20 to +85 (–4 to +185) | –10 to +75 (+14 to +167) |
| | Storage | **°C (°F)** | –30 to +85 ( –22 to +185) | –20 to +85 (–4 to +185) |
| **Degree of protection** | Conforming to IEC 60529 | | IP 66 | IP 65 |
| **Vibration resistance** | Conforming to IEC 60068-2-6 | | 10 gn (10–2 kHz) | |
| **Shock resistance** | Conforming to IEC 60068-2-27 | | 30 gn, duration 11 ms | |
| **Resistance to electromagnetic interference** | Electrostatic discharges | | Conforming to IEC 61000-4-2: level 3, 8 kV air; 4 kV contact | |
| | Radiated electromagnetic fields (electromagnetic waves) | | Conforming to IEC 61000-4-3: level 3, 10 V/m | |
| | Fast transients (Start/Stop interference) | | Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs) | |
| | Surge withstand | | Conforming to IEC 61000-4-5: level 2, 1 kV | |
| **Materials** | Base | | Aluminum | |
| | Housing | | Zamak | |
| | Shaft | | Stainless steel | |
| | Ball bearings | | 6001ZZ | 6807ZZ |

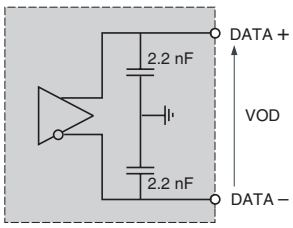
## Mechanical specifications

| | | | | |
|---|---|---|---|---|
| **Shaft type** | | | Ø 12, solid shaft (g6) | Ø 30, through-shaft (H7) |
| **Maximum rotational speed** | Continuous | | 6000 rpm | 3600 rpm |
| **Shaft moment of inertia** | | **g•cm²** | 150 (2.08 oz-in) | 56 (0.78 oz-in) |
| **Torque** | | **N•cm** | 1 (1.42 oz-in) | 0.8 (1.13 oz-in) |
| **Maximum load** | Radial | **N** | 200 | 80 |
| | Axial | **N** | 100 | 50 |

## Electrical specifications

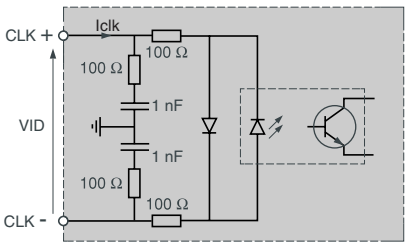
| | | | |
|---|---|---|---|
| **Connection** | Connector | | **Encoders with SSI output stage types SB (N), SG (N):** M23, 12-pin male connector |
| **Frequency** | | | **Encoders with SSI output stage types SB (N), SG (N):** 100 to 500 kHz clock |
| **Encoders with type SBN or SGN (Gray) output stage: SSI output without parity, 25-bit clock, 11–30 V supply, binary code (SB) or Gray code (SG)** | | | |
| **Supply voltage** | | | ⎓ 11–30 V<br>Max. ripple: 500 mV |
| **Current consumption, no-load** | | **mA** | 100 max. |
| **Protection** | | | Against short-circuits and reverse polarity |
| **Output level** | | | Idata = 20 mA \|VOD\| > 2 V |

**Wiring diagrams**
**RS-422 data output**



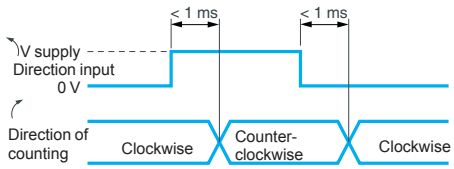

Idata = 20 mA |VOD| > 2 V

**Isolated clock input**



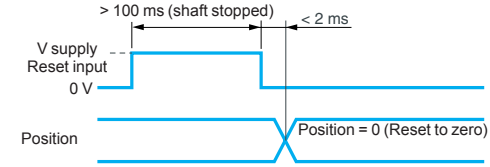

|VID| max.: 5 V
|Iclk| max.: 15 mA

**Direction input**

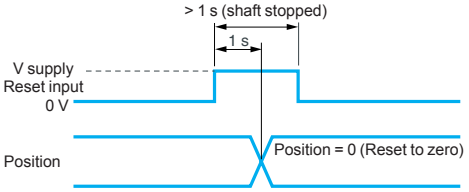



**Input stage—Reset to zero**

**XCC3912P●●●●●**

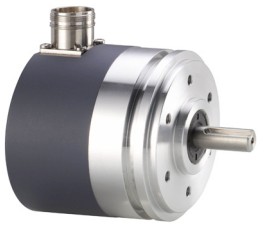



**XCC3930T●●●●●**



# OsiSense™ XCC
# Multi-turn absolute encoders
Ø 90 mm encoders

105178



*XCC3912PS●●●●*

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

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

**Solid shaft, Ø 12 mm**

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

105179

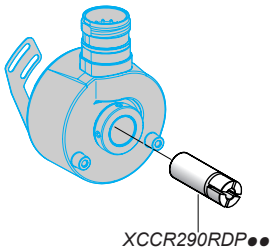


*XCC3930TS●●●●*

**Through-shaft, Ø 30 mm** *(3)*

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

523200



*XCCR290RDP●●*

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

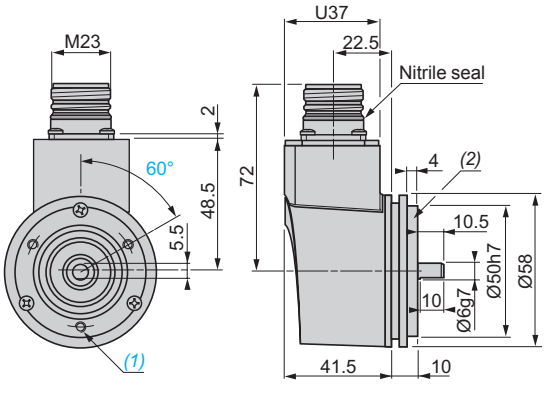
| Encoder type | Diameter mm | Catalog number | Weight kg | (lb) |
|---|---|---|---|---|
| **Encoders with through-shaft** XCC3930TS84●●● | Ø 12 | **XCCR290RDP12** | 0.060 | (0.132) |
| | Ø 16 | **XCCR290RDP16** | 0.060 | (0.132) |
| | Ø 20 | **XCCR290RDP20** | 0.030 | (0.066) |
| | Ø 25 | **XCCR290RDP25**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

*(1) For female connector use XZCC23FDP120S or pre-wired connectors (2, 5, or 10 m). See page 35.*
*(2) For specifications of the output stage type (indicated by last letter of the catalog number). See page 30.*
*(3) Anti-rotation device included with encoder.*

# OsiSense™ XCC
# Multi-turn absolute encoders
Ø 58 mm and Ø 90 mm encoders

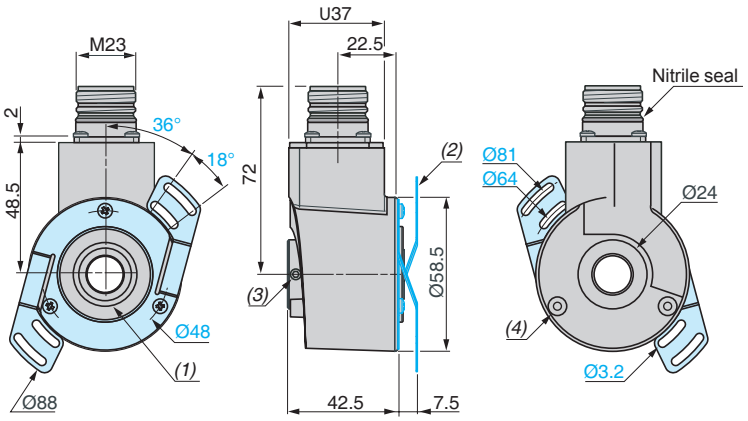
## Ø 58 mm encoders

### XCC3506PS84SBN, XCC3506PS84SGN



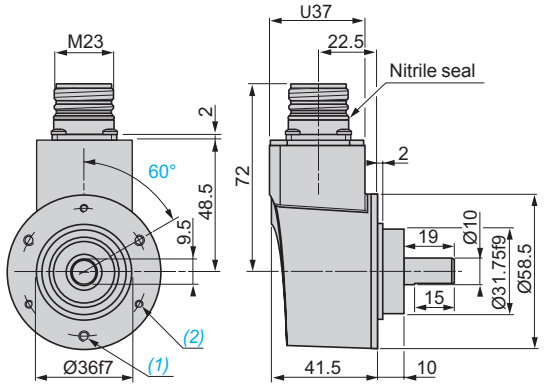

*(1) 3 M4 holes at 120° on 42 PCD, depth: 10 mm.*
*(2) Collar XCCRB1 mounted.*

### XCC3514TS84SB, XCC3514TS84SG



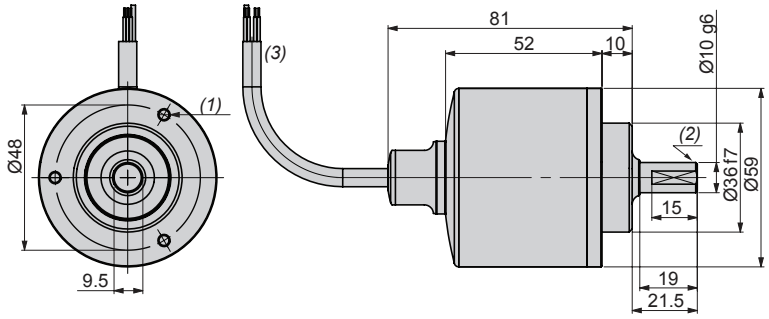

*(1) Through-shaft, Ø 14 (H7).*
*(2) Flexible mounting kit, 1 x XCCRF5N mounted.*
*(3) 2 HC M4 x 4 locking screws.*
*(4) Hole for M3 x 6 self-threading screw.*

### XCC3510PS84SBN, XCC3510PS84SGN




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

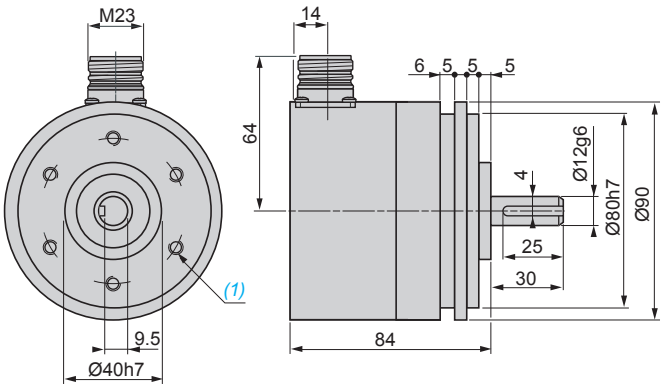
### XCC3510SPA48SGN




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

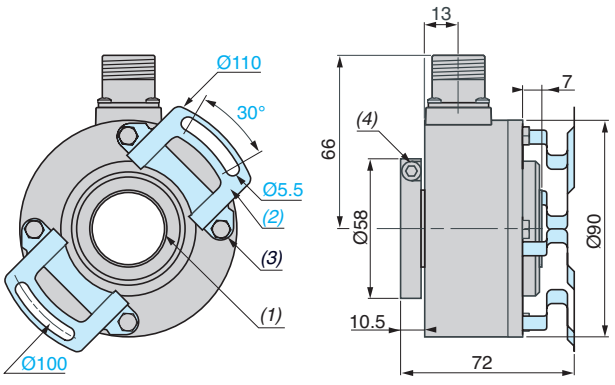
## Ø 90 mm encoders

### XCC3912PS84S●N




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

### XCC3930TS84S●N



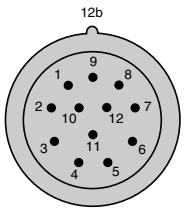

*(1) Through-shaft, Ø 30 (H7).*
*(2) Anti-rotation device, 1 x XCCRF9N, mounted.*
*(3) 4 M5 x 6 on 78 PCD.*
*(4) 3 HC M5 x 6 stainless steel A2 locking screws.*

# OsiSense™ XCC
# Multi-turn absolute encoders
Ø 58 mm and Ø 90 mm encoders

## Connector version encoders

**Encoder with SSI output (types SBN and SGN)**
**M23, 12-pin connector, counterclockwise connections**

**Male connector on encoder (pin view)**




**Twisted cable pairs + general shielding must be used.**

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

R = Reserved (do not connect).
*(1) ↻ : Clockwise direction, ↺ : Counterclockwise direction.*

**Selection of code progression direction**
The Direction input enables the code progression to match the rotational direction of the encoder shaft (clockwise or counterclockwise).
Clockwise direction: connect pin 5 to 0 V.
Counterclockwise direction: connect pin 5 to + V.

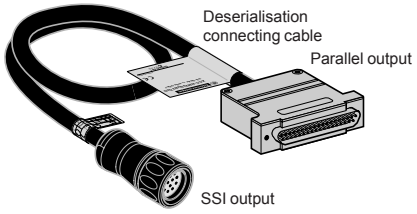
**Reset to zero**
The Reset input enables the encoder to be set to the zero position.
It is actuated by applying an 11–30 Vdc supply to pin 6, while the shaft is stopped, for the following times:
- over 100 ms for XCC3506, XCC3510 and XCC3912,
- over 1 s for XCC3930T.

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

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

# OsiSense™ XCC
# Multi-turn absolute encoders
Ø 58 mm and Ø 90 mm encoders
Connection accessories

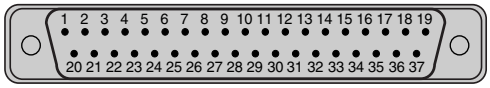
## Connector version multi-turn absolute encoders




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

### Specifications

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




Male connector (pin view)

■ **Selection of code progression direction**
The Direction input enables the code progression to match the rotational direction of the encoder shaft (clockwise or counterclockwise).
Clockwise direction: connect pin 30 to an 11–30 Vdc supply.
Counterclockwise direction: connect pin 30 to 0 V.

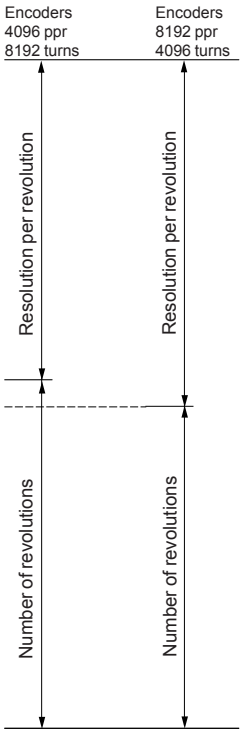
■ **Reset to zero**
The Reset input enables the encoder to be set to the zero position. It is actuated by applying an 11–30 Vdc supply to pin 27 for more than 1 second.

■ **Encoder selection**
The Select input enables encoder selection when several units are connected in parallel on the same data bus.
Encoder selected: apply 0 V potential to pin 28.
Encoder not selected: apply 11–30 Vdc to pin 28.

■ **Data locking**
The Latch input, particularly useful for high speed applications, enables the freezing of the encoder data output while reading the code.
Function not actuated: apply 0 V potential to pin 29.
Function actuated: apply 11–30 Vdc to pin 29.

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

| Pin number | Signal |
|---|---|
| 1 | $2^0$ (LSB) |
| 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 | $2^{10}$ |
| 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 | $2^{20}$ |
| 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 |

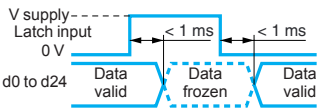



R = Reserved, do not connect
*(1) ↻ : clockwise direction, ↺ : counterclockwise direction.*

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

## Wiring diagrams

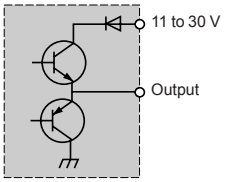
### Latch input




| | min. | max. |
|---|---|---|
| Level "0" | 0 V | 0.3 x V supply |
| Level "1" | 0.7 x V supply | V supply |
| I Latch | < 5 mA | |

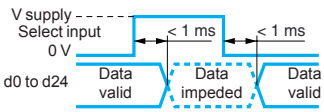
### Push-Pull

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



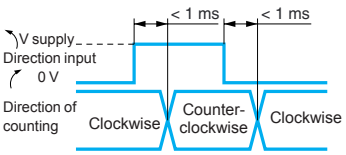

Max. current: 20 mA
Level "0" max.: 1.5 V
Level "1" min.: V supply — 2.5 V
Protection against short-circuits
NPN/PNP compatible

### Select input



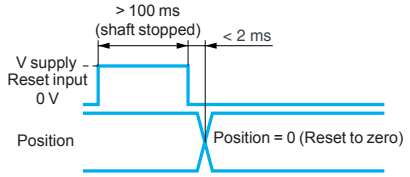

| | min. | max. |
|---|---|---|
| Level "0" | 0 V | 0.3 x V supply |
| Level "1" | 0.7 x V supply | V supply |
| I Select | < 5 mA | |

### Direction input




| | min. | max. | |
|---|---|---|---|
| Level "0" | 0 V | 0.3 x V supply | Increasing Clockwise |
| Level "1" | 0.7 x V supply | V supply | Increasing Counterclockwise |
| I DIR | < 5 mA | | |

### Input stage — Reset to zero

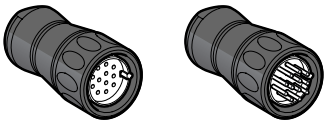



| | min. | max. |
|---|---|---|
| Level "0" | 0 V | 0.3 x V supply |
| Level "1" | 0.7 x V supply | V supply |
| I Reset | < 5 mA | |

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

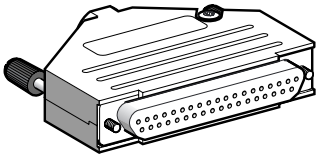
# OsiSense™ XCC
# Connection and mounting
## Connection accessories

566466



*XZCC23FMDP120S*

566467



*XZCCHFDM370S*

105193



*XCCRM23SUB37PG*

105194



*XCCPM23161L2*

### Cables

| Description | For encoders | Number of wires/c.s.a. | Ø mm | Catalog number | Weight kg | (lb) |
|---|---|---|---|---|---|---|
| **Shielded cables with twisted pairs** Length: 100 m UL/CSA | Incremental | 10 wires/0.14 mm² | 6 | **XCCRX10** | 5.000 | (11.023) |
| | Absolute, single turn // | 16 wires/0.14 mm² | 6.8 | **XCCRX16** | 5.600 | (12.346) |
| | Absolute, single turn and multi-turn SSI, and incremental | 1 pair of 0.50 mm² wires and 3 pairs of 0.14 mm² wires | 8.6 | **XCCRXS8** | 11.750 | (25.904) |

### Connectors

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

### Deserialization jumper cables *(1)*

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

### Pre-wired connectors

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

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

## Pre-wired connector connections

**XCCPM23122L●**

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

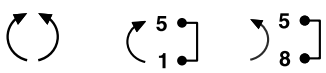
**XCCPM23121L●**

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

**XCCPM23161L●**

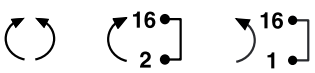
| Pin | Function | Color |
|---|---|---|
| 1 | Gnd | WH |
| 2 | V Supply | BN |
| 3 | d0 | GN |
| 4 | d1 | YE |
| 5 | d2 | GY |
| 6 | d3 | OG |
| 7 | d4 | BU |
| 8 | d5 | RD |
| 9 | d6 | BK |
| 10 | d7 | VT |
| 11 | d8 | WH/BN |
| 12 | d9 | WH/GN |
| 13 | d10 | WH/YE |
| 14 | d11 | WH/BK |
| 15 | d12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

**Direction of rotation for pin 5**




**R**: reserved, do not connect

**Direction of rotation for pin 16**



# OsiSense™ XCC
# Connection and mounting
Mounting and installation accessories

## Shaft couplings with spring *(1)*

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

## Homokinetic (flexible) shaft couplings with bellows

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

## Elastic monobloc shaft couplings

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

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

## Catalog Numbers

105191



*XCCRAR●●●*

105192



*XCCRAS●●●●*

105192



*XCCRAS●●●●S*

806309



*XCCRAE0606*

**Shaft couplings** (for encoders with solid shaft)

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

*(1) Not recommended for resolutions higher than 500 pulses per revolution.*
*(2) Stainless steel version 316L.*

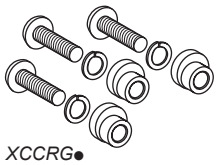
# OsiSense™ XCC
# Connection and mounting
## Mounting and installation accessories

806311



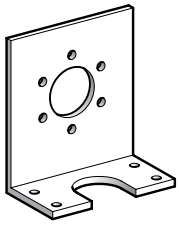
*XCCRF●*

DF600268



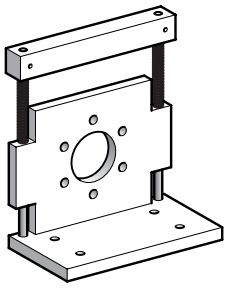
*XCCRG●*

566461



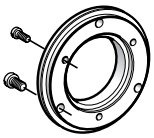
*XCCRE9S*

566462



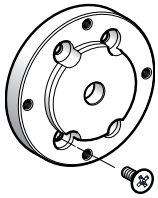
*XCCRE●R*

566463



*XCCRB1*

566464



*XCCRB2*

105188



*XCCR158RDA08*

105190



*XCCR●90RDP20*

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

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

### Mounting and mounting accessories (for encoders with solid shaft)

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

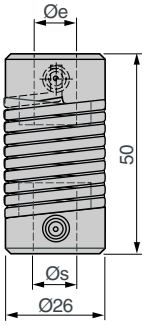
### Reduction collars for encoders with through-shaft

| Description | For use with | Reduction | Catalog number | Weight kg | (lb) |
|---|---|---|---|---|---|
| **Reduction collars** | Incremental encoders Ø 58<br>Absolute single turn encoders Ø 58<br>Absolute multi-turn encoders Ø 58 | 14 mm to 6 mm | **XCCR158RDA06** | 0.015 | (0.033) |
| | | 14 mm to 8 mm | **XCCR158RDA08** | 0.010 | (0.022) |
| | | 14 mm to 10 mm | **XCCR158RDA10** | 0.010 | (0.022) |
| | | 14 mm to 12 mm | **XCCR158RDA12** | 0.010 | (0.022) |
| | | 14 mm to 0.375 in. | **XCCR158RDAU37** | 0.011 | (0.024) |
| | | 14 mm to 0.5 in. | **XCCR158RDAU50** | 0.007 | (0.015) |
| | Incremental encoders Ø 90<br>Absolute single turn and multi-turn encoders Ø 90 | 30 mm to 12 mm | **XCCR290RDP12** | 0.060 | (0.132) |
| | | 30 mm to 16 mm | **XCCR290RDP16** | 0.040 | (0.088) |
| | | 30 mm to 20 mm | **XCCR290RDP20** | 0.030 | (0.066) |
| | | 30 mm to 25 mm | **XCCR290RDP25** | 0.020 | (0.044) |
| | | 30 mm to 0.375 in. | **XCCR290RDPU37** | 0.080 | (0.176) |
| | | 30 mm to 0.5 in. | **XCCR290RDPU50** | 0.060 | (0.132) |
| | | 30 mm to 0.75 in. | **XCCR290RDPU75** | 0.030 | (0.066) |
| | | 30 mm to 1.0 in. | **XXCR290RDPU1** | 0.018 | (0.040) |

*(1) 3 M3 x 12 screws for XCCRG5, 3 M4 x 25 screws for XCCRG9.*
*(2) Screws included with brackets and collars.*

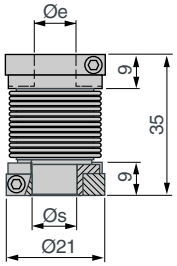
## Shaft couplings

### XCCRAR●●●●



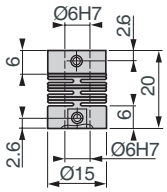

| | Ø e | Ø s |
|---|---|---|
| **XCCRAR0606** | 6 mm | 6 mm |
| **XCCRAR0608** | 6 mm | 8 mm |
| **XCCRAR0610** | 6 mm | 10 mm |
| **XCCRAR0612** | 6 mm | 12 mm |
| **XCCRAR0614** | 6 mm | 14 mm |
| **XCCRAR0616** | 6 mm | 16 mm |
| **XCCRAR1008** | 10 mm | 8 mm |
| **XCCRAR1010** | 10 mm | 10 mm |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

### XCCRAS●●●●

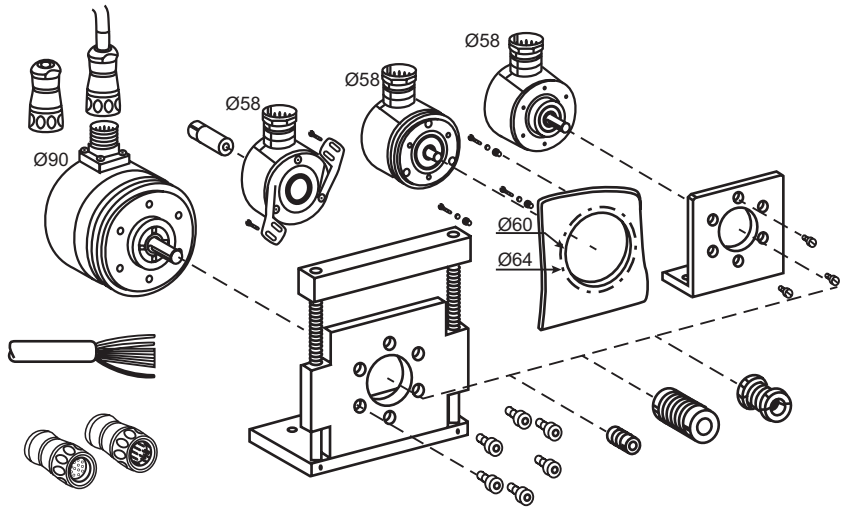



| | Ø e | Ø s |
|---|---|---|
| **XCCRAS0606** | 6 mm | 6 mm |
| **XCCRAS0608** | 6 mm | 8 mm |
| **XCCRAS0610** | 6 mm | 10 mm |
| **XCCRAS0612** | 6 mm | 12 mm |
| **XCCRAS1008** | 10 mm | 8 mm |
| **XCCRAS1010** | 10 mm | 10 mm |
| **XCCRAS1010S** | 10 mm | 10 mm |
| **XCCRAS1012** | 10 mm | 12 mm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

### XCCRAE0606



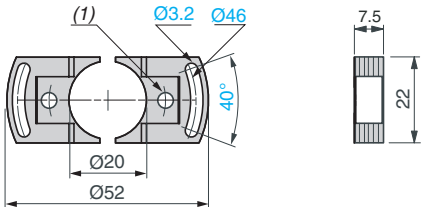

## Typical installation



## Anti-rotation devices (flexible mounting kit)

### XCCRF4

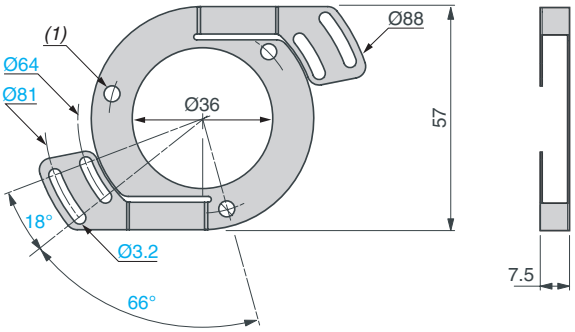
**Mounting on Ø 40 mm encoder XCC1406T**




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

### XCCRF5N

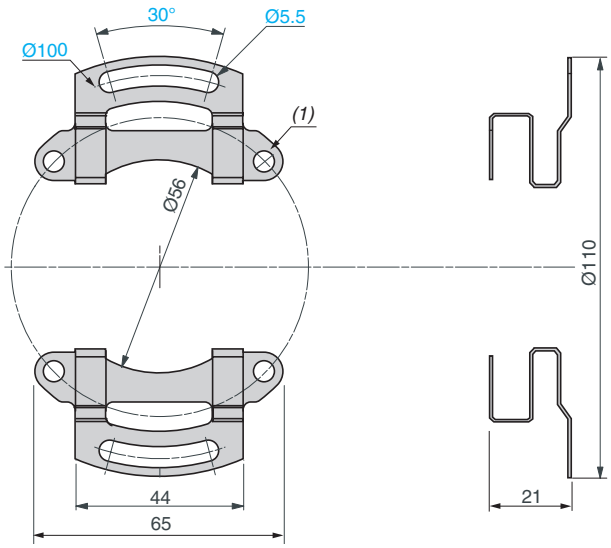
**Mounting on Ø 58 mm encoders XCC1514T, XCC2514T and XCC3514T**




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

### XCCRF9

**Mounting on Ø 90 mm encoders XCC1930T, XCC2930T and XCC3930T**

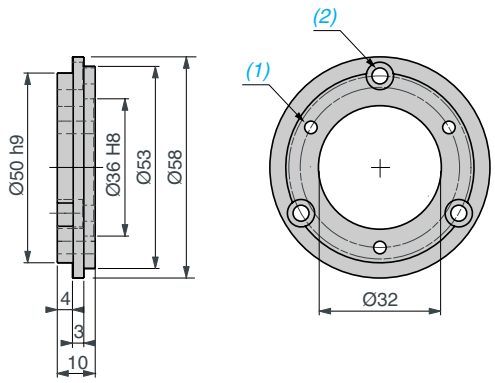



*(1) 4 holes Ø 5.2 at 90° on 78 PCD. TH M5 x 6 screw mountings.*

## Collar kits

### XCCRB1

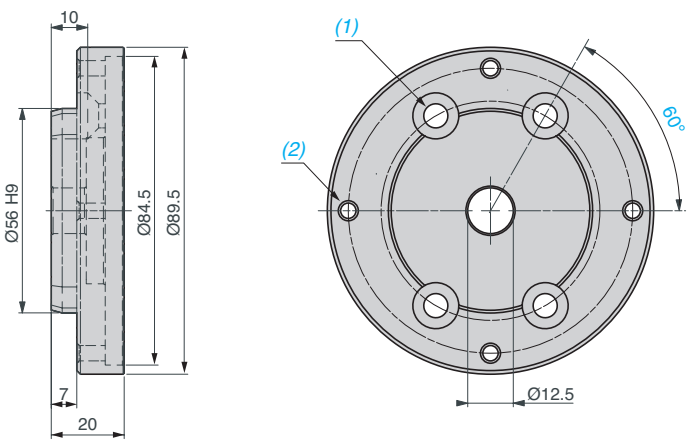
**Collar for synchro mounting, for Ø 58 encoders:**
**XCC15●●P, XCC25●●P and XXC35●●P**




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

### XCCRB2

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

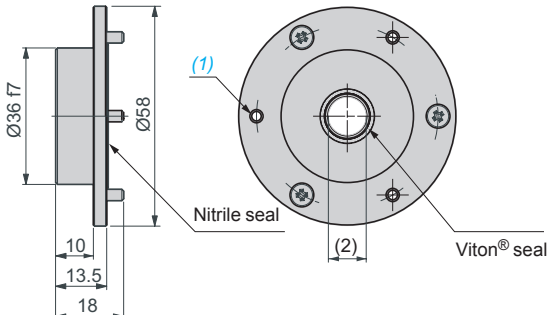



*(1) 4 holes Ø 6.6 at 120° on 60 PCD. Countersunk for TZ M6 x 16 screws.*
*(2) 4 holes M5 x 0.8 at 90° on 78 PCD.*

## Collar kits *(continued)*

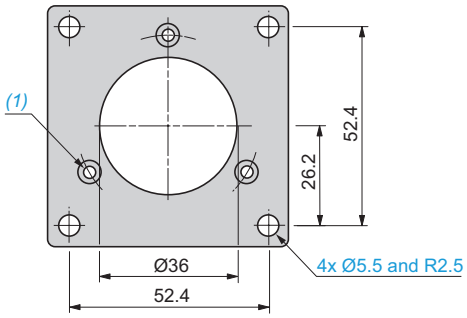
### XCCRB1

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



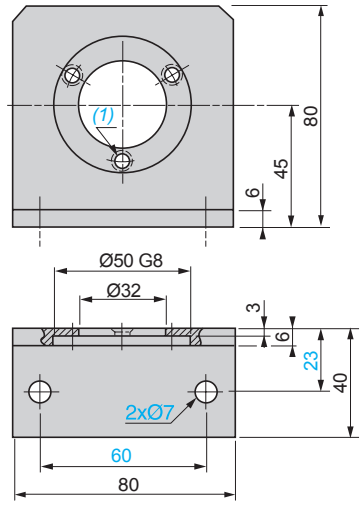

*(1) 3 holes M3 x 0.5 at 120°on 48 PCD. TZ M3 x 8 screw mountings.*
*(2) Shaft Ø 10 mm.*

### XCCRB2



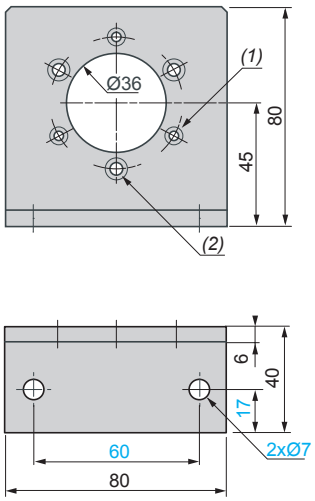

## Plain brackets

### XCCRE5S



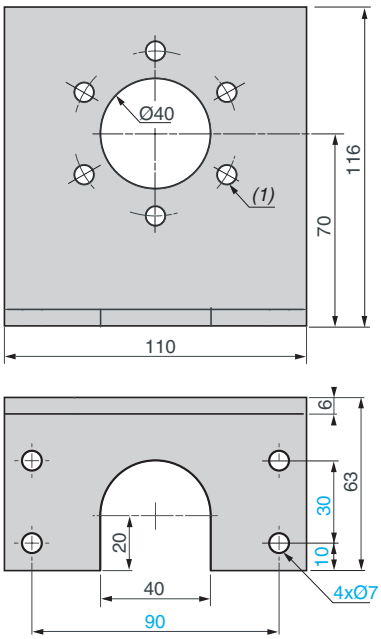

*(1) 3 holes Ø 4.5 at 120° on 42 PCD.*

### 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.*

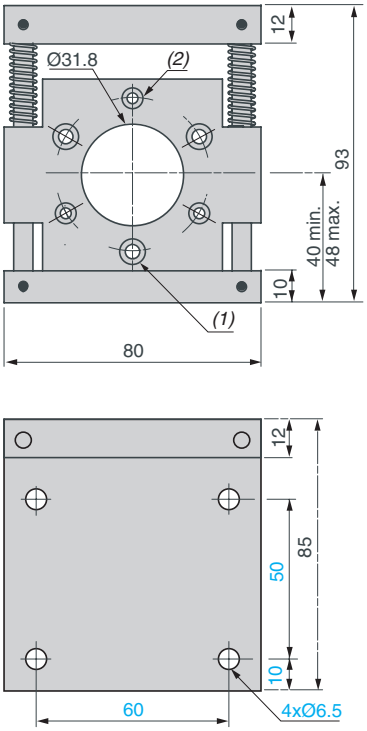
### XCCRE9SN




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

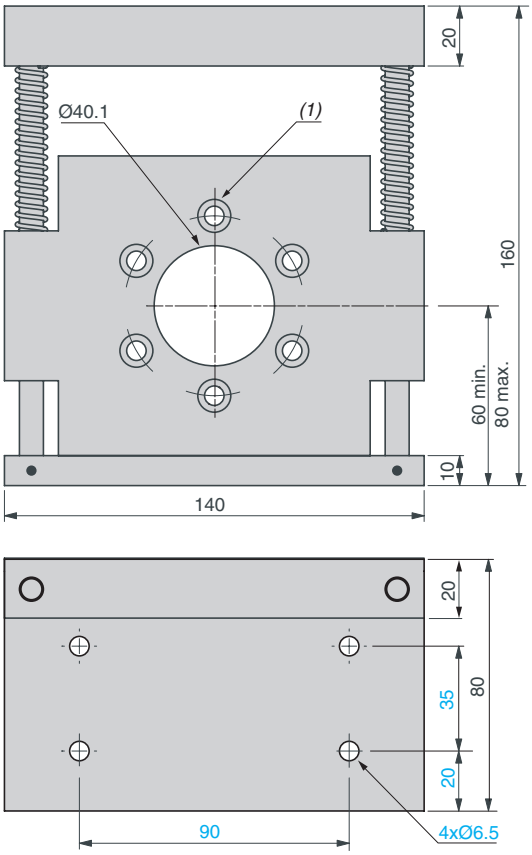
## Brackets with play compensator

### 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

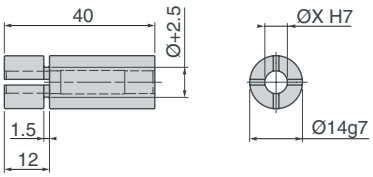



*(1) 6 counterbored holes for CHC M6 screws at 120° on 60 PCD.*

## Reduction collars for through-shaft

### XCCR158RDA●●

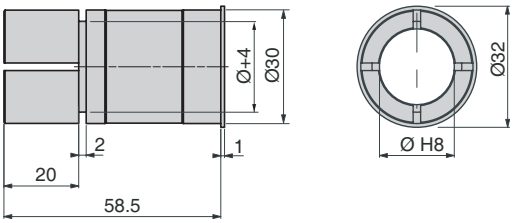
**For Ø 58 incremental, absolute single turn, and absolute multi-turn encoders**




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

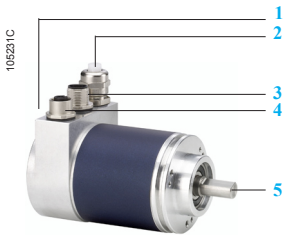
### XCCR290RDP●●

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




| XCC | Ø |
|---|---|
| XCCR290RDP12 | 12 mm |
| XCCR290RDP16 | 16 mm |
| XCCR290RDP20 | 20 mm |
| XCCR290RDP25 | 25 mm |
| R290RDPU37 | 0.375 in. |
| R290RDPU50 | 0.5 in. |
| R290RDPU37 | 0.75 in. |
| R290RDPU1 | 1 in. |

# OsiSense™ XCC
# Multi-turn fieldbus encoders
## CANopen Ø 58 mm encoders




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

## Introduction

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

The CAN-Bus interface integrated in to the absolute rotary encoder supports all CANopen functions. The following modes can be programmed and made operational or stopped: Pooling mode, Cyclic mode and Sync mode. The application-specific protocol supports the programming of the following additional functions:
- code sequence,
- resolution per revolution,
- global resolution,
- presets,
- bus speed and address.

The connection housing ensures simple assembly and addressing. It performs the function of a T coupler and has M12 connectors for the incoming and outgoing bus signals.
The rotary encoder can be supplied via the CANopen bus or by using the dedicated PG9 cable gland. The address of the equipment is adjusted from the rotary switches.
Encoders XCC3510PS84CBN and XCC3515CS84CBN have 2 LEDs located on the rear face of the housing to facilitate monitoring and diagnostics conforming to standard DR303-3 v1.3.0 (CIA). The LEDs provide information regarding the operating mode, bus errors, and supply problems.

## Standards

Encoders XCC3510PS84CBN and XCC3515CS84CBN conform to:
- standard ISO 11898,
- specifications DS301 V4.02/CAN2.A, DS406 V3.2, DR303-1 V1.7 (cabling and connector), DR303-3 V1.3 (light indicator).

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

## Encoder setup/configuration software

The CANopen bus is configured with the aid of SyCon version 2.9 software, reference SYC SPU LF, to be ordered separately.
The EDS file, reference TEXCC35CBN_0101E.eds, required for encoder configuration can be downloaded from our website, www.schneider-electric.com.

## Configurable parameters

■ **Transmission speed**
Default value: 250 Kbaud, configurable from 10 Kbaud (distance 6700 m) to 1 Mbaud (distance 12 m).
■ **Address**
defines encoder identification on the bus, 1 to 99. Default value: id = 1. It is defined using 2 coding wheels located in the housing.
■ **Resolution**
defines the number of pulses per revolution (0 to 8191).
■ **Global resolution**
defines the total number of codes of the encoder (0 to 33,554,431).
■ **Direction**
enables the defining of the counting direction of the encoder (increasing clockwise or counterclockwise) in relation to its mechanical position.
■ **Reset to X**
defines the value of its actual position (reset to X or reset to amount).

## Communication modes

■ **Pooling mode**
The encoder responds to requests from the master. This mode enables programming and reading of the encoder parameters while in position.
■ **Cyclic mode**
The encoder transmits its data cyclically. The transmission period is programmable from 0 to 65,535 ms.
■ **Sync mode**
The encoder transmits its data when the master sends a synchro.

# OsiSense™ XCC
# Multi-turn fieldbus encoders
## CANopen Ø 58 mm encoders

## Specifications

| Encoder type | | | XCC3510PS84CBN | XCC3515CS84CBN |
|---|---|---|---|---|
| **Conformity** | | | CE | |
| **Temperature** | Operation (housing) | **°C (°F)** | –40 to +85 (–40 to +185) | |
| | Storage | **°C (°F)** | –40 to +85 (–40 to +185) | |
| **Degree of protection** | Conforming to IEC 60529 | | IP 64 | |
| **Vibration resistance** | Conforming to IEC 60068-2-6 | | 10 gn (10–2 kHz) | |
| **Shock resistance** | Conforming to IEC 60068-2-27 | | 100 gn (6 ms, 1/2 sine wave) | |
| **Resistance to electromagnetic interference** | Electrostatic discharges | | Conforming to IEC 61000-4-2: level 2, 4 kV air; 2 kV contact | |
| | Radiated electromagnetic fields (electromagnetic waves) | | Conforming to IEC 61000-4-3: level 3, 10 V/m | |
| | Fast transients (Start/Stop interference) | | Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs) | |
| | Surge withstand | | Conforming to IEC 61000-4-5: level 1, 500 V | |
| **Materials** | Base | | Aluminum | |
| | Housing | | Aluminum | |
| | Shaft | | Stainless steel | |
| | Ball bearings | | 6000ZZ1 | 6803ZZ |

## Mechanical specifications

| | | | | |
|---|---|---|---|---|
| **Shaft type** | | **mm** | Ø 10, solid shaft (h8) | Ø 15, hollow shaft (F7) |
| **Maximum rotational speed** | Continuous | | 6000 rpm | |
| **Shaft moment of inertia** | | **g•cm²** | 30 (0.16 oz/in²) | |
| **Torque** | | **N•cm** | 0.3 (0.44 oz-in) | |
| **Maximum load** | Radial | **N** | 110 | |

## Electrical specifications

| | | | |
|---|---|---|---|
| **Connection** | Connector | | CANopen bus network by M12 connector (input: male; output: female), 5-pin, A coding.<br>Supply via PG9 of the encoder |
| **Frequency** | | **kHz** | 800 |
| **Supply** | Nominal voltage | **V** | ⎓ 24 (10-30)<br>Recommended PELV supply (protective extra low voltage) |
| **Current consumption, no-load** | | **mA** | 100 max. |
| **Protection** | | | Against reverse polarity and voltage surges |
| **Signaling** | | | Green LED: CAN_RUN; red LED: CAN_ERR |

## Communication

| | | | |
|---|---|---|---|
| **CANopen service** | Conformity class | | S10 (Transparent Ready) |
| | Profile | | DS406 V3.1, class C2 |
| | Specifications | | ISO 11898, DS301 V4.02/CAN2.A, DR303-1 V1.7, DR303-3 V1.3. |
| **Structure** | Speed | **Kbps** | 10, 20, 50, 125, 250, 500, 800 and 1000 |
| **Product certification** | | | CiA<br>Schneider Electric interoperability standards |
| **Distance depending on speed** | | | 250 m at 250 kbps,<br>100 m at 500 kbps,<br>30 m at 800 kbps,<br>12 m at 1000 kbps |

# OsiSense™ XCC
# Multi-turn fieldbus encoders
## CANopen Ø 58 mm encoders

105231C



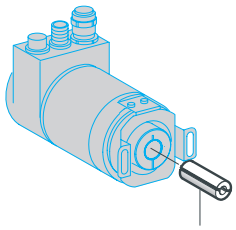
*XCC3510PS84CBN*

105232C



*XCC3515CS84CBN*

600496



XCC R358RDL●●

## CANopen Ø 58 mm encoders

| Description | Connection method | Output stage type | Supply voltage | Catalog number | Weight kg | Weight (lb) |
|---|---|---|---|---|---|---|
| **Solid shaft, Ø 10 mm** | | | | | | |
| **Ø 58 mm multi-turn absolute CANopen bus encoder** Resolution 8192 pts/ 4096 turns | Radial 2 x M12 connectors A coding 1 x PG9 | CANopen, 25-bit, binary | 11–30 V | **XCC3510PS84CBN** | 0.560 | (1.234) |
| **Hollow shaft, Ø 15 mm** *(1)* | | | | | | |
| **Ø 58 mm multi-turn absolute CANopen bus encoder** Resolution 8192 pts/ 4096 turns | Radial 2 x M12 connectors A coding 1 x PG9 | CANopen, 25-bit, binary | 11–30 V | **XCC3515CS84CBN** | 0.570 | (1.256) |

### Reduction collars for encoders with hollow shaft, Ø 15 mm

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

## Connection accessories for CANopen bus

### Connecting cables for CANopen bus

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

### CANopen cables

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

105507

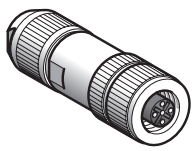


*TSXCANCA●●*

### Shielded connectors, cabled by user

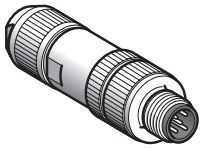
| Description | Type | Unit catalog number | Weight kg | Weight (lb) |
|---|---|---|---|---|
| **M12 female connector** 5 spring terminals | Straight | **XZCC12FDB50R** | 0.020 | (0.044) |
| **M12 male connector** 5 spring terminals | Straight | **XZCC12MDB50R** | 0.025 | (0.055) |

DF504022



*XZCC12FDB50R*

DF504021



*XZCC12MDB50R*

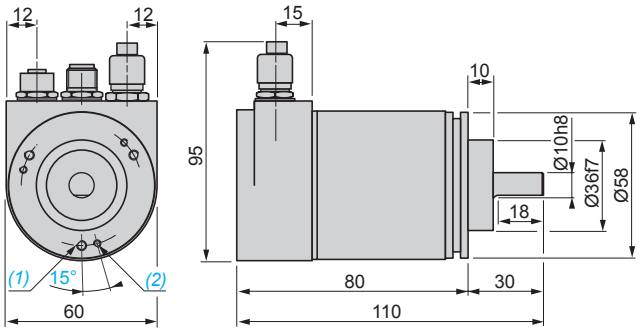
*(1) Anti-rotation device included with encoder.*

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

# OsiSense™ XCC
# Multi-turn fieldbus encoders
**CANopen** Ø 58 mm encoders

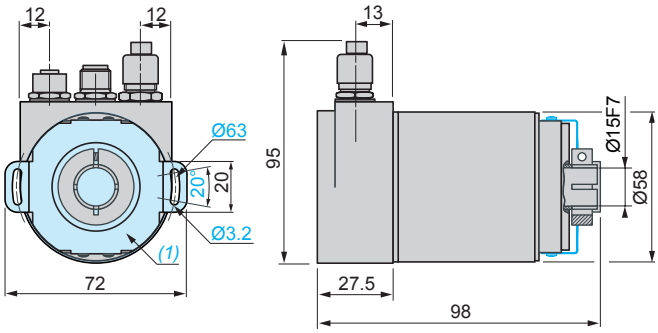
## Dimensions

### XCC3510PS84CBN




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

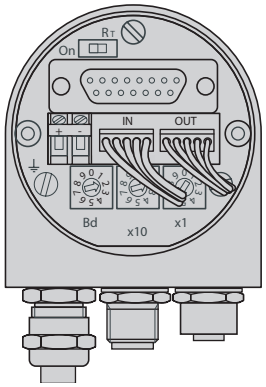
### XCC3515CS84CBN




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

## Connections

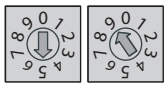
### CANopen




Bus termination resistor




Permissible address range




1 => 99
0 => reserve

Example: 59




Bus In
M12 male connector



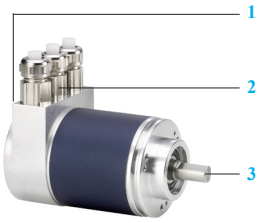

Bus Out
M12 female connector

| Pin | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function | CAN_SHLD | (CAN_V+) | CAN_GND | CAN_H | CAN_L |

| Terminal | + | – |
|---|---|---|
| Function | 24 V | 0 V |

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

105233




**1** 2 LEDs
**2** PG9 cable gland for supply cable
**3** Encoder shaft

## Introduction

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

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

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

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

- Green LED: “Sta”
- Red LED: “Err”.

## Standards

Profibus-DP encoders XCC3510PV84FBN and XCC3515CV84FBN conform to:
- international standards IEC 61158 and IEC 61784 for Profibus-DP communication
- the Profibus-DP standard EN 50170 Class 2 in accordance with profile 3.062 V 1.1 for the encoder application.
They are certified by the PNO organization and meet the requirements of the Schneider Electric interoperability standards.

## Encoder setup/configuration software

The Profibus-DP bus is configured with the aid of SyCon version 2.9 software, reference SYCSPULFDCD29M, to be ordered separately.
The GSD “gsd file” required for encoder configuration can be downloaded from our website, www.schneider-electric.com, under reference TELE4711.GSD.

## Configurable parameters

■ **Speed**

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

□ Steps/10 ms,
□ Steps/100 ms,
□ Steps/s or rpm.

■ **Address**

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

■ **Resolution**

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

■ **Global resolution**

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

■ **Direction**

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

■ **2 soft stops**

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

■ **Reset to X**

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

## Communication modes

2 communication modes are possible:
- simple and fast, cyclic and deterministic exchanges between the master and the encoder,
- acyclic exchanges.

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

## Specifications

| Encoder type | | | XCC3510PV84FBN | XCC3515CV84FBN |
|---|---|---|---|---|
| **Conformity** | | | DIN VDE 0160 | |
| **Temperature** | Operation (housing) | **°C (°F)** | –40 to +85 (–40 to +185) | |
| | Storage | **°C (°F)** | –40 to +85 (–40 to +185) | |
| **Degree of protection** | Conforming to IEC 60529 | | IP 64 | |
| **Vibration resistance** | Conforming to IEC 60068-2-6 | | 10 gn (10–2 kHz) | |
| **Shock resistance** | Conforming to IEC 60068-2-27 | | 100 gn (6 ms, 1/2 sine wave) | |
| **Resistance to electromagnetic interference** | Electrostatic discharges | | Conforming to IEC 61000-4-2: level 2, 4 kV air; 2 kV contact | |
| | Radiated electromagnetic fields (electromagnetic waves) | | Conforming to IEC 61000-4-3: level 3, 10 V/m | |
| | Fast transients (Start/Stop interference) | | Conforming to IEC 61000-4-4: level 3, 2 kV (1 kV for inputs/outputs) | |
| | Surge withstand | | Conforming to IEC 61000-4-5: level 1, 500 V | |
| **Materials** | Base | | Aluminum | |
| | Housing | | Aluminum | |
| | Shaft | | Stainless steel | |
| | Ball bearings | | 6000ZZ1 | 6803ZZ |

## Mechanical specifications

| | | | | |
|---|---|---|---|---|
| **Shaft type** | | **mm** | Ø 10, solid shaft (h8) | Ø 15, hollow shaft (F7) |
| **Maximum rotational speed** | | | 6000 rpm | |
| **Shaft moment of inertia** | | **g•cm²** | 30 (0.16 oz/in²) | |
| **Torque** | | **N•cm** | 0.3 (0.44 oz-in) | |
| **Maximum load** | Radial | **N** | 110 | |

## Electrical specifications

| | | | |
|---|---|---|---|
| **Connection** | Via PG9 | | 3 x PG9 entries:<br>- 2 x PG9 entries for the Profibus-DP bus<br>- 1 x PG9, positioned in middle, for external supply (10-30 V)<br>Due to the T integrated in the housing, the supply can be distributed on the bus.<br><br>Connections are made using screw terminals. |
| **Frequency** | | **kHz** | 800 |
| **Supply** | Nominal voltage | **V** | ⎓ 24 (10–30)<br>Recommended PELV supply (protective extra low voltage) |
| **Current consumption, no-load** | | **mA** | 100 |
| **Protection** | | | Against reverse polarity and voltage surges |
| **Signaling** | | | Green LED: “Sta”; red LED: “Err” |

## Communication

| | | | |
|---|---|---|---|
| **Profibus-DP V0 service** | Profile for encoder | | 3.062 V1.1. |
| | Specifications | | IEC 61158, IEC 61784, EN 50170 class 2, EN 50254 |
| **Interface** | | | RS 485 |
| **Speed** | | | 9.6 Kbps to 12 Mbps max. |
| **Product certification** | | | PNO<br>Schneider Electric interoperability standards |

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

105233



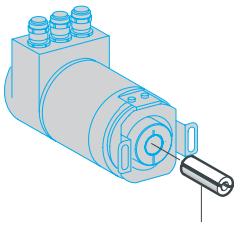
*XCC3510PV84FBN*

105236



*XCC3515CV84FBN*

600495



XCC R358RDL●●

## Catalog Numbers

| Description | Connection method | Output stage type | Supply voltage | Catalog number | Weight kg | Weight (lb) |
|---|---|---|---|---|---|---|
| **Solid shaft, Ø 10 mm** | | | | | | |
| **Ø 58 mm multi-turn absolute Profibus-DP encoder** Resolution 8192 pts/ 4096 turns | 3 x PG9 radial | Profibus-DP, 25-bit, binary | 11–30 V | **XCC3510PV84FBN** | 0.560 | (1.234) |
| **Hollow shaft, Ø 15 mm** *(1)* | | | | | | |
| **Ø 58 mm multi-turn absolute Profibus-DP encoder** Resolution 8192 pts/ 4096 turns | 3 x PG9 radial | Profibus-DP, 25-bit, binary | 11–30 V | **XCC3515CV84FBN** | 0.570 | (1.256) |

**Reduction collars for encoders with hollow shaft, Ø 15 mm**

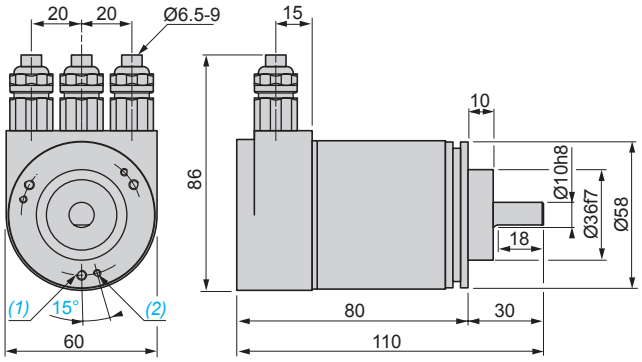
| For use with | Diameter | Catalog number | Weight kg | Weight (lb) |
|---|---|---|---|---|
| **Encoder with hollow shaft** XCC3515CV84FBN | Ø 6 mm | **XCCR358RDL06** | 0.040 | (0.088) |
| | Ø 8 mm | **XCCR358RDL08** | 0.030 | (0.066) |
| | Ø 10 mm | **XCCR358RDL10** | 0.025 | (0.055) |
| | Ø 12 mm | **XCCR358RDL12** | 0.020 | (0.044) |
| | Ø 14 mm | **XCCR358RDL14** | 0.010 | (0.022) |
| | 0.5 in. | **XCCR358RDLU50** | 0.007 | (0.015) |
| | 0.375 in. | **XCCR358RDLU37** | 0.011 | (0.024) |

*(1) Anti-rotation device included with encoder.*

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

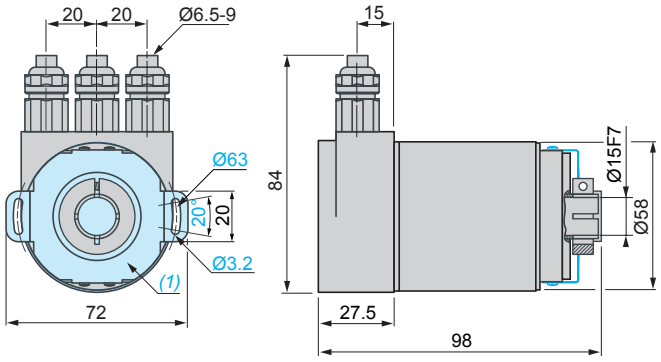
## Profibus-DP Ø 58 mm encoders

### XCC3510PV84FBN




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

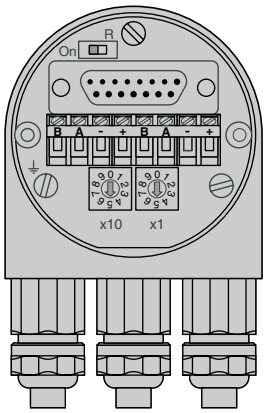
### XCC3515CV84FBN




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

## Connection

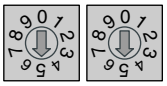
### Profibus-DP




Bus termination resistor




Permissible address range




0 => 99

Example: 55

| Terminal | ⏚ | **B** (left) | **A** (left) | – | + |
|---|---|---|---|---|---|
| **Function** | Ground | Bus line B (Bus in) | Bus line A (Bus in) | 0 V | 11–30 V |
| **Terminal** | | **B** (right) | **A** (right) | – | + |
| **Function** | | Bus line B (Bus out) | Bus line A (Bus out) | 0 V | 11–30 V |

# OsiSense™ XCC
# Multi-turn fieldbus encoders
Accessories for CANopen and Profibus-DP encoders

## Homokinetic (flexible) shaft couplings with bellows

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

## Catalog numbers

105192



*XCCRAS●●●●*

105189



*XCCR358RDL06*

### Shaft couplings (for encoders with solid shaft)

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

### Anti-rotation devices (for encoders with hollow shaft)

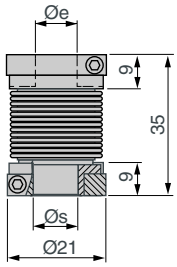
| Description | Features | For encoders | Catalog number | Weight kg | Weight (lb) |
|---|---|---|---|---|---|
| **Flexible mounting kit** | 1 flexible mounting + screws | CANopen and Profibus-DP | **XCCRF5B** | 0.010 | (0.022) |

### Reduction collars for encoders with hollow shaft

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

## Shaft couplings

### XCCRAS●●●●

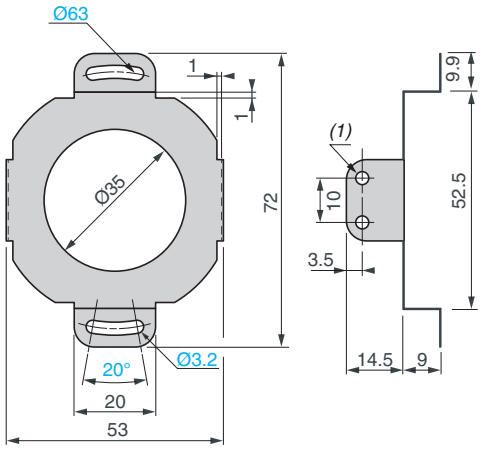



| XCC | Ø e | Ø s |
|---|---|---|
| **XCCRAS1008** | 10 | 8 |
| **XCCRAS1010** | 10 | 10 |
| **XCCRAS1012** | 10 | 12 |

## Anti-rotation device

### XCCRF5B

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

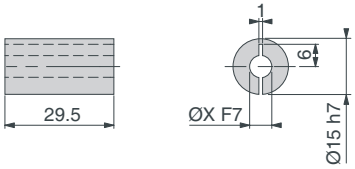



*(1) 4 holes Ø 3.2. M3 x 6 screw mountings.*

## Reduction collars

### XCCR358RDL●●

**For CANopen and Profibus-DP encoders**




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

**Telemecaniqe Sensors**

www.tesensors.com

**Schneider Electric USA, Inc.**
1875 Founders Drive
Dayton, Ohio 45420
(800) 435-2121
www.tesensors.us

**Schneider Electric Canada, Inc.**
5985 McLaughlin Road
Mississauga, Ontario L5R 1B8
(800) 435-2121
www.tesensors.ca

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