Backlash free electronic switching cam encoder
with electromagnetic absolute encoder - **CANopen safety**
Model NOCN/S3 with PLd certificate

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- **Cam switch with integrated safety encoder and safety-cams PLd**
- **Play-free version for use instead of electromechanical switching cam encoders**
- **For use in stationary and mobile machines and systems, particularly for wind turbines, power plants, cranes, etc.**
- **2 electronically controlled PLd-switching outputs: Normally open contacts**
- **Integrated absolute multiturn encoder with CANopen Safety / CANopen interface**
- **Parameterisable via CANopen bus**
- **ATEX devices for zone 1/21 or 2/22 available**

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Design

- Robust housing manufactured from seawater-proof aluminium (AlMgSi1) or stainless steel (material: 1.4305 optionally 1.4404). Equipped with shaft seal ring.
- Shaft fitted with ball bearings bears the magnet for recording the angular position and the drive gear of the multiturn transmission for absolute revolution counting.
- Shaft and transmission are located in the prechamber. Sealed off from this, the main chamber contains all electronic components for position recording, evaluation and output.
- Available Versions:

  Ø 64 mm (standard) with clamping collar and M6 threaded holes. 2 x relay NO contacts PLd at maximum.

  Ø 78 mm (on request) for ATEX zone 1/21

  Ø 79 mm (on request) with clamping collar and M6 threaded holes. 4 x relay NO contacts PLd at maximum.

- Electrical connection for voltage supply, switching out puts and CANopen data via M12 connectors. The number of connectors varies (up to a maximum of three) depending on version or customer specifications.
- Output via SRDO and PDO possible. PDO is independently adjustable.

The two switching contacts are PLd certified safety contacts. They are suitable for the safety chain.

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Description

General functional principle

This involves a play-free electronic switching cam encoder (abbreviated to: NOCN) with two (At version 79 four) galvanically separated safety switching outputs (cams), which can be set by the customer and which are activated or deactivated depending on the relevant position of the drive shaft. An absolute mulitturn encoder with CANopen interface, adjustable parameters and an electronic switching cam module is realized in the compact housing. A separate controller unit monitors the function of the cams.

The encoder's CANopen position signal and the switching outputs can be parameterised separately. The parameterisation (cam limits, resolution, measuring range a.s.o.) has to be verified to the NOCN via a checksum. This checksum can be calculated by a TWK program or the standard algorithm recommended by the CiA. After verification the device can be set operational.

Preset and resolution of the position signal also influence the cams which refer to the position signal.

Parameterisation is carried out via the relevant CANopen objects in accordance with the encoder profile according to CiA, DS 406, revision 4.0.2.

The 64 mm & 79 mm housing styles can be supplied with an ATEX certificate to Zone 2/22 on request. The special housing design 78 mm meets the ATEX requirements for zone 1/21 and is supplied with the associated certificate. See datasheet 16360.

Absolute encoder

The absolute encoder is equipped with a CANopen interface. Its resolution is 12 bits (= 4096 step) resp. 13 Bits (= 8192 step) per revolution (on request up to 32.768 steps = 15 Bits). The measuring range set in the factory is 4096 revolutions. The absolute encoder's position data can be parameterised using CANopen objects.

Switching outputs (cams)

The electronically activated cams can be used to control potential-free, galvanically separated switching processes. The switching outputs are implemented using relays with long service lives.

The switching outputs are PLd-certified, i.e. they represent safe switching outputs. This is implemented by internally wiring each switching output with two relays connected in series which switch with a slight time lag (about some ms). This ensures that only relay 1 switches under load and relay 2 is usually in no-load operation, so that relay 2 can safely interrupt the contact in the event of a fault in relay 1. Additionally each relay is monitored by the µC for proper operation. If one relay failes, an alarm will be generated by the NOCN and transmitted via CANopen to the customers controller. All contacts will open.

The switching information for the cams is taken from the absolute encoder. In comparison with an electromechanical switching cam encoder, switching output activation and deactivation is carried out electronically without play or wear.

Each switching output represents a normally open logic / physical contact which is routed out via an M12 connector.

In the specified operating status - without the limits having been triggered - the relays are picked up, i.e. the normally open contacts are closed. The relays open if the limits are reached or the NOCN's supply voltage fails / drops below the minimum limit. Also the relays open up in case of an internal device error. The connected circuit is interrupted and an alarm can be triggered.

The precise NOCN measuring range point at which each switching output is to switch (switching flanks) can be set using the relevant CANopen objects.

Within the measuring range, one on and off process is possible per switching output. Customer-specific switching procedures are also possible ex-works.

If operating voltage is missing, the cams do not switch. All contacts are open.

Technical data

Electrical data

- Sensor system: Magnetic
- Operating voltage range: + 9 VDC to + 36 VDC
- Power consumption: < 2.5 W
- Resolution: 4096 steps / 360° - 12-bit or 8192 steps / 360° - 13-bit
  On request up to 15 bits (32.768 steps / 360°)
- Measuring range: 4096 revolutions
- Absolute accuracy: ± 0.2 % / 360°
- Position monitoring (2 systems): < 3 %
- Temperature drift: ± 0,02° in the range -40 °C bis 85 °C
- Output code: Binary
- Code path: CW / CCW, parameterisable
- Reference value: 0 - (total No. of steps -1)
- Overvoltage protection and galvanic separation power supply - CANopen - housing
- CAN interface: According to ISO/DIS 11898
- Address setting: Via LMT / LSS
- Terminating resistor: To be implemented separately
- Max.transmission length: 200 m with no galvanic separation (also see CiA, DS 301)
- EMC standards:
  Interference emission: acc. to EN 61000-6-4
  Interference immunity: acc. to EN 61000-6-2
  (further standards see below)
- Electrical connection: 2 x connector M12 - (1 x Power supply + CANopen and 1 x switching outputs)
  3 x connector M12 - (In addition BUS OUT or other pinouts)
  connectors M12 radial or on request axial
- CAN IC voltage rating: Maximum common mode voltage -7 to +12 V
  Maximum allowed voltage at pins ± 36 V
- Electrical supply circuit: Reverse battery protection and protection against too high volage
  Suppression of AC components in the DC power supply

Switching output relay electrical data

- Maximum switching current: 0.5 A at 30 VDC / VAC
- Maximum switching voltage: 60 VDC / VAC
- Response time: 20 ms (ON and OFF)
- Maximum resistance ON 0.5 Ohms
- Protection capacity at contact output: C = 47 nF (other capacitors possible on request)
  → Time constant τ for decay of voltage after opening contact:
  τ = RC with R = external resistor connected by customer

CANopen data

A CAN controller at the output enables integration into the CANopen network according to the following specifications:

CiA DS301 CANopen Application Layer and Communication Profile, Version 4.1
EN 50325-5 CANopen Framework for safety-relevant communication, Version 1.0.1
CiA DS305 CANopen - Layer Setting Services and Protocol (LSS)
CiA DS406 CANopen - Device Profile for Encoders, Version 4.0.2

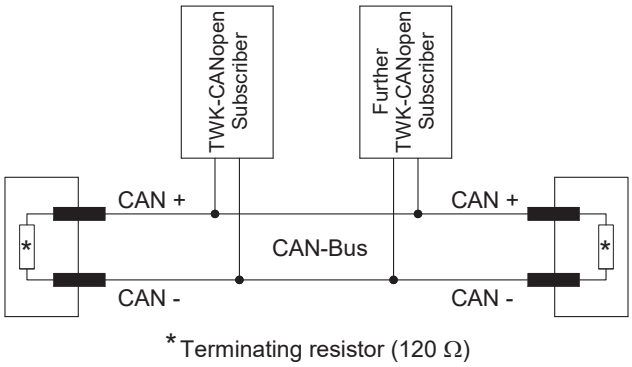
Parameters for the absolute encoder's position signal, which is output via the process data objects (SRDO* or PDO*), can be parameterised via the bus in order to adapt the NOCN to the application. The details of the CANopen profile are exhaustively described in the NOC13100 specifications. The bootloader function can be used to update the NOCN's firmware at the customer's premises.

*: SRDO is valid for CANopen Safety Profile. PDO is valid for CANopen Standard profile. When using PDO the NOCN behaviour is like a CANopen Standard device concerning process data exchange. It depends on resolution and measuring range how many bits are significant data bits. E. g. 24 (bit 0 to 23) for 12 bits resolution and 12 bits measuring range (4096 turns).

Technical data

- NMT Master: no
- NMT-Slave: yes
- Maximum Boot up: no
- Minimum Boot up: yes
- COB ID Distribution: Default, SDO
- Node ID Distribution: via Index 2000 oder LSS
- No of PDOs: 2 Tx
- PDO-Modes: sync, async, cyclic, acyclic
- Variables PDO-Mapping: no
- Emergency Message: yes
- Heartbeat: yes
- No. of SDOs: 1 Rx / 1 Tx
- Device Profile: CiA DSP 406 Version 4.0.2

Bus activation according to ISO / DIS 11898



*Terminating resistor (120 Ω)

System data

- Power on time due to power supply coming up: 500 ms (10 % bis 90 %) required
- Time of storage cycles: 3 s per storage cycle
- Setup Time: ~ 2 s
- Time between error recognition and alarm (emergency message): 100 ms (power supply)
300 ms (relay control)
5 s (RAM test, single bit error)
2 s (ROM test during setup time)
- Safety norms: EN ISO 13849-1: 2015
EN 60947-5-1: 2017
- Maximum service life: 20 years

Mechanical data

- Operating speed: 1000 rpm (due to shaft sealing ring. Higher speeds with Nilos ring)
- Angular acceleration: 10^5 rad/s² max.
- Moment of inertia (shaft): 20 gcm²
- Operating torque: ≤ 8 Ncm (at speed 500 rpm)
- Starting torque: ≤ 4 Ncm
- Perm. shaft load: 250 N axial
250 N radial
- Bearing service life: 10^9 revolutions
- Weight: Approx. 0.8 kg

Technical data

Environmental data

- Operating temperature range: - 40 °C to + 70 °C
- Storage temperature range: - 45 °C to + 85 °C
- Maximum relative humidity: 95 %, without condensing
- Resistance:
  - To shock: (DIN EN 60068-2-27): 250 m/s², 6 ms, 100 x each in 3 axes
  - To vibration: (DIN EN 60068-2-6): 100 m/s², 5 Hz ... 2000 Hz, 1 h each in 3 axes
- Protection type (DIN EN 60529): IP67

EMC standards

EN 61000-6-4:2006 + A1:2011	EMC Part 6-4: Generic standards-Emision standard for industrial environments
EN 61000-6-2:2005	EMC Part 6-2: Generic standards-Immunity for industrial environments
EN 61000-4-2:2009	EMC Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
EN 61000-4-3:2006 A1:2008 + A2:2010	EMC Part 4-3: Testing and measurement techniques - Radiated, radio frequency. electromagnetic field immunity test
EN 61000-4-4:2004	EMC Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-5:2006	EMC Part 4-5: Testing and measurement techniques - Surge immunity test
EN 61000-4-6:2009	EMC Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8:2010	EMC Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test Power frequency magnetic field immunity test: 30 A/m, test criterion A (±16 digit) 100 A/m, test criterion B
EN 61000-4-29:2000	EMC Part 4-8: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests
IEC 61326-3-2:2018	Electrical equipment for measurement, control and labortory use - EMC requirements Part 3-2: Immunity for safety-related systems and for equipment intended to perform safety related functions (functional safety) - industrial applications with specified electromagnetic environment

Safety data

According to standard EN 13849-1:2015 for NOCN/S3 - version 2 (Certificate valid from August, 26th 2020).
Safety data for NOCN/S3 - version 1 on request (Certificate valid from November 2014 to November 2019).

Encoder

- Category: 2
- MTTFd (Jahre): 100 (calculated 217.6)
- CCF: fulfilled
- DC [%]: 93.04
- PL: d

Cam switch

- Category: 2
- MTTFd (Jahre): 100 (calculated 121.7)
- CCF: fufilled
- DC [%]: 95.67
- PL: d

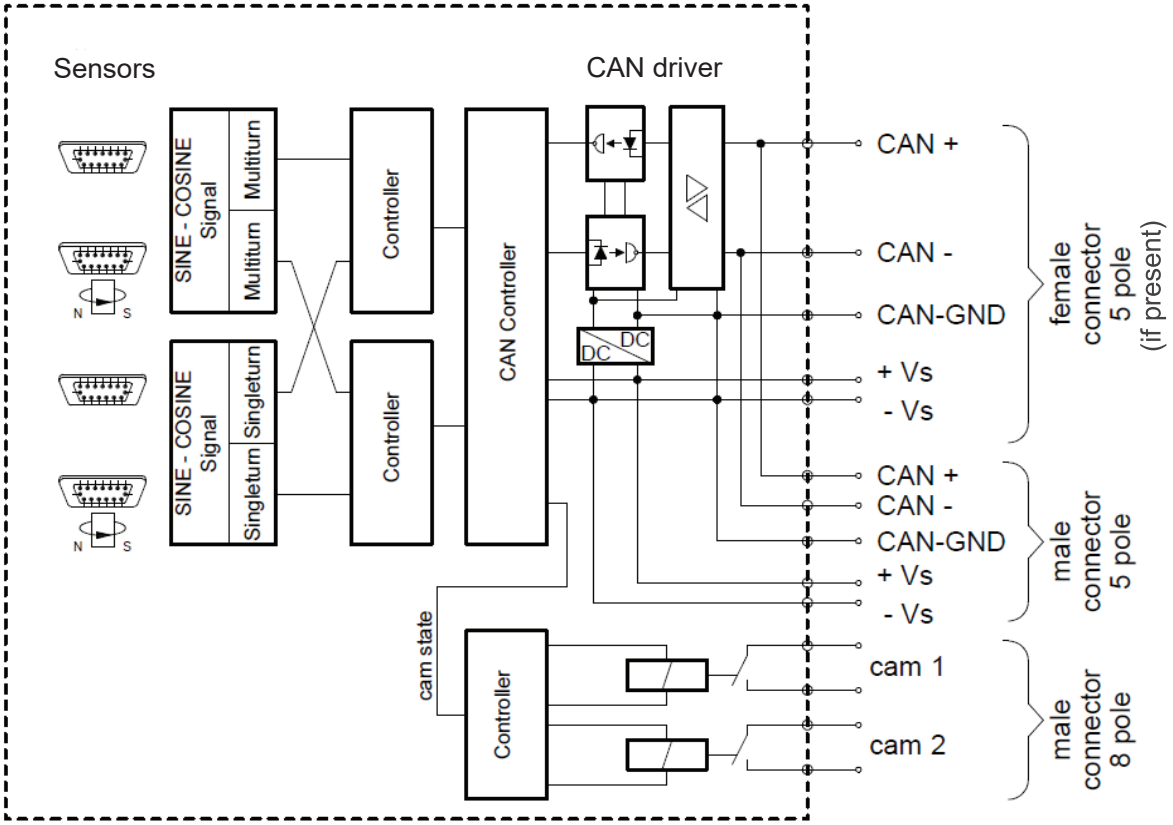
Technical data

Documentation

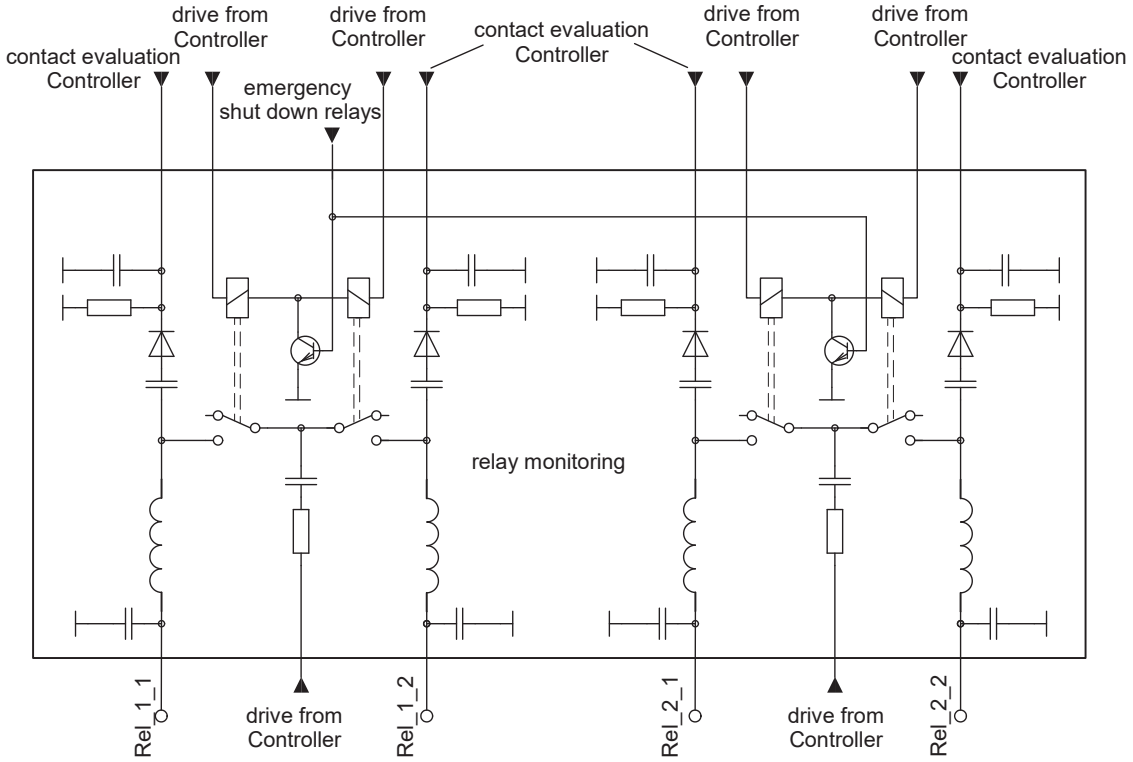
The following documents and further information and programmes can be found in the Internet under www.twk.de in the documentation area and model NOCN/S3 PLd:

- This datasheet: 13099
- Handbook: 13100
- Installation instructions: 16169
- PLd certificate: 15806
- CRC checksum program: CRC
- Characteristic values: VDMA-Safety-Library

Principle circuit diagram - NOCN



Principle circuit diagram - switching outputs



Programmable parameters

see handbook 13100

Parameter	Description
Communication	Master ↔ Slave communication properties (ID, baudrate, mapping etc.)
Sensor	Position- / speed properties (Preset, code path, gate times, etc.)
Cams	Cam behavior (enable / disable, polarity, switching limits, etc.)
Safety validation	CRC-checksums, valid-flags

Switching outputs

Function

The function of the switching outputs (cams) is implemented by means of relays. The relays have normally open contacts.

The contacts are galvanically separated in terms of operating voltage and the CANopen bus.

The switching outputs are PLd-certified, i.e. they represent safe switching outputs. This is implemented by internally wiring each switching output with two relays connected in series which switch with a slight time lag (about some ms). This eliminates the risk that the second relay welds shut. It opens safely in case off an error of working relay 1. Additionally each relay is monitored for proper operation.

The information regarding when which relay is to pick up and drop off again is made available to the relay control system by the internal controller. If receives the shaft position data from the NOCN's absolute encoder.

The precise position of the switching flanks, i.e. calibration of the cams, can be carried out via the corresponding objects of the encoder profile according to CiA, DS 406, rev. 4.0.2. See specifications 13100.

The switching flanks of the switching outputs are set as follows in the factory as regards the angular position of the shaft (see cam diagram below for a NOCN with a measuring range of 4096 revolutions):

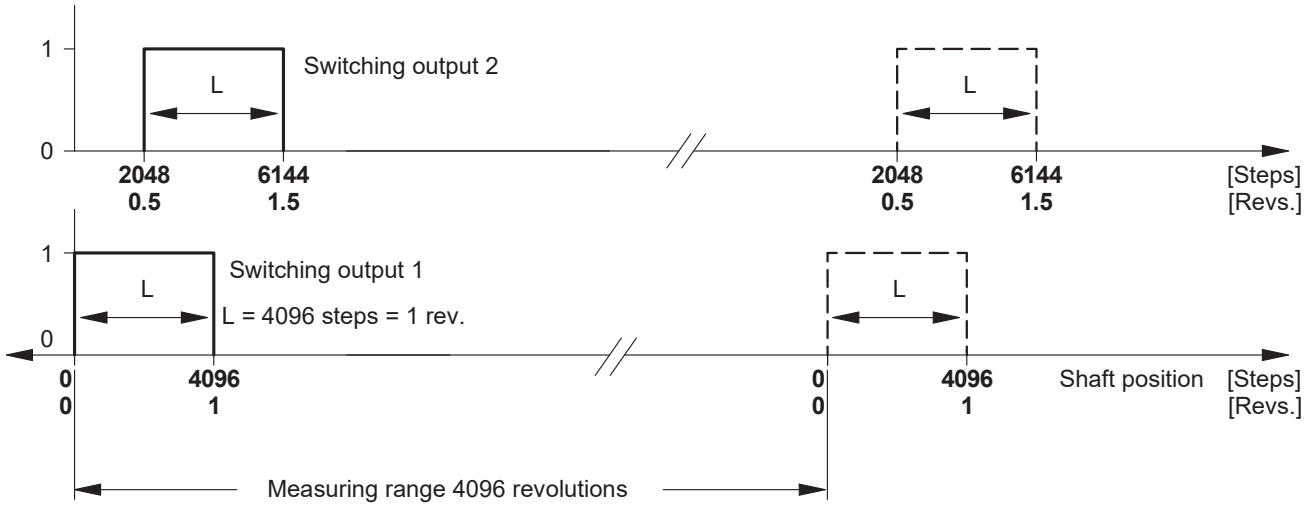
The cams are picked-up/switched over 1 revolution (status '1') and are not picked-up/switched over the remainder of the measuring range (status '0'). The default switching length L is therefore 1 revolution. All four cams each switch with an offset of 0.5 revolutions. Cam 1 switches on at revolution 0, cam 2 at revolution 0.5, cam 3 at revolution 1, etc. The switching flanks of the cams, with reference to the absolute encoder's position signal, accordingly lie at (steps / revs.): cam 1 low limit: 0 (0 revs.), cam 1 high limit: 4096 (1 rev.), cam 2 low limit: 2048 (0.5 revs.), cam 2 high limit: 6144 (1.5 revs.), cam 3 low limit: 4096 (1 revs.), cam 3 high limit: 8192 (2 revs.), etc.

The switching output switching flanks refer to the CANopen output signal of the absolute encoder. If the position signal's preset function is used (CANopen output signal offset), the switching flanks are also accordingly shifted with reference to the shaft position.

To avoid undesired switching back and forth (flutter) on the part of the relays when the shaft is stationary or as a result of slight shaft vibrations on the switching flank, a switching hysteresis of 10 digits (~1°) is pre-programmed. This can be changed via the CANopen bus.

Cam diagram

Setting ex works valid for resolution of 4096 steps/360° and measuring range of 4096 revolutions.



Switching outputs

Parameterisation of the switching outputs (cams)

Each of the switching outputs can be parameterised via the CANopen bus. To achieve this, a range of objects is assigned to each switching output in the CANopen profile according to CiA, DS 406 revision 4.0.2. These objects enable each switching output to be set individually:

Object 6310: Low limit	Cam 1 >	Cam 1 switches on in this position (relay picks up)
Object 6320: High limit	Cam 1 >	Cam 1 switches off in this position (relay drops off)
Object 6330: Hysteresis	Cam 1 >	Switching hysteresis of cam 1 in the case of the switching flanks (with low and high limit)
Object 6311: Low limit	Cam 2 >	Cam 2 switches on in this position (relay picks up)
Object 6321: High limit	Cam 2 >	Cam 2 switches off in this position (relay drops off)
Object 6331: Hysteresis	Cam 2 >	Switching hysteresis of cam 2 in the case of the switching flanks (with low and high limit)

Object 6300: Status of all cams (read only) >
0x0 = no cam picked up
0x1 = only cam 1 picked up
0x2 = only cam 2 picked up
0x3 = cams 1 and 2 picked up

Object 6301: Enable register for all cams >
0x0 = no cam active
0x1 = only cam 1 active
0x2 = only cam 2 active
0x3 = cams 1 and 2 active

Note: If the switching contacts are disabled via object 6301, they are deactivated. The contacts (normally open contacts) are permanently open regardless of the cam limit settings.

Object 6302h: Polarity of the cams (inversion option): >
0x0 = no cam inverted
0x1 = only cam 1 inverted
0x2 = only cam 2 inverted
0x3 = cams 1 and 2 inverted

The reference variable for parameterisation is the position signal output by the absolute encoder. The measuring range ranges from step 0 to step 16.777.215 (in the version with 4096 revs. and 4096 steps / 360°). Each cam can be set within this range.

Due to the safety functionality all changings of parameters have to be verified via the correlated check sum, which is to send to the NOCN separately. This check sum can be calculated via a TWK program for PC/notebook. In this program the customer has to put in all relevant parameters (preset value, cam settings etc.) and the check sum will be calculated. When this check sum is send to the NOCN after changing one or more parameters, the NOCN can be set operational.

Before changing the position data (code sense and preset value) the data valid flag of the cam must be set to 0. The same applies when changing parameters of the cam switch. Afterwards the data valid flags need to be enabled again. This procedure ensures that no accidental changes are made by the user, which have an impact on the PLd cam functions.

(See also: Recommended parameter settings for NOCN / S3 in specifications 13100 - chapter 11)

Electrical connection — Standard version

Attention: The description of the different versions of galvanic separation, V1 to V3, refers only to the relationships of the individual potentials (-UB, CAN_GND and housing/shield) to one another. I.e. whether they are galvanically connected or not. The connection plug pin assignments shown below are independent of this and only describe the standard pin assignment. Other variants may reveal a different pin assignment. The connection assignment (TYxxxxx) which is enclosed with each device or can be requested must always be observed.

Note: The recommended version is V1 with full galvanic separation. This offers maximum EMC resistance, maximum CANopen data transfer security and thus maximum operating safety.

Versions V2 and V3 are special versions which must be compatible with the structure (topology) of the CANopen bus system in the customer application (→ control system and other CANopen subscribers). Operating safety or data transfer security may otherwise be affected.

Different M12 connector combinations or assignments are possible at the request of the customer.

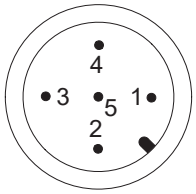
For the following description and pictorials is valid:

Viewed looking at the PIN side of the connector installed in the NOCN.

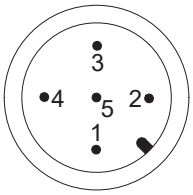
There is one connector for Bus-In and Bus-Out each for the NOCN / S3.
If there is only Bus-In, the female connector Bus-Out is omitted.

V1: CAN_GND and U_B galvanically separated (≠). Screening/housing galvanically separated (≠)

This version is recommended and provides complete galvanic separation. Power supply and CAN_GND is galvanically separated. The housing and the screening of the cable is galvanically separated as well. The screening of the cable comes to the housing of the NOCN via the housing of the mating plug.



female

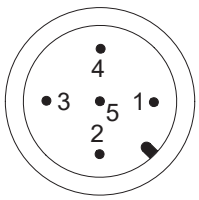


male

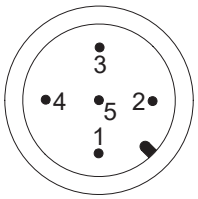
PIN	Function for standard version
1	CAN GND
2	Operating voltage **+ U_B**
3	Operating voltage **- U_B**
4	CAN_H
5	CAN_L

V2: CAN_GND and U_B not galvanically separated (=). Screening/housing galvanically separated (≠)

This version provides partly galvanic separation. Power supply and CAN_GND are not galvanically separated. The housing and the screening of the cable are galvanically separated from power supply and CAN_GND. The screening of the cable comes to the housing of the NOCN via the housing of the mating plug and/or Pin 1 of the connector. Please note the maximum voltage rating of the CAN interface IC on page 3.



female



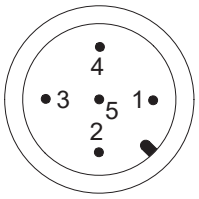
male

PIN	Function for standard version
1	Screen (Cable / housing)
2	Operating voltage **+ U_B**
3	Operating voltage **- U_B** and CAN_GND
4	CAN_H
5	CAN_L

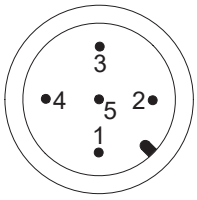
Electrical connection — Standard version

V3: CAN_GND and U_B not galvanically separated (=). Screening/housing not galvanically separated (=)

This version provides no galvanic separation. Power supply and CAN_GND are not galvanically separated. The housing and the screening of the cable are not galvanically separated from power supply and CAN_GND. The screening of the cable comes to the housing of the NOCN via the housing of the mating plug and/or Pin 1 of the connector. Please note the maximum voltage rating of the CAN interface IC on page 3.



female

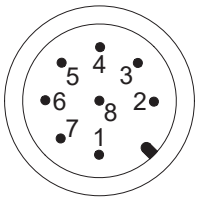


male

PIN	Function for standard version
1	Screen (Cable / housing) - *shorted to pin 3* -
2	Operating voltage **+ U_B**
3	Operating voltage **- U_B** and CAN_GND *- shorted to pin 1 -*
4	CAN_H
5	CAN_L

Switching output connector assignment - valid for 2 switching outputs (NOCN64)

(Due to safety functionality only *normally open contacts* (NO) are possible)

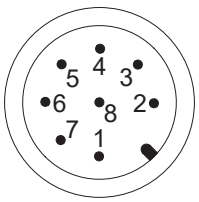


male

PIN	Function
1	n.c.
2	Safety contact 1 / (13)
3	n.c.
4	Safety contact 2 / (23)
5	Safety contact 1 / (14)
6	n.c.
7	Safety contact 2 / (24)
8	n.c.

Switching output connector assignment - valid for 4 switching outputs (NOCN79 on request)

(Due to safety functionality only *normally open contacts* (NO) are possible)



male

PIN	Function
1	Safety contact 1 / (13)
2	Safety contact 1 / (14)
3	Safety contact 2 / (23)
4	Safety contact 2 / (24)
5	Safety contact 3 / (33)
6	Safety contact 3 / (34)
7	Safety contact 4 / (43)
8	Safety contact 4 / (44)

Order code number

NOCN	64	-	KZ	A	2	-	4096	R	4096	S3	S2	V1	N	01	→ Standard version

Electrical and mechanical variants: *
- 01 Standard
- xx Special version/presetting on customer request

Interface:
- N CANopen

Galvanic separation (See pages 10, 11)**:**
- V1 $-V_S$ ǂ CAN_GND ǂ screening/housing → Recommended
- V2 $-V_S$ = CAN_GND ǂ screening/housing
- V3 $-V_S$ = CAN_GND = screening/housing

Electrical connections (see remark on pages 10, 11)**:**
→ Combine kind (S, T) and number of connection (2, 3)
- 2 = 2 connections (standard)
- 3 = 3 connections

- S Device connector M12, radial (standard)
- T Device connector M12, axial (on request)

Profile:
- S0 S0: Safety version with safety switching outputs
- S3 S3: PLd certified

Measuring range:
- 4096 4096 revolutions

Code:
- R Binary

Resolution in steps / 360°:
- 4096 = 12 Bits
- 8192 = 13 Bits
- 16384 = 14 Bits (on request)
- 32768 = 15 Bits (on request)

Number of switching outputs:
- 2 2 switching outputs PLd
- 4 4 switching outputs PLd (on request → version 79)

Housing material:
- A Aluminium
- S Stainless steel 1.4305
- V Stainless steel 1.4404

Flange and shaft:

K	Clamped flange	Shaft 12 mm with flat
K P	Clamped flange	Shaft 12 mm with parallel key
K Z	Clamped flange	Shaft 12 mm for play-compensating toothed gear ZRS
K N	Clamped flange	Clamping shaft 12 mm with notch

Design form:
- 64 Flange ø : 64 mm
- 78 Flange ø : 78 mm for ATEX zone 1/21 (on request).
  For possible flange-, shaft- and connection designs see datasheet 16360
- 79 Flange ø : 79 mm (on request)

NOCN Electronic switching cam encoder with CANopen / CANopen Safety interface

Mating connectors (for NOCN standard connection: 1 x 5-pole/male + (1 x 5-pole/female +) 1 x 8-pole/male, A-coded each)

M12, 5-pin, female: **STK5GS56**
M12, 5-pin, male: **STK5GP90**
M12, 8-pin, female: **STK8GS54**

(EMC-resistant, metal version, straight, to order separately)

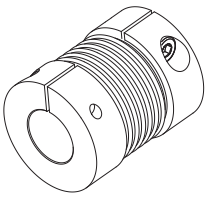
* The basic versions according to the data sheet bear the number 01. Deviations are identified with a variant number and are documented in the factory.

Accessories

Play free bellows coupling BKK 32 / x - y

x and y: bore diameter for shaft mounting

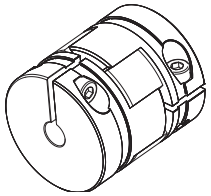
See data sheet BKK11840



Play free clamp coupling KK14S / x - y (without notch)

x and y: bore diameter for shaft mounting

See data sheet KK12301

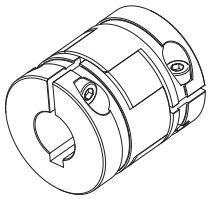


Play free clamp coupling KK14N / x - y (with notch)

x and y: bore diameter for shaft mounting

With groove for keyway according to DIN 6885 Bl. 1 – JS9.

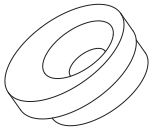
See data sheet KK12301



KL 66-2-S and others

Mounting brackets for mounting encoders.

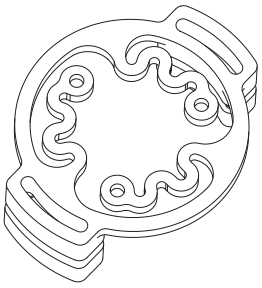
See data sheet MZ10111 for the appropriate model.



ZMS58

Torque arm / stator. Can be used as encoder shaft holder for version 'clamp shaft' to compensate for radial and axial play of the drive shaft.

See data sheet ZMS12939

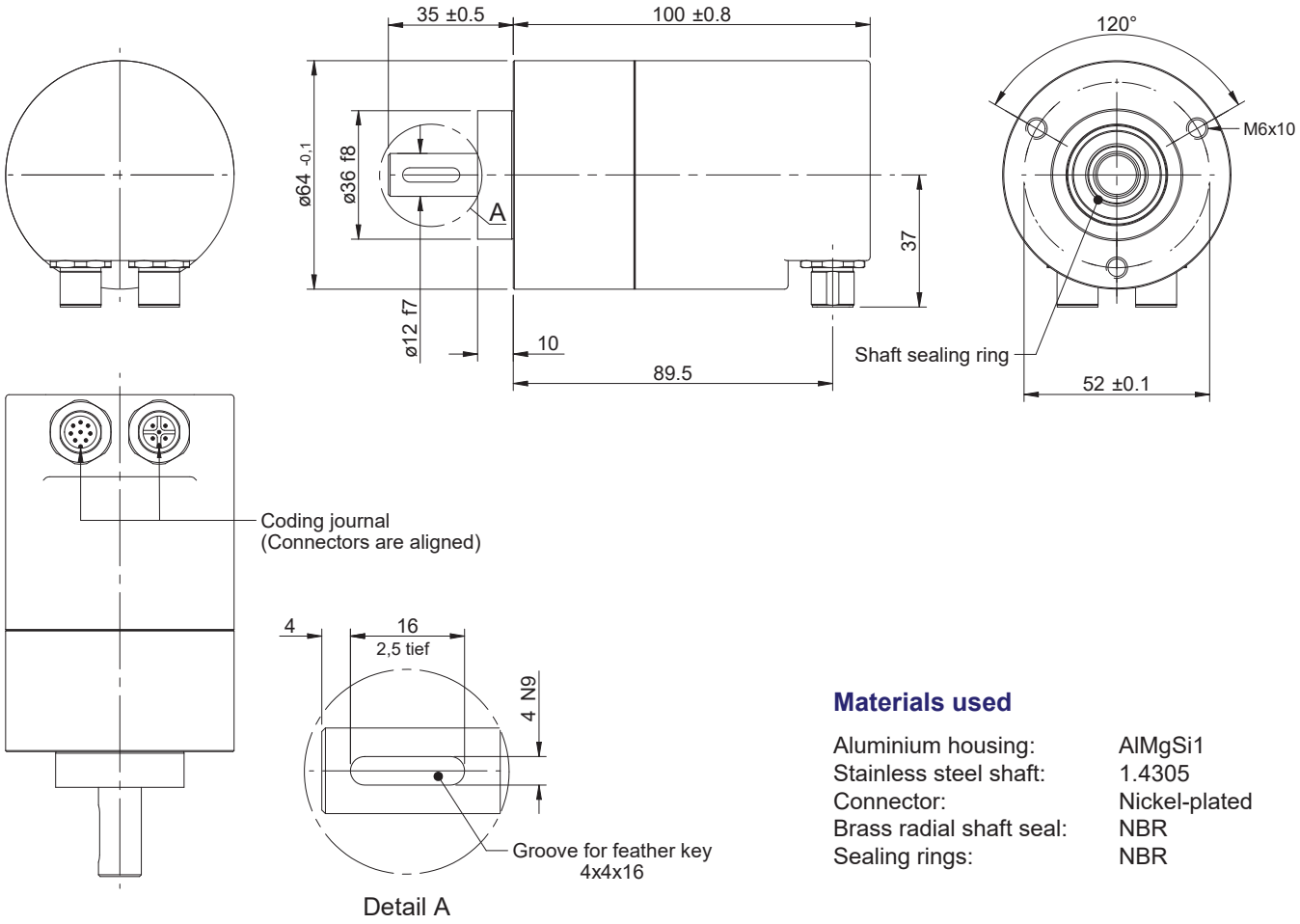


Installation drawings

further installation drawings on request

Model NOCN64-KP with 12 mm shaft with feather key and 2 connectors

Dimensions in mm



Materials used

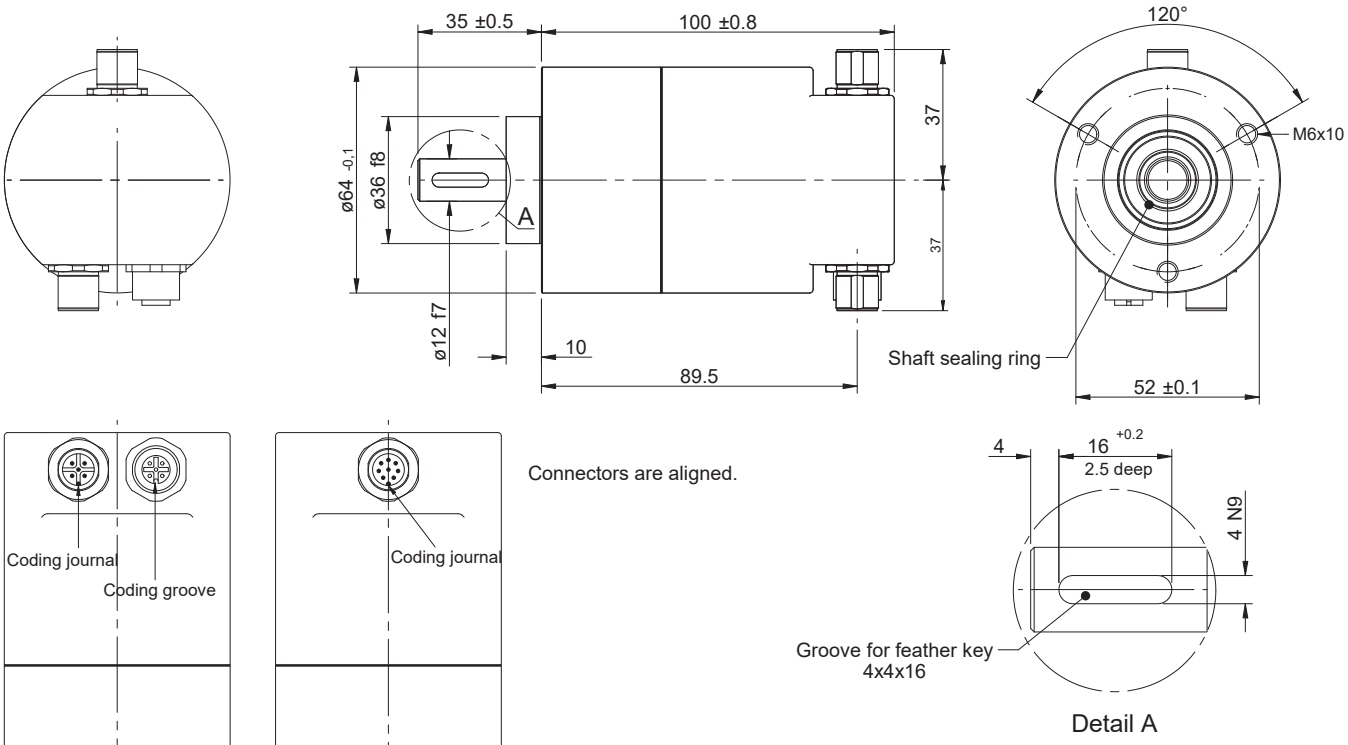
Aluminium housing:	AlMgSi1
Stainless steel shaft:	1.4305
Connector:	Nickel-plated
Brass radial shaft seal:	NBR
Sealing rings:	NBR

Installation drawings

further installation drawings on request

Model NOCN64-KP with 12 mm shaft with feather key and 3 connectors

Dimensions in mm



Connectors are aligned.

Detail A

Materials used

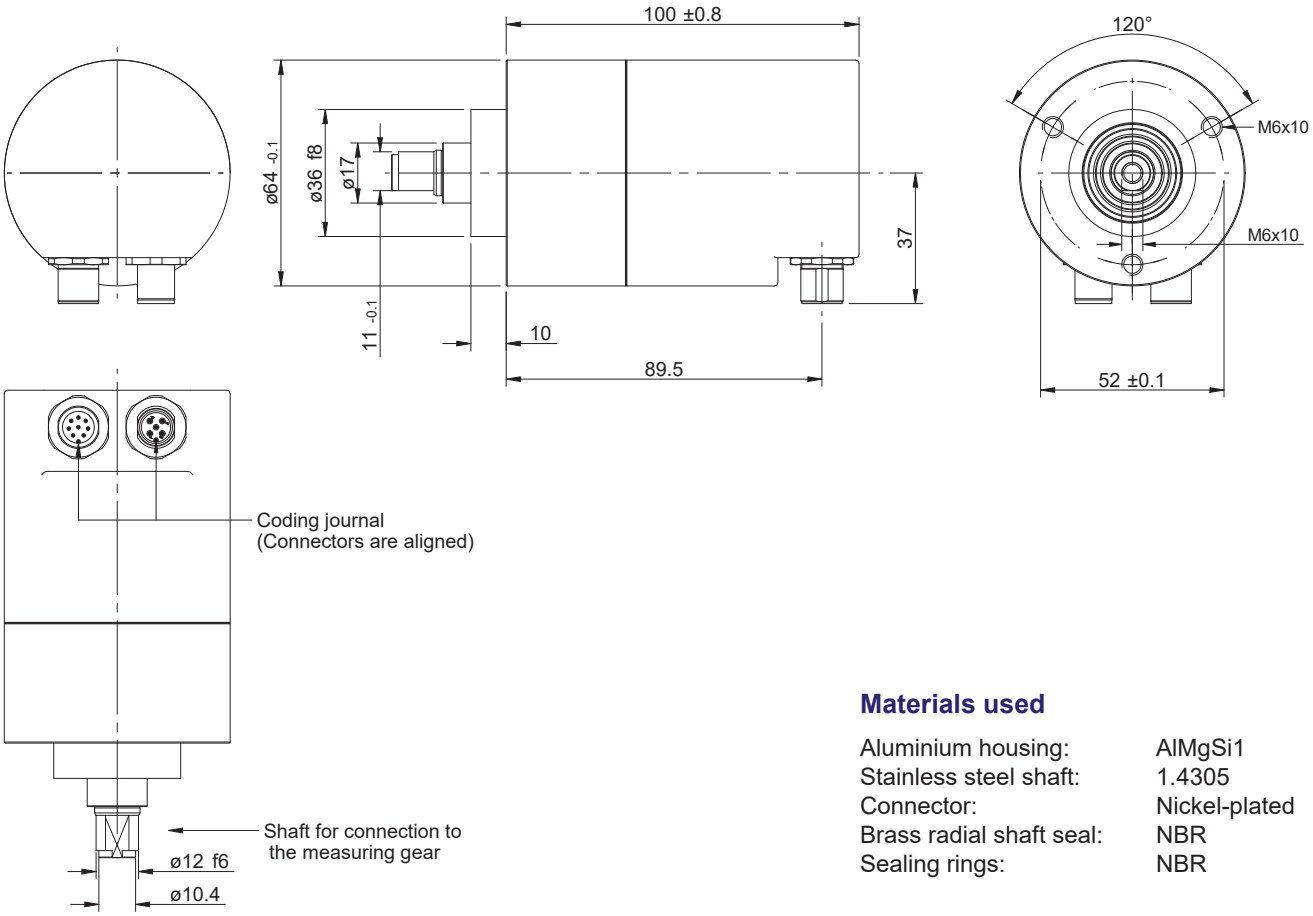
Aluminium housing:	AlMgSi1
Stainless steel shaft:	1.4305
Connector:	Nickel-plated
Brass radial shaft seal:	NBR
Sealing rings:	NBR

Installation drawings

further installation drawings on request

Model NOCN64-KZ with shaft for TWK play-compensating toothed gear ZRS

Dimensions in mm



Materials used

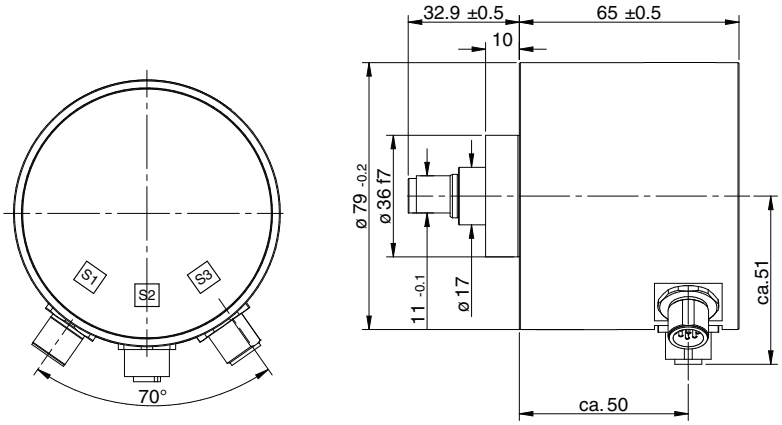
Aluminium housing:	AlMgSi1
Stainless steel shaft:	1.4305
Connector:	Nickel-plated
Brass radial shaft seal:	NBR
Sealing rings:	NBR

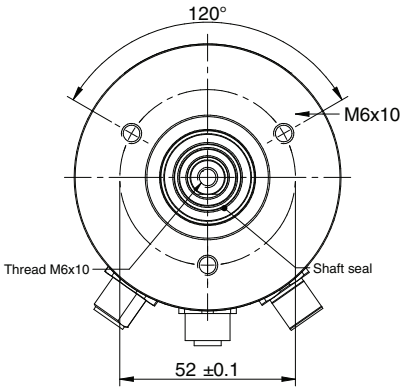
Installation drawings - model 79

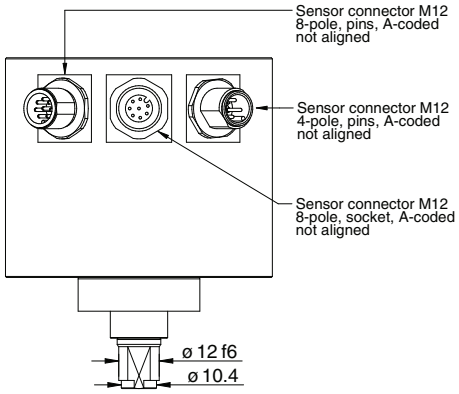
special version on request

Model NOCN79-KZ (3 connectors, radial)

Dimensions in mm







Connector selection exemplary

Materials used

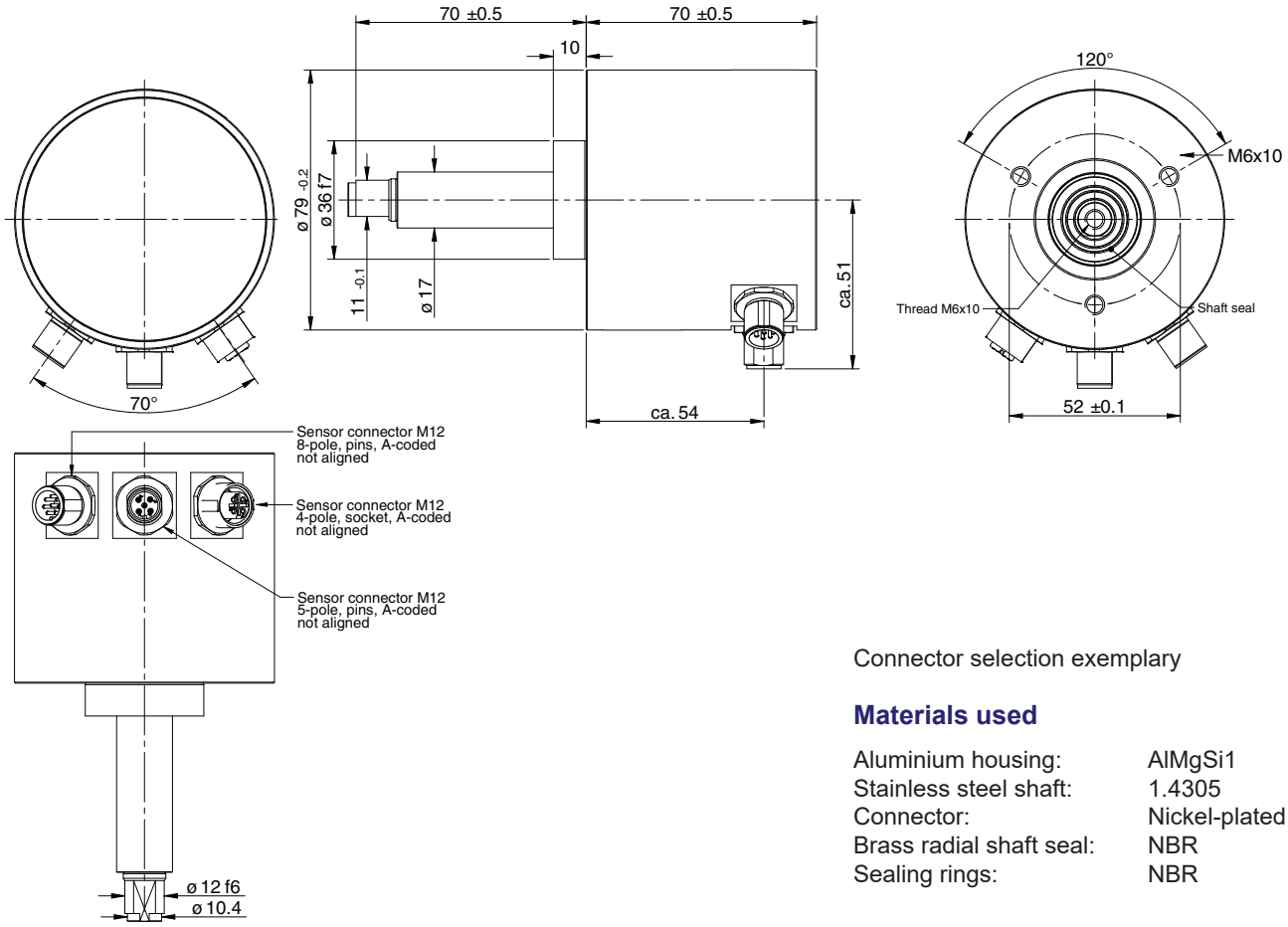
Aluminium housing:	AlMgSi1
Stainless steel shaft:	1.4305
Connector:	Nickel-plated
Brass radial shaft seal:	NBR
Sealing rings:	NBR

Installation drawings - model 79

special version on request

Model NOCE79-KZ (3 connectors, radial) → version with extended shaft

Dimensions in mm



Connector selection exemplary

Materials used

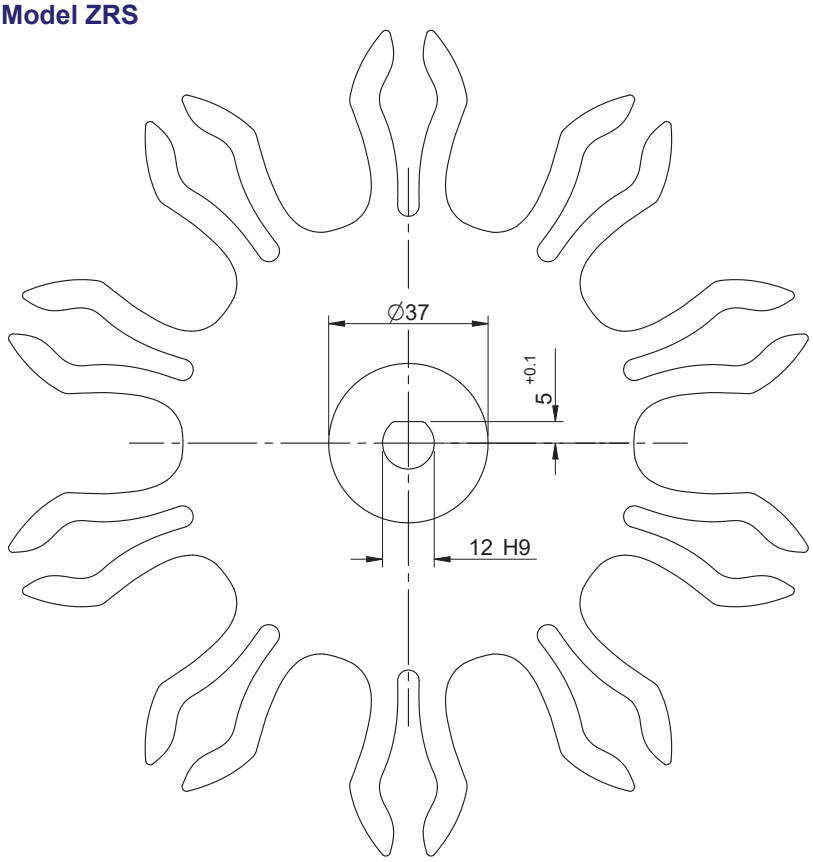
Aluminium housing:	AlMgSi1
Stainless steel shaft:	1.4305
Connector:	Nickel-plated
Brass radial shaft seal:	NBR
Sealing rings:	NBR

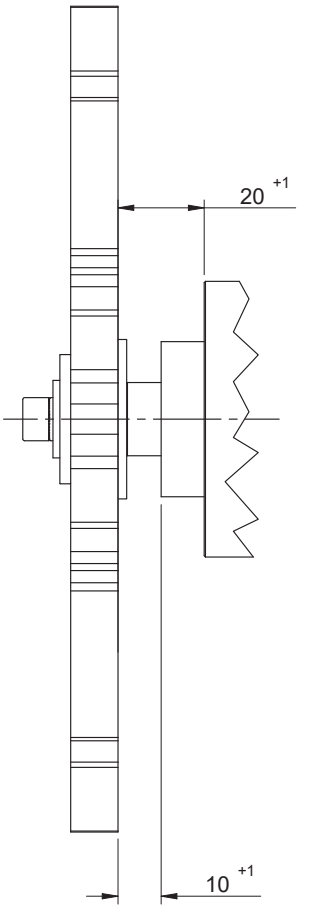
Play-compensating toothed gear ZRS

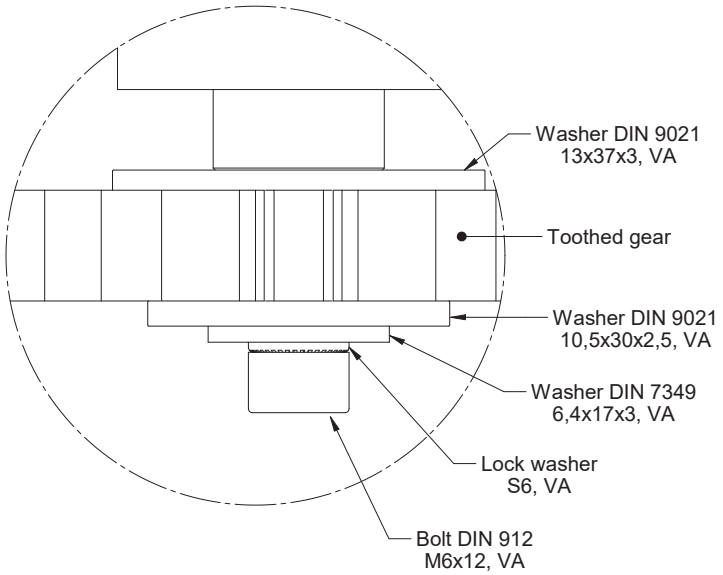
A 'play-compensating toothed gear' ZRS is available to mechanically drive the switching cam encoder shaft on a ring gear (slewing ring) or a rack without play. Different modules and numbers of teeth are available. ZRS material: polyamide. Also see data sheet ZRS11877. Mechanical connection necessitates a specific shaft version. Standard involute tooth gears (not play compensating) are available at TWK under the name ZRM (ZRM13229).

Installation recommendation: tighten 6 mm bolt to a torque of 6 Nm and secure with Loctite (medium adhesive strength).

Model ZRS







Order code number

ZRS - 12 - 10 - A 01		
		Variants **:
		A 01 Standard
		Teeth:
	10	No. of ZRS teeth *
	Module:	
12	5 to 24 *	
Model:		
ZRS	toothed gear, play-compensating model	
ZRM	toothed gear, standard model (involute)	

*: Other values on request

**: Please contact our technical support to select the required measuring gear.