

Play-free digital switching cam encoder with digital electromagnetic rotary encoder Model NOCIO S0 / S3



- Play-free digital version for use instead of electromechanical switching cam encoders
- For use in stationary and mobile machines and systems, especially for wind power plants, power plants, cranes, etc.
- Integrated safety (SIL2, PLd) multiturn rotary encoder with standard IO-Link Interface
- Switching outputs electronically controlled by shaft position or shaft speed/acceleration
- Two safety switching output (forcibly driven safety relay)
- Switching outputs and IO-Link position signal can be preset and adjusted via IO-Link
- High vibration and shock resistance thanks to robust design
- UL® certification
- Presettings ex works possible (e.g. especially for position or speed/acceleration trip)



Design

Robust aluminium (AlMgSi1) or stainless steel (1.4305 or 1.4404) housing in dual-chamber design. Shaft with shaft seal and ball bearing mounted in pre-chamber. Electronics housed in sealed main chamber.

Ø 79 mm with short design length.

Shaft diameter 12 mm. Electrical connection for voltage supply, switching outputs and IO-Link position data via M12 connector or cable. The number of connectors or cables varies depending on design or customer specification.

Safety switching contacts are designed with a forcibly driven safety relay connected in series with a second relay to guarantee reliable contact separation (no contact sticking). The contact is galvanically separated to the electronic for high EMC resilience and suitable for use in the safety chain. The **non-safety switching contact** (if applicable) is designed with a standard relay with high reliability.

The switching contact is closed during normal operation (logic state TRUE), and therefore establish a conductive connection - the relay coils are live (normally open → NO). If the limit values are reached, the contact is opened (logic state FALSE). It is also opened when the switching cam encoder NOCIO is not connected to the voltage supply or a fault is detected in the NOCIO due to self diagnosis.

The control contact of the safety relay is used to ascertain the switching status. The controller generates an error message in the event of relay faults. The integrated **relay monitoring** function continuously compares whether the specified ON/OFF switching status of the safety switching contact is correct (nominal/actual comparison). If a deviation is detected the device will go into a fault state and the contact will open.

NOCIO relay output can be controlled / triggered by **shaft position and / or shaft speed/acceleration**.

Therefore a number of parameters can be transmitted via IO-Link to adjust NOCIO to the application.

Description

General functional principle

The NOCIO79 device is a safety construction according to IEC 61508 and ISO 13849 with the related safety values.

This involves a play-free electronic switching cam encoder (abbreviated to: NOCIO) with two galvanically separated safety switching outputs (SIL 2 and PLd) that can be configured by the customer. The outputs are activated or deactivated depending on the position of the drive shaft or its speed and acceleration behaviour. A parameterisable multivalue absolute encoder with IO-Link interface and the switching cam encoder with separate controller are integrated in the compact housing. Via the IO-Link interface several parameterizations can be done.

A special shaft design appropriate to the play-compensating measurement gear ZRS is available ("Z").

The supply voltage, IO-Link signal and safety switching contact are each galvanically separated from one another.

NOCIO has a number of error detection procedures and self diagnosis functions due to safety design. Any detected error (at encoder and cams) are displayed by transmitting an error message via IO-Link and by opening of the safety contact. Errors are recorded in a device error history object (0x1003) for diagnosis.

The NOCIO-internal temperature is output via IO-Link process data.

The parameters (limits etc.) can be set only when the rotating speed of the encoder shaft $v_s \approx 0$. Otherwise the parameters were not adopted and the valid flags xxFE cannot be set A5 for operation. An error message is generated.

Rotary encoder

The rotary encoder has a standard IO-Link interface (no safety IO-Link protocol). Its resolution is up to 15(16) bits / 360° with a measuring range of 4096 revolutions (process data output resolution can be reduced, e.g. 13 bits). The IO-Link position value can be referenced / preset using IO-Link protocol. The signal path (CW/CCW) can be set.

A speed and acceleration signal in the IO-Link output is provided at NOCIO79. The speed and acceleration signal can trigger the switching outputs as well in addition to the position value.

Switching outputs (→ cams)

Potential-free, galvanically separated switching processes in the application can be controlled with the electronically activated cams which control the safety contact.

The safety switching outputs are implemented using forcibly driven safety relays with a long service life. The safety contacts consist of 2 relays contacts connected in series. These two relays switch with a brief offset (in the millisecond range). This measure guarantees reliable contact separation - even if there is a risk of contact sticking due to high applied voltages and currents. A separate controller unit monitors the function of the switching outputs. If incorrect switching is ascertained, this is detected as an error and will be output.

The switching contacts are normally open contacts. In normal operating state - without the limits having triggered by position or by speed/acceleration - the contact is closed and the relay coils are live. They open when the position / speed / acceleration limits are reached, a fault is ascertained, the supply voltage is too low or if the NOCIO is shut off completely.

The triggering limits (low- and high limits) can be parameterized via IO-Link. Customer-specific switching procedures can also be implemented in the factory.

The switching information for the cams/relays is taken from the rotary encoder. The switching outputs are activated and deactivated without play, electronically and wear-free in comparison with an electromechanical switching cam encoder. A small hysteresis is implemented to avoid contact flickering.

Direct and alternating voltage can be switched.

The contact do not switch if there is no operating voltage. In this case, the switching contacts are open. The current is interrupted.

Different connector assignments are possible at the customer's request.

Safety parameters

Standard ISO 13849-1:2015 (calculated, certification in progress)

- Category: 2
- MTTFd @ +65 °C: 100 a (calculated: 303 a)
- CCF: fulfilled
- DC [%] @ +65 °C: 90.46
- PL: d

Standard IEC 61508:2010 (certification in progress):

- PFH = tbd
- SFF = tbd
- HFT = 0
- SIL2


Digital switching cam encoder - model NOCIO S0 / S3

Technical data

UL® standards and definitions

- NOCIO certified according to standard UL61010-1
- UL certificate number: E517808
- NOCIO enclosure rating: TYPE 1
- For use in wet locations (max. voltage/current ratings at connectors S1 and S2 as mentioned below)
- NOCIO power supply according to
 - LEC/LPS/Class2 (directly connected to IOL-connector S1 and relay-connector S2)
 - or SELV with using a current breaker according to UL61010, table 18, $\leq 8.33 \text{ A @ 24 VDC}$

Electrical data

- Sensor system: Magnetic
- Operating voltage range: 18 ... 30 VDC
- Power consumption: < 2.3 W
 UL® : Use power supply according to IEC 60950-1 / VDE 0805 **SELV** with using a current breaker according to UL61010, table 18, $\leq 8.33 \text{ A @ 24 VDC}$ ($\leq 120 \text{ s}$) or **LEC/LPS/Class2** (directly connected to IOL-connector S1 and relay-connector S2)
- Switch-on current: < 500 mA
- Resolution position output: 32,768 steps / 360° (up to 65,536 steps / 360° on request)
- Resolution speed: Corresponding to "speed gate time", "speed multiplier" and "speed divider" which can be defined via IO-Link parameters by customer. Calculation basis: 15 or 16 Bits (speed is calculated by position difference within gate time, actualized every 1 ms)
- Resolution acceleration: Depending on "resolution speed" and parameter settings "acceleration"
- Measuring range: 4096 revolutions (optionally 256 or 16 revs.)
- Output code: Binary
- Absolute accuracy: $\pm 0.2 \% / 360^\circ$
- Repeatability: $\pm 0.05 \% / 360^\circ$
- Accuracy of position sensor read out: Equidistance = 1 ms $\pm 2 \mu\text{s}$ on time scale (important for exact speed calculation)
- Code path: CCW (adjustable)
- Actualization time: 1 ms (for position, speed and acceleration)
- EMC standards: See separate table on page 5
- Electrical connection: M12 connectors (4-pole male (IO-Link) and 5-pole female (contacts)). Optional: cable
- IO-Link Interface: IEC 61131-9
- Port class: A (option: class B) - class A can be connected to class B master ports as well
- Specification: Version 1.1.2 (1.1.3 in preparation)
- Communication: COM3 (230.4 kBaud)
- Cycle time: < 5 ms
- Parameters: Details in handbook/specifications NOC15597

Electrical data of the switching relay outputs

- Maximum switching ratings at DC*: max. 35 Vdc @ 0.5 A (resistive or inductive** load)
- Maximum switching ratings at AC*: max. 16 V (rms) @ 0.15 A or 22.6 V (peak) @ 0.15 A



UL® : All voltages shall be Class 2, LEC or LPS!

- Switching time: ~15 ms (after recognition of exceeding a limit)
- Switching hysteresis: 10 digits to avoid contact rattling (pos./speed/acc.), can be set by customer.
- Maximum ON resistance ~0.5 Ohms

* : Power supply requirement: LEC/LPS/Class2 or SELV with current breaker

** : Surge protection at load (e.g. coil) recommended, e.g. suppressor diode

Digital switching cam encoder - model NOCIO S0 / S3**Technical data****Overall system**

- On-time (rise time) of supply voltage: 500 ms (10% to 90%) required
- Storage cycle time: 3 s per storage cycle
- Set-up time: ~ 2 s in the operating temperature range
- Time between detection of an error and output:
 - 100 ms (voltage supply)
 - 300 ms (relay check)
 - Several seconds
 - (RAM: Test is done during normal operation of NOCIO permanently/cyclically)
 - 2 s (ROM test (within set-up time))
- Safety standards: EN ISO 13849-1: 2015 and IEC 61508:2010
- Maximum usage duration: 20 years (25 years on request)

Mechanical data

- Operating speed: 1000 rpm max.
- Angular acceleration: 10^5 rad/s² max.
- Moment of inertia (rotor): 20 gcm²
- Operating torque: ≤ 8 Ncm (with rotational speed 500 rpm)
- Starting torque: ≤ 4 Ncm
- Perm. shaft load: 250 N axially, 250 N radially
- Bearing service life: ≥ 10⁹ Revolutions
- Weight:
 - Approx. 0,6 kg (aluminium)
 - Approx. 1.3 kg (stainless steel)

Environmental data

- Operating (ambient) temperature range: -40°C to +65°C
- Storage temperature range: -45°C to +70°C
- Resistance:
 - To shock: 300 m/s², 6 ms, (DIN EN 60068-2-27) per 100 x in 3 axes
 - To shock (continuous): 150 m/s², x ms, (DIN EN 60068-2-27) per 100 x in 3 axes
 - To vibration: 100 m/s², 5 Hz ... 2000 Hz, (DIN EN 60068-2-6) per 1 h in 3 axes
- Protection type: IP67 (DIN EN 60529) (not evaluated by UL)
- Humidity: 10 to 95 % condensing
- Altitude: ≤ 2000 m
- Power frequency magnetic field immunity test (EN 6100-4-8):
 - 30 A/m, test criterion A (±8 digit at 13 Bits output resolution)
 - 100 A/m, test criterion B

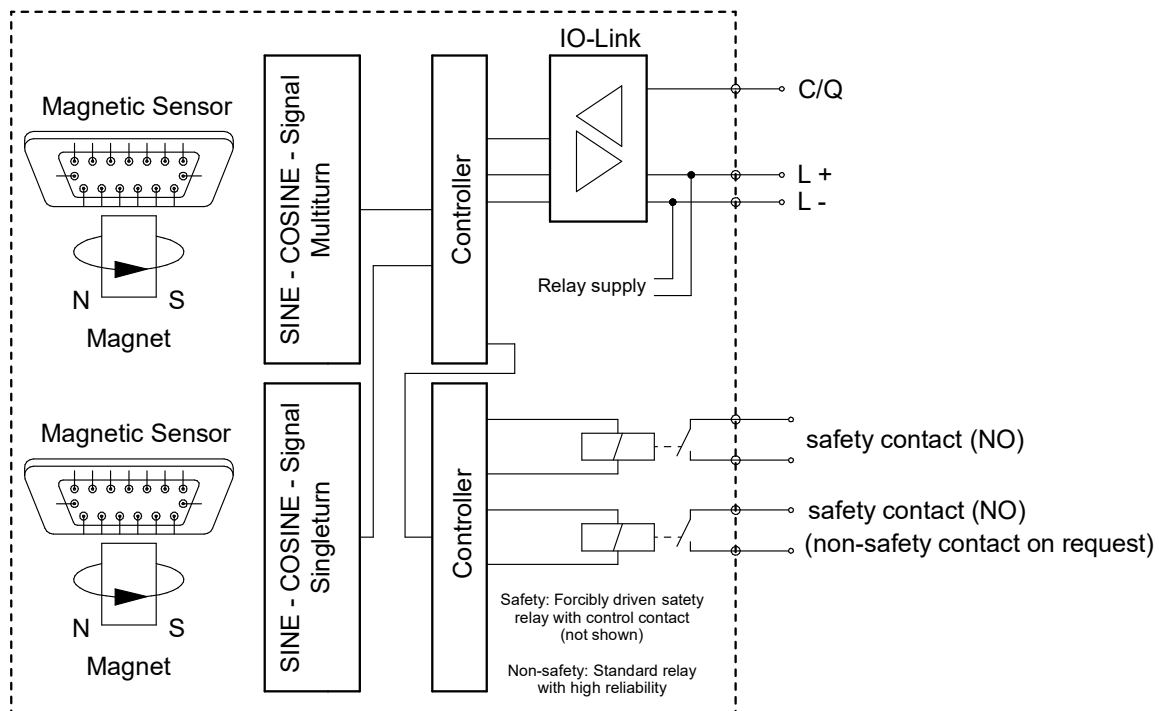
Digital switching cam encoder - model NOCIO S0 / S3

Technical data

EMC standards

EN 61000-6-4:2006 + A1:2011	EMC Part 6-4: Generic standards-Emission 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 laboratory 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

Principle circuit diagram (simplified)



Digital switching cam encoder - model NOCIO S0 / S3

Order number

NOCIO	79	-	KZ	A	2	-	32768	R	4096	S0	T2	L	01	→ Standard version																	
<p>Electrical and mechanical variants*</p> <p>01 Standard version xx Further versions on customer request</p> <p>Output:</p> <p>L IO-Link</p> <p>Electrical connection:</p> <p>2 2 connectors T Via device connector M12, axial</p> <p>Profile:</p> <p>S0 Safety design with safety switching outputs S3 SIL2 / PLd certified according to this datasheet Both options: standard IO-Link interface</p> <p>Measuring range:</p> <p>4096 Revolutions</p> <p>Code:</p> <p>R R = Binary</p> <p>Resolution:</p> <p>32768 Steps / 360°. 4096, 16,384, 32,768, 65,536 steps / 360° also possible</p> <p>Number of switching outputs:</p> <p>2 Two switching outputs (2 x safety or 1 x safety and 1 x non-safety on request)</p> <p>Housing material:</p> <p>A Aluminum S Stainless steel 1.4305 V Stainless steel 1.4404</p> <p>Flange and shaft:</p> <table border="0"> <tr> <td>K</td> <td>Clamped flange</td> <td>Shaft 12 mm with flattened area</td> </tr> <tr> <td>KP</td> <td>Clamped flange</td> <td>Shaft 12 mm with feather key</td> </tr> <tr> <td>KZ</td> <td>Clamped flange</td> <td>Shaft 12 mm for measurement gear</td> </tr> <tr> <td>S#</td> <td>Synchroniser flange</td> <td>Shaft 12 mm with flattened area</td> </tr> <tr> <td>SP#</td> <td>Synchroniser flange</td> <td>Shaft 12 mm with feather key</td> </tr> <tr> <td>SZ#</td> <td>Synchroniser flange</td> <td>Shaft 12 mm for measurement gear</td> </tr> </table> <p>Design form:</p> <p>79 Ø 79 mm</p>														K	Clamped flange	Shaft 12 mm with flattened area	KP	Clamped flange	Shaft 12 mm with feather key	KZ	Clamped flange	Shaft 12 mm for measurement gear	S#	Synchroniser flange	Shaft 12 mm with flattened area	SP#	Synchroniser flange	Shaft 12 mm with feather key	SZ#	Synchroniser flange	Shaft 12 mm for measurement gear
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NOCIO Electronic switching cam encoder with IO-Link Interface																															

On request

* 01: Basic versions according to this data sheet. Deviations are identified with a variant number, for example when the cams shall have certain presettings ex works.

Digital switching cam encoder - model NOCIO S0 / S3

Accessories (selection)

partially not UL certified

Mating connectors

STK4GS60	M12, 4-pin, female, A-coded, straight - datasheet STK14572
STK5GS56	M12, 5-pin, female, A-coded, straight
STK8GS54	M12, 8-pin, female, A-coded, straight - datasheet STK14567
STK4GP115	M12, 4-pin, male, A-coded, straight
STK5GP90	M12, 5-pin, male, A-coded, straight
STK8GP99	M12, 8-pin, male, A-coded, straight
STK4WS61	M12, 4-pin, female, A-coded, angled - datasheet STK14675
STK8WS86	M12, 8-pin, female, A-coded, angled



Cable

KABEL-X-232	M12 Connector Pin (M12-A coded) to M12 Connector Socket (M12-A coded) X: length of cable (1m / 2m / other lengths on request)
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Couplings

BKK	Folding bellows coupling, all stainless steel - datasheet BKK11840
BKA	Folding bellows coupling, aluminium and stainless steel - datasheet BKA15029
KK14N	Clamp coupling, see data sheet - datasheet KK12301



Toothed gears

ZRS	Play-compensating toothed gear - datasheet ZRS11877
ZRM	Involute toothed gear (on request)

Digital switching cam encoder - model NOCIO S0 / S3

IO-Link Interface - general

Registered trademark of IO-Link Community

Function

To register and output the angle or position of the shaft more accurately, the contactless electromagnetic sensor system is equipped with a serial *IO-Link* interface so that the measured variable is available as digital, serial data.

IO-Link is not a bus system, but a point-to-point connection between the IO-Link device and a link device, called IO-Link master. The IO-Link master communicates with the IO-Link devices, collects data from them and transmits the data to the higher-level bus system (Fieldbus) or to the Industrial Ethernet.

IO-Link interface complies to (www.io-link.com)	<ul style="list-style-type: none"> ■ Programmable encoders IEC 61131-9 ■ Programmable controllers IEC 61131-2 ■ Specification "IO-Link Interface and System", Version 1.1.2 (1.1.3 in preparation) ■ IO-Link Design Guideline, Order No. 10.912 ■ IO-Link Common Profile – Specification V1.0, Order No. 10.072
Input data	<ul style="list-style-type: none"> ■ 4 bytes position data (format: unsigned) ■ 2 bytes speed data (format: signed) ■ 2 bytes acceleration data (format: signed) ■ 2 byte temperature data of main controller (unit °C, resolution: 0.1 °C / digit) ■ 1 status word
Output data	<ul style="list-style-type: none"> ■ 1 control byte
LED	<ul style="list-style-type: none"> ■ 3 LEDs (see table below)
Software	<ul style="list-style-type: none"> ■ IODD file, IO-Link device description on request ■ FW file, Firmware update file on request
Handbook	<ul style="list-style-type: none"> ■ NOC15597

Diagnosis LEDs

Device LED	Relay 2 LED	Relay 1 (safety) LED	Description
green / red	green	yellow	
green on			Operating voltage available
green flashing			Encoder exchanges data with master
red on			Encoder error (see handbook 15597 for details)
red flashing			Hard error (flashing codes see handbook 15597)
		on	Relay 1 (safety) contact is in condition TRUE (contact is closed)
	on		Relay 2 (safety or non-safety) contact is in condition TRUE (contact is closed)

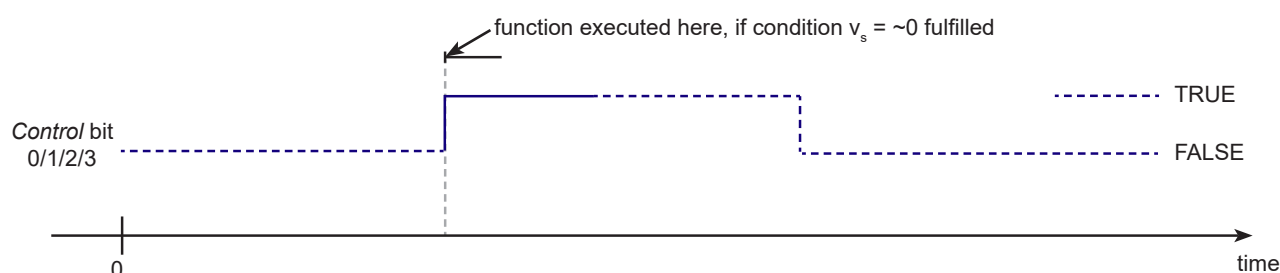
Status word *

	Bit	Description	IO-Link def.	
Byte 1	0	Cam1 limit status. Bit = 1 (TRUE): Low limit \leq value < high limit. Bit = 0 else. (If cam is not inverted)	15	Octet 0
	1	Cam2 limit status. Bit = 1 (TRUE): Low limit \leq value < high limit. Bit = 0 else. (If cam is not inverted)	14	
	2	Cam3 limit status. Bit = 1 (TRUE): Low limit \leq value < high limit. Bit = 0 else. (If cam is not inverted)	13	
	3	Cam4 limit status. Bit = 1 (TRUE): Low limit \leq value < high limit. Bit = 0 else. (If cam is not inverted)	12	
	4	Safety relay (1) status. Bit = 1 (TRUE): Relay = TRUE (=contact closed) All cams with "AND" combination: cam1 & cam2 & ... = TRUE \rightarrow Relay = TRUE	11	
	5	Relay (2) status. Bit = 1 (TRUE): Relay = TRUE (=contact closed) All cams with "AND" combination: cam1 & cam2 & ... = TRUE \rightarrow Relay = TRUE	10	
	6 & 7	reserved	9-8	
Byte 2	8	Encoder fault	7	Octet 1
	9	Bit = TRUE: Valid flag 11FE is set to A5 (parameterization is valid)	6	
	10	Bit = TRUE: Valid flag 30FE is set to A5 (parameterization is valid)	5	
	11 - 15	reserved	4-0	

Control byte

Bit	Description
0	Acknowledge limit trip "Safety relay" (1). Relay contact closes (TRUE), if all assigned cams are TRUE. Command will be accepted only at shaft speed $v_s = \sim 0$. If <u>both</u> conditions fulfilled, this command is executed immediately on rising edge.
1	Acknowledge limit trip relay 2. Relay contact closes (TRUE), if all assigned cams are TRUE. Command will be accepted only at shaft speed $v_s = \sim 0$. If <u>both</u> conditions fulfilled, this command is executed immediately on rising edge.
2	Application reset. All parameters are restored to factory default values (except I&M data). No IO-Link communication reset. Command will be accepted only at shaft speed $v_s = \sim 0$ and 11FE = 30FE = 0.
3	Position preset. Sets position value to "reference value" (parameter 1100/02) Command will be accepted only at shaft speed $v_s = \sim 0$. 11FE / 30FE = 0 or A5. If condition is fulfilled, this command is executed immediately on rising edge.
4 - 7	reserved

Diagram



Digital switching cam encoder - model NOCIO S0 / S3

Principle function diagram of cams and relays

See handbook 15597 for table of parameters

NOCIO provides 4 cams. A cam is a software module which compares the input signal (source) with limits which are deposit as a parameter set for each cam. For each different source (e.g. position, speed and acceleration) a set of limits is valid. Therefore these limits have to be adapted to the chosen source. The other cam parameters as well.

If no limit is exceeded the cam is in the TRUE state. If a limit is exceeded, the cam changes to the FALSE state. But this is only when the related cam is enabled via *Cam enable* (13x0/05). If not enabled the cam is always in the FALSE state, even it is inverted.

When a cam is inverted via *Cam polarity* (13x0/06) the TRUE and FALSE states are swapped. The actual state (limit exceeded or not) of each cam can be read out via *Cam state* (1300). In addition the state of each cam is displayed in the status word (bits 0 to 3). Cam = TRUE means status-bit = 1. The status bits and the status in object 1300 display always the actual state of the cams without regarding the *Acknowledge* command (30FC or bits 0/1 in control byte - see below), because the acknowledge command refers to the relay status only (set TRUE).

The relay outputs can be assigned to any cam (1 to 4) and to more than one cam simultaneously. This is done via object *Relay assign* (30x0/01). Therefore the relays can react to several cam limits and to several sources. The particular relay contact is closed (TRUE) when no limit is exceeded and therefore the cam(s) is (are) TRUE as well. It changes to the FALSE state by exceeding limits registered and indicated by the cams (FALSE). Therefore we have: *cam = TRUE* means *relay = TRUE* and vice versa. If a cam is inverted by 13x0/06 (cam polarity) the cam is FALSE when no limit is exceeded and TRUE when source value is outside the limits.

If a relay is assigned to more than one cam, the cams are combined with logical "and" (&) → relay = TRUE when cam1 & cam2 & ... = TRUE.

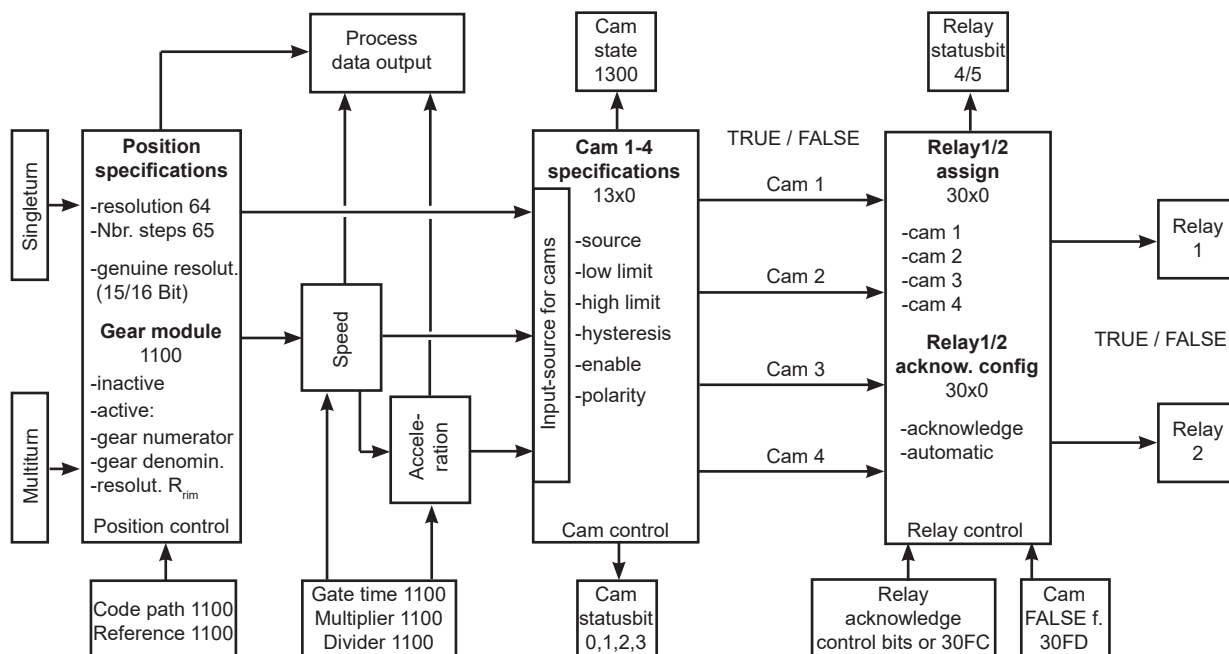
The state of each relay can be supervised by status bit 4 (relay 1) and status bit 5 (relay 2) in the status word. In addition the reset behaviour of a relay can be determined via object 30x0/02: *Automatic* or *Acknowledge*. At *automatic* the relay changes to the state TRUE as soon as no limit of the assigned cams is exceeded any more (related cam = TRUE. Be aware of cam polarity). At *acknowledge* the user has to send the *acknowledge command* (via 30FC or bit 0/1 in control byte) to set relays TRUE again. But the relay(s) change(s) to the state TRUE only when all related cams = TRUE.

If 30x0/02 is set to "1" (=acknowledge) after boot up of NOCIO the acknowledge command has to be sent to NOCIO once to set the relay to condition TRUE (NOCIO = "operational").

The relays can be tested at any time (and state of NOCIO) via object *Cam FALSE forcing* (30FD). The PLC or safety chain has to ignore the relay trip in case of test. This object has no influence on the relays directly but on the cams. To do the test, the relay(s) have to be TRUE – means the relays are assigned to one/more cams with are (all) TRUE and valid flags are set "A5". With 30FD the cam(s) are set to FALSE by force (input "1" for related cam(s)). Therefore the relay goes into condition FALSE and the user can see that the contact opens properly. After that the user inputs "0" for the related cam(s) (at any time later) for setting the cam(s) TRUE again. Relay closes again after acknowledge command (if ackn. = active) and test is done.

With the gear module (1100/09/A/B) the user has the possibility to calibrate the outputs signals (position/speed/acceleration) to the rim of a gearbox (rim / pinion) to which the shaft (pinion) of the NOCIO is mechanical connected to. The number of teeth of rim and pinion and the desired output resolution has to be inserted in the gear module. It can be activated / deactivated.

See handbook 15597 for the full list of parameters and the safety parameterization process (CRC checksums, etc.)



Digital switching cam encoder - model NOCIO S0 / S3

Electrical connection

Pin configuration and numbering

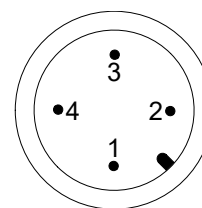
Viewed looking at the contact side of connectors / sockets installed in the NOCIO.
Depending on customer specifications, the use of different M12 connectors with individual assignment is possible.
Please always note the connection assignment TY which is enclosed with each device.

M12 connectors, A-coded

Connector IO-Link Class A - S1

PIN	Connector S1 (pins - male)
1	L+ / Operating voltage + V_s
2	I/Q (DI/DO (digital I/O)) / Not used
3	L- / Operating voltage - V_s
4	C/Q / IO-Link Interface

M12 male



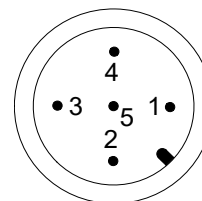
This connector can be connected to Class B port at master as well

Class B connection at NOCIO available only after consulting TWK

Connector for switching contacts - S2

PIN	Connector S2 (socket - female)
1	Safety contact (13) - normally open *
2	Contact relay 2 (23) - normally open *
3	Safety contact (14) - normally open *
4	Contact relay 2 (24) - normally open *
5	not connected

M12 female



*: Normally open (NO) is meant physically (relay). When NOCIO is in normal operation state and no limit is exceeded the contact is closed → normally closed (NC) at normal operation (working area).

Cable

Cable for IO-Link interface: 3 or 5-wire (class A or B), not twisted and not shielded possible

Cable for switching contacts: 2 or 4 wire, not twisted and not shielded possible



Only user CYJV/PVVA cables for connection!

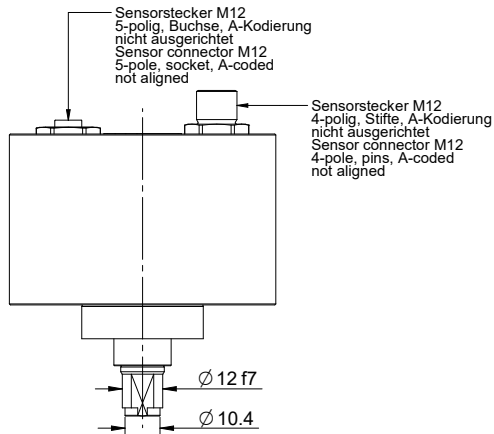
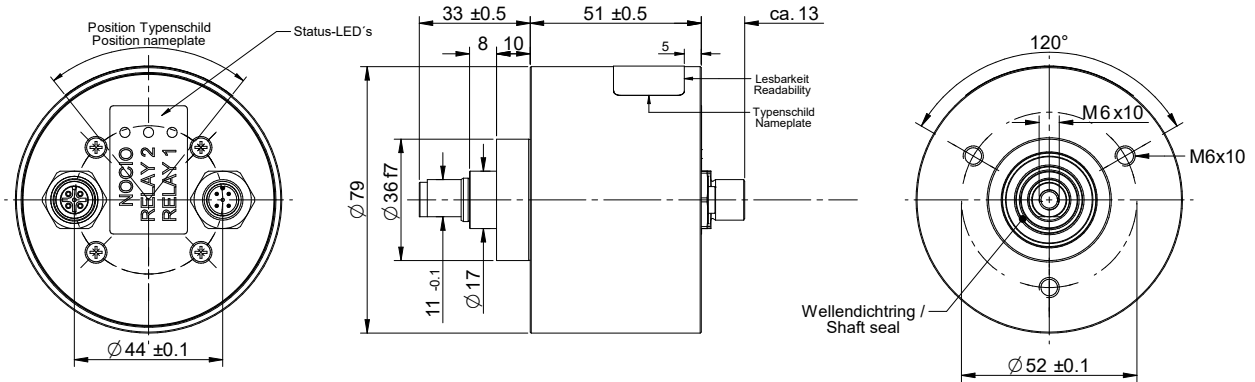
Please only use cables with appropriate cross section and max. temperature rating (min. 75°C!)

Digital switching cam encoder - model NOCIO S0 / S3

Installation drawing

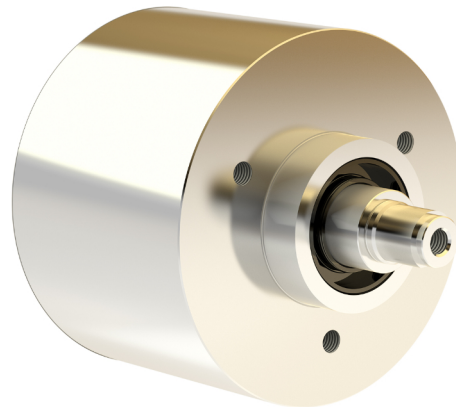
Model NOCIO79-KZx2-xxxx R 4096 Sx T2 Lxx

Dimensions in mm



S1 = sensor connector M12 (4-pole plug), power / data
 S2 = sensor connector M12 (5-pole socket), switching outputs
 Connectors are not aligned

Longer shaft on request



Materials used

Aluminium housing:	AlMgSi1
Stainless steel housing:	1.4305 or 1.4404
Stainless steel shaft:	1.4305
Connectors / cable gland:	Brass, nickel plated or Diecast zinc, nickel plated or Stainless steel
Shaft seal:	NBR
Sealing rings:	NBR

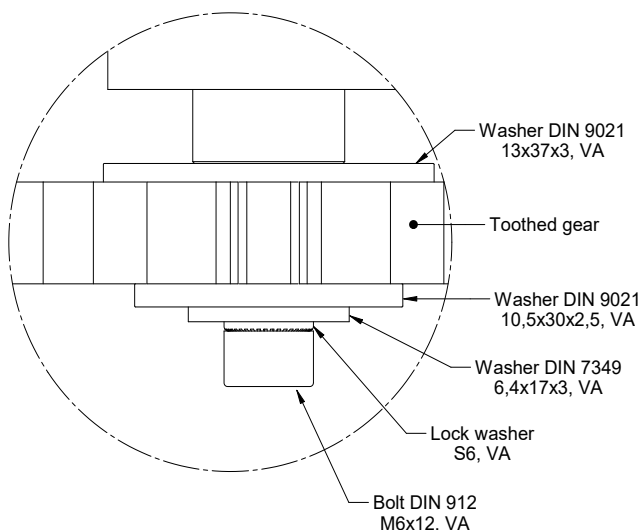
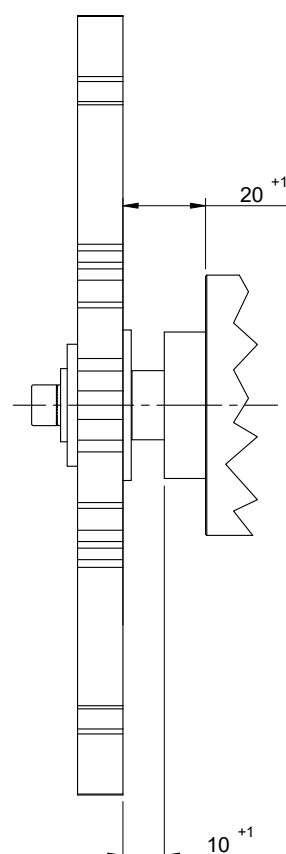
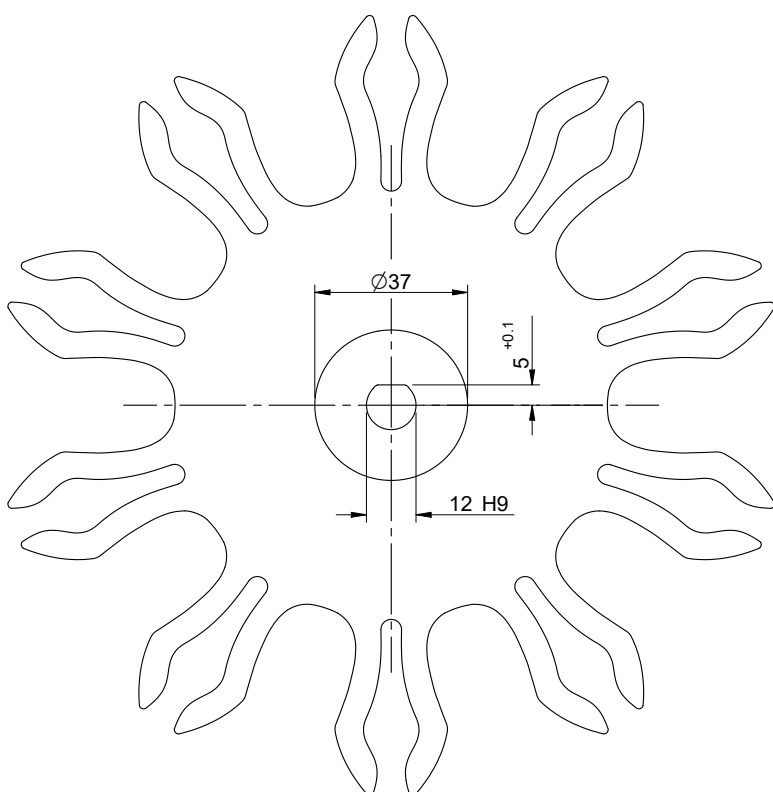
Digital switching cam encoder - model NOCIO S0 / S3

Play-compensating measurement gear ZRS

to order separately if required - not UL capable

To mechanically drive the switching cam encoder shaft without play on a ring gear (slewing ring) or a toothed rack, we offer a 'play-compensating measurement gear' ZRS. Different modules and numbers of teeth are available. ZRS material: polyamide. See also data sheet [ZRS 11877](#). Mechanical connection necessitates a specific shaft design (version -xZxx- at NOCIO).

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



Order number

ZRS - 12 - 10 - A 01

variants **:

A 01 Standard

Number of teeth :

10 Teeth *

Module:

12 5 to 24 *

Model:

ZRS Play-compensating measurement gear

*: Further values on request

**.: Please contact our technical staff to adapt the measurement gear to your requirements.