



ABSOLUTE ROTARY ENCODER PURE CANOPEN



Main Features

- Compact and heavy-duty industrial design
- Interface: CANopen / CAN
- Housing: 58 mm Ø
- Solid / hollow shaft: 6 or 10 mm Ø / 15 mm Ø
- Max. 65536 steps per revolution (16 Bit)
- Max. 16384 revolutions (14 Bit)
- Code: Binary

Software Features

- Direction of rotation (complement)
- Resolution per revolution
- Total resolution
- Preset value
- Two limit switches
- Baudrate and CAN-identifier
- Transmission mode: Polled mode, cyclic mode, sync mode

Mechanical Structure

- Aluminium flange and housing
- Stainless steel shaft
- Precision ball bearings with sealing or cover rings
- Code disc made of unbreakable and durable plastic

Electrical Features

- Temperature insensitive IR-opto-receiver-asic
- Highly integrated circuit in SMD-technology
- Polarity inversion protection
- Over-voltage-peak protection

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Technical Data

Electrical Data

Interface	Transceiver according ISO 11898, galvanically isolated by opto-couplers
Transmission rate	max. 1 MBaud
Device addressing	programmable via SDO telegrams
Supply voltage	10 - 30 V* DC (absolute limits)
Current consumption	max. 230 mA with 10 V DC, max. 100 mA with 24 V DC
Power consumption	max. 2.5 Watts
Step frequency LSB	800 kHz
Accuracy of division	$\pm 1/2$ LSB (12 bit), ± 2 LSB (16 bit)
EMC	Emitted interference: EN 61000-6-4
	Noise immunity: EN 61000-6-2
Electrical lifetime	$> 10^5$ h

*Absolute rotary encoders should be connected only to subsequent electronics whose power supplies comply with EN 50178 (protective low voltage)

Mechanical Data

Housing	Aluminum
Lifetime	Dependent on shaft version and shaft loading – refer to table
Max. shaft loading	Axial 40 N, radial 110 N
Inertia of rotor	$\leq 30 \text{ gcm}^2$
Friction torque	$\leq 3 \text{ Ncm}$ (without shaft sealing)
RPM (continuous operation)	Singleturn: max. 12,000 RPM
	Multiturn: max. 6,000 RPM
Shock (EN 60068-2-27)	$\leq 100 \text{ g}$ (half sine, 6 ms)
Permanent shock (EN 60028-2-29)	$\leq 10 \text{ g}$ (half sine, 16 ms)
Vibration (EN 60068-2-6)	$\leq 10 \text{ g}$ (10 Hz ... 2000 Hz)
Weight (standard version)	Singleturn: $\approx 300 \text{ g}$
	Multiturn: $\approx 400 \text{ g}$

Flange	Synchro (S)		Clamp (C)	Hollow shaft (B)
Shaft diameter	6 mm	10 mm	10 mm	15 mm
Shaft length	10 mm	20mm	20 mm	-
hollow shaft depth min. / max.	-	-	-	15 mm / 30 mm

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Minimum (mechanical) lifetime

Flange	Lifetime in 10 ⁸ revolutions with F _a / F _r		
	40 N / 60 N	40 N / 80 N	40 N / 110 N
C10 (Clamp flange 10 x 20)	247	104	40
S10 (Synchro flange 10 x 20)	262	110	42
S06 (Synchro flange 6 x 10) without shaft sealing	822	347	133

S06 (Synchro flange 6 x 10) with shaft sealing: max. 20 N axial, 80 N radial

Environmental Conditions

Operating temperature	- 40 .. +85 °C*
Storage temperature	- 40 .. + 85 °C*
Humidity	98 % (without liquid state)
Protection class (EN 60529)	Casing side: IP 65
	Casing side: IP 54 (axial 9 pin D-Sub connector)
	Shaft side: IP 64 (optional with shaft sealing: IP 66)

* Cable exit: -30 ... + 70 °C (static), -5 ... + 70 °C (flexing)

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Interface

Configuration

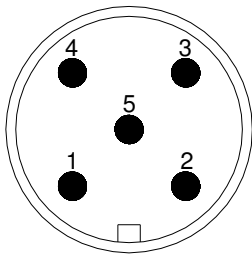
The standard configuration of the encoder is: node number 32 and baudrate 20KBaud. For adapting the encoder for a respective application the customer could use SDO telegrams. Valid baudrate range is 20 kBaud up to 1MBaud and for the node number from 0 to 89.

Remark: The encoder adds internal 1 to the adjusted device address.

Electrical Interface

The encoder can be connected in the following versions: 5 pin circular plug M12 or as cable exit.

Signal	5 pin circular connector	Open cable
(CAN Ground)	1	green
24 V power supply	2	white
0 V power supply	3	brown
CAN High	4	yellow
CAN Low	5	pink



Bus in

5 pin circular connector M12

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Programmable Encoder - Parameter

Operating Parameters	This parameter determines the counting direction, in which the output code increases or decreases. As an important operating parameter the code sequence (complement) can be programmed.
Resolution per Revolution	The parameter resolution per revolution is used to program the desired number of steps per revolution. Each value between 1 and 4,096 can be programmed.
Total Resolution	This parameter is used to program the desired number of measuring units over the total measuring range. This value may not exceed the total resolution of the absolute rotary encoder. If the encoder is used in a continuous measuring application, certain rules for the setting of this parameter must be followed. These rules are outlined in the manual.
Preset Value	The preset value is the desired position value, which should be reached at a certain physical position of the axis. The position value is set to the desired process value by the parameter pre-set.
Limit Switch, Min. and Max.	Two position values can be programmed as limit switches. By reaching these values one bit of the 32-bit process value is set to high.

Programmable CAN Transmission Modes

Polled Mode	By a remote-transmission-request telegram the connected host calls for the current process value. The absolute rotary encoder reads the current position value, calculates eventually set-parameters and sends back the obtained process value by the same identifier.
Cyclic Mode	The absolute rotary encoder transmits cyclically - without being called by the host - the current process value. The cycle time can be programmed in milliseconds for values between 1 ms and 65536 ms.
Sync Mode	After receiving a sync telegram by the host, the absolute rotary encoder answers with the current process value. If more than one node number (encoder) shall answer after receiving a sync telegram, the answer telegrams of the nodes will be received by the host in order of their node numbers. The programming of an offset-time is not necessary. If a node should not answer after each sync telegram on the CAN network, the parameter sync counter can be programmed to skip a certain number of sync telegrams before answering again.

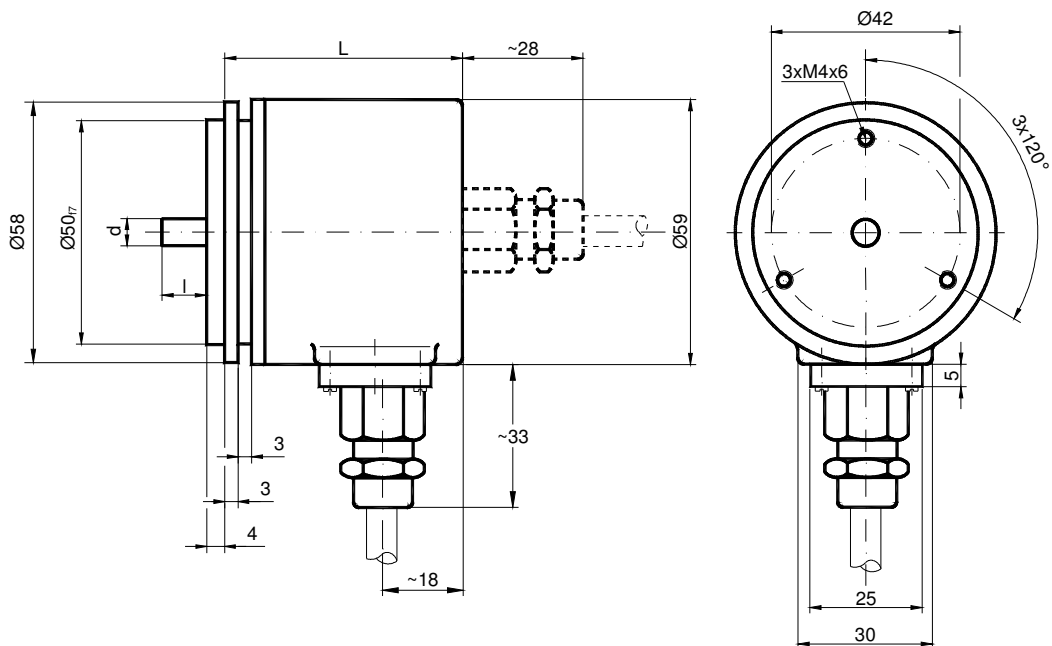
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Mechanical drawings

Synchroflange (S)

Two versions available
Cable exit (cable diameter = 8 mm)

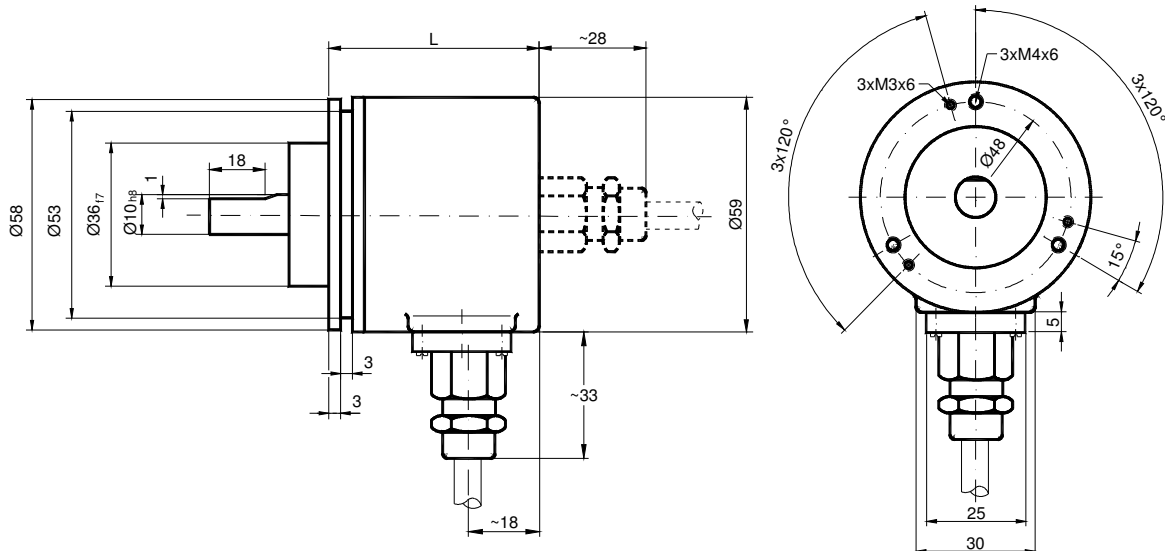
Synchroflange	d / mm	l / mm
Version S06	6 _{f6}	10
Version S10	10 _{h8}	20



Clampflange (C10)

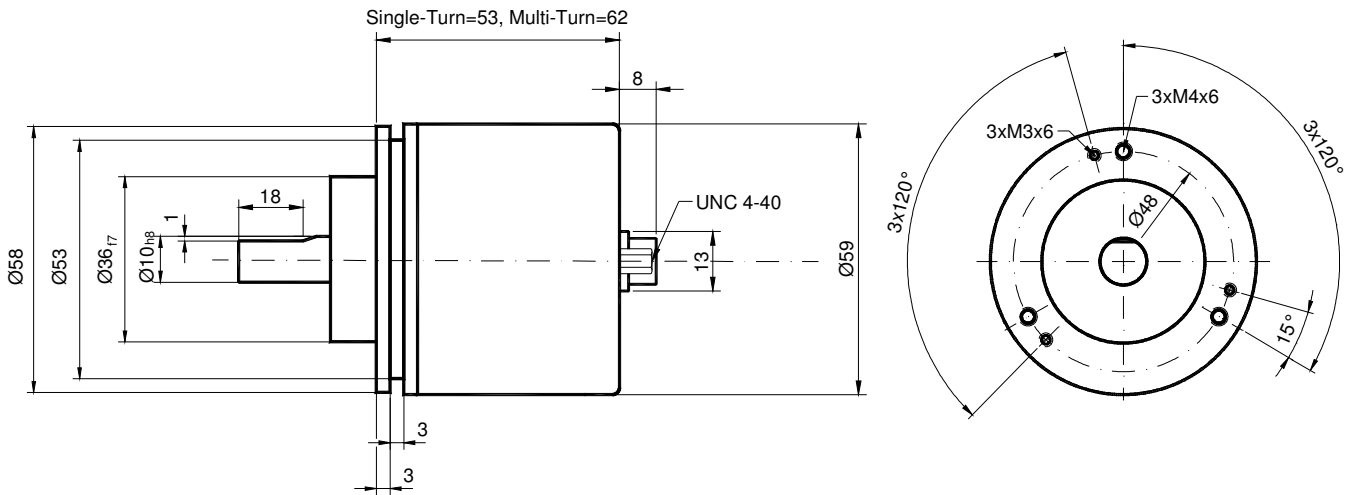
Cable exit (cable diameter = 8 mm)
or 5 pin M12 connector

	L
Single-Turn	53mm
Multi-Turn	62mm



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9 pin D-Sub connector



	L
Single-Turn	53mm
Multi-Turn	62mm

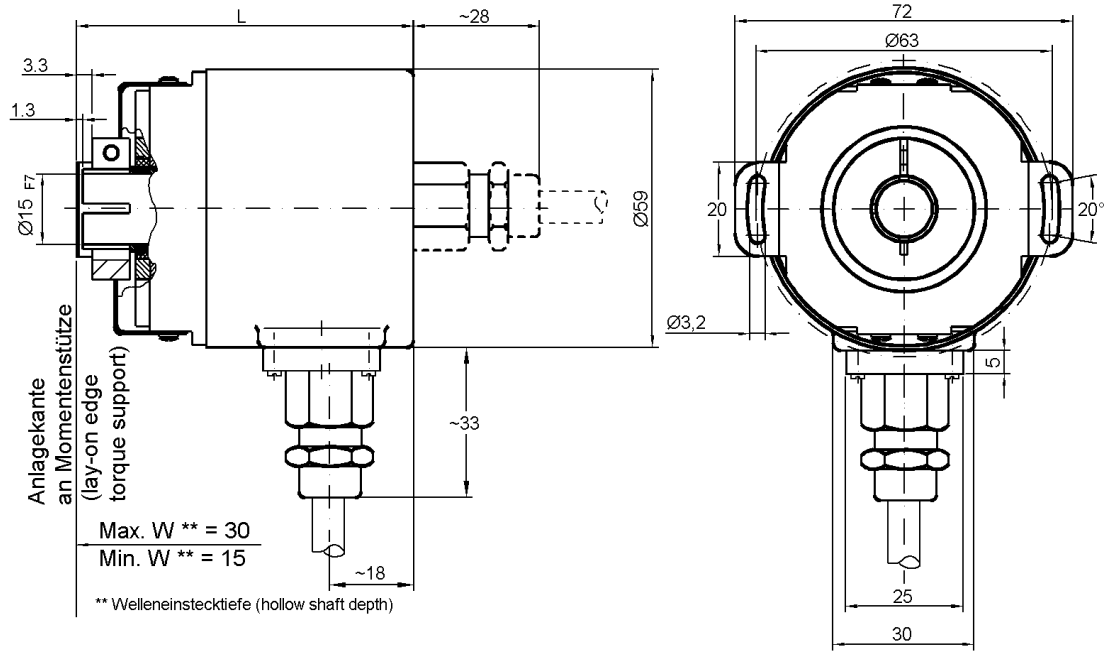
Synchroflange (S), 9 pin connector

The dimensions of encoder housing in the versions cable exit, 12 pin circular connector and 5 pin connector from clamp flange are also valid for the synchro flange.

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Blind shaft (B)

Cable exit (cable diameter = 8 mm)
or 5 pin M12 connector



	L
Single-Turn	72mm
Multi-Turn	81mm

Mounting instructions

The clamp ring should only be tightened if the shaft of the driving element is inserted into the hub shaft.

The diameter of the hollow shaft can be reduced to 12mm, 10 mm or 8 mm by using an adapter

(this reducing adapter can be pushed into the hollow shaft).

Maximum shaft movements of the drive element are listed in the table.

	Axial	Radial
static	± 0,3 mm	± 0,5 mm
dynamic	± 0,1 mm	± 0,2 mm

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Models/Ordering Description

Description	Type key							
Optocode	SAG-	__	B1	B -	__	-	__	- CRW
Interface	Pure CANopen	C5						
Version			B1					
Code	Binary			B				
Revolutions (Bits)	Singleturn						00	
	Multiturn						12	
	Multiturn						14	
Steps per revolution (Bits)	4096						12	
	8192						13	
	65536						16	
Flange	Clamp flange							C
	Synchro flange							S
	Blind shaft							B
Sjaft diameter	10 mm							10
	06 mm							06
	15 mm (Hollow shaft)							15
Mechanical options	without							0
	Shaft sealing (IP66)							S
	customized							C
Anschluss	Cable exit 1m, radial, open cable ends							CRW
	Cable exit 1m, axial, open cable ends							CAW
	Connector exit, axial, 5 pin M12							PAM
	Connector exit, radial, 5 pin M12							PRM
	Connector exit, axial, 9 pin D-Sub							PA9

Standard = bold, further models on request

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Accessories and documentation

Description		Article Name	Article Number
Shaft Coupling	Drilling: 10 mm / 10 mm	GS 10	29100450
	Drilling: 6 mm / 6 mm	GS 06	29100350
Clamp Disc	Set (4 pieces).	SP 15	32400155
Clamp Ring	Set (2 pieces)	SP H	32400152
Reducing Ring*	15 mm to 12 mm	RR 12	32220291
Reducing Ring *	15 mm to 10 mm	RR 10	32220292
Reducing Ring *	15 mm to 8 mm	RR 8	32220295

We do not assume responsibility for technical inaccuracies or omissions. Specifications are subject to change without notice.