

Absolute encoders - SSI

Ex approval Ex II 2D/2G (ATEX)

Optical single and multiturn encoders

Singleturn 14 bit, Multiturn 13 bit ST / 12 bit MT

X 700 - SSI



X 700 with clamping flange

Features

- Encoder single- or multiturn / SSI / ATEX
- Optical sensing method
- Resolution: singleturn 14 bit, multiturn 13 + 12 bit
- Clamping flange with solid shaft $\varnothing 10$ mm
- Explosion protection per Ex II 2D/2G (ATEX)
- Device class 2 / zone 1 (gas), zone 21 (dust)
- Electronic setting of zero point
- Counting direction input
- Maximum resistant against magnetic fields

Technical data - electrical ratings

Reverse polarity protection	Yes
Consumption w/o load	≤ 50 mA (24 VDC)
Initializing time typ.	20 ms after power on
Interface	SSI
Steps per turn	16384 / 14 bit
Absolute accuracy	$\pm 0.025^\circ$
Sensing method	Optical
Code	Gray or binary
Code sequence	CW/CCW coded by connection
Inputs	SSI clock Control signals UP/DOWN and zero
Output stages	SSI data: linedriver RS485 Diagnostic outputs push-pull
Interference immunity	DIN EN 61000-6-2
Emitted interference	DIN EN 61000-6-4
Diagnostic functions	Self-diagnosis Multiturn sensing

X 700 - Singleturn

Voltage supply	10...30 VDC
Function	Singleturn

X 700 - Multiturn

Voltage supply	10...30 VDC 5 VDC $\pm 10\%$
Function	Multiturn
Number of turns	4096 / 12 bit

Technical data - mechanical design

Size (flange)	$\varnothing 70$ mm
Shaft type	$\varnothing 10$ mm solid shaft (clamping flange)
Flange	Clamping flange
Protection DIN EN 60529	IP 67
Operating speed	≤ 6000 rpm (mechanical) ≤ 6000 rpm (electric)
Starting acceleration	≤ 1000 U/s ²
Starting torque	≤ 0.4 Nm (+25 °C)
Admitted shaft load	≤ 60 N axial ≤ 50 N radial
Materials	Housing: stainless steel Flange: stainless steel
Operating temperature	-25...+60 °C
Relative humidity	95 % non-condensing
Resistance	DIN EN 60068-2-6 Vibration 10 g, 16-2000 Hz DIN EN 60068-2-27 Shock 200 g, 6 ms
Explosion protection	Ex II 2G Ex d IIC T6 Ex II 2D
Weight approx.	1300 g
Connection	Cable

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Part number

Singleturn

X 700. **A** **1** **12** **02**

Connection
12 Cable 2 m, axial

Voltage supply / signals
0 10...30 VDC / gray code 13 bit
2 10...30 VDC / binary code 13 bit
4 10...30 VDC / gray code 14 bit
5 10...30 VDC / binary code 14 bit

Flange / Solid shaft
1 Clamping flange / ø10 mm, IP 67

Design
A Singleturn

Multiturn

X 700. **M** **1** **02**

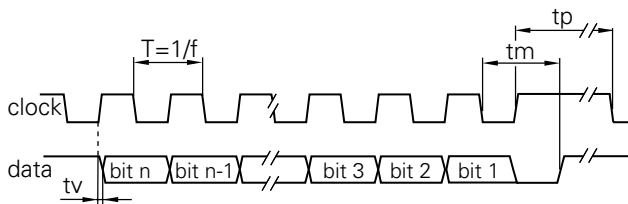
Connection
12 Cable 2 m, axial
14 Cable 5 m, axial
16 Cable 10 m, axial
19 Cable 20 m, axial
21 Cable 70 m, axial
22 Cable 6 m, axial
23 Cable 40 m, axial

Voltage supply / signals
1 10...30 VDC / gray code 13 + 12 bit
2 10...30 VDC / binary code 13 + 12 bit
4 10...30 VDC / gray code 12 + 12 bit
5 5 VDC / binary code 12 + 12 bit

Flange / Solid shaft
1 Clamping flange / ø10 mm, IP 67

Design
M Multiturn

Data transfer



Clock frequency f	62.5...1500 kHz
Duty cycle of T	40...60 %
Delay time tv	150 ns
Monoflop time tm	26 µs + T/2
Clock interval tp	30 µs

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Terminal significance	
UB	Encoder voltage supply.
GND	Encoder ground connection relating to UB.
Data+	Positive, serial data output of differential linedriver.
Data-	Negative, serial data output of differential linedriver.
Clock+	Positive SSI clock input. Clock+ together with clock- forms a current loop. A current of approx. 7 mA towards clock+ input means logic 1 in positive logic.
Clock-	Negative SSI clock input. Clock- together with clock+ forms a current loop. A current of approx. 7 mA towards clock- input means logic 0 in positive logic.
Zero setting	Input for setting a zero point anywhere within the programmed encoder resolution. The zero setting operation is triggered by a High impulse and has to be in line with the selected direction of rotation (UP/DOWN). Connect to GND after setting operation for maximum interference immunity. Impulse duration >100 ms.
$\overline{\text{DATAVALID}}$	Diagnostic output. An error warning is given at level Low. Important: Interferences must be drained by the downstream electronics.
$\overline{\text{DATAVALID MT}}$	Diagnostic output for monitoring the multiturn sensor voltage supply. Upon dropping below a defined voltage level the $\overline{\text{DV MT}}$ output is switched to Low.
$\overline{\text{UP/DOWN}}$	$\overline{\text{UP/DOWN}}$ counting direction input. This input is standard on High. $\overline{\text{UP/DOWN}}$ means ascending output data with clockwise shaft rotation when looking at flange. $\overline{\text{UP/DOWN}}$ -Low means ascending values with counterclockwise shaft rotation when looking at flange.

Terminal assignment	
Core colour	Assignment
brown	UB
white	GND
green	Clock+
grey	Data+
blue	Zero setting
pink	Data-
yellow	Clock-
black	$\overline{\text{DATAVALID}}$
red	$\overline{\text{UP/DOWN}}$
violet	$\overline{\text{DATAVALID MT}}$

Trigger level	
SSI	Circuit
SSI-Clock	Optocoupler
SSI-Data	Linedriver RS485

Control inputs	Input circuit
Input level High	>0.7 UB
Input level Low	<0.3 UB
Input resistance	10 k Ω

Diagnostic outputs	Output circuit Push-pull circuit-proof
Output level High	>UB -3.5 V (I = -20 mA)
Output level Low	<0.5 V (I = 20 mA)
Load High / Low	<20 mA

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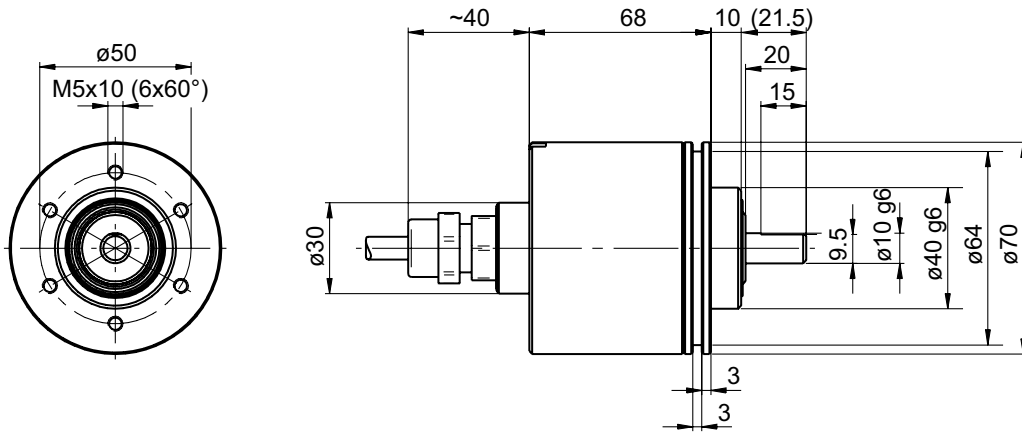
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Dimensions



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Check list for EX-approval

In compliance with EU standards 94/9/EG for potentially explosive areas it is imperative that the present checklist is duly completed and that all pending questions relating to explosion protection and application are clarified.

Company: _____
Address: _____
Division: _____
In charge: _____
Phone: _____ Fax: _____
e-mail: _____

Product name:	Version:	Resolution (ppr / code):	Supply voltage:
Kind of e-connection:	Length of cable (m):	Output circuit:	Special options:

Responsibility

- Our customer will receive all relevant information to verify a correct application.
- Our customer has to clarify all relevant criterions and characteristics.
- The operator shall be responsible for not exceeding the maximum performance limits of our devices (see data sheet).

Device utilization/application (E.g.: Lacquering line, manufacturing tech., gas storing vessel etc.)

Device group, device category and zone classification

Device group		please tick
Device group I		☐
Device group II		☐
Category / Zone	Ex-atmosphere prevailing	
Category 1 (= Zone 0/20)	... permanently, long-term or frequently	☐
Category 2 (= Zone 1/21)	... only now and then	☐
Category 3 (= Zone 2/22)	... rarely or seldom	☐
Zone classification		
G (gases)	Zone 0, zone 1, zone 2	☐
D (dusts)	Zone 20, zone 21, zone 22	☐

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Check list for EX-approval

Ignition protection

please tick

Ex d	Flameproof (pressure-proof capsule)	☐
Ex ia	Intrinsic safety	☐
Ex ib	Intrinsic safety	☐

Gas explosion group

Gases are classified into explosion groups. Danger increases from group II A to II C.

please tick

II A	Propane	☐
II B	Ethylene	☐
II C	Hydrogen, Acetylene	☐

Temperature classes and groups of explosion

Temperature class	Max. surface temperature of operating equipment (°C)	Max. ignition temperature of combustible substances (°C)	please tick
T1	450	> 450	void
T2	300	>300...< 450	void
T3	200	>200...< 300	void
T4 (on request)	135	>135...< 200	☐
T5	100	>100...< 135	void
T6	85	> 85...< 100	☐

Information on ambient and operating temperature

Expected operating temperature:	to be clarified
Field ambient temperature:	to be clarified

Mechanical strain

Rotation speed (rpm)
Axial shaft load (N)
Radial shaft load (N)
Ambient impacts (salt, lye, etc.)

Date	Signature
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Stamp:

Date	Release EExB / trained sales
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