Installation instructions

Incremental Shaft Encoder Type RI 58 / RI 59

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Introduction

These installation instructions are provided for the connection and starting procedure of your shaft encoder.
For further informations see our Shaft Encoders Catalogue.

Safety and Operating Instructions

- The incremental shaft encoders of the type RI 58 / RI 59 model series are quality products manufactured in accordance with established electrical engineering standards.
  The units have been delivered from the factory in perfect conformance to safety regulations.
  To maintain this condition and to ensure trouble-free operation, please observe the technical specifications of this document.
- **Installation and mounting may only be performed by an electrotechnical expert!**
- The units may only be operated within the limits specified by the technical data.
- **Maximum operating voltages must not be exceeded!**
  The units are designed complying with VDE 0160, protection class III.
  To prevent dangerous structure-borne currents, the equipment has to be run on safety extra-low voltage (SELV) and must be in an area of equipotential bonding.
- Application: Industrial processes and control systems.
  Overvoltage at the connecting terminals must be limited to the values within overvoltage category II.
- Please avoid shocks to the housing – especially to the encoder shaft – and axial or radial overload to the encoder shaft.
- Maximum accuracy and durability of our shaft encoders is only granted when using suitable couplings.
- The high-quality EMC-specifications are only valid together with standard-type cables and plugs. When using screened cables, the screen must broadly be connected with ground on both ends. Likewise, the voltage-supply cables should entirely be screened. If this is not possible you will have to take appropriate filtering measures.
- Installation environment and wiring are influential on the encoder's EMC: Thus the installer must secure EMC of the whole facility (device).
- Transient peaks on the power supply leads are to be limited by the pre-connected power unit to a maximum of 1000 V.
- In electrostaticly threatened areas please take care for neat ESD-protection of plug and connecting cable during installation work.

Mechanical data

Shaft diameter	6 / 6.35 / 7 / 9.52 / 10 / 12 mm	
Absolute max. shaft load	∅ 12 mm	radial 180 N (39 lbs)
		axial 140 N (30 lbs)
	∅ 7 ... 10 mm	radial 160 N (35 lbs)
		axial 107 N (24 lbs)
	∅ 6 mm / 6.35 mm	radial 110 N (24 lbs)
		axial 60 N (13 lbs)
Maximum speed	10,000 RPM	
Torque	≤ 0.5 Ncm (IP 64)	
Moment of inertia	synchro flange 14 gcm² approx.	
	clamping flange 20 gcm² approx.	
Protection class housing/ball bearing	IP 50/40, IP 65/64[1], IP 67/67	
Operating temperature	RI 58-O: –10 ... +70 °C / RI 58-T: –25 ... +100 °C	
Storing temperature	RI 58-O: –25 ... +85 °C / RI 58-T: –25 ... +100 °C	
Vibration performance (IEC 68-2-6)	100 m/s² (10 ... 2,000 Hz)	
Shock resistance (IEC 68-2-27)	1,000 m/s² (6 ms)	
Connection	1.5 m cable or flange box	
Housing	RI 58: aluminium, RI 59: high-grade steel	
Flange[2]	S = synchro flange, K, L = clamping flange,	
	G, Q = square flange, M = synchro clamping flange	
Weight	360 g approx.	
Bearing life	1 x 10^{10} revolutions (typ.) at 35% of full rated shaft load	
	1 x 10^{9} revolutions (typ.) at 75% of full rated shaft load	
	1 x 10^{8} revolutions (typ.) at 100% of full rated shaft load	

[1] no standing water allowed at the shaft entrance or at the ball bearing
[2] S, L: use threads M4 for fastening
K: use threads M3 for fastening
M: use threads 10-32 UNF for fastening

Electrical data

General design	as per DIN VDE 0160, protection class III, contamination level 2, overvoltage class II						
Screening	connected to housing						
Noise emission	as per EN 50081-2 (edition 1993)						
Noise immunity	as per EN 50082-2 (edition 1995)						
Power consumption	40 mA (5 V DC), 30 mA (24 V DC), 60 mA (10 V DC)						
Supply voltage U_B	5 V DC (SELV) ±10%			10 ... 30 V DC (SELV)			
Output circuit[1]	PP	PP	RS422	PP	PP compl.	RS422	
Code letter	K	D	R, T	K	I	R	
Output load [mA]	±10	±30	±30	±30	±30	±30	
Output level [V] High	≥2.5	≥2.5	≥2.5	U_B-3	U_B-3	≥2.5	
Low	≤0.5	≤0.5	≤0.5	≤2	≤2	≤0.5	
Pulse rise time [ns]	250	100	100	2000	2000	100	
Max. pulse frequency [kHz]	300	300	300	200	200	300	
Pole protection of U_B	yes	no	no	yes	yes	yes	
Short circuit proof	yes	1 chn.	1 channel	yes	yes	yes	
Pulse duty factor	1 : 1						
Pulse width error	± 25° electrical						
Phase shift	90° (distance from Channel A to B is at least 0.45 µs, at 300 kHz)						
Pulse shape	rectangular						
Alarm output	Open Collector, NPN (5 mA, 24 V max. with U_B=5 VDC; 5 mA, 32 V max. with U_B=10...30 VDC)						

[1] PP=Push-pull; PP compl.=Push-pull complementary; RS422=Line driver

Technical specifications subject to change without notice.

Incremental Shaft Encoder Type RI 58 / RI 59

Connection diagram

Colour (TPE)	Colour (PVC)	Output RS 422 + Sense (T)	RS 422 + Alarm (R)	Push-pull (K, D)	Push-pull complementary (I)
brown	white	Channel A	Channel A	Channel A	Channel A
green	white/brown	Channel $\bar{A}$	Channel $\bar{A}$		Channel $\bar{A}$
grey	green	Channel B	Channel B	Channel B	Channel B
pink	green/brown	Channel $\bar{B}$	Channel $\bar{B}$		Channel $\bar{B}$
red	yellow	Channel N	Channel N	Channel N	Channel N
black	yellow/brown	Channel $\bar{N}$	Channel $\bar{N}$		Channel $\bar{N}$
violet (white)[2]	yellow/black	Sense GND	$\overline{Alarm}$	$\overline{Alarm}$	$\overline{Alarm}$
blue	yellow/red	Sense V_{CC}	Sense V_{CC}		Sense V_{CC}
brown/green	red	5 V DC	5/10...30 V DC	5/10...30 V DC	10...30 V DC
white/green	black	GND	GND	GND	GND
Screen[1]	Screen[1]	Screen[1]	Screen[1]	Screen[1]	Screen[1]

[1] connected to encoder housing
[2] white for Sense (T)

Pinout of connector

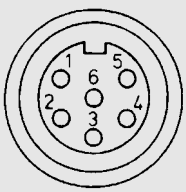
CONIN 12 poles

Pin	RS 422 + Sense (T)	RS 422 + Alarm (R)	Push-pull (K, D)	Push-pull complementary (I)
1	Channel $\bar{B}$	Channel $\bar{B}$	N.C.	Channel $\bar{B}$
2	Sense V_{CC}	Sense V_{CC}	N.C.	Sense V_{CC}
3	Channel N	Channel N	Channel N	Channel N
4	Channel $\bar{N}$	Channel $\bar{N}$	N.C.	Channel $\bar{N}$
5	Channel A	Channel A	Channel A	Channel A
6	Channel $\bar{A}$	Channel $\bar{A}$	N.C.	Channel $\bar{A}$
7	N.C.	$\overline{Alarm}$	$\overline{Alarm}$	$\overline{Alarm}$
8	Channel B	Channel B	Channel B	Channel B
9	N.C.*	N.C.*	N.C.*	N.C.*
10	GND	GND	GND	GND
11	Sense GND	N.C.	N.C.	N.C.
12	5 V DC	5/10...30 V DC	5/10...30 V DC	10...30 V DC

* Screen for cable with CONIN-plug

BINDER 6 poles

Pin	Push-pull (K, D)
1	5 /10...30 V DC
2	Channel A
3	Channel N
4	Channel B
5	$\overline{Alarm}$
6	GND



KPT 12-8 P

Pin	RS 422 (R), Push-pull complementary (I)
1/A	Channel B
2/B	Channel $\bar{B}$
3/C	Channel $\bar{A}$
4/D	Channel A
5/E	5 /10...30 V DC
6/F	GND
7/G	Channel N
8/H	Channel $\bar{N}$

N.C. = Not Connected

(Pinout of connector)

MIL 6 poles		MIL 7 poles	
Pin	Push-pull (K, D)	Pin	Push-pull (K, D)
1/A	5 /10...30 V DC	1/A	Channel A
2/B	Channel A	2/B	Channel B
3/C	Channel B	3/C	Channel N
4/D	Channel N	4/D	5 /10...30 V DC
5/E	GND	5/E	$\overline{Alarm}$
6/F	Screen	6/F	GND
		7/G	Screen

MIL 10 poles

Pin	RS 422 (R), Push-pull compl. (I)	RS 422 (R) – US-pinout	Push-pull (K. D)
1/A	Channel A	Channel A	Channel A
2/B	Channel B	Channel B	Channel B
3/C	Channel N	Channel N	Channel N
4/D	5 /10...30 V DC	5 /10...30 V DC	5 /10...30 V DC
5/E	$\overline{Alarm}$	$\overline{Alarm}$	$\overline{Alarm}$
6/F	GND	GND	GND
7/G	Channel $\bar{A}$	Screen	Screen
8/H	Channel $\bar{B}$	Channel $\bar{A}$	N.C.
9/I	Channel $\bar{N}$	Channel $\bar{B}$	N.C.
10/J	Screen	Channel $\bar{N}$	Screen

Ordering code (see identification plate)

O Standard
T High Temperature

Supply voltage
A 5 V DC
E 10 ... 30 V DC

Type of flange
A Synchro flange adapter
C Square flange adapter;58 x 58
G Square flange adapter; 80 x 80
K Clamping flange (M3 fastening thread)
L Clamping flange (M4 fastening thread)
M Synchro clamping flange; ∅ 63,5
Q Square flange; 63,5 x 63,5
S Synchro flange

Shaft diameter
1 6 mm (S)
2 10 mm (K, Q)
3 7 mm (K, G)
5 6,35 mm (S)
6 9,52 mm (K, Q, M)
7 12 mm (K)

R I – □ / □□□ · □□□□ [3]

Number of pulses
1 ... 10,000

Protection class
1 IP 50
4 IP 64
7 IP 67

Output
T RS 422 (TTL) + Sense
K Push-pull short circuit proof
I Push-pull complementary
R RS 422 + Alarm
D Push-pull 5 V, 30 mA

Type of connection
A Cable PVC, axial
B Cable PVC, radial
C CONIN connector, axial clockwise
D CONIN connector, radial clockwise
E Cable TPE, axial
F Cable TPE, radial
G CONIN connector, axial counterclockwise
H CONIN connector, radial counterclockwise
J BINDER, 6 poles, radial
N BINDER, 6 poles, axial
O MIL MS, 10 poles, axial[1]
K MIL MS, 10 poles, radial[1]
P MIL MS, 7 poles, axial
L MIL MS, 7 poles, radial
M MIL MS, 6 poles, axial
Q MIL MS, 6 poles, radial
R MIL MS, 10 poles, axial[2]
T MIL MS, 10 poles, radial[2]
1 KPT 12-8P, axial
2 KPT 12-8P, radial

Type designation
58 Standard
59 High-grade Steel

[1] Euro pinout
[2] US pinout
[3] Special types are additionally marked by an ordering code **-S**.
In this case customer specifications are to be applied.
If you don't know these please call us for the specifications, indicating the encoder ordering code.

Item No. 2 522 480, 3290699hu