Absolute Encoders Typ RA 58

SSI

synchro flange

clamping flange

- **New:** singleturn up to 14 Bit (RA 58-S)
- **New:** multiturn up to 26 Bit (RA 58-M)
- **New:** option stainless steel encoder RA 59
- Gray or binary code
- Programmable version or version with preset pushbutton see type RA 58-P with SSI
- Ex-version see type RX 70

TECHNICAL DATA
mechanical

Shaft diameter	RA 58: 6 mm (synchro flange), 10 mm (clamping flange) RA 59: 10 mm (square flange)
Absolute max. shaft load	diam. 6 mm: axial 60 N (13 lbs), radial 110 N (24 lbs) diam. 10 mm: axial 107 N (24 lbs), radial 160 N (35 lbs)
Absolute maximum speed	10,000 RPM (short term), 6,000 RPM (continuous duty)
Torque	≤ 0,5 Ncm (IP 64), ≤ 1 Ncm (IP 67)
Moment of inertia	synchro flange: 14 gcm² ; clamping-/square flange.: 20 gcm²
Protection class (EN 60529)	Housing IP 65 [1] bearings IP 64 [1]
Operating temperature	–25 ... +85 °C, RA 58-P: -10 ... +60 °C
Storage temperature	–25 ... +85 °C
Vibration proof (IEC 68-2-6)	100 m/s² (10 – 500 Hz) [3]
Shock resistance (IEC 68-2-27)	1000 m/s² (6 ms) [3]
Connection, axial or radial	1.5 m cable [2] or flange connector
Housing	RA 58: aluminium, RA 59: stainless steel
Flange	RA 58: S = synchro flange, K = clamping flange RA 59: Q = square flange 63.5 x 63.5 mm
Weight	Singleturn: RA 58-S approx. 300 g, RA 59-S approx. 620 g Multiturn: RA 58-M approx. 350 g
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 For example 30,000 h at 6,000 RPM with a 13 lb radial load (10 mm shaft)

[1] IP 67 on request
[2] other cable lengths possible on request
[3] For applications with higher vibration and shock values, see section "Accessories: Encoder with shock module"

DIMENSIONED DRAWINGS

See section "Absolute Encoders – dimensioned drawings"

RECOMMENDED DATA TRANSMISSION RATE FOR SSI

The maximum data transmission rate depends on the cable length. Please use twisted cable pairs and screened cable for clock rate / $\overline{\text{clock}}$ rate and data / $\overline{\text{data}}$.

Cable length	Baud rate
< 50 m	< 400 kHz
< 100 m	< 300 kHz
< 200 m	< 200 kHz
< 400 m	< 100 kHz

TECHNICAL DATA
electrical

General design	as per DIN 61010-part 1, protection class III, contamination level 2, overvoltage class II
Output	RS 485
Resolution	360 pulses (9 Bit) [1] 512 pulses (9 Bit) 720 pulses (10 Bit) [2] 1024 pulses (10 Bit) 3600 pulses (12 Bit) [3] 4096 pulses (12 Bit) 8192 pulses (13 Bit) 16384 pulses (14 Bit) 4096 pulses/4096 revolutions (24 Bit) 8192 pulses/4096 revolutions (25 Bit) 16384 pulses/4096 revolutions (26 Bit)
Linearity	± ½ LSB (± 1 LSB with 13, 14, 25 and 26 Bit)
Type of code	Gray, Gray Excess, Binary
Sense of direction	adjustable via input $\overline{\text{Direction}}$
Supply voltage (SELV)	5 VDC ±10 %, 10 ... 30 VDC [4]
Power consumption	max. 0.2 A (5 VDC), max. 0.2 A (10 ... 30 VDC)
Recommended external fuse	T 0.4 A (5 VDC); T 0.25 A (10 ... 30 VDC)
Baud rate	70 KB ... 1.5 MB
Inputs [5]	$\overline{\text{Direction}}$
Alarm output	alarm bit
Parity Bit	optional, on request
Cable length	400 m [6]

1) With offset 76 (value range 76 ... 435)
2) With offset 152 (value range 152 ... 871)
3) With offset 248 (value range 248 ... 3847)
4) Pole protection
5) Typical actuating delay time 10 µs with push-pull selection. When selected via PNP-O.C., an external pull-down resistor (1 kOhm) is required
6) see table "Recommended data transmission rate for SSI"

DATA FORMAT

Singleturn Encoders [1]

Resolution	Data Bits							
	T1	...	T9	T10	T11	T12	T13	T14
9 Bit [2]	**S8**	**...**	**S0**	**0**	**0**	**0**	**A**	**0**
10 Bit [2]	**S9**	**...**	**S1**	**S0**	**0**	**0**	**A**	**0**
12 Bit [2]	**S11**	**...**	**S3**	**S2**	**S1**	**S0**	**A**	**0**
13 Bit	**S12**	**...**	**S4**	**S3**	**S2**	**S1**	**S0**	**0**
14 Bit	**S13**	**...**	**S5**	**S4**	**S3**	**S2**	**S1**	**S0**

Multiturn Encoders [1]

Resolution	Data Bits											
	T1	**T2**	**...**	**T12**	**T13**	**...**	**T21**	**T22**	**T23**	**T24**	**T25**	**T26**
24 Bit [2]	**M11**	**M10...**		**M0**	**S11**	**...**	**S3**	**S2**	**S1**	**S0**	**A**	**0**
25 Bit	**M11**	**M10...**		**M0**	**S12**	**...**	**S4**	**S3**	**S2**	**S1**	**S0**	**0**
26 Bit	**M11**	**M10...**		**M0**	**S13**	**...**	**S5**	**S4**	**S3**	**S2**	**S1**	**S0**

1) S0, S1, ...: Data Bits for resolution per RPM
M0, M1, ...: Data Bits for number of RPM (only for multiturn)
A: Alarm Bit
2) Options (Parity Bit, Alarm and Parity Bit, Zero Bit) on request and only for resolutions 9, 10, 12 and 24 Bit possible.

Alarm Bit: is set to "1" for overtemperature, undervoltage, disc breakage and defect LEDs
Parity Bit: Even Parity (The Parity Bit supplements the data bits to an even number of (Option) 1-Bits).

SYNCHRONOUS-SERIAL TRANSFER (SSI)

Synchronous readout of the encoder data is according to the clock rate given by the SSI-counterpart.
The number of clock rates is determined by the type of encoder (singleturn resp. multiturn) and the configuration of the special Bits as defined.
For multiple transactions (the stored value is readout several times successively) a fixed clock rate per transaction must be kept (for singleturn 13 resp. 14 clocks, for multiturn 25 resp. 26 clocks).

- In the rest position, when the last clock brush has passed by more than 30µs, the data output is logically at "1".
- With the first descending clock edge the encoder data and the special bits are loaded in the shift register of the encoder interface.
- With each ascending clock edge the data bits are serially readout, beginning with the MSB.
- At the end of the data transfer the data output is set to logically "0" for approx. 20µs.
  If within these 20µs a further clock brush reaches the encoder interface, the already transferred data is readout once again.
  This multiple transfer of the same data makes it possible to recognize transfer errors.
- After the 20µs the data output goes to its rest position, logically "1". Subsequently new encoder data can be readout.

CONNECTION DIAGRAM

Cable	Flange connector	Signal
brown (0.5 mm²)	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
	4	N.C.
blue	5	$\overline{\text{Direction}}$ [1]
red	6	N.C.
violet	7	N.C.
white (0.5 mm²)	8	5/10 ... 30 VDC
	9	N.C.
grey	10	$\overline{\text{Data}}$
green	11	$\overline{\text{Clock}}$
black	12	0 V-signal output [2]

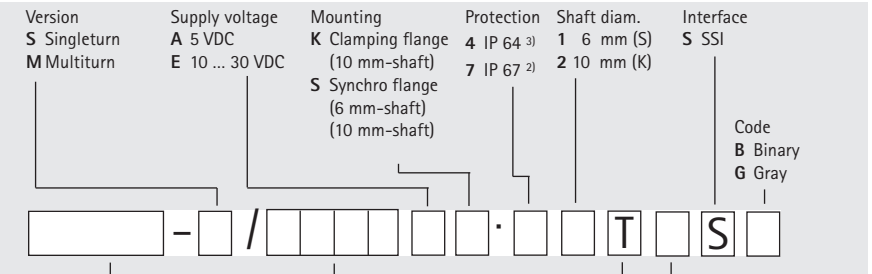
[1] $\overline{\text{Direction}}$: + U_B or not used = ascending code values for clockwise rotation cw
0 V = descending code values for clockwise rotation cw

[2] connected with 0V in the encoder. Please use this output to connect $\overline{\text{Direction}}$ to logically "0" if required.

ACCESSORIES

Position indicator signo 727-SSI	see section "Accessories"
For Mounting	**Ordering code**
Clamping eccentric	0 070 655
Diaphragm coupling (hub diam. 6/6 mm)	1 076 013
Diaphragm coupling (hub diam. 10/10 mm)	1 076 014

ORDERING DATA



Type
RA 58 Standard
RA 59 Stainless steel [1]

Resolution [4]
0360 360 pulses (S)
0009 9 Bit (S)
0720 720 pulses (S)
0010 10 Bit (S)
3600 3600 Incr. (S)
0012 12 Bit (S)
0013 13 Bit (S)
0014 14 Bit (S)
1212 24 Bit (M)
1213 25 Bit (M)
1214 26 Bit (M)

Output
T RS 485

Connection
A cable, axial
B cable, radial
C flange connector 12pole axial clockwise
D flange connector 12pole radial clockwise
G flange connector 12pole axial counter clockwise
H flange connector 12pole radial counter clockwise

[1] only with mounting = Q, shaft = 2, protection = 7, connection = B
[2] only for type RA 59 (stainless steel)
[3] IP 67 on request
[4] S = singleturn, M = multiturn with 12 Bit revolutions