Absolute Encoders Typ RA 58

Parallel Interface

Synchro flange

Clamping flange

- **New:** singleturn up to 14 Bit (RA 58-S)
- **New:** option hollow shaft version RA 58 with hollow shaft
- multiturn up to 24 Bit (RA 58-M)
- **New:** option stainless steel version RA 59
- short circuit proof Tristate outputs
- Gray or binary code
- encoder self monitoring

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	Ø 6 mm axial 60 N (13 lbs), radial 110 N (24 lbs) Ø 10 mm axial 107 N (24 lbs), radial 60 N (35 lbs)
Absolute maximum speed	10,000 RPM (short term), 6,000 RPM (continuous duty)
Torque	≤ 0.5 Ncm, ≤ 1 Ncm (IP 67)
Moment of inertia	synchro flange: 14 gcm² ; clamping flange: 20 gcm²
Protection class (EN 60529)	Housing IP 65 [1], bearings IP 64 [1]
Operating temperature	-25 ... +85 °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)	1,000 m/s2 (6 ms) [3]
Connection, axial or radial	Singleturn: 1.5 m cable [2] or flange connector Multiturn 1.5 mm cable [2] or 10 cm cable [2] with 37 pole plug SUB-D
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 length on request
[3] For applications with higher vibration and shock values, see "Accessories, Encoder with Shock Module"

DIMENSIONED DRAWINGS

See section "Absolute Encoders – dimensioned drawings"

TECHNICAL DATA
electrical

General design	as per DIN EN 61010, protection class III, contamination level 2, overvoltage class II
Output	push-pull
Resolution	360 pulses (9 Bit) [3] 512 pulses (9 Bit) 720 pulses (10 Bit) [4] 1024 pulses (10 Bit) 3600 pulses (12 Bit) [5] 4096 pulses (12 Bit) 8192 pulses (13 Bit) 16384 pulses (14 Bit) [2] 4096 pulses/16 revolutions (16 Bit) 4096 pulses/256 revolutions (20 Bit) 4096 pulses/4096 revolutions (24 Bit)
Linearity	± ½ LSB, ± 1 LSB with 13, 14 Bit
Sense of direction when turning clockwise (cw)	$\overline{\text{Direction}}$ = 1: ascending code values $\overline{\text{Direction}}$ = 0: descending code values
Type of code	Gray, Gray Excess, Binary
Supply voltage	5 VDC ±10 % (only for singleturn possible) or 10 ... 30 VDC [1] (SELV)
Power consumption	max. 0.6 A (9 ... 14 Bit), max. 0.9 A (16 ... 24 Bit)
Recommended external fuse	T 0.8 A (9 ... 14 Bit), T 1.2 A (16 ... 24 Bit)
Code switching frequency	max. 100 kHz
Control inputs multiturn)	$\overline{\text{Direction}}$, $\overline{\text{Latch}}$, $\overline{\text{Tristate}}$ (for singleturn), Tristate (for
Output load	30 mA, short circuit proof
Alarm output	NPN O.C. 5 mA
Max. cable length	100 m

[1] Pole protection
[2] 16384 pulses (14 Bit) on request
[3] with offset 76 in binary or Gray Excess code
[4] with offset 152 in binary or Gray Excess code
[5] with offset 248 in binary or Gray Excess code

DATA OUTPUT LEVEL

supply voltage U_B	5 VDC ± 10 %	10 - 30 VDC
output level high	≥ 3.5 V (30 mA) ≥ 3.9 V (10 mA)	≥ U_B -2.2 V (30 mA) ≥ U_B -1.8 V (10 mA)
output level low	≤ 1.6 V (30 mA) ≤ 1.2 V (10 mA)	≤ 1.6 V (30 mA) ≤ 1.2 V (10 mA)
rise time (1.5 m cable)	≤ 0.1 µs	≤ 0.2 µs
drop time (1.5 m cable)	≤ 0.05 µs	≤ 0.1 µs

Control inputs [1]:

Input	Level logical (physical)	Function
$\overline{\text{Direction}}$	1 (+ UB or open)	ascending code values when turning clockwise (cw)
	0 (0 V)	descending code values when turning clockwise (cw)
$\overline{\text{Latch}}$	1 (+ UB or open)	encoder data continuously changing at output
	0 (0 V)	encoder data stored and constant at output
$\overline{\text{Tristate}}$ (with singleturn)	1 (+ UB or open)	outputs active
	0 (0 V)	outputs at high impedance (Tristate mode)
Tristate (with multiturn)	1 (+ UB)	outputs at high impedance (Tristate mode)
	0 (0 V or open)	outputs active

[1] Typical actuating delay time 10 µs with push-pull selection; when selected via O.C., an external pull-down resistor (1 KΩ) is required

CONNECTION DIAGRAM CABLE, SINGLETURN

Parallel interface with cable:					
Colour (PVC)	9 Bit/360 pulses	10 Bit/720 pulses	12 Bit	13 Bit	14 Bit
grey/pink	N.C.	N.C.	N.C.	N.C.	S0 (LSB)
brown/yellow	N.C.	N.C.	N.C.	S0 (LSB)	S1
brown/grey	N.C.	N.C.	S0 (LSB)	S1	S2
red/blue	N.C.	N.C.	S1	S2	S3
violet	N.C.	S0 (LSB)	S2	S3	S4
white/brown	S0 (LSB)	S1	S3	S4	S5
white/green	S1	S2	S4	S5	S6
white/yellow	S2	S3	S5	S6	S7
white/grey	S3	S4	S6	S7	S8
white/pink	S4	S5	S7	S8	S9
white/blue	S5	S6	S8	S9	S10
white/red	S6	S7	S9	S10	S11
white/black	S7	S8	S10	S11	S12
brown/green	S8 (MSB)	S9 (MSB)	S11 (MSB)	S12 (MSB)	S13 (MSB)
yellow	$\overline{\text{Tristate S0...S8}}$	$\overline{\text{Tristate S0...S9}}$	$\overline{\text{Tristate S0...S11}}$	$\overline{\text{Tristate S0...S12}}$	$\overline{\text{Tristate S0...S13}}$
pink	$\overline{\text{Latch}}$ (only binary)	$\overline{\text{Latch}}$ (only binary)	$\overline{\text{Latch}}$ (only binary)	$\overline{\text{Latch}}$ (only binary)	$\overline{\text{Latch}}$ (only binary)
green	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$
black	0 V	0 V	0 V	0 V	0 V
red	5 V/10...30 VDC	5 V/10...30 VDC	5 V/10...30 VDC	5V/10...30 VDC	5 V/10...30 VDC
brown	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$

CONNECTION DIAGRAM SINGLETURN, FLANGE CONNECTOR

Parallel interface with flange connector, 17 pole (Conin):					
Pin	9 Bit/360pulses	10 Bit/720 pulses	12 Bit	13 Bit	14 Bit
1	S0 (LSB)	S0 (LSB)	S0 (LSB)	S12 (MSB)	S13 (MSB)
2	S1	S1	S1	S11	S12
3	S2	S2	S2	S10	S11
4	S3	S3	S3	S9	S10
5	S4	S4	S4	S8	S9
6	S5	S5	S5	S7	S8
7	S6	S6	S6	S6	S7
8	S7	S7	S7	S5	S6
9	S8 (MSB)	S8	S8	S4	S5
10	N.C.	S9 (MSB)	S9	S3	S4
11	N.C.	N.C.	S10	S2	S3
12	$\overline{\text{Tristate S0...S8}}$	$\overline{\text{Tristate S0...S9}}$	S11 (MSB)	S1	S2
13	$\overline{\text{Latch}}$ (only binary)	$\overline{\text{Latch}}$ (only binary)	$\overline{\text{Latch}}$ (only binary)	S0 (LSB)	S1
14	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$	S0 (LSB)
15	0 V	0 V	0 V	0V	0 V
16	5 V/10...30 VDC	5 V/10...30 VDC	5 V/10...30 VDC	5V/10...30 VDC	5/10...30VDC
17	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$	$\overline{\text{Latch}}$/$\overline{\text{Alarm}}$ [1]	$\overline{\text{Latch}}$/$\overline{\text{Alarm}}$ [1]

[1] $\overline{\text{Latch}}$ with binary code, $\overline{\text{Alarm}}$ wit Gray code

CONNECTION DIAGRAM CABLE, MULTITURN

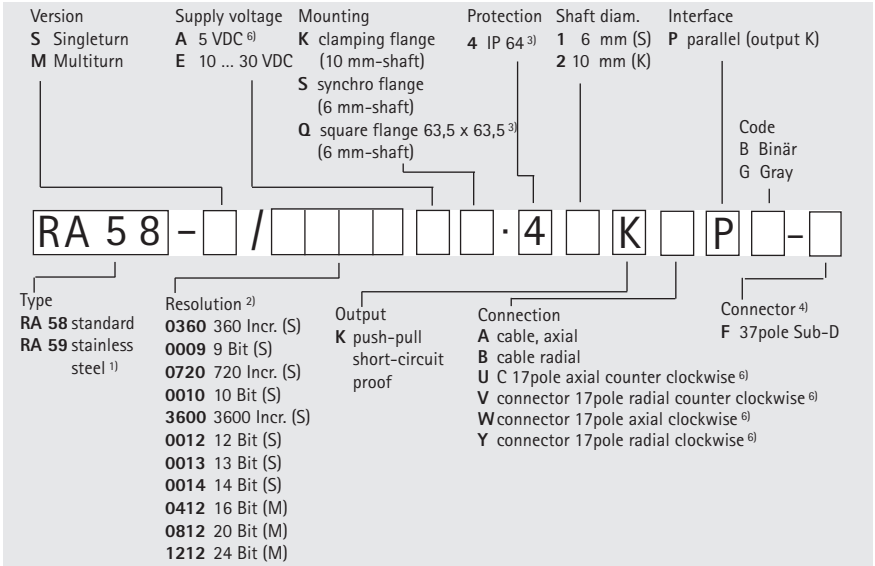
Parallel interface					
cable (TPE)	10 cm cable with 37pole Sub-D-plug	cable (TPE)	10 cm cable with 37pole Sub-D-plug		
Colour	Pin	Connection	Colour	Pin	Connection
brown	2	S0	white/blue	14	M4 [1]
green	21	S1	brown/blue	33	M5 [1]
yellow	3	S2	white/red	15	M6 [1]
grey	22	S3	brown/red	34	M7 [1]
pink	4	S4	white/black	16	M8 [2]
violet	23	S5	brown/black	35	M9 [2]
grey/pink	5	S6	grey/green	17	M10 [2]
red/blue	24	S7	yellow/grey	36	M11 [2]
white/green	6	S8	pink/green	18	$\overline{\text{Alarm}}$
brown/green	25	S9	yellow/pink	10	$\overline{\text{Direction}}$
white/yellow	7	S10	green/blue	30	$\overline{\text{Latch}}$
yellow/brown	26	S11	yellow/blue	12	Tristate
white/grey	8	M0	red (0.5 mm²)	13	10...30 VDC
grey/brown	27	M1	white (0.5 mm²)	31	10...30 VDC
white/pink	9	M2	blue (0.5 mm²)	1	0 V
pink/brown	28	M3	black (0.5 mm²)	20	0 V

[1] N. C. with resolution 16 Bit
[2] N. C. with resolution 16 Bit or 20 Bit

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



[1] only with mounting = Q, shaft = 2, protection = 7, connection = B
[2] S = singleturn, M = multiturn (4, 8 or 12 Bit revolutions)
[3] only for type RA 59 (stainless steel)
[4] optional with multiturn and connection cable: 10 cm cable with 37 pole plug Sub-D
[5] IP 67 on request
[6] only for singleturn