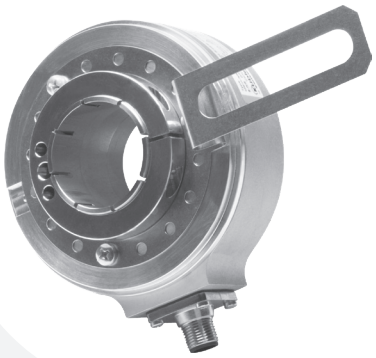
Large Bore Type RI-43 (Hollow Shaft)

Temperature | Shock/vibration resistant | Short-circuit protected | Reverse polarity protection | High rotational speed

Rugged
- Balanced, stainless-steel clamping rings, special bearing-shaft connection increases stability and vibration resistance.
- Optional plastic isolating inserts protect against damage from shaft currents.
- New type of mechanical construction, ideal for handling tough mechanical stresses and strains.



Economical
- Alternative to traditional heavy duty encoders that are often over-engineered and expensive.

Versatile
- Very compact. Optional isolating inserts protect against damage from shaft currents, e.g. with AC vector motors.
- Only 49 mm clearance needed.
- Hollow shaft diameter up to Ø 42 mm.
- RS422, push-pull or SIN/COS outputs.
- Extended speed range up to 6,000 RPM.
- High-quality construction, balanced, stainless steel ensures quiet vibration-free running.

Mechanical Characteristics:

Speed:	max. 6,000 RPM at 158 °F (70 °C) [1] max. 3,500 RPM at 176 °F (80 °C) [1]
Rotor moment of inertia:	< 12 oz-in² (< 220 x 10-6 kgm²) [2]
Starting torque with sealing:	< 28.3 oz-in (< 0.2 Nm)
Weight:	approx. 1.8 lbs (0.8 kg)
Protection acc. to EN 60 529:	IP65
Working temperature:	-40 to +176 °F (-40 to +80 °C) [3]
Shaft:	stainless steel
Shock resistance acc. to DIN-IEC 68-2-27	200 g (2,000 m/s²), 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	10 g (100 m/s²), 10-2,000 Hz

[1] During the run-in-phase of approx. 2 hours, reduce the limits for working temperature max or speed max by 1/3
[2] Dependent on the shaft diameter
[3] With connectors, -40 °C, cable securely installed; -30 °C, cable flexibly installed; -20 °C

Electrical Characteristics Sine Wave Output:

Output circuit [Key Code]:	Sine [AB] U = 1 Vpp (±20%)	Sine [AA] U = 1 Vpp (±20%)
Supply voltage:	5 VDC (±5%)	10-30 VDC
Current consumption (no load) with inverted signal:	typ. 65 mA / max. 110 mA	typ. 65 mA / max. 110 mA
-3 dB frequency:	< 180 kHz	< 180 kHz
Signal level channels A/B:	1 Vpp (±20%)	1 Vpp (±20%)
Signal level channel 0:	0.1-1.2 V	0.1-1.2 V
Short-circuit protected [1]	yes	yes
Reverse polarity protection:	no	yes
RoHS compliant acc. to EU guideline 2011/65/EU		

[1] If supply voltage correctly applied

Large Bore Type RI-43 (Hollow Shaft)

Electrical Characteristics RS422 or Push-Pull Output:

Output circuit [Key Code]:	RS 422 [4A/4C] (TTL compatible)	Push-Pull [2B]	Push-Pull [2F] (7272) [3]
Supply voltage:	5 VDC (±5 %) or 10-30 VDC	10-30 VDC	5-30 VDC
Power consumption (no load) without inverted signal:	-	typ. 55 mA / max. 125 mA	-
Power consumption (no load) with inverted signal:	typ. 40 mA / max. 90 mA	typ. 80 mA / max. 150 mA	typ. 50 mA / max. 100 mA
Permissible load/channel:	max. ±20 mA	max. ±30 mA	max. ±20 mA
Pulse frequency:	max. 300 kHz	max. 300 kHz	max. 300 kHz
Signal level high:	min. 2.5 V	min. +V -3 V	min. +V -2.0 V
Signal level low:	max. 0.5 V	max. 2.5 V	max. 0.5 V
Rise time t_r:	max. 200 ns	max. 1 µs	max. 1 µs
Fall time t_f:	max. 200 ns	max. 1 µs	max. 1 µs
Short-circuit protected [1]:	yes	yes	yes
Reverse polarity protection:	5 VDC: no, 10-30 VDC: yes	yes	no

[1] If supply voltage correctly applied
[2] Only one channel allowed to be shorted-out:
(If +V = 5 VDC, short-circuit to channel, 0 V, or +V is permitted) (If +V = 5-30 VDC, short-circuit to channel or 0 V is permitted)
[3] Max. recommended cable length 30 m

Standard Wiring:

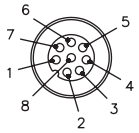
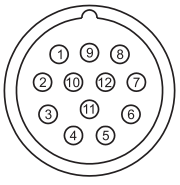
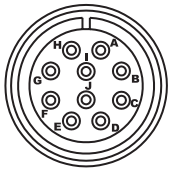
Connection Type	Case Ground	Common (0 V)	+V	A	$\overline{A}$	B	$\overline{B}$	Z	$\overline{Z}$	-	-	OV Sensor	+V Sensor
M23 Multifast	Coupling Nut	10	12	5	6	8	1	3	4	-	-	11	2
MS 10-pin	J	F	D	A	G	B	H	C	I	-	-	-	-
M12 Eurofast	Coupling Nut	1	2	3	4	5	6	7	8	-	-	-	-
Cable	Shield/Drain	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY/PK	RD/BU

Individually isolate unused outputs before inital start up.

Special Pin Configuration:

		Connection Type	Case Ground	Common (0 V)	+V	A	$\overline{A}$	B	$\overline{B}$	Z	$\overline{Z}$	-	-
Output Code	N41	M12 Eurofast	Coupling Nut	7	2	1	3	4	5	6	8	-	-
	N40	MS 10-pin	G	F	D	A	H	B	I	C	J	-	-

Wiring Diagrams:

Male Encoder View		
		
M12 Eurofast Pinout	M23 Multifast Pinout	MS Pinout (10-pin)
Mating Cordset: **E-RKC 8T-930-***	Mating Cordset: **E-CKM 12-931-***	Mating Cordset: **E-MK 10-931-***

* Length in meters.

Large Bore Type RI-43 (Hollow Shaft)

Part Number Key: RI-43 Hollow Shaft Version

A	B	C		D	E		F		G/H/I
RI-43H	19	E2	-	1B	50	-	H1181	/	Specials

A	Type
RI-43H	Ø 100 mm, Hollow Shaft, IP65 Shaft Seal

B	Bore
20	Ø 20 mm [1]
25	Ø 25 mm [1]
28	Ø 28 mm
30	Ø 30 mm [1]
32	Ø 32 mm [2]
38	Ø 38 mm
40	Ø 40 mm
42	Ø 42 mm
A3	Ø 1/2" [2]
A4	Ø 5/8" [1]
A5	Ø 3/4" [2]
A6	Ø 1" [1]
A7	Ø 1-1/8" [2]
A8	Ø 1-1/4" [1]

[1] Bores Available with Isolation Inserts.
[2] Only Available with an Isolation Insert.

C	Flange
E2	4 -1/2" C-Face Tether
S	Face Mount
S4	Long Anti-Rotation Spring
S5	Short Anti-Rotation Spring
S8	Long Tether Arm

D	Voltage Supply and Output Type
1B	10-30 VDC, Push-Pull
2B	10-30 VDC, Push-Pull (w/ Inverted Signals)
2E	5-30 VDC, Push-Pull (w/ Inverted Signals)
2F	5-30 VDC, Line Driver (7272)
4A	5 VDC, RS422 (w/ Inverted Signals)
4B	5-30 VDC, TTL (26C31 w/ Inverted Signals)
4C	10-30 VDC, RS422 (w/ Inverted Signals)
4J	
AA	10-30 VDC[3], SIN/COS, 1 Vpp (w/ Inverted Signals)
AB	5 VDC [3], SIN/COS, 1 Vpp (w/ Inverted Signals)

[3] N24 is the Only Valid Special Output Code for SIN/COS Outputs.

E	Pulse Rate
	50*,360*, 512*, 600*, 1000*, 1024, 1500, 2000, 2048, 2500, 4096, 5000 (e.g. 360 Pulses => 360) Other Pulse Rates Available on Request

* SIN/COS Version not Available with Pulses < 1024

F	Type of Connection
H1181	Radial 8-pin M12 Eurofast Connector
12M23	Radial 12-pin M23 Multifast Connector
10MIL	Radial 10-pin MS Connector
C1M	Radial Cable (1 m PVC)

G	Special Output Signal Formats
	See N21 thru N33 on Page E40

H	Special Insert Options
N42	Isolation Insert Included [4]

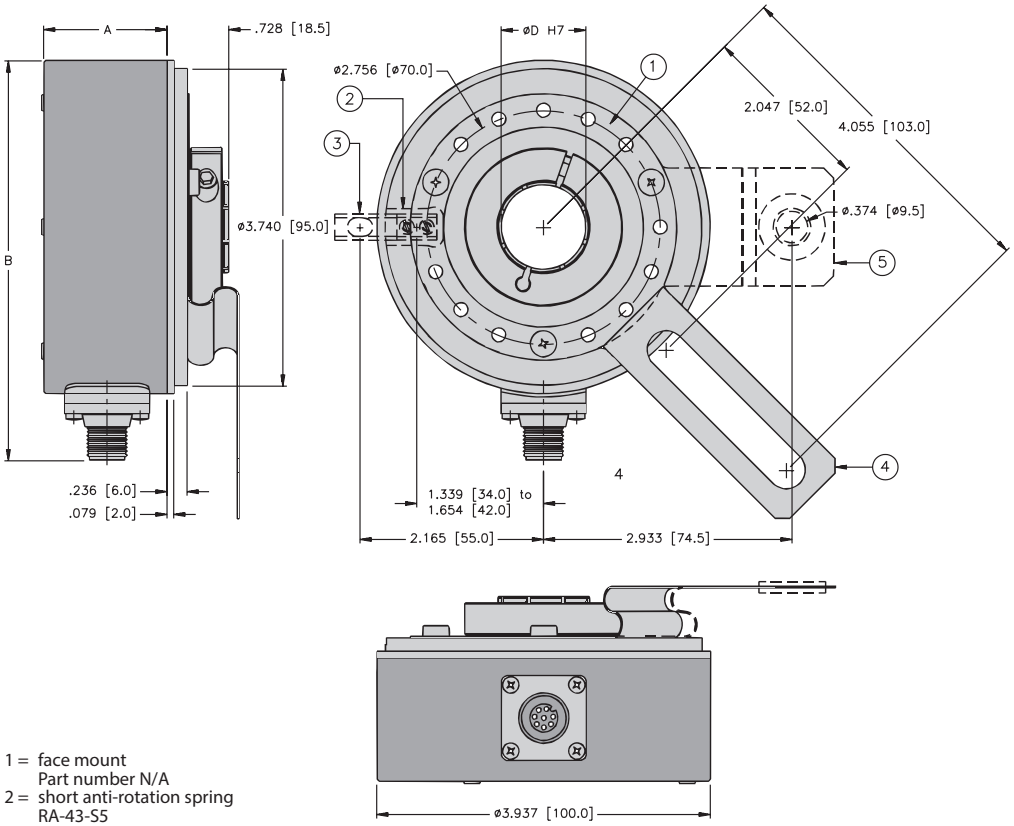
[4] Includes Plastic Hollow Shaft Inserts for Electrical Isolation.

I	Special Connector Pin Configuration
	See N40 or N41 on Page E29

Large Bore Type RI-43 (Hollow Shaft)

Dimensions: RI-43 Hollow Shaft Version

RI-43 Flange S8/E2
Connection H1181



1 = face mount
Part number N/A
2 = short anti-rotation spring
RA-43-S5
3 = long anti-rotation spring
RA-43-S4
4 = tether arm (long)
RA-43-S8
5 = 4 1/2" C-face tether
RA-43-E2

Dimensions for Radial Connector - in [mm]

Connection Style				
DIM	**Cable**	**M12**	**M23**	**MS** (10-pin)
A	1.181 [30.0]	1.181 [30.0]	1.181 [30.0]	1.457 [37.0]
B	-	4.705 [119.5]	4.961 [126.0]	5.394 [137.0]

Large Bore Type RI-43 (Hollow Shaft)

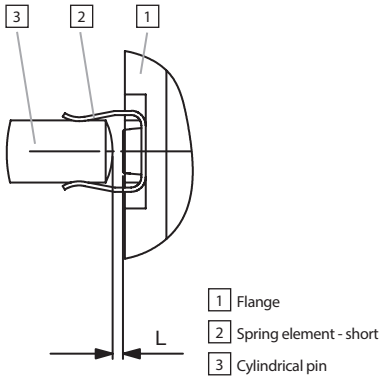
Mating Shaft Requirements:

Type of Flange	Axial End Play	Radial Runout	Angular Offset
S5 (anti-rotational spring short)	max. ±1 mm	max. ±0.3 mm	max. ±2°
S4 (anti-rotational spring long)	max. ±1 mm	max. ±0.3 mm	max. ±2°
S8 (tether arm long)	max. ±0.5 mm	max. ±0.3 mm	max. ±2°
E2 (C-face tether)	max. ±0.5 mm	max. ±0.3 mm	max. ±2°

Mounting:

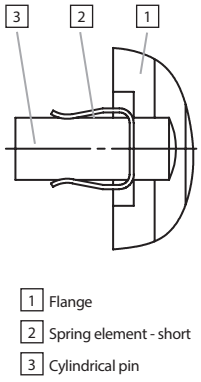
Mounting using the spring element - short:

When mounting the encoder, ensure that dimension **L** is larger than the maximum axial play of the drive in the direction of the arrow.



Mounting using the spring element - long:

Cylindrical pin fed through the bore of the spring.



Large Bore Type RI-43 (Hollow Shaft) Accessories

Isolation Insert

Part Number:	Inner Dimensions
RSA-A3	12.7 mm (1/2")
RSA-A4	15.875 mm (5/8")
RSA-12	12 mm
RSA-14	14 mm
RSA-15	15 mm
RSA-16	16 mm
RSA-18	18 mm
RSA-A5	19.05 mm (3/4")
RSA-20	20 mm
RSA-25	25 mm
RSA-A6	25.4 mm (1")
RSA-A7	28.58 mm (1-1/8")
RSA-30	30 mm
RSA-A8	31.75 mm (1-1/4")
RSA-32	32 mm

The RI-43 encoder is used for AC vector motor and general industrial applications. For AC vector motor applications, the encoder should be electrically isolated from the motor chassis to minimize encoder bearing currents and ground noise. An isolation insert for the hollow shaft is provided with the encoder by specifying N42 in the "special insert option" decode. **When ordering isolation inserts separately, choose option 38 with a bore diameter of 38 mm.**

For general industrial applications, isolation is not required and the decode for "special insert options" can be left blank.

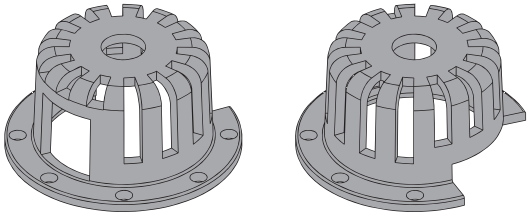
Isolation insert for hollow shaft Ø 42 mm:
External diameter 42 mm
Internal diameter 38 H7 in accordance with ISO 286-2
Order Number: RSA-38

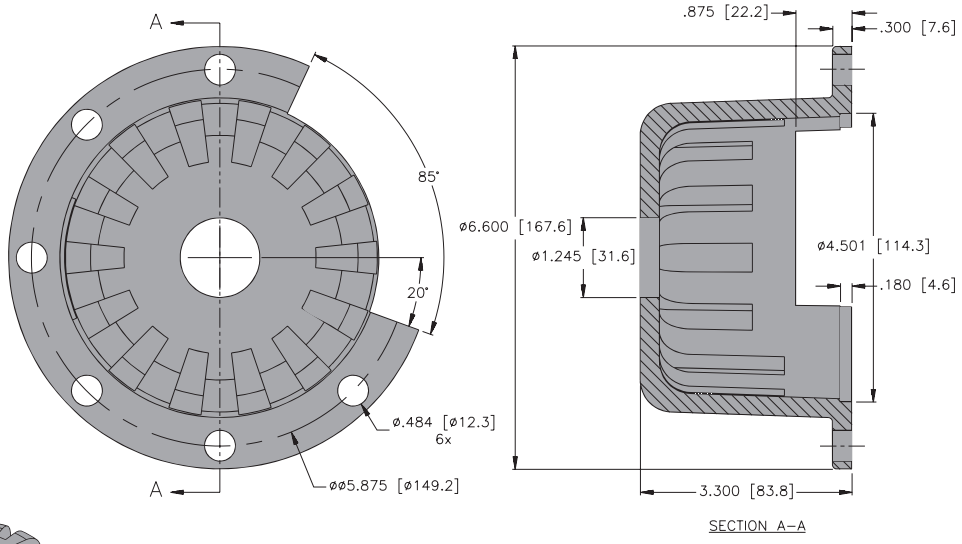
Large Bore Type RI-43 (Hollow Shaft) Accessories

Part Number:
ENCODER COVER KIT

Description:
Cover kit for 4.5" C-face motors

Included: (3) 3/8 x 16 x 3/4 bolts, (3) washers

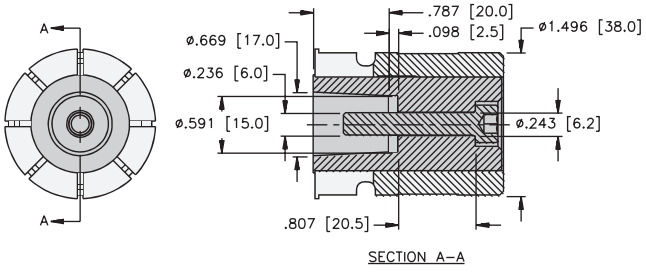




Part Number:
RSA-TAPER

Description:
Mounting kit adapts the RI-43 hollow shaft encoder for mounting onto a tapered shaft. Tapered shafts are used for high-precision direct coupling to devices. An isolating insert is also included in the mounting kit; this reliably protects the encoder from shaft currents.

Included: Insert for cone blind hole, cone 1:10, 17 mm length, isolation insert, allen screw for tightening

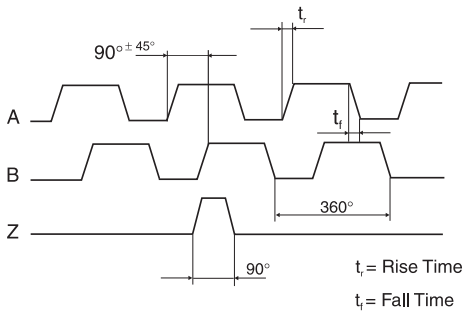


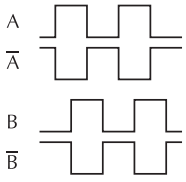
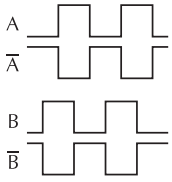
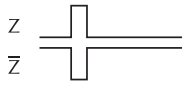
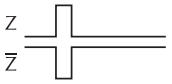
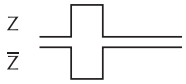
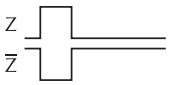
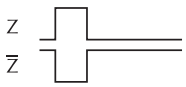
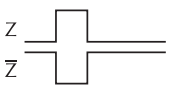
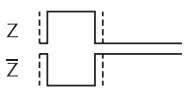
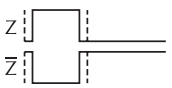
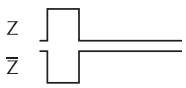
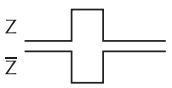
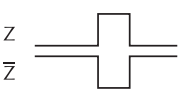
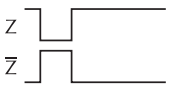
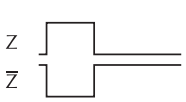
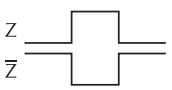
Wave Forms

Outputs

All Turck encoders come standard with six channels, where A leads B in the clockwise direction and the standard index is gated with A & B. The tolerance of the wave form affects the control, and in some cases it may affect the smoothness of system operation.

Wave Form Tolerances



A leads B when the shaft is turned in the clockwise direction viewing the shaft or collet end. This is Turck standard. This format applies to the pin key codes listed below.		B leads A when the shaft is rotated in the clockwise direction viewing the shaft or collet end. This format applies to the pin key codes listed below.	
A leads B, Z gated with A & B. This is Turck standard. Z is 90° wide.		**Code N24:** B leads A, Z gated with A & B. Z is 90° wide.	
Code N21: A leads B, Z gated with B. Z is 180° wide.		**Code N25:** B leads A, Z gated with B. Z is 180° wide.	
Code N22: A leads B, Z gated with A. Z is 180° wide.		**Code N26:** B leads A, Z gated with A. Z is 180° wide.	
Code N23: A leads B, Z ungated. Z is 330° to 360° wide.		**Code N27:** B leads A, Z is ungated. Z is 330° to 360° wide.	
Code N28: A leads B, Z is 180° wide.		**Code N29:*** B leads A, Z gated with $\overline{B}$. Z is 180° wide.	
Code N33:* A leads B, Z gated with $\overline{B}$. Z is 180° wide.		**Code N30:** B leads A, Z is a negative marker gated with B. Z is 180° wide.	
Code N31: A leads B, Z is a minimum with of 270° (electrical degrees).		**Code N32:** B leads A. Z has a minimum width of 270°.	

Note: * For RI-10/12/65 encoders, Z is 160° Wide