

RM36 rotary magnetic encoder



The RM36 is a high-speed magnetic rotary encoder designed for use in harsh industrial environments. The non-contact two-part design removes the need for seals or bearings ensuring long-term reliability and simple installation.

The encoder comprises a magnetic actuator and a separate encoder body. Rotation of the magnetic actuator is sensed by a custom encoder chip within the body, and processed to the required output.

The encoder chip processes the signals received to provide resolutions to 13 bit (8,192 positions per revolution) with high operational speeds. Resolution options include binary and decimal. Output signals are provided in industry standard absolute, incremental or linear formats.

The compact encoder body is 36 mm in diameter and provides dirt immunity up to IP68.

The RM36 can be used in a wide range of applications including marine, medical, print, converting, industrial automation, metal working, motor control and instrumentation.

Product range

5 V power supply version

RM36IC

Incremental with 80 to 2,048 pulses per revolution (320 to 8,192 counts per revolution with x 4 evaluation)

RM36S

Synchro serial interface (SSI) with 320 to 8,192 positions per revolution

24 V power supply version

RM36I

Incremental with 80 to 2,048 pulses per revolution (320 to 8,192 counts per revolution with x 4 evaluation)

RM36Vx

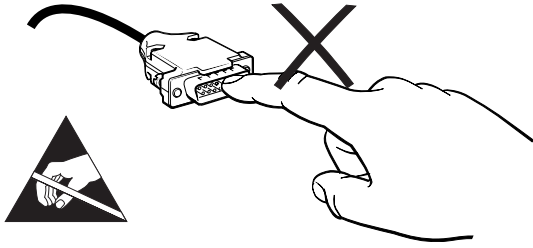
Linear voltage output in a range of variants

RM36Cx

Linear current output in a range of variants

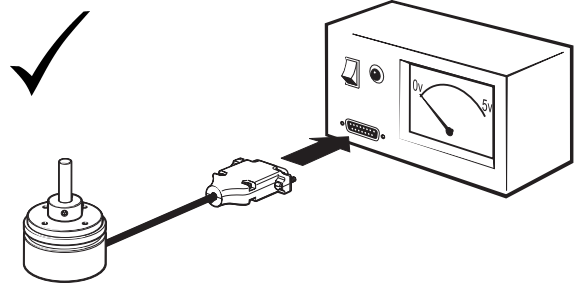
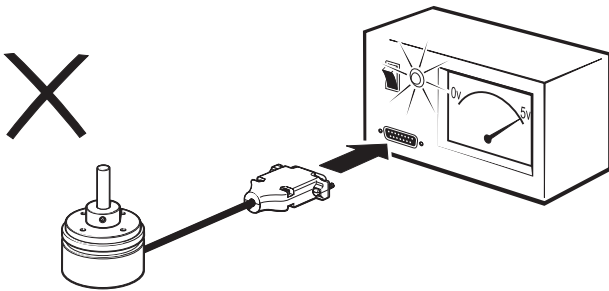
- Excellent immunity to IP68
- Non-contact, frictionless design
- High speed operation to 30,000 rpm
- 36 mm diameter body
- Accuracy $\pm 0.5^\circ$
- Simple installation
- Low inertia
- Stainless steel body option
- CE compliant, including RoHS - see Declaration of conformity

Storage and handling

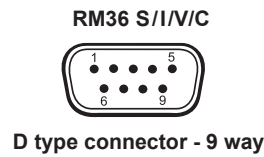
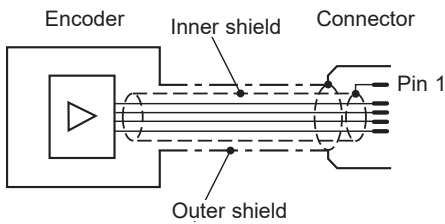


IMPORTANT: Power to RM36 encoders must be supplied from a DC SELV supply complying with the essential requirements of EN (IEC) 60950 or similar specification.

The RM36 series encoders have been designed to the relevant EMC standards, but must be correctly integrated to achieve EMC compliance. In particular, attention to shielding arrangements is critical.



Connections



Pin Nr.	RM36SC		RM36x		RM36Vx		RM36Cx		RM36SI	
	Function	Wire colour	Function	Wire colour	Function	Wire colour	Function	Wire colour	Function	Wire colour
1	Shield - see connection diagram		Shield - see connection diagram		Shield - see connection diagram		Shield - see connection diagram			
2	Clock	White	Z	White	NC	-	NC	-	A+	Gray
3	Clock-	Brown	B	Green	V_{out}	Green	I_{out}	Green	A-	Pink
4	NC	-	A+	Grey	NC	-	NC	-	B+	Green
5	V_{dd}	Red	V_{dd}	Red	$V_{dd}+$	Red	V_{dd}	Red	B-	Yellow
6	Data	Green	$Z-^1$	Brown	$V_{dd}-^2$	Brown	NC	-	Ri+	White
7	Data-	Yellow	$B-^1$	Yellow	NC	-	NC	-	Ri-	Brown
8	NC	-	$A-^1$	Pink	NC	-	NC	-	V_{dd}	Red
9	GND	Blue	GND	Blue	0 V	Blue	0 V	Blue	Clock+	Black
10									Clock-	Violet
11									NC	-
12									Data+	Orange
13									Data-	Clear
14									NC	-
15									GND	Blue

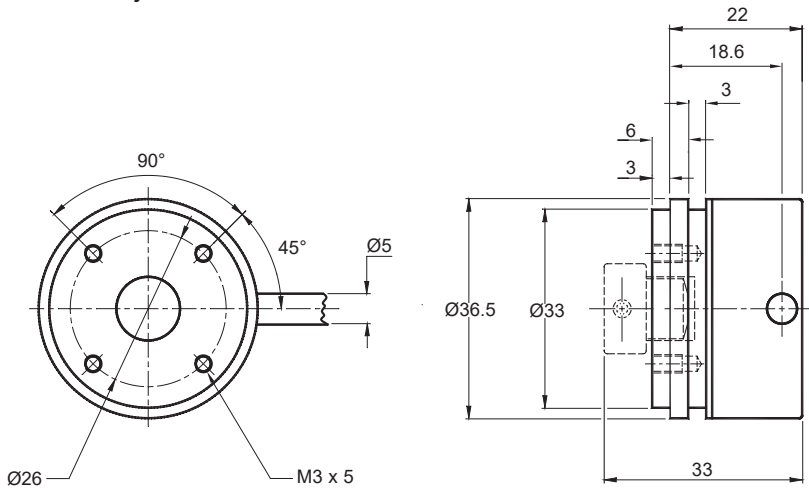
¹ Not available for IB variant

² For variants VM, VN, VP, VQ, VR, VS, VT, and VV only

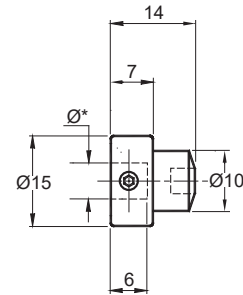
Dimensions

Dimensions and tolerances in mm

Encoder body

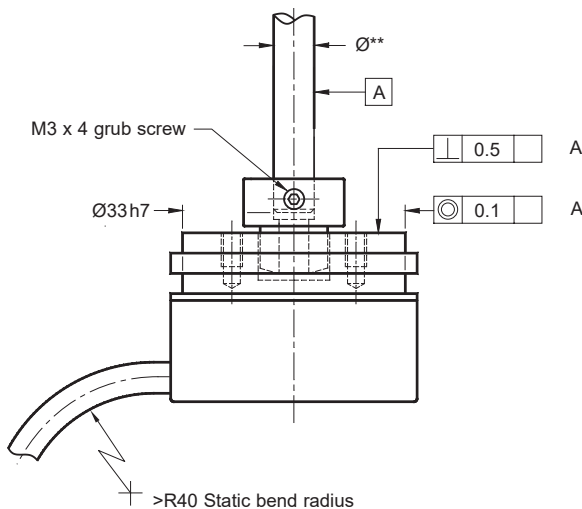


Magnetic actuator

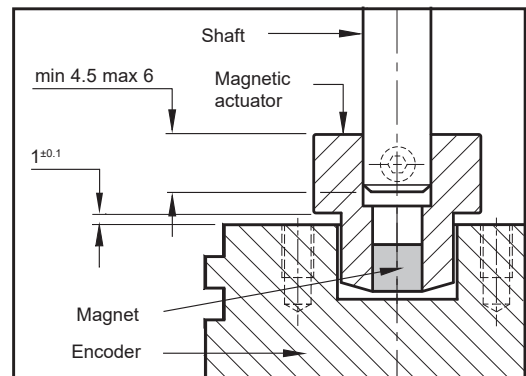


* Hole diameter for nominal shaft size.

Installation drawing



**Nominal shaft size with tolerance h7.



Clockwise (CW) rotation of magnetic actuator.



Operating and electrical specifications

Humidity (for IP64 version)	Storage 95 % maximum relative humidity (non-condensing) (IEC 61010-1) Operating 80 % maximum relative humidity (non-condensing) (IEC 61010-1)
Acceleration	Operating 500 m/s ² EN 60068-2-7:1993 (IEC 68-2-7:1983)
Shock (non-operating)	1000 m/s ² , 6 ms, 1/2 sine EN 60068-2-27:1993 (IEC 68-2-27:1987)
Vibration (operating)	100 m/s ² max at 55 to 2000 Hz EN 60068-2-6:1996 (IEC 68-2-6:1995)
EMC compliance	EN 61326
Cable	Outside diameter 5 mm
Mass	Encoder unit 1 m cable (no connector) 85 g. Stainless steel variant 160 g. Magnetic actuator 12 g
Environmental sealing	IP64 (IP68 optional) EN 60529

Output specifications - 5 V supply

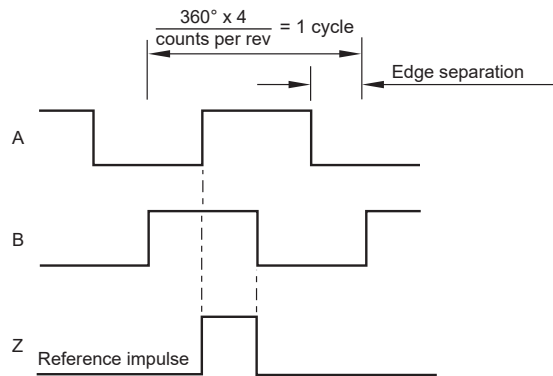
RM36IC – Incremental, RS422

Square wave differential line driver to RS422

Power supply	$V_{dd} = 5\text{ V} \pm 5\%$
Power consumption	Max. 35 mA
Output signals	A, B, Z, A-, B-, Z- (RS422)
Accuracy	Typ. $\pm 0.5^\circ$
Hysteresis	0.18°
Resolution	80 to 2,048 pulses per revolution (320, 400, 500, 512, 800, 1,000, 1,024, 1,600, 2,000, 2,048, 4,096, 8,192 counts per revolution)
Maximum speed	30,000 rpm
Maximum cable length	50 m
Operating temperature	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$ (IP64) $-40\text{ }^\circ\text{C}$ to $+85\text{ }^\circ\text{C}$ (IP68)

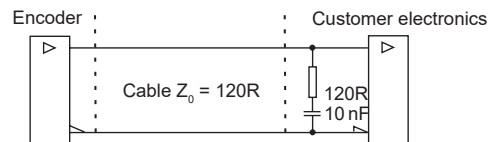
Timing diagram

Complementary signals not shown



B leads A for clockwise rotation of magnetic actuator.

Recommended signal termination

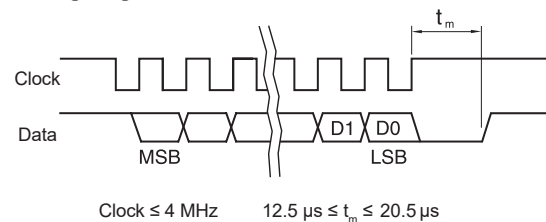


RM36SC – Absolute binary synchro-serial interface (SSI)

Serial encoded absolute position measurement

Output code	Natural binary
Power supply	$V_{dd} = 5\text{ V} \pm 5\%$
Power consumption	Max. 35 mA
Data output	Serial data (RS422)
Data input	Clock (RS422)
Accuracy	Typ. $\pm 0.5^\circ$
Hysteresis	0.18°
Resolution	320, 400, 500, 512, 800, 1,000, 1,024, 1,600, 2,000, 2,048, 4,096, 8,192 positions per revolution
Maximum speed	30,000 rpm
Maximum cable length	100 m (at 1 MHz)
Operating temperature	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$ (IP64) $-40\text{ }^\circ\text{C}$ to $+85\text{ }^\circ\text{C}$ (IP68)

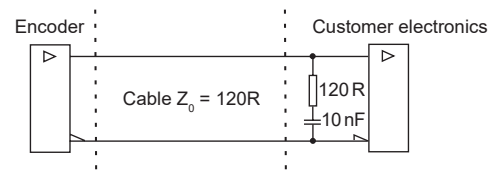
Timing diagram



Position increases for clockwise rotation of magnetic actuator.

Recommended signal termination

For data output lines only



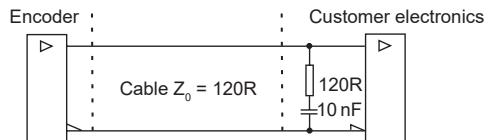
RM36SI – Absolute binary synchro-serial (SSI) + Incremental, RS422

Complex feedback device for absolute position at start up as well as during operation + incremental outputs.
Both the incremental and the SSI output always have the same fixed resolution.

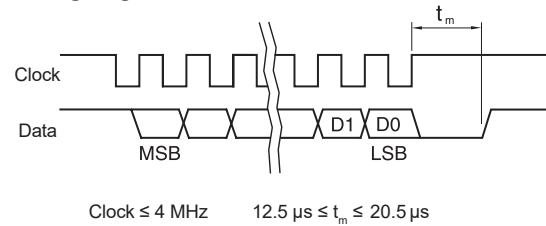
Output code	Natural binary
Power supply	$V_{dd} = 5\text{ V} \pm 5\%$
Power consumption	Max. 35 mA
Incremental outputs	A, B, Z, A-, B-, Z- (RS422)
Data output	Serial data (RS422)
Data input	Clock (RS422)
Accuracy	Typ. $\pm 0.5^\circ$
Hysteresis	0.18°
Resolution	80 to 2,048 pulses per revolution (320, 400, 500, 512, 800, 1,000, 1,024, 1,600, 2,000, 2,048, 4,096, 8,192 counts per revolution)
Maximum speed	30,000 rpm
Maximum cable length	50 m
Operating temperature	-40°C to $+125^\circ\text{C}$ (IP64) -40°C to $+85^\circ\text{C}$ (IP68)

Recommended signal termination

For incremental signals + SSI data output lines only



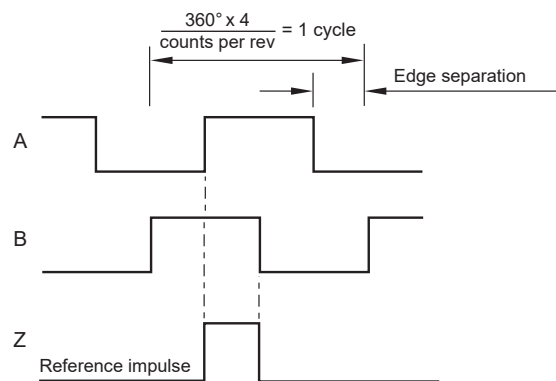
Timing diagram - SSI



Position increases for clockwise rotation of magnetic actuator.

Timing diagram - Incremental

Complementary signals not shown



B leads A for clockwise rotation of magnetic actuator.

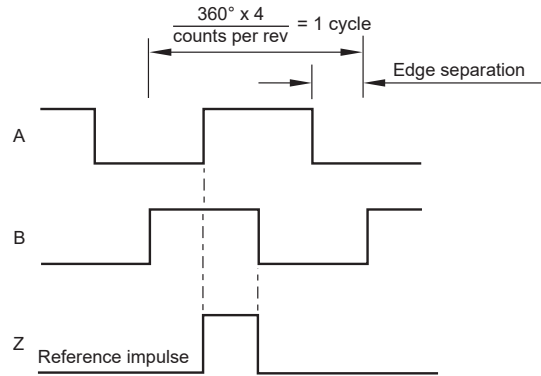
Output specifications - 24 V supply

RM36IA – Incremental, push-pull

Power supply	$V_{dd} = 8\text{ V to }26\text{ V}$
Power consumption	50 mA
Output signals	A, B, Z, A-, B-, Z- (RS422)
Maximum output load	30 mA
Accuracy	Typ. $\pm 0.5^\circ$
Hysteresis	0.18°
Resolution	80 to 2,048 pulses per revolution (320, 400, 500, 512, 800, 1,000, 1,024, 1,600, 2,000, 2,048, 4,096, 8,192 counts per revolution)
Maximum speed	30,000 rpm
Maximum cable length	20 m
Operating temperature	$-40\text{ }^\circ\text{C to }+125\text{ }^\circ\text{C}$ (IP64) $-40\text{ }^\circ\text{C to }+85\text{ }^\circ\text{C}$ (IP68)

Timing diagram

Complementary signals not shown



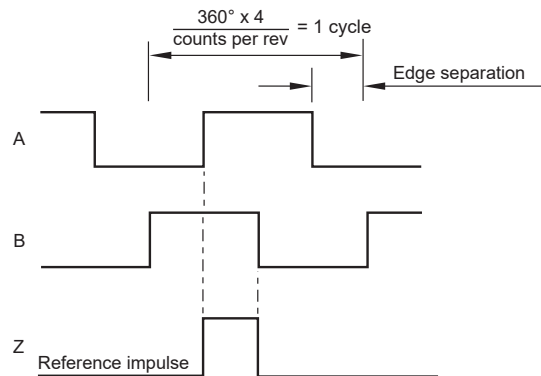
B leads A for clockwise rotation of magnetic actuator.

RM36IB – Incremental, open collector NPN

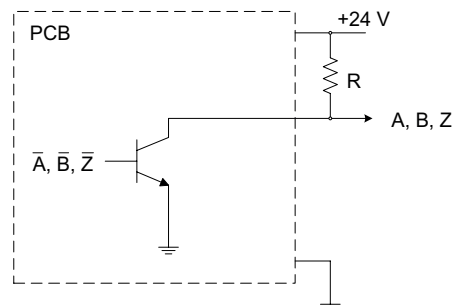
Square wave output

Power supply	$V_{dd} = 8\text{ V to }26\text{ V}$
Power consumption	50 mA
Output signals	A, B, Z
Maximum output load	20 mA
Accuracy	Typ. $\pm 0.5^\circ$
Hysteresis	0.18°
Resolution	80 to 2,048 pulses per revolution (320, 400, 500, 512, 800, 1,000, 1,024, 1,600, 2,000, 2,048, 4,096, 8,192 counts per revolution)
Maximum speed	30,000 rpm
Maximum cable length	20 m
Operating temperature	$-40\text{ }^\circ\text{C to }+125\text{ }^\circ\text{C}$ (IP64) $-40\text{ }^\circ\text{C to }+85\text{ }^\circ\text{C}$ (IP68)

Timing diagram



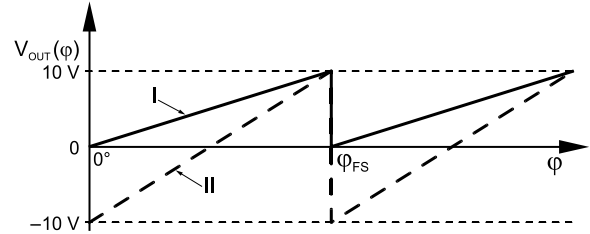
Recommended signal termination



RM36Vx – Linear voltage output

Power supply	Type I: +20 V to +30 V DC Type II: ±12 V to ±16 V DC
Power consumption	Typ. 40 mA
Output voltage	Type I: 0 V to 10 V DC Type II: –10 V to +10 V DC
Output loading	Max. 10 mA
Nonlinearity	1 %
Maximum speed	30,000 rpm
Maximum cable length	20 m
Operating and storage temperature	–25 °C to +85°C

Electrical output/shaft position



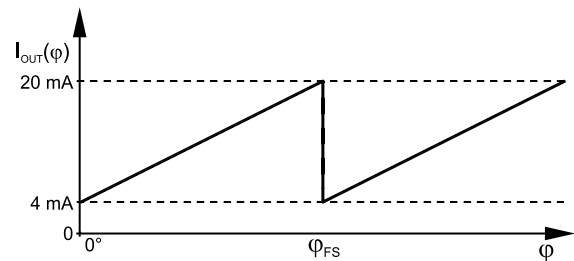
Output type and electrical variant

Φ_{FS}	Type I				Type II			
	360°	180°	90°	45°	360°	180°	90°	45°
CW	VA	VB	VC	VD	VM	VN	VP	VQ
CCW	VE	VF	VG	VH	VR	VS	VT	VV

RM36Cx - Linear current output

Power supply	$V_{dd} = +20 \text{ V to } +30 \text{ V DC}$
Power consumption	50 mA plus output current
Output current	4 mA to 20 mA
Output loading	$R_L = 0 \text{ to } \frac{V_{dd}}{I_{OUTmax}}$
Nonlinearity	1 %
Maximum speed	30,000 rpm
Maximum cable length	20 m
Operating and storage temperature	–25 °C to +85°C

Electrical output/shaft position



Output type and electrical variant

Φ_{FS}	360°	180°	90°	45°
CW	CA	CB	CC	CD
CCW	CE	CF	CG	CH

Part numbering

Encoder system = Encoder body + Magnetic actuator



RM36 SC 00 12B 10 A 2 B 00

Output type

- IA** - Incremental, push-pull, 24 V
- IB** - Incremental, open collector, 24 V
- IC** - Incremental, RS422, 5 V
- SC** - Absolute binary synchro-serial (SSI), RS422, 5 V
- SI** - SSI + Incremental, RS422, 5 V
- Cx** - Linear current:

Linear current output 4 - 20 mA, supply +20 V to +30 V DC				
	360°	180°	90°	45°
CW	CA	CB	CC	CD
CCW	CE	CF	CG	CH

Vx - Linear voltage:

Linear voltage output 0 - 10 V, supply +20 V to +30 V DC				
	360°	180°	90°	45°
CW	VA	VB	VC	VD
CCW	VE	VF	VG	VH
Linear voltage output ±10 V, supply ±12 V to ±16 V DC				
	360°	180°	90°	45°
CW	VM	VN	VP	VQ
CCW	VR	VS	VT	VV

Shaft size

00 - N/A

Special requirements

- 00** - No special requirements (standard)
- 0M** - Cable length in meters

Environment and material

- B** - IP64, aluminium body, high EMC grade (standard)
- C** - IP68, aluminium body, high EMC grade
- J** - IP68, stainless steel body, high EMC grade

Body style and cable exit

- 2** - Cylindrical body, radial cable exit

Connector option

- A** - 'D' type connector - 9 way (for **IA, IB, IC, SC, Cx, Vx** only)
- B** - 'D' type connector - 15 way (for **SI** only)
- F** - Flying lead (no connector)

Cable length

- 10** - 1.0 meter (or 10 meters if **0M** special requirement is chosen)

Resolution

For **IA, IB, IC, SC** and **SI** (counts/positions per revolution):

Decimal			Binary	
D32 - 320	D80 - 800	2D0 - 2000	09B - 512	12B - 4096
D40 - 400	1D0 - 1000		10B - 1024	13B - 8192
D50 - 500	1D6 - 1600		11B - 2048	

NOTE: Not all combinations are valid.

For **Cx** and **Vx**:

10B - 1,024 positions per revolution

Magnetic actuator ordering information

Actuator for integration onto shaft



Shaft = Ø*h7
Fixing: Grub screw provided

Part numbers:

For resolutions of 9 bit absolute (512 cpr incremental)

- RMA04A2A00** - 4 mm dia shaft
- RMA05A2A00** - 5 mm dia shaft
- RMA06A2A00** - 6 mm dia shaft
- RMA08A2A00** - 8 mm dia shaft
- RMA10A2A00** - 10 mm dia shaft
- RMA19A2A00** - 3/16" dia shaft
- RMA25A2A00** - 1/4" dia shaft
- RMA37A2A00** - 3/8" dia shaft

For resolutions from 10 bit absolute (800 cpr incremental) and above

- RMA04A3A00** - 4 mm dia shaft
- RMA05A3A00** - 5 mm dia shaft
- RMA06A3A00** - 6 mm dia shaft
- RMA08A3A00** - 8 mm dia shaft
- RMA10A3A00** - 10 mm dia shaft
- RMA19A3A00** - 3/16" dia shaft
- RMA25A3A00** - 1/4" dia shaft
- RMA37A3A00** - 3/8" dia shaft

Head office

RLS merilna tehnika d.o.o.

Poslovna cona Žeje pri Komendi
Pod vrbami 2
SI-1218 Komenda
Slovenia

T +386 1 5272100

F +386 1 5272129

E mail@rls.si

www.rls.si

Document issues

Issue	Date	Page	Corrections made
3	18. 5. 2018	4 - 6	Resolutions amended
4	4. 7. 2018	General	All outputs amended

This product is not designed or intended for use outside the environmental limitations and operating parameters expressly stated on the product's datasheet. Products are not designed or intended for use in medical, military, aerospace, automotive or oil & gas applications or any safety-critical applications where a failure of the product could cause severe environmental or property damage, personal injury or death. Any use in such applications must be specifically agreed to by seller in writing, and is subject to such additional terms as the seller may impose in its sole discretion. Use of products in such applications is at buyer's own risk, and buyer will indemnify and hold harmless seller and its affiliates against any liability, loss, damage or expense arising from such use. Information contained in this datasheet was derived from product testing under controlled laboratory conditions and data reported thereon is subject to the stated tolerances and variations, or if none are stated, then to tolerances and variations consistent with usual trade practices and testing methods. The product's performance outside of laboratory conditions, including when one or more operating parameters is at its maximum range, may not conform to the product's datasheet. Further, information in the product's datasheet does not reflect the performance of the product in any application, end-use or operating environment buyer or its customer may put the product to. Seller and its affiliates make no recommendation, warranty or representation as to the suitability of the product for buyer's application, use, end-product, process or combination with any other product or as to any results buyer or its customer might obtain in their use of the product. Buyer should use its own knowledge, judgment, expertise and testing in selecting the product for buyer's application, end-use and/or operating environment, and should not rely on any oral or written statement, representation, or samples made by seller or its affiliates for any purpose. EXCEPT FOR THE WARRANTIES EXPRESSLY SET FORTH IN THE SELLER'S TERMS AND CONDITIONS OF SALE, SELLER MAKES NO WARRANTY EXPRESS OR IMPLIED WITH RESPECT TO THE PRODUCT, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, WHICH ARE DISCLAIMED AND EXCLUDED. All sales are subject to seller's exclusive terms and conditions of sale which, where the seller is (a) RLS merilna tehnika d.o.o., are available at <https://www.rls.si/customer-service>, (b) Renishaw, Inc., are available at <http://www.renishaw.com/Shop/legal/en/-42186>, or (c) another person, are available on request, and in each case, are incorporated herein by reference, and are the exclusive terms of sale. No other terms and conditions apply. Buyer is not authorized to make any statements or representations that expand upon or extend the environmental limitations and operating parameters of the products, or which imply permitted usage outside of that expressly stated on the datasheet or agreed to in writing by seller.

RLS merilna tehnika d.o.o. has made considerable effort to ensure the content of this document is correct at the date of publication but makes no warranties or representations regarding the content. RLS merilna tehnika d.o.o. excludes liability, howsoever arising, for any inaccuracies in this document. © 2018 RLS d.o.o.