RM08

Miniature Rotary Magnetic encoder

SUPER SMALL SIZE

HIGH SPEED

EASY INSTALLATION

The RM08 is a compact, sealed, high-speed magnetic encoder designed for use in space-constrained applications. The non-contact two-piece design eliminates the need for seals or bearings and ensures long-term reliability and easy installation.

Designed for direct integration into high-volume OEM applications, the RM08 encoder can be used in a variety of applications including motor control and industrial automation. The encoder housing has a diameter of only 8 mm and offers a degree of protection to IP68.

Features and benefits

- Super small – 8 mm diameter
- Non-contact, frictionless design
- High-speed operation up to 30,000 rpm
- Accuracy up to ±0.3°
- Resolutions up to 12 bit
- Analogue sinusoidal, incremental, SSI and linear voltage output formats

MOTOR CONTROL | MEDICAL | PAN/TILT POSITIONING | GRIPPER | INDUSTRIAL AUTOMATION

General information

The encoder consists of a magnet/ magnetic actuator and a separate sensor board. The rotation of the magnetic actuator is sensed and processed by a custom encoder chip in the body, to provide analogue, incremental, SSI or linear voltage outputs. The RM08 encoders use the AM4096 sensor, see **the AM4096 data sheet** for details.

RM08 readhead + **Magnet** = **RM08 system**

Product range

RM08AC

Analogue sinusoidal output with a single sine/cosine period per revolution.

RM08I

Incremental with 8 to 1,024 pulses per revolution (up to 4,096 counts per revolution).

RM08S

Synchro serial interface (SSI) with up to 4096 positions per revolution.

RM08Vx

Linear voltage output in a range of variants.

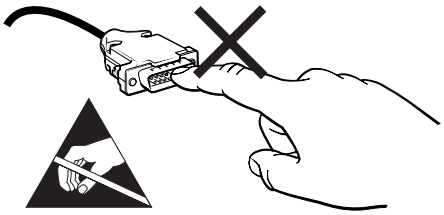
Storage and handling

Operating and storage temperature

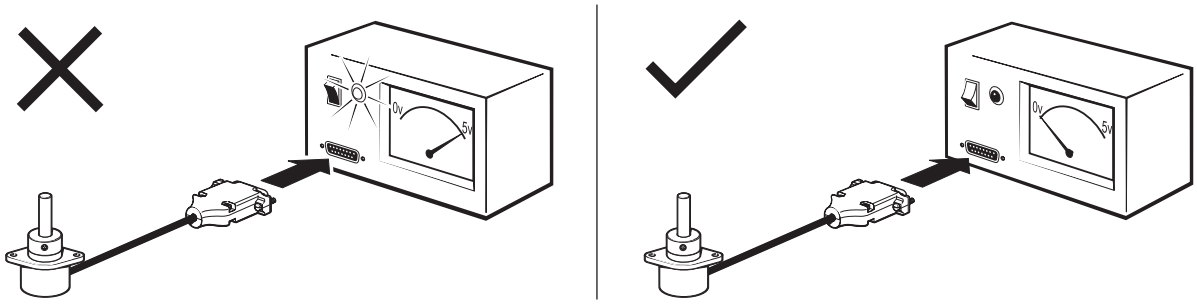
–40 °C to +85 °C

Humidity

Up to IP68



Readhead is ESD sensitive - handle with care.
Do not touch electronic circuit, wires or sensor area without proper ESD protection or outside of ESD controlled environment.

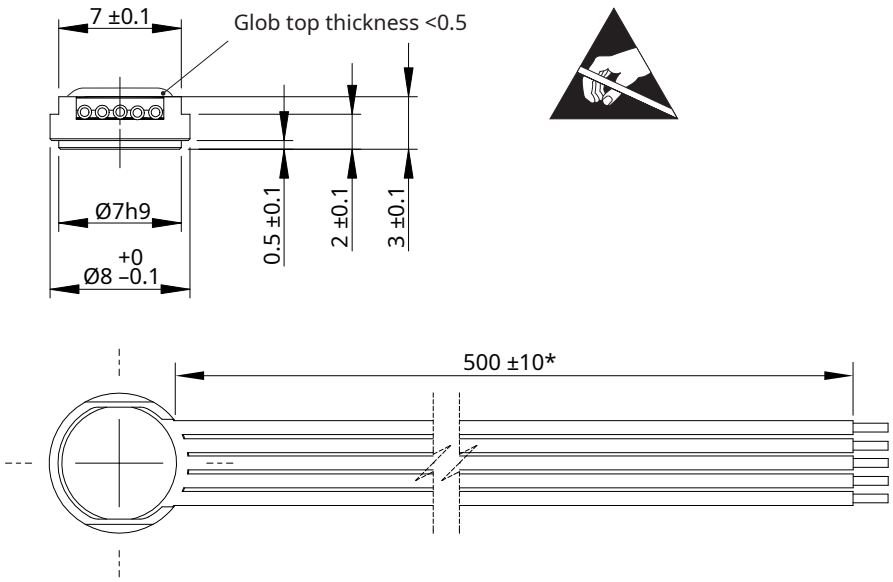


Packaging

Each encoder is packed individually in an antistatic bag.

Dimension drawings

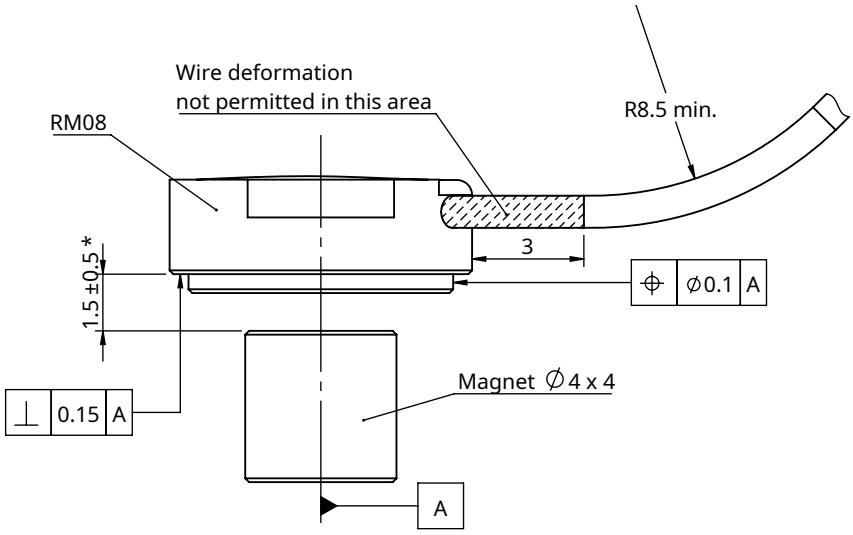
Dimensions and tolerances are in mm. Dimensions without tolerance values are in accordance with ISO 2768-m.

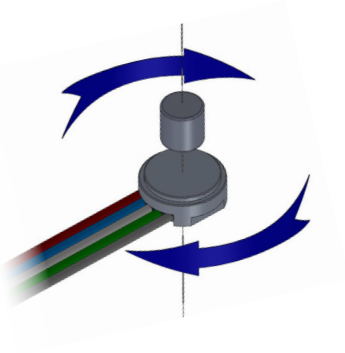


* For cable lengths over 0.5 m, see **FAQ**.

The number of wires depends on the output type.

Installation drawing

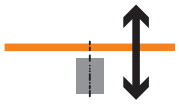
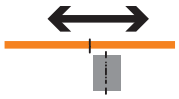




Clockwise rotation of magnet.

* 0.5 mm ±0.2 mm for Ø3 × 1 mm magnet
For more information see **Part numbering**.

Installation tolerances

Mounting distance	See installation drawings of encoder assemblies on **page 4**.	
Radial displacement (concentricity)	±0.1 mm	

- Encoder - Magnet

Technical specifications

Mechanical data

Encoder housing material	Aluminium
Encoder mass	<2 g (with 200 mm long wires)
Wire thickness	AWG30
Magnet material	SmCo (Sm2Co17), NiCuNi coated
Magnet mass	0.4 g
Shock	Half-sine 100 g, according to IEC 60068-2-27, Ed. 4
Steady-state acceleration	700 g, according to IEC 60068-2-27, Ed. 2

Environmental data

Temperature	Operating	–40 °C to +85 °C
	Storage	–40 °C to +85 °C
Environmental sealing		IP68

* IP protection is ensured only when a mating connector with an equal or higher IP rating is used.

Electrical connections

Output type

AC		ID		SD		Vx	
Signal	**Wire colour**	**Signal**	**Wire colour**	**Signal**	**Wire colour**	**Signal**	**Wire colour**
V_{dd}	Red	V_{dd}	Red	V_{dd}	Red	V_{dd}	Red
GND	Blue	GND	Blue	GND	Blue	GND	Blue
Sin	White	Z	White	Clock	White	V_{out}	Green
Cos	Grey	B	Green	Data	Green		
		A	Grey				

Output type

IC (LDB01)

SC (LDB02)

Pin nr.	Signal	Pin nr.	Signal
1	A+	1	V_{dd}
2	A–	2	GND
3	B–	3	Data+
4	B+	4	Data–
5	Z+	5	CLK–
6	Z–	6	CLK+
7	GND		
8	V_{dd}		

Output types

AC – Analogue sinusoidal outputs

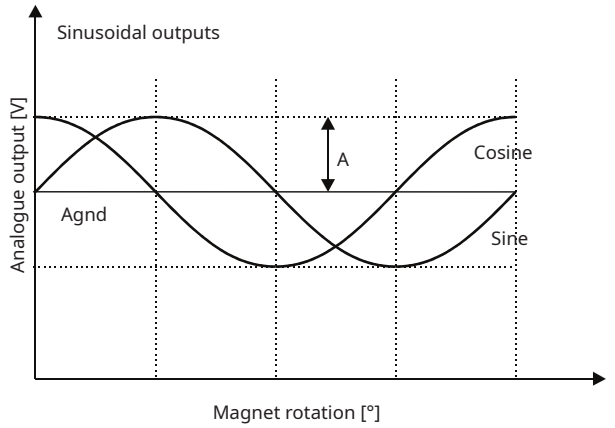
2 channels V_A V_B sinusoids (90° phase shifted, single ended)

Specifications

Power supply	V_{dd} = 5 V or 3.3 V ±5 %	
Current consumption	Typ. 26 mA	
Outputs	Signal amplitude (A)*	0.8 V ±0.2 V
	Signal offset (Agnd)	1.55 V ±5 mV
	Phase difference	90° ±0.2°
Maximum speed	30,000 rpm	
Operating temperature	–40 °C to +85 °C	

* Valid for Ø4 × 4 mm magnets only

Timing diagram for clockwise rotaion of magnet



IC – Incremental, RS422

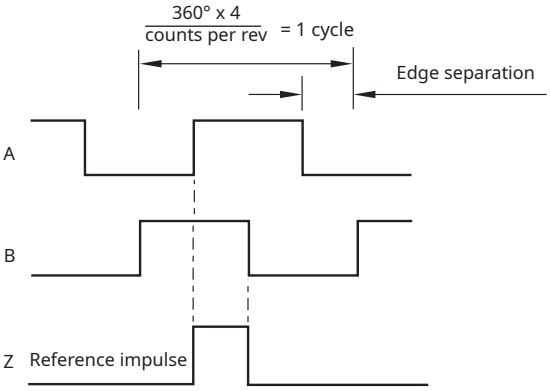
Square wave differential line driver to RS422

Specifications

Power supply	V_{dd} = 5 V or 3.3 V ±5 %
Current consumption	Typ. 26 mA
Output signals	A, B, Z, A–, B–, Z– (RS422)
Accuracy*	Typ. ±0.3°
Hysteresis	0.17°
Resolution	32, 64, 128, 256, 512, 1024, 2048, 4096 cpr
Maximum speed	30,000 rpm
Operating temperature	–25 °C to +85 °C (limited by LDB01)

* Valid for Ø4 × 4 mm magnets only.

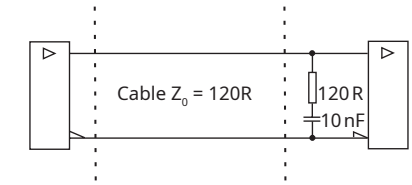
Timing diagram



B leads A for clockwise rotation of magnetic actuator.

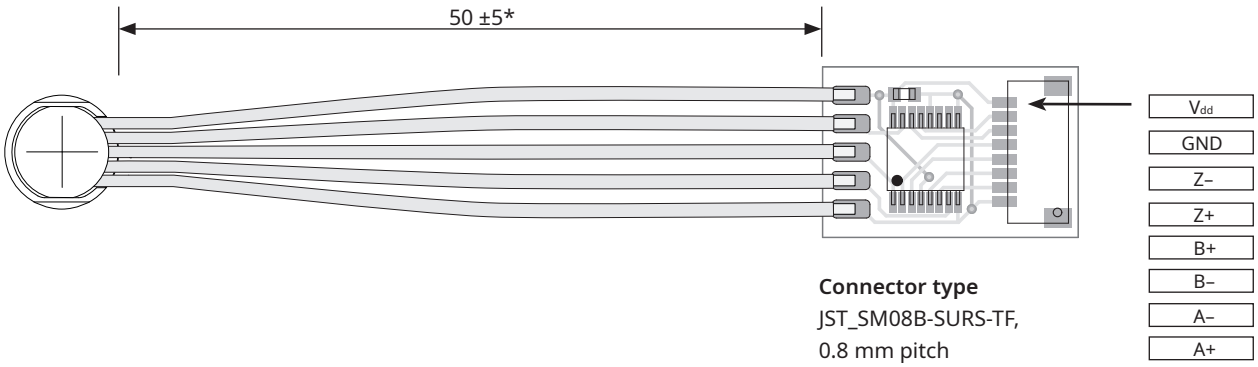
Recommended signal termination

For data output lines only



RM08 with line driver board (LDB01)

Dimensions and tolerance in mm



Connector type
JST_SM08B-SURS-TF,
0.8 mm pitch

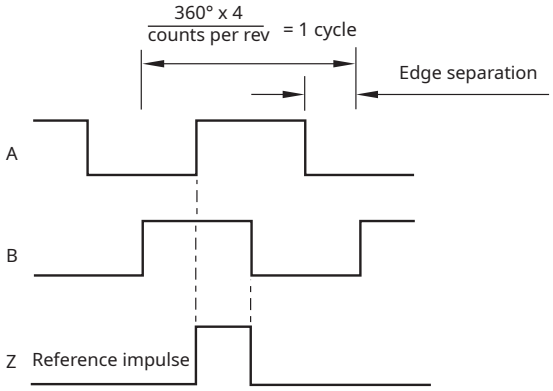
* Differential output available with soldered LDB01 and added strain relief on 50 mm distance from the RM08.

Specifications

Power supply	V_{dd} = 5 V or 3.3 V ±5 %
Current consumption	Typ. 26 mA
Output signals	A, B, Z (single-ended)
Accuracy*	Typ. ±0.3°
Hysteresis	0.17°
Resolution	32, 64, 128, 256, 512, 1024, 2048, 4096 cpr
Maximum speed	30,000 rpm
Operating temperature	–40 °C to +85 °C

* Valid for Ø4 × 4 mm magnets only.

Timing diagram



B leads A for clockwise rotation of magnetic actuator.

SC – Absolute binary synchro-serial interface (SSI)

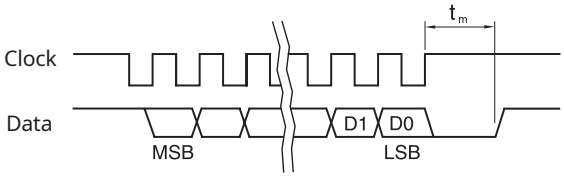
Serial encoded absolute position measurement

Specifications

Output code	Natural binary
Power supply	V_{dd} = 5 V or 3.3 V ±5 %
Current consumption	Typ. 26 mA
Data output	Serial data (RS422)
Data input	Clock (RS422)
Clock frequency	≤4 MHz
Accuracy*	Typ. ±0.3°
Hysteresis	0.17°
Resolution	32, 64, 128, 256, 512, 1024, 2048, 4096 cpr
Maximum speed	30,000 rpm
Operating temperature	–25 °C to +85 °C (limited by LDB02)

* Valid for Ø4 × 4 mm magnets only.

Timing diagram

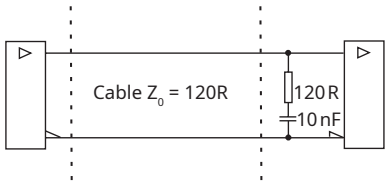


Clock ≤ 4 MHz 12.5 µs ≤ t_m ≤ 20.5 µs

Position increases for clockwise rotation of magnetic actuator.

Recommended signal termination

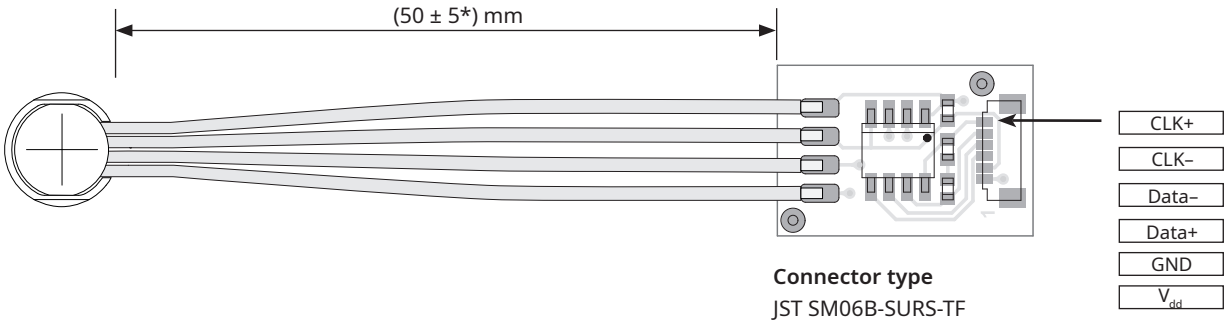
For data output lines only



Encoder Customer electronics

RM08 with line driver board (LDB02)

Dimensions and tolerance in mm



Connector type
JST SM06B-SURS-TF

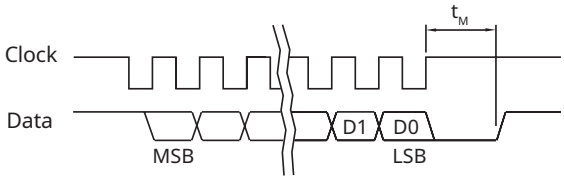
* Differential output available with soldered LDB02 and added strain relief on 50 mm distance from the RM08.

Specifications

Output code	Natural binary
Power supply	V_{dd} = 5 V or 3.3 V ±5 %
Current consumption	Typ. 26 mA
Data output	Data (single ended)
Data input	Clock (single ended)
Clock frequency	≤4 MHz
Accuracy*	Typ. ±0.3°
Hysteresis	0.17°
Resolution	32, 64, 128, 256, 512, 1024, 2048, 4096 cpr
Maximum speed	30,000 rpm
Operating temperature	–40 °C to +85 °C

* Valid for Ø4 × 4 mm magnets only.

Timing diagram



Clock ≤ 4 MHz 12.5 µs ≤ t_m ≤ 20.5 µs

Position increases for clockwise rotation of magnetic actuator.

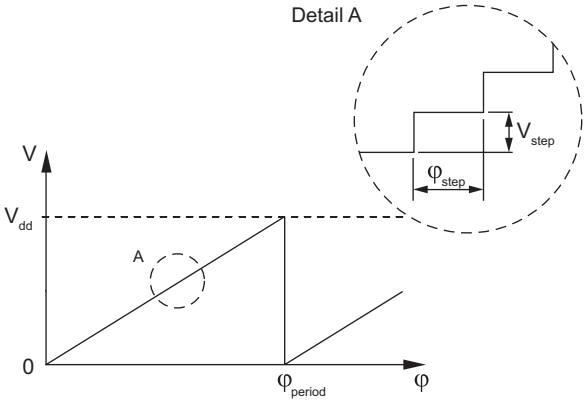
Vx – Linear voltage output

Alternative for potentiometers

Specifications

Power supply	V_{dd} = 5 V ±5 %
Current consumption	Typ. 26 mA
Output voltage	0 V to V_{dd}
Output loading	Max. 10 mA
Resolution of DAC	10 bit
Nonlinearity	1 %
Maximum speed	30,000 rpm
Operating temperature	–40 °C to +85 °C

Timing diagram



φ_{period}	N_{period}	N_{step}	φ_{step}
360°	1	1,024	0.35°
180°	2	1,024	0.18°
90°	4	1,024	0.09°
45°	8	512	0.09°

$$\varphi_{step} = \frac{\varphi_{period}}{N_{step}} \qquad V_{step} = \frac{V_{dd}}{N_{step}}$$

φ_{period} = Angle covered in one period (one sawtooth)
V_{period} = Output voltage range for one period
φ_{step} = Step angle (angular movement needed to register a change in the position)
V_{step} = Output voltage range for one step
N_{period} = Number of periods in one revolution
N_{step} = Number of steps in one period

Output type and electrical variant

Rotation \ φ_{period}	360°	180°	90°	45°
Clockwise	VA	VB	VC	VD
Counterclockwise	VE	VF	VG	VH

Part numbering

RM08 ID 00 12B 02 L 2 G 00

Output type

AC - Analogue sinusoidal
IC - Incremental, RS422 **
ID - Incremental, single ended
SC - Absolute binary synchro-serial (SSI), RS422 **
SD - Absolute binary synchro-serial (SSI), single ended
Vx - Linear voltage output 0 - 5 V, supply 5 V DC:

	360°	180°	90°	45°
CW	**VA**	**VB**	**VC**	**VD**
CCW	**VE**	**VF**	**VG**	**VH**

Shaft size

00 - N/A (standard)

Resolution

For **AC:**
01S - One sine/cosine period per revolution

For **IC**, **ID, SC** and **SD** (counts/positions per revolution):

Binary		
12B - 4096	**09B** - 512	**06B** - 64
11B - 2048	**08B** - 256	**05B** - 32
10B - 1024	**07B** - 125	

For **Vx:**
10B - 1024 counts/positions per revolution

Cable length (length of leads)

02 - 0.2 m (max. 0.5 m) (for AC, ID, SD and Vx only)
05 - 50 mm (for IC and SC only)

For cable lengths above 0.5 m, see **FAQ**.

Connector

L - Leads only (no connector)
U - Line driver board with JST connector

Body style and cable exit

2 - Cylindrical body, radial cable/leads exit

Environment and material

G - IP68, no EMC grade, aluminium body (standard)

Special requirements

00 - No special requirements (standard)
33 - 3.3 V power supply

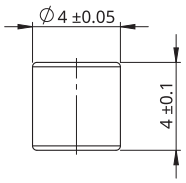
** Differential output available with soldered LDB01/LDB02 and added strain relief on 50 mm distance from the RM08. See image below.

Table of available combinations

Series	Output type	Shaft size	Resolution	Cable length	Connector	Body style and cable exit	Environment and material	Special requirements
RM08	AC	00	01S	02	L	2	G	00 / 33
	IC		05B / 06B / 07B / 08B / 09B / 10B / 11B / 12B	50	U			
	ID			02	L			
	SC			50	U			
	SD			02	L			
	Vx		10B					00

Magnetic actuator and magnet ordering information

Magnet for direct recessing in non-ferrous shafts

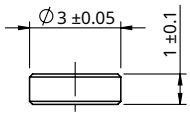


Fixing: Adhesive (recommended – LOCTITE 648 or 2701)

Part numbers:

For resolutions up to 9 bit absolute (512 cpr incremental)
RMM44A2A00 (individually packed) – for sample quantities only
RMM44A2C00 (packed in tubes)

For resolutions from 10 bit absolute (800 cpr incremental) and above
RMM44A3A00 (individually packed) – for sample quantities only
RMM44A3C00 (packed in tubes)



Part numbers:

RMM3010A1B00

RMM3010 magnets are only tested (not graded). Specified accuracy cannot be achieved by using magnet RMM3010

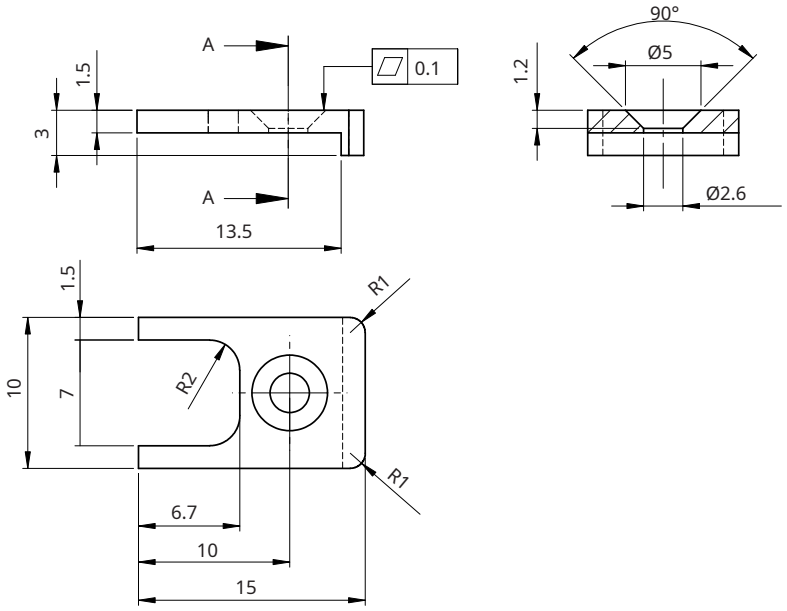
Accessories

Mounting bracket

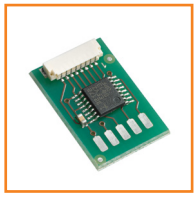
ACC014

Dimensions

Dimensions and tolerances are in mm.



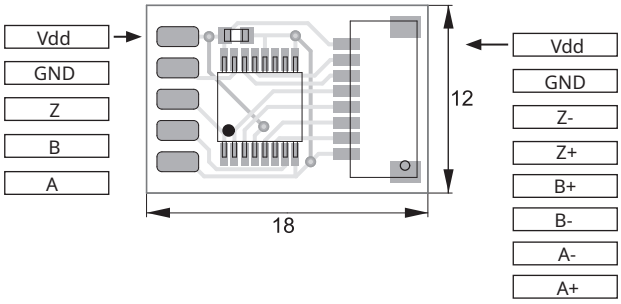
Line drive board for incremental output - LDB001



LDB01

Dimensions

Dimensions and tolerances are in mm.



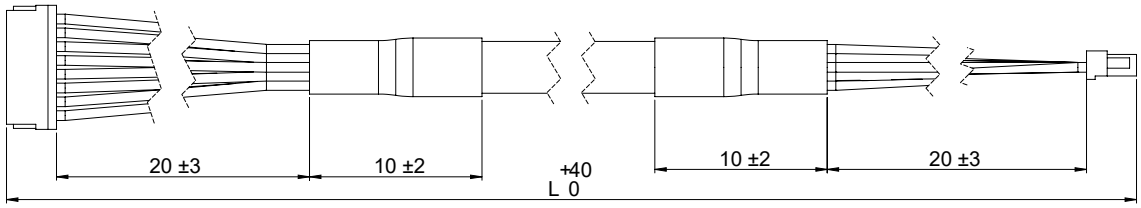
Cable assembly for LDB001

ACC033, ACC034

Cable specifications	M-9693-2350-01-C
Configuration	10 × 0.0320 mm²
Sheath color	Black
Rated voltage	30 V
Temperature range	From –40 °C to +90 °C

Dimensions

Dimensions and tolerances are in mm.



Electrical connections

Pin	Wire color
1	Grey
2	Pink
3	Yellow
4	Green
5	White
6	Brown
7	Blue
8	Red

Part number

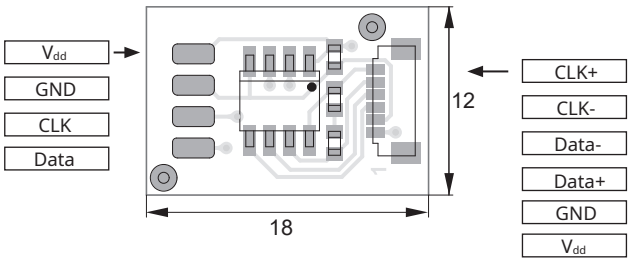
	Cable length (L)
ACC033	1 m
ACC034	0.5 m

Line drive board for incremental output - LDB02

LDB02

Dimensions

Dimensions and tolerances are in mm.



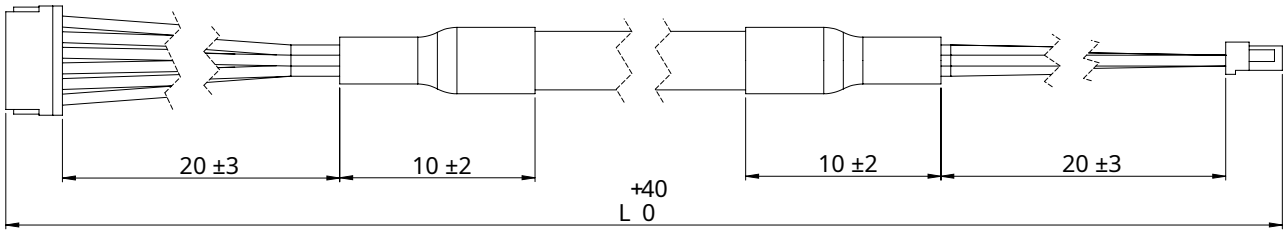
Cable assembly for LDB02

ACC031, ACC032

Cable specifications	M-9693-2350-01-C
Configuration	10 × 0.0320 mm²
Sheath color	Black
Rated voltage	30 V
Temperature range	From –40 °C to +90 °C

Dimensions

Dimensions and tolerances are in mm.



Electrical connections

Pin	Wire color
1	Red
2	Blue
3	Green
4	Yellow
5	Brown
6	White

Part number

	Cable length (L)
ACC031	1 m
ACC032	0.5 m

Head office

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Document issues

Issue	Date	Page	Description
16	29. 5. 2025	General	New design of document, dimension drawing amended