Data sheet
L-9518-0122-01-C

RENISHAW
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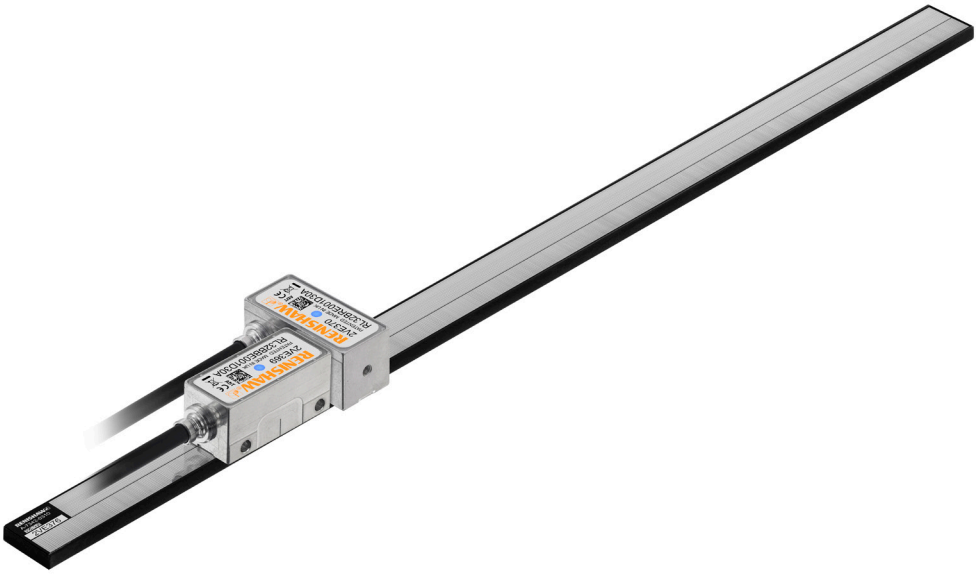
RXMA30 1.5D absolute multi-DoF encoder scale



RXMA30 is a 1.5D scale for measuring multiple degrees of freedom (multi-DoF). Using a multi-DoF system helps machine designers control motion in additional degrees of freedom, and to gain control of error mechanisms within dynamic motion systems.

With a low coefficient of thermal expansion, RXMA30 1.5D scales offer excellent thermal stability and repeatability. RXMA30 scales are compatible with the RESOLUTE™ absolute optical encoder. This combination enables true-absolute position feedback in both X and Y axes, with no need for complex homing routines.

Convenience and versatility are key to the Renishaw multi-DoF encoder approach. Individual readheads directly measure motion in each axis.

The encoder system offers a compact solution for multi-DoF positioning systems, enabling linear and rotational control.

Depending on the requirements of an application, readheads and scales can be combined to measure translation and rotation in all six degrees of freedom (6DoF).

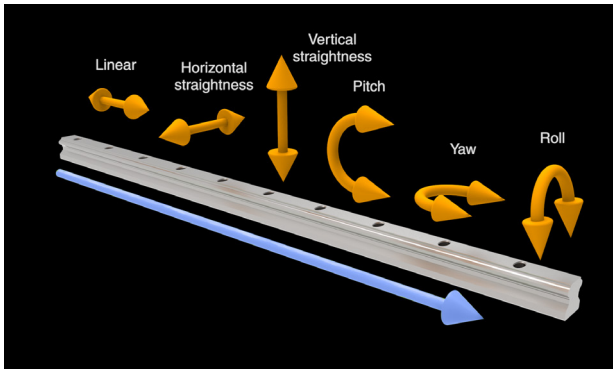
- **Unique absolute scale**
- **Designed for easy electrical and mechanical integration**
- **Accuracy of up to ±3 µm (in the x axis)**
- **Near-zero thermal expansion**
- **High performance and repeatability under dynamic conditions**
- **Standard lengths up to 350 mm**
- **Longer lengths available by request, for example > 1 m**
- **Compatible with RESOLUTE absolute readheads**

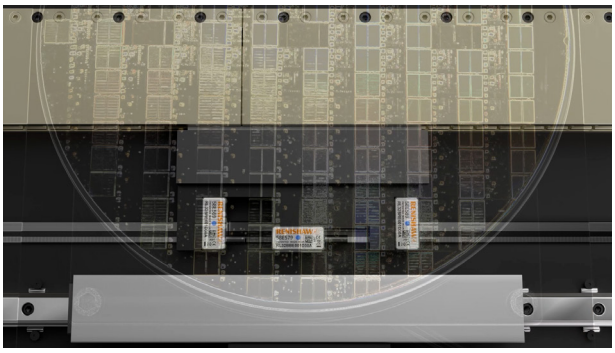
Renishaw's multi-DoF approach

Error detection and compensation

High-performance position measurement along a single axis can be improved by detecting small, unavoidable errors in up to 6DoF, including horizontal and vertical axis straightness, pitch, roll and yaw.

Renishaw's advanced absolute encoder technology, paired with its unique 1.5D scale, enables dynamic compensation of these errors - resulting in superior accuracy and repeatability.





Versatile absolute system

Renishaw has engineered a true-absolute multi-DoF encoder system, featuring one or more low-expansion glass 1.5D scales, read by market-proven RESOLUTE absolute encoders.

This combination offers exceptional thermal stability and high-speed absolute position measurement.

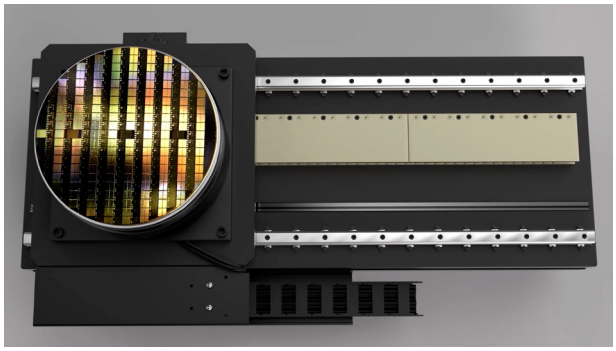
RESOLUTE readheads are available with end and side cable outlet options. This enables machine designers to integrate multi-DoF encoders in highly compact arrangements. Individual readheads can also be spaced according to the application's requirements, and are not constrained to a set footprint. [1]

Built for high performance

Highly dynamic applications such as XY stages used by the semiconductor industry require exceptional accuracy and repeatability to meet quality and productivity demands.

By measuring multiple degrees of freedom along each axis, machine builders can dynamically measure error sources such as the straightness of linear guideways and compensate for the resulting translation and rotation errors.

Multi-DoF encoders from Renishaw ensure exceptional in-process repeatability and monitoring to maintain optimum performance in operation.



[1] Suggested configurations are shown on page 5.

RXMA30 scale specifications

Description		Low-expansion glass, dual axis 1.5D spar scale for use with RESOLUTE
Pitch		30 µm
Form (height × width)		4 mm x 15.1 mm
Accuracy (at 20 °C)		Up to ±3 µm
Coefficient of thermal expansion (at 20 °C)		0 ±0.5 µm/m/°C
Temperature	Storage	–20 °C to +80 °C
	Operating	0 °C to +70 °C
	Installation	+10 °C to +35 °C
Mass		157 g/m
Available lengths (total scale length, L)		Up to 350 mm (available in 50 mm increments as standard) Longer lengths are possible - specification may vary
Measuring length	X axis	Up to L – 31.5 mm, depending on readhead configuration
	Y axis:	4 mm
Mounting		Adhesive tape and epoxy thermal datum
Adhesive tape thickness		0.212 mm
Density (at 20 °C)		2.6 g/cm³

For further information on installation and mounting options, refer to the *RESOLUTE RELA30/RSLA30 high-accuracy absolute linear encoder system* installation guide (Renishaw part number M-9553-9128), which is available from the website at **www.renishaw.com/resolutedownloads**.

Custom solutions

Renishaw welcomes enquiries from customers who may have special application requirements. Example customisations Renishaw may be able to support include:

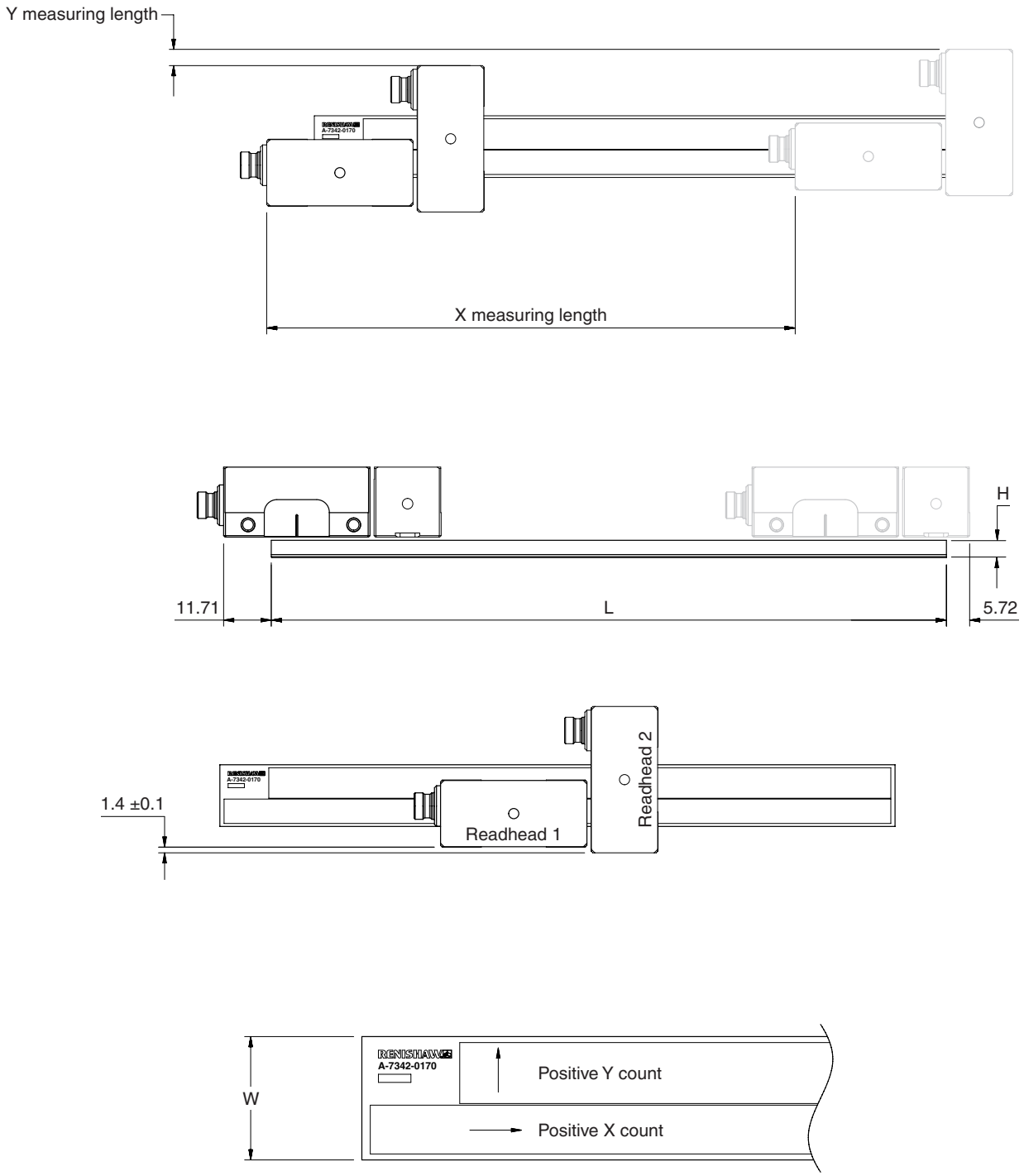
- Longer scale lengths (Renishaw has previously supplied lengths over 1 m)
- Alternative encoder technologies, including incremental x-axis measurement
- Alternative scale substrates

Contact your local Renishaw representative to discuss your requirements.

RXMA30 installation drawing

A standard X-Y measuring configuration is shown.

Dimensions and tolerances in mm



For other tolerances, refer to the *RESOLUTE™ RSLA30/RELA30 high-accuracy absolute linear encoder system* installation guide (Renishaw part no. M-9553-9128).

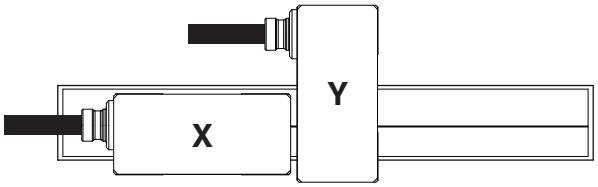
For full installation drawing, please refer to the appropriate installation drawings.

System configuration options

Multi-DoF encoders can be arranged to suit physical constraints and measurement priorities of the application. Some examples are shown below.

X, Y

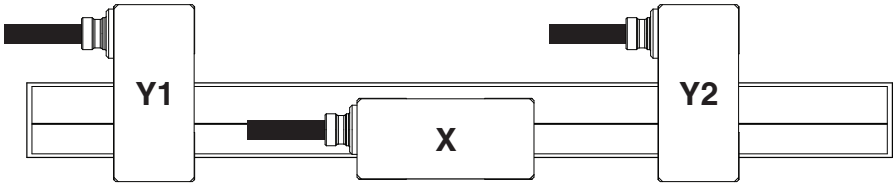
Cable exit configuration chosen to align with the primary axis direction.



Configuration	Maximum possible measuring length
X, Y	L - 31.5 mm
X, Y, Rz	L - 86 mm
X, Y, Rz - perpendicular	L - 69.5 mm
Y, Rz	L - 49 mm

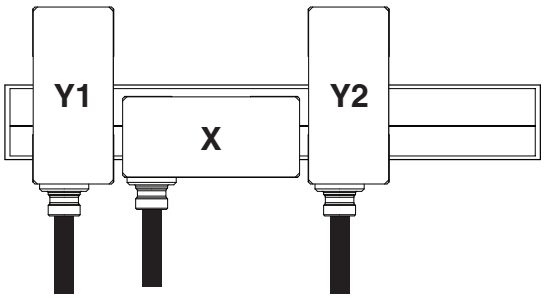
X, Y, Rz

A second readhead in the Y axis enables measurement of rotation about Rz. Increasing the separation between Y1 and Y2 readhead enables more precise measurement in Rz.



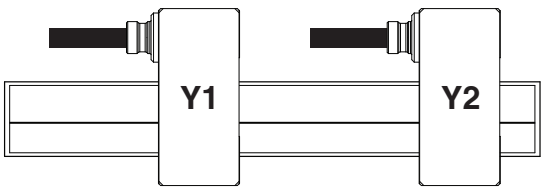
X, Y, Rz - perpendicular cable exit

Readhead cable outlet configurations chosen to exit perpendicular to the primary axis direction.



Y, Rz

Only the Y axis scale is used to measure motion in Y and Rz. Mount on the side of a stage to detect pitch errors.

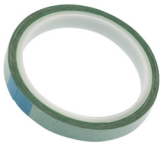


Scale part numbers

Part number	Available lengths	Available in increments of	Ordering instructions
A-7342-xxxx	50 mm to 350 mm	50 mm	xxxx is the length in mm. Ordering A-7342-0150 for example will result in a length of 150 mm.

Scale accessory part numbers

Self-adhesive mounting accessories

Part description	Part number	Product image
Adhesive backing tape (5 m) (nominal thickness 0.2 mm)	A-9584-2111	
Adhesive backing tape applicator Aids the application of the adhesive backing tape to the scale	A-9584-0601	
RGG-2 two part epoxy adhesive Used to create a datum point	A-9531-0342	

Compatible RESOLUTE BiSS readhead part numbers

Linear readheads

R L 32B B E 001 D 30 A

Series

R = RESOLUTE

Scale form

L = Linear

Serial interface

26B = BiSS 26 bit

32B = BiSS 32 bit

36B = BiSS 36 bit

Mechanical option

B = Standard cable outlet

R = Side cable outlet

Gain option

E = RXMA30

Resolution

001 = 1 nm

005 = 5 nm

050 = 50 nm

Scale code option

D = RXMA30 (50 mm to 350 mm total scale length)

Cable length

02 = 0.2 metres

05 = 0.5 metres

10 = 1.0 metres

15 = 1.5 metres

30 = 3.0 metres

50 = 5.0 metres

90 = 9.0 metres

99 = 10.0 metres

Cable termination

A = 9-way D-type connector

F = Flying lead (unterminated cable)

L = LEMO in-line connector

S = M12 (sealed) connector

For full details and technical information about compatible RESOLUTE readheads, refer to the *RESOLUTE™ absolute optical encoder system* data sheet (Renishaw part number L-9518-0013), which is available from the website at **www.renishaw.com/resolutedownloads**.

Compatible RESOLUTE FANUC readhead part numbers

Linear readheads

R L 37F B E 001 D 30 A

Series

R = RESOLUTE

Scale form

L = Linear

Serial interface

37F = FANUC α and α*i* (37 bit)

Mechanical option

B = Standard cable outlet

R = Side cable outlet

Gain option

E = RXMA30

Resolution

001 = 1 nm

050 = 50 nm

Scale code option

D = RXMA30 (50 mm to 350 mm total scale length)

Cable length

02 = 0.2 metres
05 = 0.5 metres
10 = 1.0 metres
15 = 1.5 metres
30 = 3.0 metres
50 = 5.0 metres
90 = 9.0 metres
99 = 10.0 metres

Cable termination

A = 9-way D-type connector

F = Flying lead (unterminated cable)

H = 20-way FANUC compatible connector

L = LEMO in-line connector

S = M12 (sealed) connector

For full details and technical information about compatible RESOLUTE readheads, refer to the *RESOLUTE™ absolute optical encoder system* data sheet (Renishaw part number L-9518-0013), which is available from the website at **www.renishaw.com/resolutedownloads**.

Compatible RESOLUTE Mitsubishi readhead part numbers

Linear readheads

R L 40M B E 001 D 30 N

Series

R = RESOLUTE

Scale form

L = Linear

Serial interface

40M = Mitsubishi 40 bit, 2 wire [1]

40N = Mitsubishi 40 bit, 4 wire [2]

Mechanical option

B = Standard cable outlet

R = Side cable outlet

Gain option

E = RXMA30

Resolution

001 = 1 nm

050 = 50 nm

Scale code option

D = RXMA30 (50 mm to 350 mm total scale length)

Cable length

02 = 0.2 metres
05 = 0.5 metres
10 = 1.0 metres
15 = 1.5 metres
30 = 3.0 metres
50 = 5.0 metres
90 = 9.0 metres
99 = 10.0 metres

Cable termination

A = 9-way D-type connector

F = Flying lead (unterminated cable)

L = LEMO in-line connector

N = 15-way D-type connector for Mitsubishi

P = 10-way Mitsubishi connector

For full details and technical information about compatible RESOLUTE readheads, refer to the *RESOLUTE™ absolute optical encoder system* data sheet (Renishaw part number L-9518-0013), which is available from the website at **www.renishaw.com/resolutedownloads**.

[1] 2 wire: MR-J4 series

[2] 4 wire: MDS-D2/DH2/DM2/DJ

Compatible RESOLUTE Panasonic readhead part numbers

Linear readheads

R L 48P B E 001 D 30 A

Series

R = RESOLUTE

Scale form

L = Linear

Serial interface

48P = Panasonic 48 bit

Mechanical option

B = Standard cable outlet

R = Side cable outlet

Gain option

E = RXMA30

Resolution

001 = 1 nm

050 = 50 nm

100 = 100 nm

Scale code option

D = RXMA30 (50 mm to 350 mm total scale length)

Cable length

02 = 0.2 metres
05 = 0.5 metres
10 = 1.0 metres
15 = 1.5 metres
30 = 3.0 metres
50 = 5.0 metres
90 = 9.0 metres
99 = 10.0 metres

Cable termination

A = 9-way D-type connector

F = Flying lead (unterminated cable)

L = LEMO in-line connector

S = M12 (sealed) connector

For full details and technical information about compatible RESOLUTE readheads, refer to the *RESOLUTE™ absolute optical encoder system* data sheet (Renishaw part number L-9518-0013), which is available from the website at **www.renishaw.com/resolutedownloads**.

Compatible RESOLUTE Siemens DRIVE-CLiQ readhead part numbers

Linear readheads

R L 34D B E 001 D 30 S

Series

R = RESOLUTE

Scale form

L = Linear

Serial interface

28D = Siemens DRIVE-CLiQ 28 bit (50 nm resolution only)

34D = Siemens DRIVE-CLiQ 34 bit (1 nm resolution only)

Mechanical option

B = Standard cable outlet

R = Side cable outlet

Gain option

E = RXMA30

Resolution

001 = 1 nm

050 = 50 nm

Scale code option

D = RXMA30 (50 mm to 350 mm total scale length)

Cable length

02 = 0.2 metres
05 = 0.5 metres
10 = 1.0 metres
15 = 1.5 metres
30 = 3.0 metres
50 = 5.0 metres
90 = 9.0 metres
99 = 10.0 metres

Cable termination

F = Flying lead (unterminated cable)

S = M12 (sealed) connector

For full details and technical information about compatible RESOLUTE readheads, refer to the *RESOLUTE™ absolute optical encoder system* data sheet (Renishaw part number L-9518-0013), which is available from the website at **www.renishaw.com/resolutedownloads**.

Compatible RESOLUTE Yaskawa readhead part numbers

Linear readheads

R L 36Y B E 001 D 30 A

Series

R = RESOLUTE

Scale form

L = Linear

Serial interface

36Y = Yaskawa 36 bit

Mechanical option

B = Standard cable outlet

R = Side cable outlet

Gain option

E = RXMA30

Resolution

001 = 1 nm

050 = 50 nm

Scale code option

D = RXMA30 (50 mm to 350 mm total scale length)

Cable length

02 = 0.2 metres
05 = 0.5 metres
10 = 1.0 metres
15 = 1.5 metres
30 = 3.0 metres
50 = 5.0 metres
90 = 9.0 metres
99 = 10.0 metres

Cable termination

A = 9-way D-type connector

F = Flying lead (unterminated cable)

L = LEMO in-line connector

S = M12 (sealed) connector

For full details and technical information about compatible RESOLUTE readheads, refer to the *RESOLUTE™ absolute optical encoder system* data sheet (Renishaw part number L-9518-0013), which is available from the website at **www.renishaw.com/resolutedownloads**.

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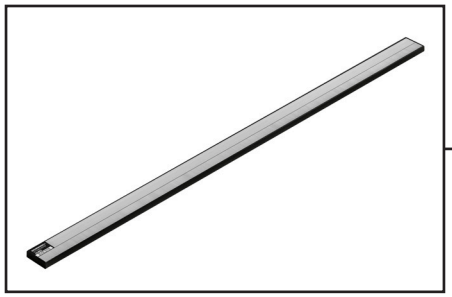
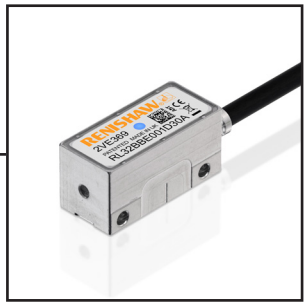
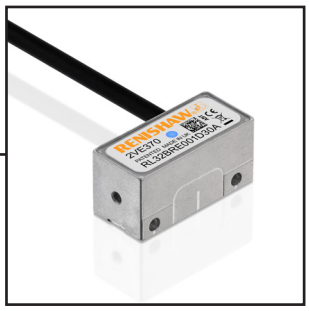
Compatible products

RXMA30





RESOLUTE standard readheads (standard cable outlet)



RESOLUTE standard readheads (side cable outlet)

www.renishaw.com/contact

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