Data sheet
L-9517-9399-01-D

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RESA absolute angle encoder

RESA is a one-piece stainless steel ring with a single track, true absolute scale marked directly onto the periphery.

Read by Renishaw's revolutionary new absolute fine pitch encoder system, RESOLUTE™, it has high tolerance to dirt, scratches and greasy fingerprints that can cause other encoder systems to miscount.

The RESA offers impressive accuracy with resolution to 0.00030 arc second, suiting the most demanding precision applications.

The low profile RESA, with large internal diameter, is easy to design into most installations. Equally important, its low mass, low inertia design does not compromise system performance. RESA is available in a wide range of sizes and line counts, providing compatibility with industry standard controllers.

System features

- Compatible with the revolutionary new true absolute encoder, RESOLUTE
- Angular resolution to 0.00030 arc second
- System repeatability to 0.0075 arc second
- 36 000 rev/min maximum speed for all resolutions
- Patented taper mount simplifies integration and minimises installation errors
- Large internal diameter for ease of integration
- Available in sizes from Ø52 mm to Ø550 mm
- Custom sizes also available
- Low mass and low inertia
- Ultra-low inertia versions also available
- Integral set-up LED on readhead for quick set-up and instant 'health check' at any time
- 30 µm scale pitch ensures exceptional motion control performance
- Resolutions to 27 bit with FANUC or 32 bit with *BiSS*

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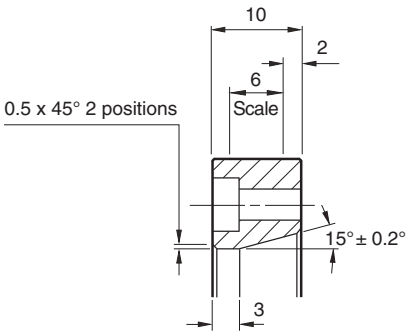
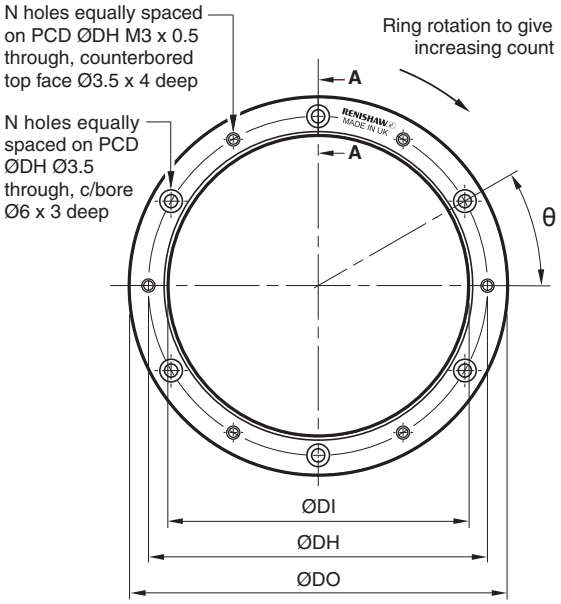
Installation drawing ('A' section)

Dimensions and tolerances in mm

Section A-A



NOTE: θ is the angle between one tapped hole and the adjacent clearance hole. For example, the angle between two clearance holes is 2θ.



Nominal external diameter (mm)	DO (mm)	DI (mm)	Mounting holes		
			DH (mm)	N	θ
52	52.20 52.10	30.04 30.00	40	6	30°
75	75.40 75.30	55.04 55.00	65	6	30°
104	104.40 104.20	80.04 80.00	90	6	30°
115	114.70 114.50	95.04 95.00	105	6	30°
150	150.40 150.20	130.04 130.00	140	9	20°
209	208.80 208.40	186.05 186.00	196	12	15°
229	229.40 229.00	209.05 209.00	219	12	15°
255	254.80 254.40	235.06 235.00	245	12	15°
300	300.40 300.20	280.06 280.00	290	16	11.25°
350	350.40 350.20	330.06 330.00	340	16	11.25°
417	417.40 417.00	380.10 380.00	390	18	10°
489	489.12 488.72	451.10 450.90	462	20	*18°
550	550.20 549.80	510.10 510.00	520	20	9°

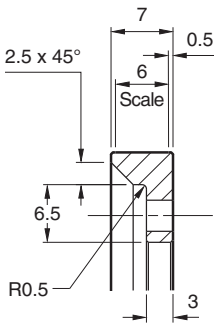
***NOTE:** There are no tapped holes on the 489 mm ring

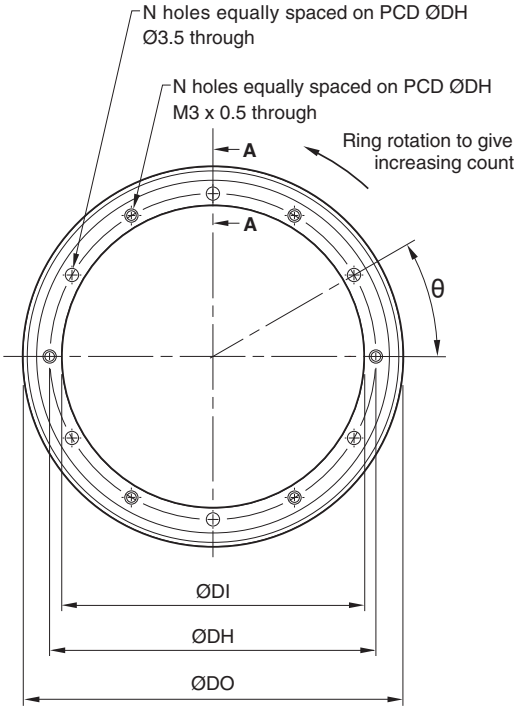
NOTE: When using an RESOLUTE ETR the hub should be made of a material with a CTE of between 15 and 19 µm/m/°C. Contact your local Renishaw representative for more information.

Installation drawing (‘B’ section)

Dimensions and tolerances in mm

Section A-A



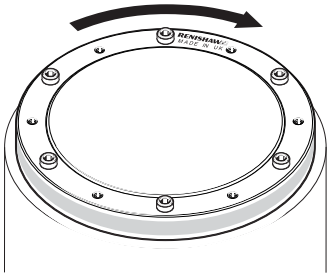


NOTE: θ is the angle between one tapped hole and the adjacent clearance hole. For example, the angle between two clearance holes is 2θ.

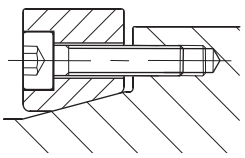
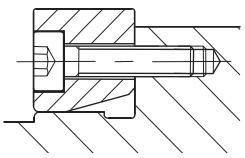
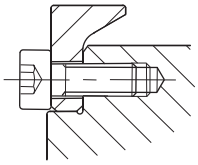
NOTE: When using an RESOLUTE ETR the hub should be made of a material with a CTE of between 15 and 19 µm/m/°C. Contact your local Renishaw representative for more information.

Nominal external diameter (mm)	DO (mm)	DI (mm)	DH (mm)	N	θ
75	75.40 75.30	55.04 55.00	61	6	30°
100	100.30 100.20	80.04 80.00	86	6	30°
150	150.40 150.20	130.04 130.00	136	9	20°
200	200.40 200.20	180.04 180.00	186	12	15°

Ring rotation to give increasing count



Mounting methods

	Taper mount	Interference fit
‘A’ section		
‘B’ section	Not applicable	
Notes	**Recommended for all installations** Offers highest accuracy. Enables simplest adjustment. Enables eccentricity to be compensated. Offers excellent mechanical stability against thermal cycling, shock and vibration. Minimises cost of substrate preparation.	**Alternative installation** Will not correct eccentricity of the supporting shaft.

For further information on installation and mounting options, please refer to the RESOLUTE RESA Installation guide (M-9553-9140) which is available from your local representative, or can be downloaded from: **www.renishawsupport.com**

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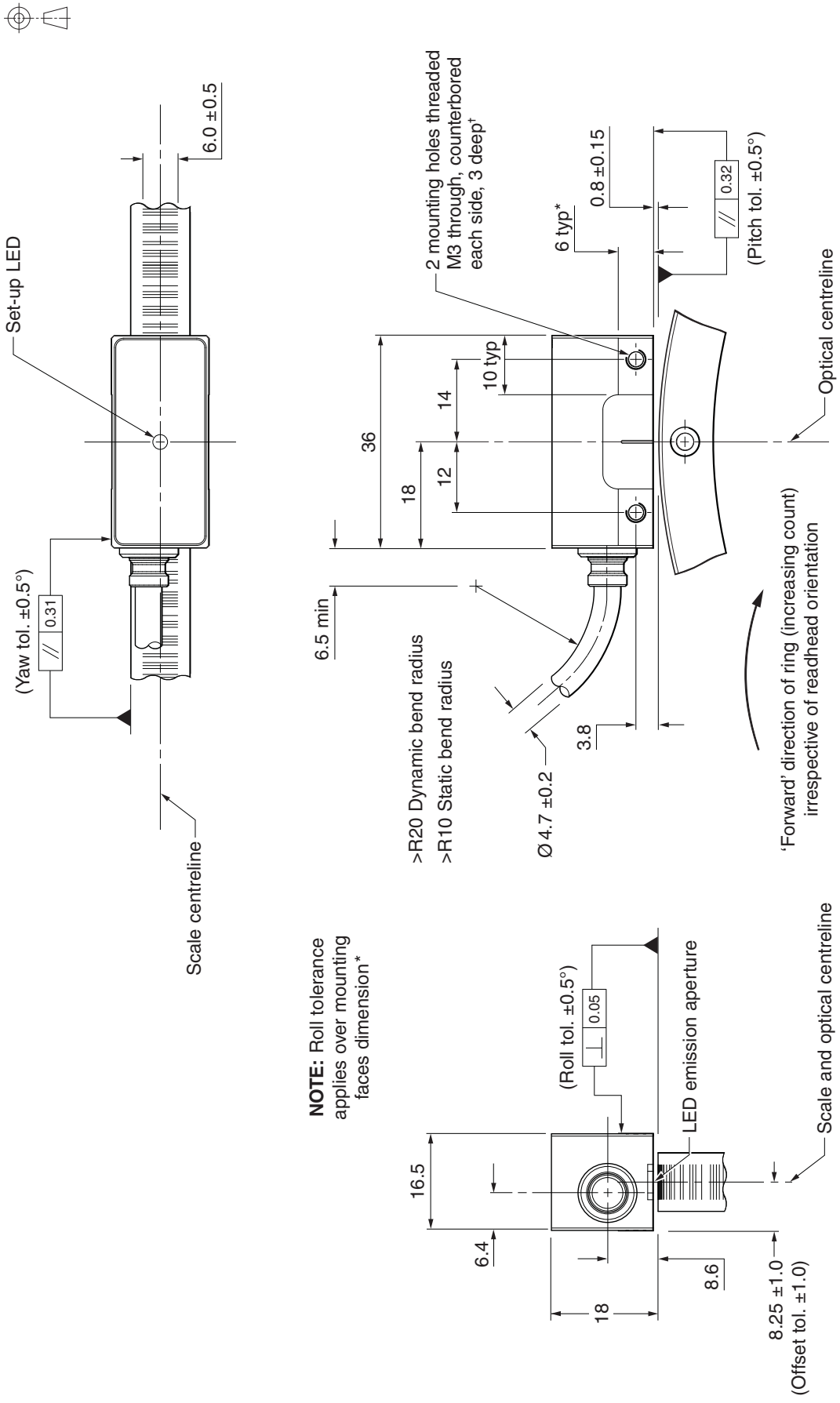
RESOLUTE installation drawing (on RESA ring)

Dimensions and tolerances in mm



†Recommended thread engagement 5 min (8 mm including counterbore).
Recommended tightening torque 0.5 to 1.0 Nm.

For more information on installation and mounting options please refer to the RESOLUTE RESA Installation guide (M-9553-9140).
This can be downloaded from our website www.renishaw.com/encoder or contact your local representative.

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Operating specifications

Material		303/304 stainless steel	
Coefficient of expansion		17 µm/m/°C (ppm/°C)	
Temperature	Storage	standard RESOLUTE: +80 °C to -20 °C	ETR: +80 °C to -40 °C
	Operating	standard RESOLUTE: +80 °C to 0 °C	ETR: +80 °C to -40 °C

Nominal external diameter (mm)		**52**	**75**	**100**	**104**	**115**	**150**	**200**	**209**
Nominal internal diameter (mm)		30	55	80	80	95	130	180	186
Mass (kg)	'A' section	0.1	0.15	–	0.25	0.25	0.3	–	0.5
	'B' section	–	0.07	0.1	–	–	0.15	0.2	–
Moment of inertia (kgmm^2)	'A' section	47	160	–	550	640	1 600	–	4 900
	'B' section	–	78	200	–	–	720	1 800	–

Nominal external diameter (mm)		**229**	**255**	**300**	**350**	**417**	**489**	**550**
Nominal internal diameter (mm)		209	235	280	330	380	451	510
Mass (kg)	'A' section	0.5	0.55	0.65	0.75	1.76	2.12	2.67
	'B' section	–	–	–	–	–	–	–
Moment of inertia (kgmm^2)	'A' section	5 900	8 000	14 000	22 000	70 000	120 000	188 000
	'B' section	–	–	–	–	–	–	–

Speed and accuracy

Nominal external diameter (mm)	Maximum reading speed (rev/min)	System accuracy (arc second)
52	36 000	±5.49
75	25 000	±3.82
100	19 000	±2.86
104	18 000	±2.69
115	16 500	±2.44
150	12 000	±1.91
200	9 500	±1.43
209	9 000	±1.4
229	8 300	±1.27
255	7 400	±1.11
300	6 300	±0.95
350	5 400	±0.82
417	4 500	±0.68
489	3 900	±0.59
550	3 400	±0.52

System accuracy is graduation accuracy plus SDE. Effects such as eccentricity influence installed accuracy; for application advice, please contact your local representative.

Caution: Very high speed motion axes require additional design consideration. For applications that will exceed 50% of the rated maximum reading speed of the ring, please contact Renishaw for further advice.

Resolution

RESOLUTE is available with a variety of resolutions, to meet the needs of a wide range of applications. The choice of resolutions depends on the serial protocol being used, but there are no limitations due to ring size, eg, FANUC 27 bit resolution is available on all ring sizes.

BiSS RESOLUTE resolution options:

18 bit (262 144 counts per revolution, ≈ 4.94 arc second)
26 bit (67 108 864 counts per revolution, ≈ 0.019 arc second)
32 bit (4 294 967 296 counts per revolution, ≈ 0.00030 arc second)
Note that 32 bit resolution is below the noise floor of the RESOLUTE encoder.

FANUC RESOLUTE resolution options:

23 bit (8 388 608 counts per revolution, ≈ 0.15 arc second)
27 bit (134 217 728 counts per revolution, ≈ 0.0097 arc second)

For resolution options on other protocols, please contact Renishaw.

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Angle encoder part numbers

RESA 30U S A 300 B

Scale code
B - Standard

Diameter
052 - 52 mm
075 - 75 mm
100 - 100 mm ('B' section only)
104 - 104 mm
115 - 115 mm
150 - 150 mm
200 - 200 mm ('B' section only)
209 - 209 mm
229 - 229 mm
255 - 255 mm
300 - 300 mm
350 - 350 mm
417 - 417 mm
489 - 489 mm
550 - 550 mm

Form
A - tapered internal diameter
B - low inertia (only available in 75, 100, 150 and 200 mm diameters)

Material
S - stainless steel

Pitch
30U - 30 µm

Absolute angle encoder series

RESA compatible readheads

RESA

RESOLUTE
Installation guide M-9553-9140
Data sheet FANUC L-9517-9442
BiSS L-9517-9448
Mitsubishi L-9517-9454
ETR L-9517-9420

For worldwide contact details, please visit our main website at www.renishaw.com/contact

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