Data sheet
L-9517-9778-08-B

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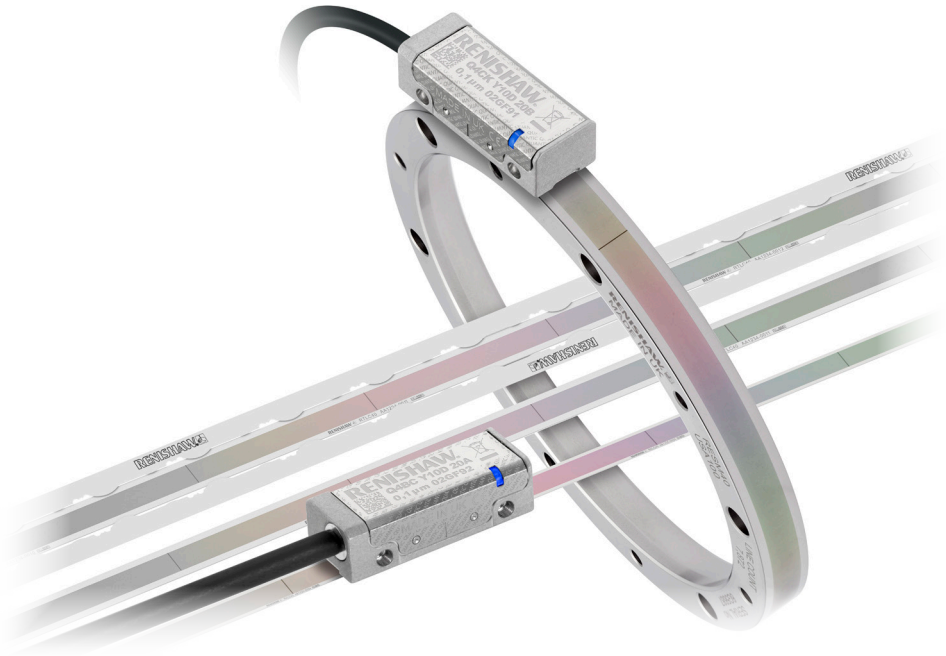
QUANTiC™ incremental optical encoder system



The QUANTiC™ encoder series provides robust incremental position measurement for linear, partial arc and rotary systems with excellent metrology and wide installation tolerances. This reduces or eliminates the need for mounting adjustment during the installation process.

QUANTiC encoders include Renishaw's high-performance integrated interpolation technology, removing the need for additional adaptors or separate interfaces. This provides stable and reliable position signals for a wide range of demanding measurement and motion control applications.

The easy-to-use built-in installation and calibration functions can be enhanced with an optional Advanced Diagnostic Tool, providing comprehensive real-time encoder feedback during installation and diagnostics.

In addition to Renishaw's proven unique filtering optics, QUANTiC encoders have a new detector design which gives superior signal purity and dirt immunity. They are combined in a compact readhead body, joining the VIONiC™ and TONiC™ family of encoders.

- **Compact, all-in-one, optical encoder with analogue or digital output**
- **Wide tolerances**
  - **Rideheight from ±0.3 mm**
  - **Yaw ±0.9°**
- **Compatible with a wide range of linear, partial arc and rotary scales with *IN-TRAC*™ auto-phase reference mark (datum)**
- **Maximum speed to 24 m/s (3.63 m/s at 0.1 µm resolution)**
- **Excellent dirt immunity**
- **Resolutions from 10 µm to 50 nm**
- **Integrated set-up LED for ease of installation**
- **Auto Gain Control (AGC), Auto Balance Control (ABC) and Auto Offset Control (AOC) ensure consistent signal strength for long-term reliability**
- **Integrated dual limits (linear only)**
- **Optional ADTpro-100 or ADTi-100 Advanced Diagnostic Tool to optimise set-up and assist with system diagnostics**

www.renishaw.com/quanticdownloads

#renishaw

System features

In-built reliability and ease of installation

- **Robust position measurement over contamination**

  QUANTiC encoder readheads ensure excellent motion control performance in a wide range of applications by minimising positional error over scale contamination. A new detector design provides an additional layer of signal filtering which helps to eliminate non-harmonic signal frequencies, ensuring low sub-divisional error (SDE) and minimal signal variation over dirt or contamination on the scale.

- **Easy installation and setup**

  The advanced optical design and signal processing of the QUANTiC encoder provides increased installation and operational tolerances whilst maintaining metrological performance. Low cost of ownership is achieved through reduced installation and setup times.

- **High speed performance**

  With best-in-class signal processing and optimum detector design, QUANTiC can achieve speeds up to 24 m/s to meet the most demanding motion control requirements. This enables end users to increase system throughput reducing cost per part to the end user.

Optional Advanced Diagnostic Tools

The QUANTiC encoder system is compatible with a range of Advanced Diagnostic Tools to assist in system set-up and planned maintenance to help minimise unscheduled machine downtime.

The **ADTpro-100** is a handheld, standalone encoder diagnostic tool featuring an integral colour touch screen. The ADTpro-100:

- Requires no computer or additional set-up equipment to display comprehensive real-time encoder information.
- Is easy and intuitive to use with plug-and-play functionality to aid system set-up and calibration.
- Interfaces with the optional ADT View computer software, which allows encoder data to be saved as a record of the system setup and performance. ADT View can also be used to update the ADTpro-100 firmware.

The **ADTi-100**, in conjunction with the intuitive ADT View computer software:

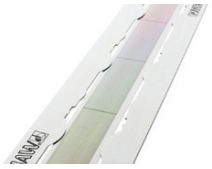
- Provides comprehensive real-time encoder data feedback to aid more challenging installations and diagnostics.
- Assists system set-up, calibration and signal optimisation along the entire axis.
- Allows data, such as signal strength vs position along the axis, to be saved as a record of the system setup and performance.

Both the ADTpro-100 and ADTi-100 are ideal for aiding system optimisation and diagnostics, particularly for installations when the readhead LED is not visible. They can be used standalone or in-line, connected between the readhead and the controller as part of the control loop.

For more information on the Advanced Diagnostic Tools, refer to the *ADTpro-100 Advanced Diagnostic Tool* data sheet (Renishaw part no. L-9518-0078), *ADTi-100 Advanced Diagnostic Tool* data sheet (Renishaw part no. L-9517-9699), and *ADT View software* user guide (Renishaw part no. M-6195-9413).

Compatible scales

Linear scales

	RTLC40-S	RTLC40 / *FASTRACK*™	RKLC40-S [1]
	Self-adhesive mounted stainless steel tape scale	**Stainless steel tape scale and self-adhesive mounted carrier**	**Self-adhesive mounted stainless steel tape scale**
			
Form (height × width)	0.4 mm × 8 mm including adhesive	RTLC40 scale: 0.2 mm × 8 mm *FASTRACK* carrier: 0.4 mm × 18 mm including adhesive	0.15 mm × 6 mm including adhesive
Accuracy (includes slope and linearity)	RTLC40-S: ±15 µm/m RTLC40H-S: ±5 µm/m	RTLC40: ±15 µm/m RTLC40H: ±5 µm/m	RKLC40-S: ±15 µm/m RKLC40H-S: ±5 µm/m
Linearity (Figures achievable with two-point error correction)	RTLC40-S: ±5 µm/m RTLC40H-S: ±2.5 µm/m	RTLC40: ±5 µm/m RTLC40H: ±2.5 µm/m	RKLC40-S: ±3 µm/m RKLC40H-S: ±2.5 µm/m
Maximum length	10 m [2] (> 10 m available on request)	10 m (> 10 m available on request)	20 m (> 20 m available on request)
Coefficient of thermal expansion (at 20 °C)	10.1 ±0.2 µm/m/°C	10.1 ±0.2 µm/m/°C	Matches that of substrate material when scale ends fixed by epoxy mounted end clamps

Rotary scales

	RESM40
	Stainless steel ring
	
Typical installed accuracy [3]	±1.9 arc second (550 mm diameter RESM40 ring)
Ring diameters	52 mm to 550 mm
Coefficient of thermal expansion (at 20 °C)	15.5 ±0.5 µm/m/°C

For more information about the scales refer to the relevant scale data sheet which can be downloaded from www.renishaw.com/quanticdownloads.

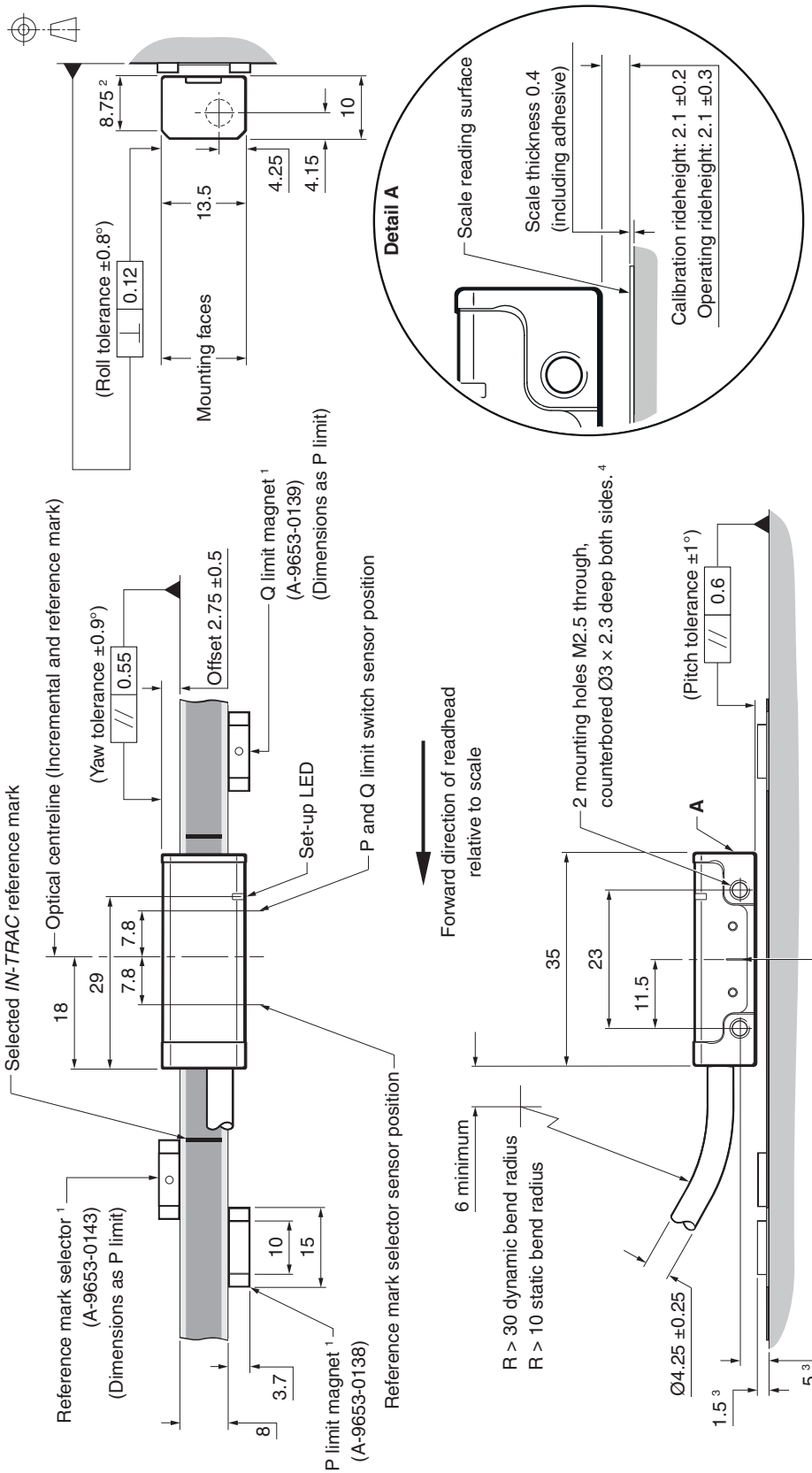
1 Suitable for partial arc applications. For more information refer to *RKL scale for partial arc applications* data sheet (Renishaw part no. L-9517-9897).

2 For RTLC40-S axis lengths > 2 m, *FASTRACK* carrier with RTLC40 is recommended.

3 'Typical' installations are a result of graduation and installation errors combining and, to some magnitude, cancelling.

QUANTiC encoder system installation drawing

Dimensions and tolerances in mm



NOTES:

- QUANTiC readhead and RTLC40-S linear scale shown. For detailed installation drawings for other scale types, refer to the relevant QUANTiC encoder system installation guide or scale data sheet.
- External magnetic fields greater than 6 mT, in the vicinity of the readhead, may cause false activation of the limit and reference sensors.

1 Bolted reference mark selector magnet and limit magnet available. See the relevant QUANTiC encoder system installation guide for further details.

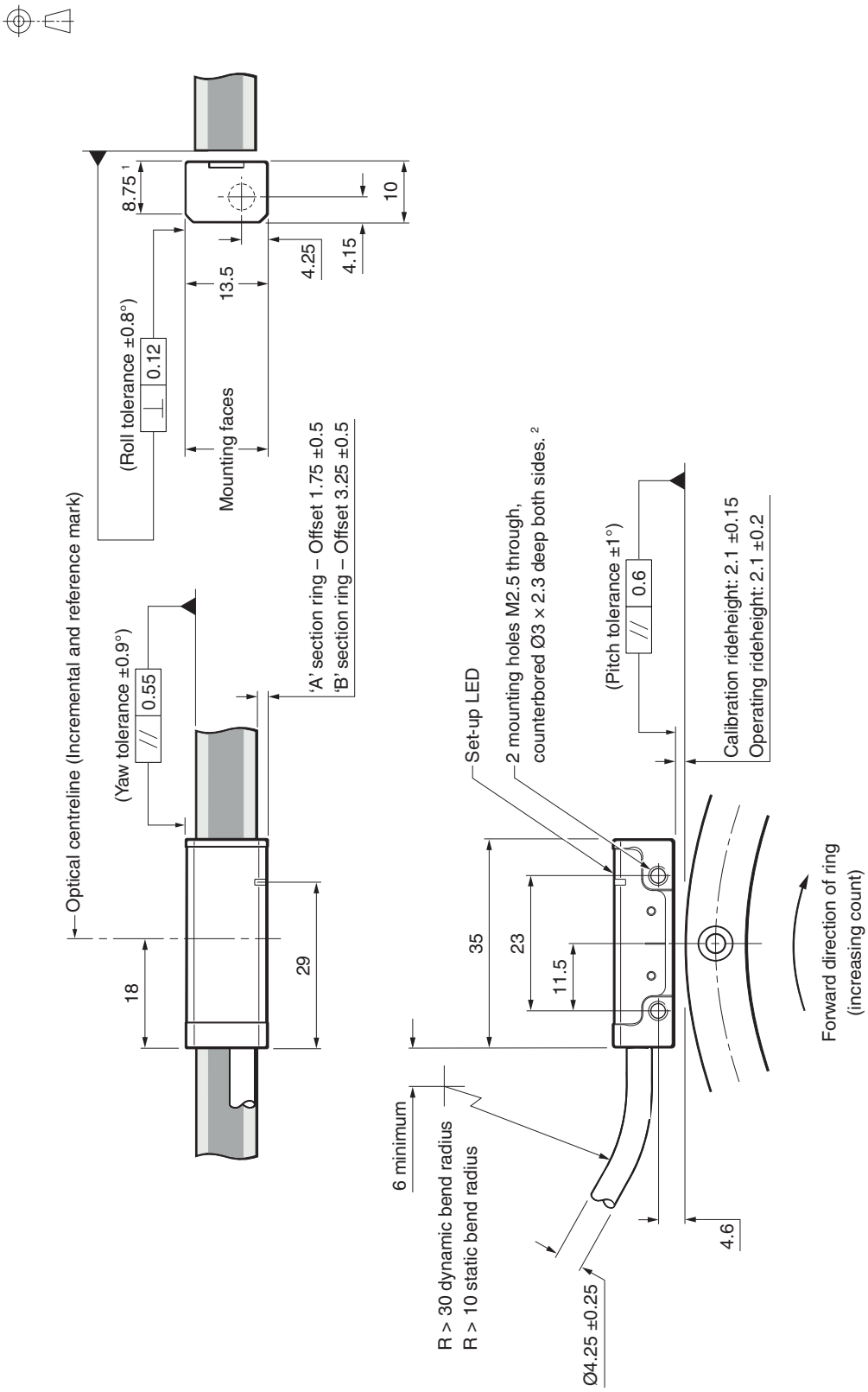
2 Extent of mounting faces.

3 Dimensions from substrate surface.

4 The recommended thread engagement is 5 mm minimum (7.5 mm including counterbore) and the recommended tightening torque is between 0.25 Nm and 0.4 Nm.

QUANTiC encoder system installation drawing

Dimensions and tolerances in mm



NOTES:

- QUANTiC readhead and RESM40 ring shown. For detailed installation drawings for other scale types, refer to the relevant QUANTiC encoder system installation guide or scale data sheet.
- External magnetic fields greater than 6 mT, in the vicinity of the readhead, may cause false activation of the limit and reference sensors.

1 Extent of mounting faces.

2 The recommended thread engagement is 5 mm minimum (7.5 mm including counterbore) and the recommended tightening torque is between 0.25 Nm and 0.4 Nm.

General specifications

Power supply	5 V –5% /+10%	Typically 150 mA fully terminated (analogue output)	
		Cable lengths ≤ 3 m, typically 200 mA fully terminated (digital output)	
		Cable lengths > 3 m, typically 250 mA fully terminated (digital output)	
		Power from a 5 Vdc supply complying with the requirements for SELV of standard IEC 60950-1	
	Ripple	200 mVpp maximum @ frequency up to 500 kHz	
Temperature	Storage	–20 °C to +70 °C	
	Operating	0 °C to +70 °C	
Humidity		95% relative humidity (non-condensing) to IEC 60068-2-78	
Sealing		IP40	
Acceleration (system)	Operating	400 m/s², 3 axes	
Shock (system)	Operating	500 m/s², 11 ms, ½ sine, 3 axes	
Vibration	Operating	Sinusoidal 100 m/s² max @ 55 Hz to 2000 Hz, 3 axes	
Mass	Readhead	9 g	
	Cable	26 g/m	
EMC compliance		IEC 61326-1	
Readhead cable		Single-shielded, outside diameter 4.25 ±0.25 mm	
		Flex life > 20 × 10^6 cycles at 30 mm bend radius	
		UL recognised component	
	Maximum cable length [1]	5 m (analogue output)	
		10 m (digital output)	
Connector options		**Code - connector type - output type**	
		A - 9-way D-type - digital output only	
		L - 15-way D-type (standard pin-out) - analogue output only	
		D - 15-way D-type (standard pin-out) - digital output only	
		H - 15-way D-type (alternative pin-out) - analogue and digital output	
		X - 12-way circular connector - digital output only	
		J - 14-way JST connector - analogue and digital output	
Typical sub-divisional error (SDE)		**Analogue output** [2]	**Digital output**
	Linear	< ±120 nm	< ±80 nm
	Rotary > Ø135 mm	< ±120 nm	< ±80 nm
	Rotary ≤ Ø135 mm	< ±150 nm	< ±150 nm

[1] Extension cables available. Contact your local Renishaw representative for further details.

[2] SDE has been measured when used with a Ti interface.

Speed

Digital readheads

Clocked output option (MHz)	Maximum speed (m/s)							Minimum edge separation [1] (ns)
	T (10 µm)	D (5 µm)	X (1 µm)	Z (0.5 µm)	W (0.2 µm)	Y (0.1 µm)	H (50 nm)	
50	24	24	24	18.13	7.25	3.626	1.813	25.1
40	24	24	24	14.50	5.80	2.900	1.450	31.6
25	24	24	18.13	9.06	3.63	1.813	0.906	51.0
20	24	24	16.11	8.06	3.22	1.611	0.806	57.5
12	24	24	10.36	5.18	2.07	1.036	0.518	90.0
10	24	24	8.53	4.27	1.71	0.853	0.427	109
08	24	24	6.91	3.45	1.38	0.691	0.345	135
06	24	24	5.37	2.69	1.07	0.537	0.269	174
04	24	18.13	3.63	1.81	0.73	0.363	0.181	259
01	9.06	4.53	0.91	0.45	0.18	0.091	0.045	1038

Analogue readheads

Maximum speed: 20 m/s (–3dB) [2]

Angular speeds

Angular speed depends on ring diameter – use the following equation to convert to rev/min:

$$\text{Angular speed (rev/min)} = \frac{V \times 1000 \times 60}{\pi D}$$

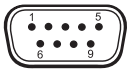
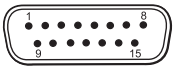
Where V = maximum linear speed (m/s) and D = external diameter of RESM40 ring (mm).

[1] For a readhead with a 1 m cable.

[2] At speeds > 20 m/s, SDE may be affected.

Output signals

Digital outputs

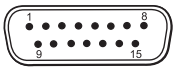
							
Function	**Signal**		**Colour**	**9-way D-type (A)**	**15-way D-type (D)**	**15-way D-type alternative pin-out (H)**	**12-way circular connector [1] (X)**	**14-way JST [2] (J)**
Power	5 V		Brown	5	7, 8	4, 12	G	10
	0 V		White	1	2, 9	2, 10	H	1
Incremental	A	+	Red	2	14	1	M	7
		–	Blue	6	6	9	L	2
	B	+	Yellow	4	13	3	J	11
		–	Green	8	5	11	K	9
Reference mark	Z	+	Violet	3	12	14	D	8
		–	Grey	7	4	7	E	12
Limits	P		Pink	-	11	8	A	14
	Q		Black	-	10	6	B	13
Alarm	E	–	Orange	-	3	13	F	3
Remote CAL [3]	CAL		Clear	9	1	5	C	4
Shield	-		Screen	Case	Case	Case	Case	Ferrule

[1] 12-way circular Binder mating socket - A-6195-0105.

[2] Pack of 5 14-way JST SH mating sockets: A-9417-0025 - Bottom mount; A-9417-0026 - Side mount.

[3] Remote CAL line must be connected for use with the Advanced Diagnostic Tools.

Analogue outputs

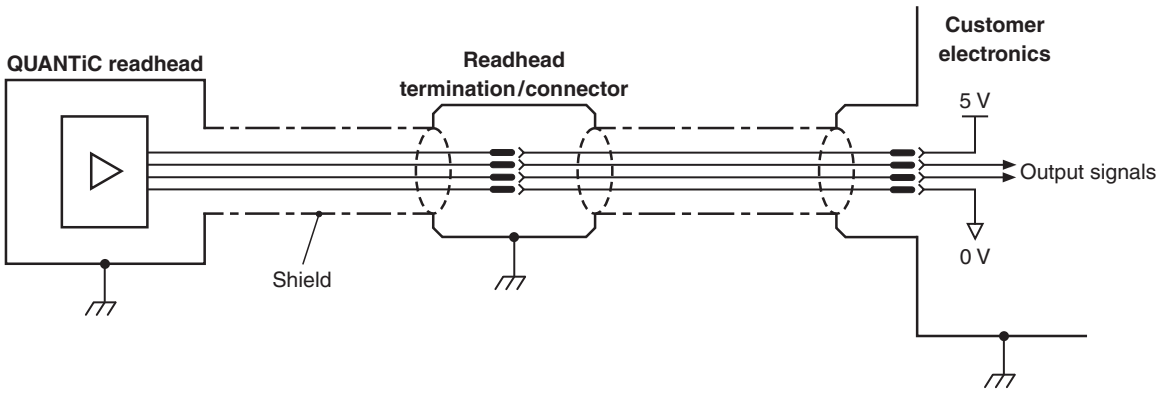
Function		Signal		Colour	 15-way D-type (L)	15-way D-type alternative pin-out (H)	 14-way JST [1] (J)
Power		5 V		Brown	4, 5	4, 12	10
		0 V		White	12, 13	2, 10	1
Incremental	**Cosine**	V_1	+	Red	9	1	7
			–	Blue	1	9	2
	Sine	V_2	+	Yellow	10	3	11
			–	Green	2	11	9
Reference mark		V_0	+	Violet	3	14	8
			–	Grey	11	7	12
Limits		V_p		Pink	7	8	14
		V_q		Black	8	6	13
Setup		V_x		Clear	6	13	6
Remote CAL [2]		CAL		Orange	14	5	4
Shield		-		Screen	Case	Case	Ferrule

[1] Pack of 5 14-way JST SH mating sockets: A-9417-0025 - Bottom mount; A-9417-0026 - Side mount.

[2] Remote CAL line must be connected for use with the Advanced Diagnostic Tools.

Electrical connections

Grounding and shielding

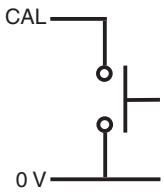


IMPORTANT: The shield should be connected to the machine earth (Field Ground). For JST variants the ferrule should be connected to the machine earth.

Maximum cable length

	Analogue	Digital
Readhead cable	5 m	10 m [1]
Maximum extension cable length	Dependent on cable type, readhead cable length and clocked output option. Contact your local Renishaw representative for more information.	
Readhead to the ADTpro-100 or ADTi-100	5 m	10 m

Remote CAL operation

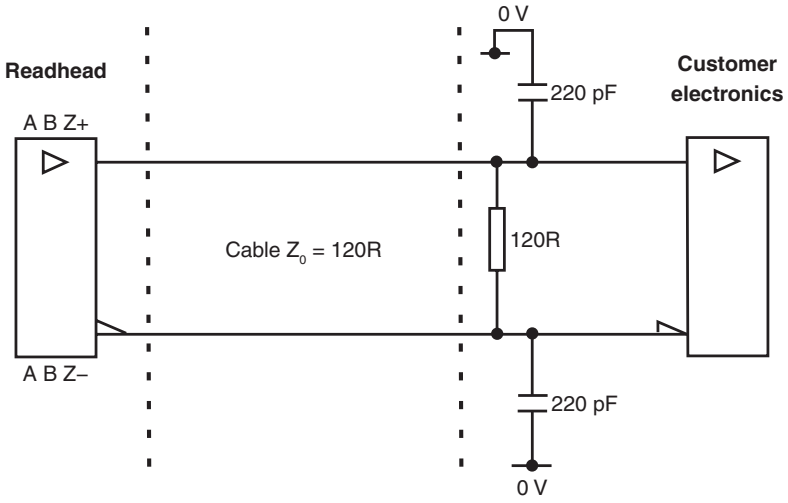


Remote operation of the CAL/AGC is possible via CAL signal.

[1] Cable lengths > 3 m are fitted with either a 15-way or 9-way D-type connector. The connector contains an active PCB and must not be removed.

Recommended signal termination

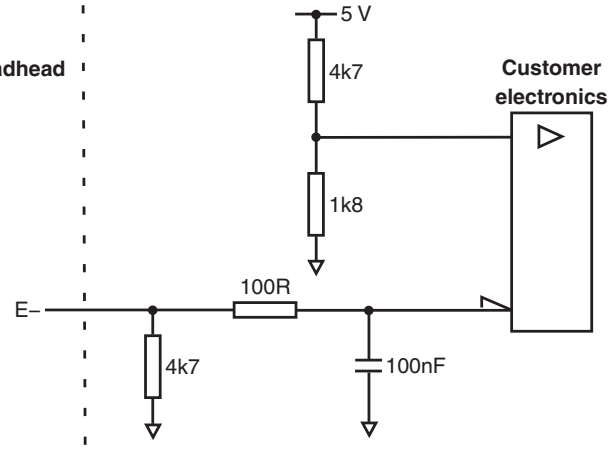
Digital outputs



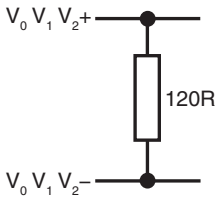
Standard RS422A line receiver circuitry.
Capacitors recommended for improved noise immunity.

Single ended alarm signal termination

(Not available with 'A' cable termination)



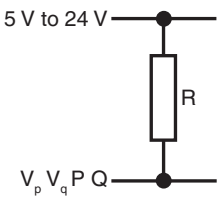
Analogue outputs



NOTE: 120R termination on the analogue output signals is essential for correct AGC operation.

Limit output

(Not available with 'A' cable termination)



NOTE: Select R so that maximum current does not exceed 20 mA. Alternatively, use a suitable relay or opto-isolator.

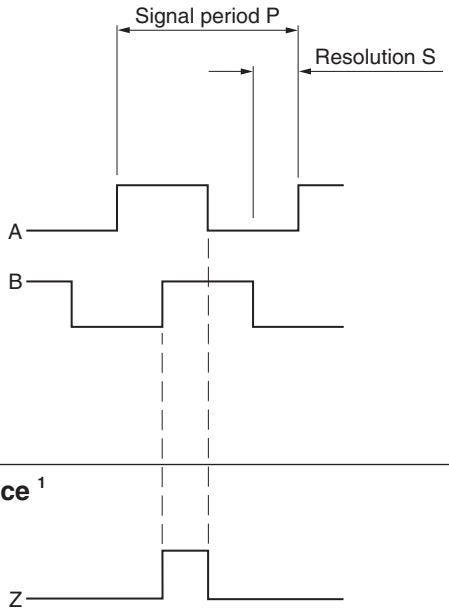
Output signals

Digital outputs

Form - Square wave differential line driver to EIA RS422A (except limits P and Q)

Incremental [1]

2 channels A and B in quadrature (90° phase shifted)



Resolution option code	P (µm)	S (µm)
T	40	10
D	20	5
X	4	1
Z	2	0.5
W	0.8	0.2
Y	0.4	0.1
H	0.2	0.05

Reference [1]

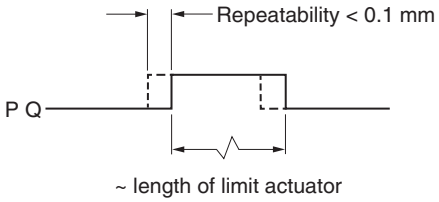
NOTE: A wide reference mark option, outputting a reference pulse for the duration of the signal period is available. Contact your local Renishaw representative for more information.

Synchronised pulse Z, duration as resolution. Bi-directionally repeatable. [2]

Limits

Open collector output, asynchronous pulse (not available with 'A' cable termination)

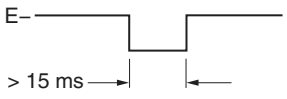
Active high



Alarm

Line driven (asynchronous pulse)

(not available with 'A' cable termination)



The alarm is asserted when:

- The signal amplitude is < 20% or > 135%
- The readhead speed is too high for reliable operation

or 3-state alarm

Differentially transmitted signals are forced open circuit for > 15 ms when the alarm conditions are valid.

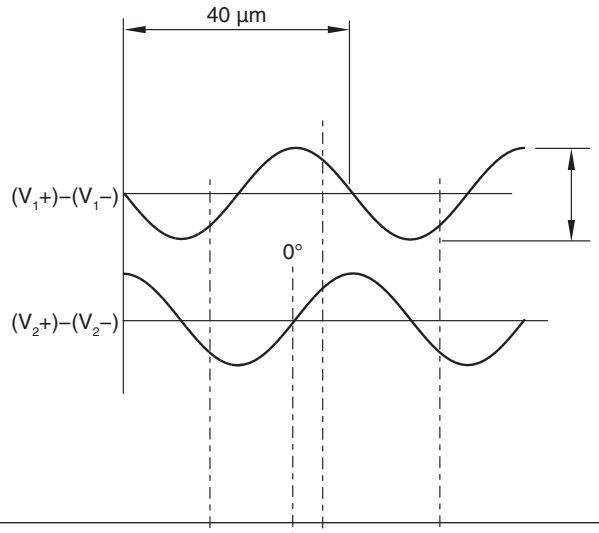
[1] For clarity, the inverse signals are not shown.

[2] Only the calibrated reference mark is bi-directionally repeatable.

Analogue outputs

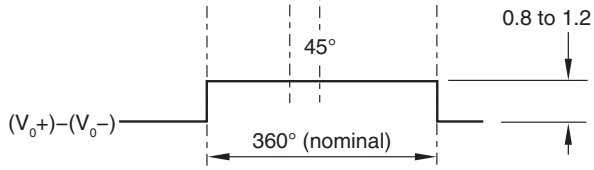
Incremental

2 channels V_1 and V_2 differential sinusoids in quadrature, centred on ~1.65 V (90° phase shifted)



0.7 to 1.35 Vpp with green LED (AGC off) and blue LED (AGC on) indication (readhead) and 120R termination.

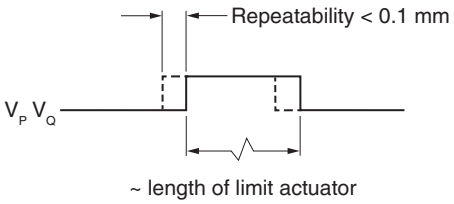
Reference



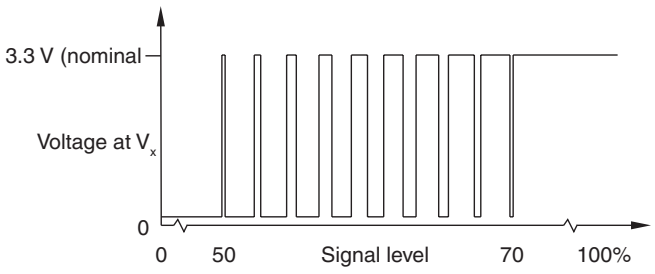
Bi-directionally repeatable [1]
Differential pulse V_0 centred on 45°

Limits [2]

Open collector output, asynchronous pulse



Set-up [3]



Between 50% and 70% signal level, V_x is a duty cycle. Time spent at 3.3 V increases with incremental signal level.
At > 70% signal level V_x is nominal 3.3 V.

1 Only the calibrated reference mark is bi-directionally repeatable.

2 Active low limits available for some configurations. Contact you local Renishaw representative for further details.

3 The set-up signal as shown is not present during the calibration routine.

Digital linear readhead part numbers

Q4 B C Y 30 D 50 A

Series

Q4 = 40 µm QUANTiC

Readhead type

B = Linear

Scale type compatibility

C = RTLC40 / RTLC40-S / RKLC40-S

Resolution

T = 10 µm
D = 5 µm
X = 1 µm
Z = 0.5 µm
W = 0.2 µm
Y = 0.1 µm
H = 50 nm

Cable length [1]

05 = 0.5 m
10 = 1 m
15 = 1.5 m (not available with 'J' cable termination)
30 = 3 m
50 = 5 m ('A' or 'D' cable termination only) [2]
99 = 10 m ('A' or 'D' cable termination only) [2]

Cable termination

A = 9-way D-type plug ('E' and 'F' Reference mark options / Alarm format only)
D = 15-way D-type plug (standard pin-out)
H = 15-way D-type plug (alternative pin-out) (0.5 m, 1 m, 1.5 m, and 3 m cables only)
X = 12-way circular connector (0.5 m, 1 m, 1.5 m, and 3 m cables only)
J = 14-way JST connector (0.5 m, 1 m, and 3 m cables only)

Clocked output options [3]

50 = 50 MHz
40 = 40 MHz
25 = 25 MHz
20 = 20 MHz
12 = 12 MHz
10 = 10 MHz
08 = 8 MHz
06 = 6 MHz
04 = 4 MHz
01 = 1 MHz

Reference mark options [4] **/ Alarm format**

A = Customer selectable reference mark / Line driven alarm (not available with 'A' cable termination)
B = All reference marks are output / Line driven alarm (not available with 'A' cable termination)
E = Customer selectable reference mark / 3-state alarm
F = All reference marks are output / 3-state alarm

Valid system configurations (readheads and scale) can be checked at **www.renishaw.com/epc**.

1 Extension cables are available. Contact your local Renishaw representative for further details.

2 The cable termination must not be removed.

3 Additional clocked output options are available. Contact your local Renishaw representative for further details.

4 A or E – 'Customer selectable reference mark' - A reference pulse is triggered only when a selector magnet is detected. This allows the activation of a specific reference mark when the scale has multiple *IN-TRAC* reference marks.

B or F – 'All reference marks are output' - A reference pulse is triggered whenever an *IN-TRAC* reference mark is passed. No selector magnet is required. This is recommended for scale with a single *IN-TRAC* reference mark.

Only the calibrated reference mark is bi-directionally repeatable.

Digital rotary readhead part numbers

Q4 B J X 30 D 50 B

Series

Q4 = 40 µm QUANTiC

Readhead type

B = Rotary > Ø135 mm (‘J’ scale type compatibility only)

C = Rotary ≤ Ø135 mm (‘K’ and ‘L’ scale compatibility only)

Scale type compatibility

J = RESM40 > Ø135 mm (‘B’ readhead type only)

K = RESM40 Ø60 mm to Ø135 mm (‘C’ readhead type only)

L = RESM40 < Ø60 mm (‘C’ readhead type only)

Resolution

T = 10 µm

D = 5 µm

X = 1 µm

Z = 0.5 µm

W = 0.2 µm

Y = 0.1 µm

H = 50 nm

Cable length [1]

05 = 0.5 m

10 = 1 m

15 = 1.5 m (not available with 'J' cable termination)

30 = 3 m

50 = 5 m ('A' or 'D' cable termination only) [2]

99 = 10 m ('A' or 'D' cable termination only) [2]

Cable termination

A = 9-way D-type plug (‘F’ Reference mark options / Alarm format only)

D = 15-way D-type plug (standard pin-out)

H = 15-way D-type plug (alternative pin-out) (0.5 m, 1 m, 1.5 m, and 3 m cables only)

X = 12-way circular connector (0.5 m, 1 m, 1.5 m, and 3 m cables only)

J = 14-way JST connector (0.5 m, 1 m, and 3 m cables only)

Clocked output options [3]

50 = 50 MHz

40 = 40 MHz

25 = 25 MHz

20 = 20 MHz

12 = 12 MHz

10 = 10 MHz

08 = 8 MHz

06 = 6 MHz

04 = 4 MHz

01 = 1 MHz

Reference mark options / Alarm format

B = All reference marks are output / Line driven alarm (not available with ‘A’ cable termination)

F = All reference marks are output / 3-state alarm

Valid system configurations (readheads and scale) can be checked at www.renishaw.com/epc.

1 Extension cables are available. Contact your local Renishaw representative for further details.

2 The cable termination must not be removed.

3 Additional clocked output options are available. Contact your local Renishaw representative for further details.

Digital partial arc readhead part numbers

Q4 B R X 30 D 50 B

Series

Q4 = 40 µm QUANTiC

Readhead type

B = Partial arc radius > 67.5 mm ('R' scale type compatibility only)

C = Partial arc radius ≤ 67.5 mm ('S' and 'T' scale type compatibility only)

Scale type compatibility

R = RKLC40-S partial arc radius > 67.5 mm ('B' readhead type only)

S = RKLC40-S partial arc radius 30 mm to 67.5 mm ('C' readhead type only)

T = RKLC40-S partial arc radius 26 mm to 29 mm ('C' readhead type only)

Resolution

T = 10 µm
D = 5 µm
X = 1 µm
Z = 0.5 µm
W = 0.2 µm
Y = 0.1 µm
H = 50 nm

Cable length [1]

05 = 0.5 m
10 = 1 m
15 = 1.5 m (not available with 'J' cable termination)
30 = 3 m
50 = 5 m ('A' or 'D' cable termination only) [2]
99 = 10 m ('A' or 'D' cable termination only) [2]

Cable termination

A = 9-way D-type plug ('F' Reference mark options / Alarm format only)

D = 15-way D-type plug (standard pin-out)

H = 15-way D-type plug (alternative pin-out) (0.5 m, 1 m, 1.5 m, and 3 m cables only)

X = 12-way circular connector (0.5 m, 1 m, 1.5 m, and 3 m cables only)

J = 14-way JST connector (0.5 m, 1 m, and 3 m cables only)

Clocked output options [3]

50 = 50 MHz
40 = 40 MHz
25 = 25 MHz
20 = 20 MHz
12 = 12 MHz
10 = 10 MHz
08 = 8 MHz
06 = 6 MHz
04 = 4 MHz
01 = 1 MHz

Reference mark options [4] **/ Alarm format**

B = All reference marks are output / Line driven alarm (not available with 'A' cable termination)

F = All reference marks are output / 3-state alarm

For more information on partial arcs refer to *RKL scale for partial arc applications* data sheet (Renishaw part no. L-9517-9897).

Valid system configurations (readheads and scale) can be checked at **www.renishaw.com/epc**.

1 Extension cables are available. Contact your local Renishaw representative for further details.

2 The cable termination must not be removed.

3 Additional clocked output options are available. Contact your local Renishaw representative for further details.

4 Only the calibrated reference mark is bi-directionally repeatable.

Analogue linear readhead part numbers

Q4 B C A 30 L 00 T

Series

Q4 = 40 µm QUANTiC

Readhead type

B = Linear

Scale type compatibility

C = RTLC40 / RTLC40-S / RKLC40-S

Output

A = 1 Vpp differential analogue signal

Cable length [1]

05 = 0.5 m
10 = 1 m
15 = 1.5 m (not available with 'J' cable termination)
30 = 3 m
50 = 5 m (not available with 'J ' cable termination)

Cable termination

L = 15-way D-type plug (standard pin-out)
H = 15-way D-type plug (alternative pin-out)
J = 14-way JST connector (0.5 m, 1 m, and 3 m cables only)

Clocked output options

00 = No clock

Reference mark options [2]

T = Customer selectable reference mark
U = All reference marks are output

Valid system configurations (readheads and scale) can be checked at **www.renishaw.com/epc**.

1 Extension cables are available. Contact your local Renishaw representative for further details.

2 T – 'Customer selectable reference mark' - A reference pulse is triggered only when a selector magnet is detected. This allows the activation of a specific reference mark when the scale has multiple *IN-TRAC* reference marks.

U – 'All reference marks are output' - A reference pulse is triggered whenever an *IN-TRAC* reference mark is passed. No selector magnet is required. This is recommended for scale with a single *IN-TRAC* reference mark.

Only the calibrated reference mark is bi-directionally repeatable.

Analogue rotary readhead part numbers

Q4 B J A 30 L 00 U

Series

Q4 = 40 µm QUANTiC

Readhead type

B = Rotary > Ø135 mm (‘J’ scale type compatibility only)

C = Rotary ≤ Ø135 mm (‘K’ and ‘L’ scale compatibility only)

Scale type compatibility

J = RESM40 > Ø135 mm (‘B’ readhead type only)

K = RESM40 Ø60 mm to Ø135 mm (‘C’ readhead type only)

L = RESM40 < Ø60 mm (‘C’ readhead type only)

Output

A = 1 Vpp differential analogue signal

Cable length [1]

05 = 0.5 m

10 = 1 m

15 = 1.5 m (not available with 'J' cable termination)

30 = 3 m

50 = 5 m (not available with ‘J ’ cable termination)

Cable termination

L = 15-way D-type plug (standard pin-out)

H = 15-way D-type plug (alternative pin-out)

J = 14-way JST connector (0.5 m, 1 m, and 3 m cables only)

Clocked output options

00 = No clock

Reference mark options

U = All reference marks are output

Valid system configurations (readheads and scale) can be checked at **www.renishaw.com/epc**.

[1] Extension cables are available. Contact your local Renishaw representative for further details.

Analogue partial arc readhead part numbers

Q4 B R A 30 L 00 U

Series

Q4 = 40 µm QUANTiC

Readhead type

B = Partial arc radius > 67.5 mm ('R' scale type compatibility only)

C = Partial arc radius ≤ 67.5 mm ('S' and 'T' scale compatibility only)

Scale type compatibility

R = RKLC40-S partial arc radius > 67.5 mm ('B' readhead type only)

S = RKLC40-S partial arc radius 30 mm to 67.5 mm ('C' readhead type only)

T = RKLC40-S partial arc radius 26 mm to 29 mm ('C' readhead type only)

Output

A = 1 Vpp differential analogue signal

Cable length [1]

05 = 0.5 m

10 = 1 m

15 = 1.5 m (not available with 'J' cable termination)

30 = 3 m

50 = 5 m (not available with 'J ' cable termination)

Cable termination

L = 15-way D-type plug (standard pin-out)

H = 15-way D-type plug (alternative pin-out)

J = 14-way JST connector (0.5 m, 1 m, and 3 m cables only)

Clocked output options

00 = No clock

Reference mark options [2]

U = All reference marks are output

For more information on partial arcs refer to *RKL scale for partial arc applications* data sheet (Renishaw part no. L-9517-9897).

Valid system configurations (readheads and scale) can be checked at **www.renishaw.com/epc**.

1 Extension cables are available. Contact your local Renishaw representative for further details.

2 Only the calibrated reference mark is bi-directionally repeatable.

Adaptor cables

The listed adaptor cables enable readheads with different terminations to be connected to the Advanced Diagnostic Tools.

Each kit consists of two cables:

- Readhead cable to the ADT
- ADT to the controller cable, for in-line use

Cable termination	Pin-out	Readhead type	Part number	
			ADTpro-100	ADTi-100
A	9-way D-type	Digital	A-6195-0102	
D	15-way D-type (Standard pin-out)	Digital	Direct connection	
H	15-way D-type (alternative pin-out)	Digital	A-6195-0103	
		Analogue	A-6647-1015	A-6195-0103 [1]
J	14 way JST	Digital	A-6195-2073	
		Analogue	Contact your local Renishaw representative	A-6195-2073 [1]
L	15-way D-type (Standard pin-out)	Analogue	Direct connection	A-6637-1540 [1]
X	12-way circular	Digital	A-6195-0104	

[1] When connecting an analogue readhead to an ADTi-100, the termination tool, A-6195-2132, is also required.

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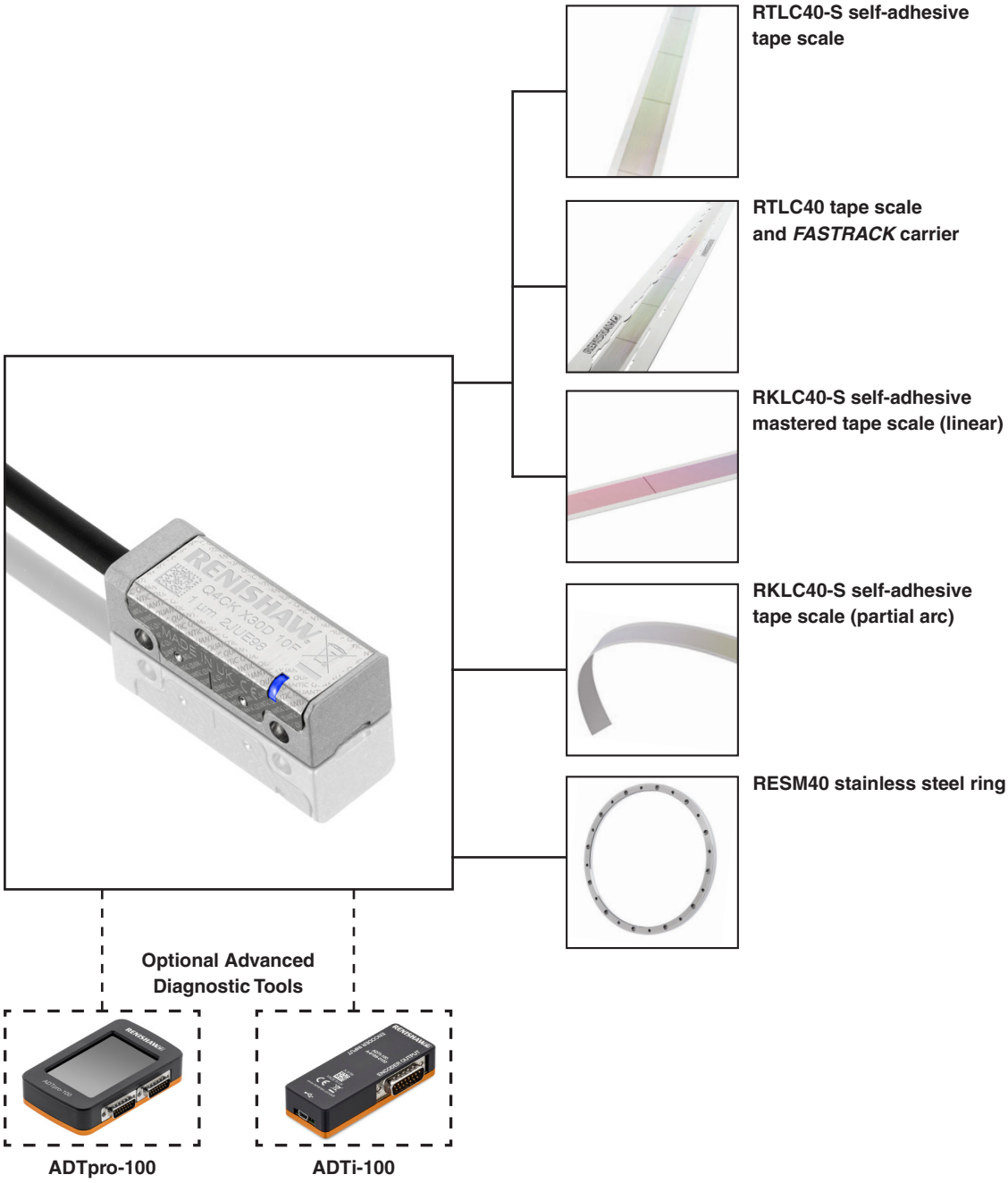

For more information about the Advanced Diagnostic Tools and scales refer to the relevant data sheets and installation guides which can be downloaded from www.renishaw.com/quanticdownloads.

www.renishaw.com/contact

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