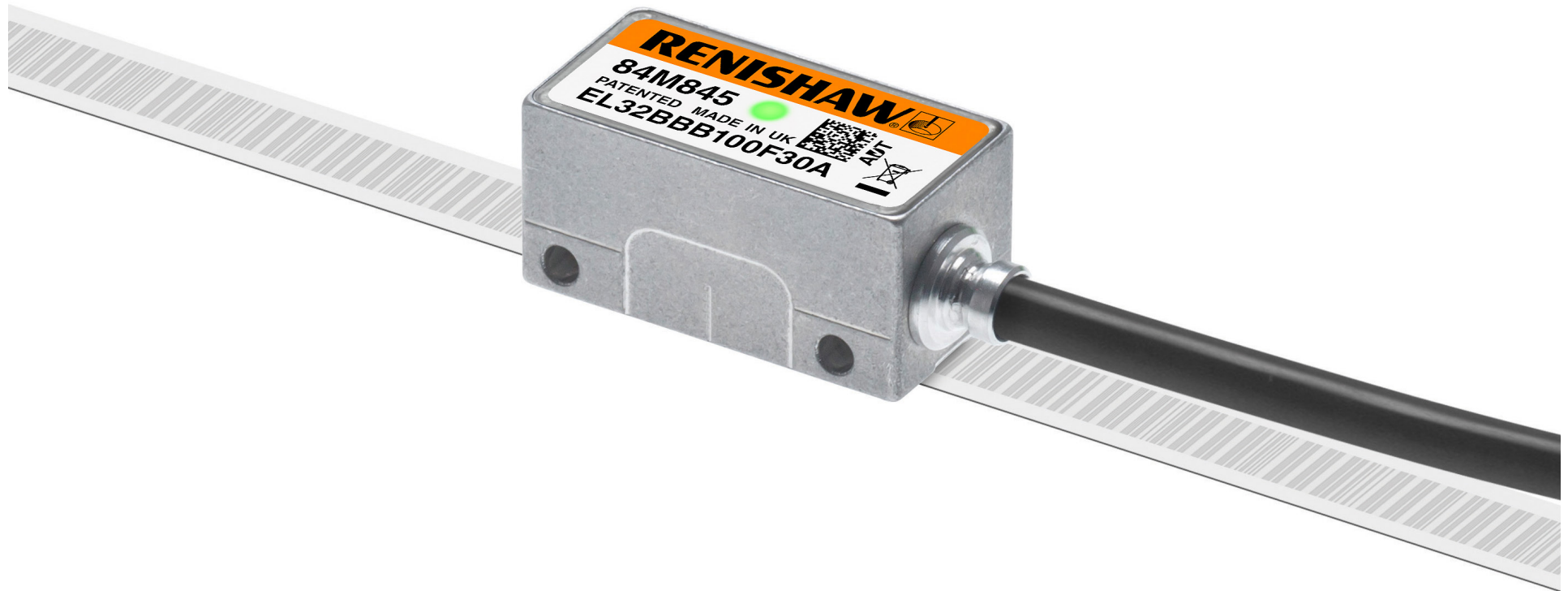


EVOLUTE™ RTLA50-S absolute linear encoder system



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Contents

Legal notices	4
Storage and handling	7
EVOLUTE readhead installation drawing	8
EVOLUTE readhead (side cable outlet) installation drawing	9
RTL50-S (with adhesive datum clamp) installation drawing	10
RTL50-S tape scale installation	11
Equipment	11
Cutting scale.	12
Using the guillotine.	12
Using the shears	12
Scale application	13
End covers	14
Datum clamp	14
Readhead mounting/installation	15
Output signals.	16
Electrical connections.	19
Specifications	20

Legal notices

Patents

Features of Renishaw's encoder systems and similar products are the subjects of the following patents and patent applications:

CN1260551	US7499827	JP4008356	GB2395005	CN1314511
EP1469969	JP5002559	CN102197282	EP2350570	JP2012507028
US20110173832	KR20110088506	CN102388295	EP2417423	KR20120014902
US2012007980	CN102460077	EP2438402	US20120072169	KR20120026579
US8141265	EP2294363	CN102057256	JP2011524534	KR20110033204

Terms and Conditions and Warranty

Unless you and Renishaw have agreed and signed a separate written agreement, the equipment and/or software are sold subject to the Renishaw Standard Terms and Conditions supplied with such equipment and/or software, or available on request from your local Renishaw office.

Renishaw warrants its equipment and software for a limited period (as set out in the Standard Terms and Conditions), provided that they are installed and used exactly as defined in associated Renishaw documentation. You should consult these Standard Terms and Conditions to find out the full details of your warranty.

Equipment and/or software purchased by you from a third-party supplier is subject to separate terms and conditions supplied with such equipment and/or software. You should contact your third-party supplier for details.

Declaration of Conformity

Renishaw plc hereby declares that the EVOLUTE encoder system is in compliance with the essential requirements and other relevant provisions of:

- the applicable EU directives
- the relevant statutory instruments under UK law.



The full text of the Declaration of Conformity is available at: www.renishaw.com/productcompliance

Compliance

Federal Code Of Regulation (CFR) FCC Part 15 – RADIO FREQUENCY DEVICES

47 CFR Section 15.19

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

47 CFR Section 15.21

The user is cautioned that any changes or modifications not expressly approved by Renishaw plc or authorised representative could void the user's authority to operate the equipment.

47 CFR Section 15.105

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

47 CFR Section 15.27

This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance.

Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance information

Unique Identifier: EVOLUTE

Responsible Party – U.S. Contact Information

Renishaw Inc.
1001 Wesemann Drive
West Dundee
Illinois
IL 60118
United States
Telephone number: +1 847 286 9953
Email: usa@renishaw.com

ICES-001 — Industrial, Scientific and Medical (ISM) Equipment (Canada)

This ISM device complies with Canadian ICES-001(A).

Cet appareil ISM est conforme à la norme ICES-001(A) du Canada.

Intended use

The EVOLUTE encoder system is designed to measure position and provide that information to a drive or controller in applications requiring motion control. It must be installed, operated, and maintained as specified in Renishaw documentation and in accordance with the Standard Terms and Conditions of the Warranty and all other relevant legal requirements.

Further information

Further information relating to the EVOLUTE encoder range can be found in the EVOLUTE data sheets available from your local Renishaw representative or from our website: www.renishaw.com/evolutedownloads

Packaging

The packaging of our products contains the following materials and can be recycled.

Packaging components			
Packaging component	Material	ISO 11469	Recycling guidance
Outer box	Cardboard	Not applicable	Recyclable
	Polypropylene	PP	Recyclable
Inserts	Low density polyethylene foam	LDPE	Recyclable
	Cardboard	Not applicable	Recyclable
Bags	High density polyethylene bag	HDPE	Recyclable
	Metalised polyethylene	PE	Recyclable

REACH regulation

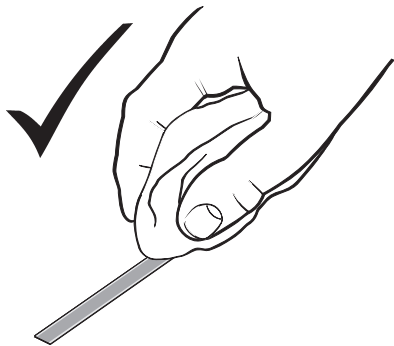
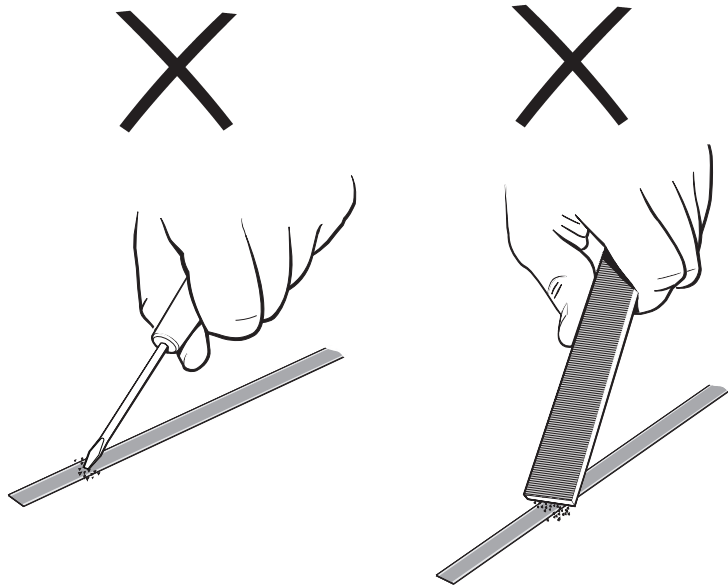
Information required by Article 33(1) of Regulation (EC) No. 1907/2006 ('REACH') relating to products containing substances of very high concern (SVHCs) is available at: www.renishaw.com/REACH

Disposal of waste electrical and electronic equipment

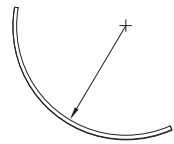


The use of this symbol on Renishaw products and/or accompanying documentation indicates that the product should not be mixed with general household waste upon disposal. It is the responsibility of the end user to dispose of this product at a designated collection point for waste electrical and electronic equipment (WEEE) to enable reuse or recycling. Correct disposal of this product will help to save valuable resources and prevent potential negative effects on the environment. For more information, contact your local waste disposal service or Renishaw distributor.

Storage and handling



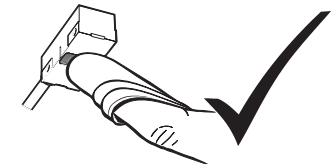
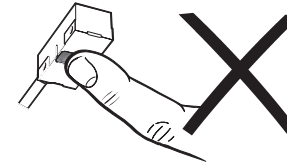
Minimum bend radius



150 mm

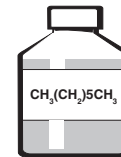
NOTE: Ensure self-adhesive tape is on the outside of the bend.

Readhead

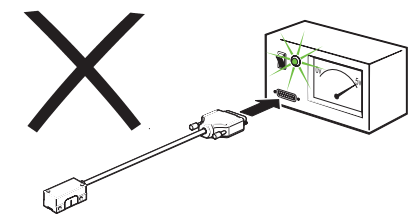
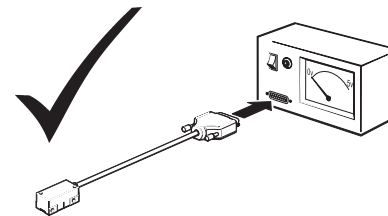
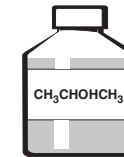


Scale and readhead

N-heptane

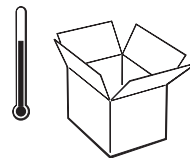


Propan-2-ol



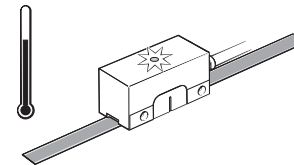
Storage

+80 °C
-20 °C



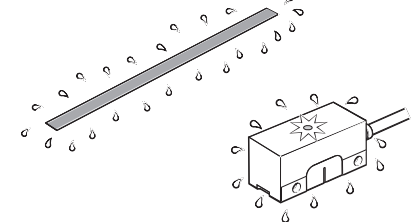
Operating

+80 °C
0 °C



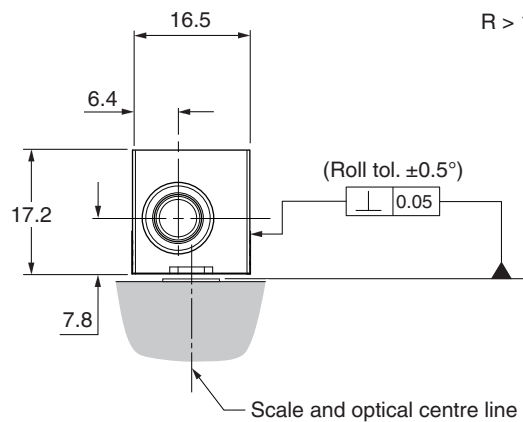
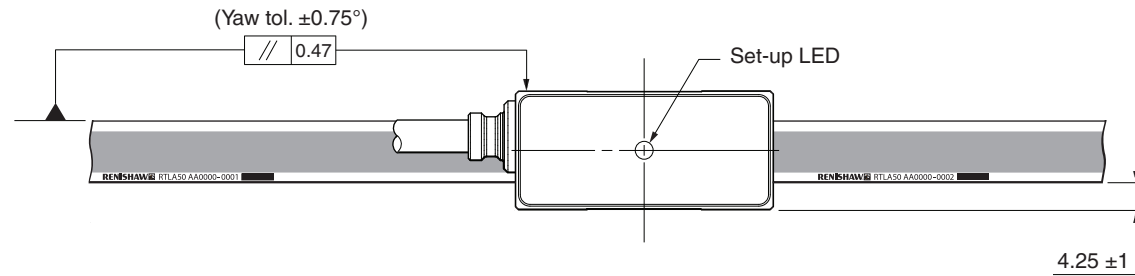
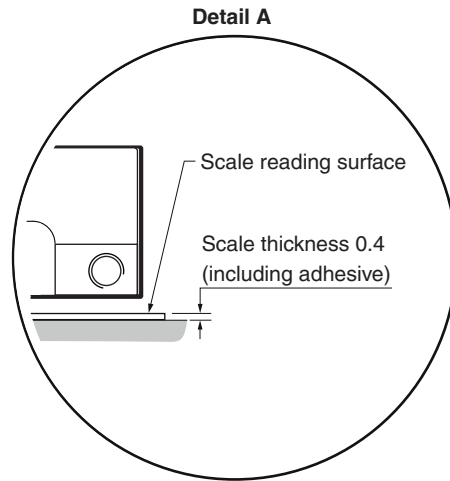
Humidity

95% relative humidity (non-condensing)
to IEC 60068-2-78

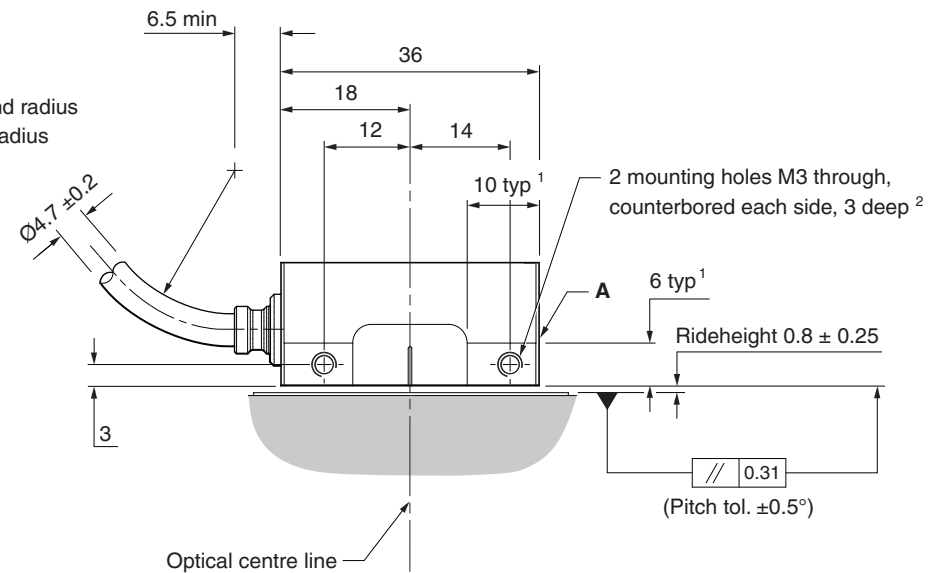


EVOLUTE readhead installation drawing

Dimensions and tolerances in mm



R > 20 Dynamic bend radius
 R > 10 Static bend radius

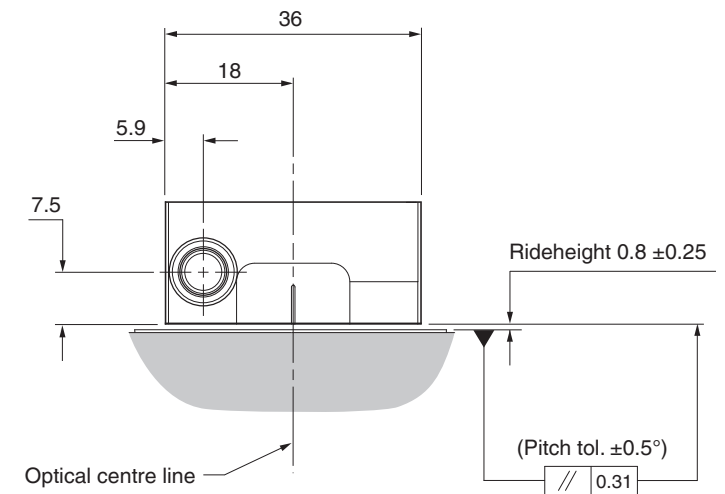
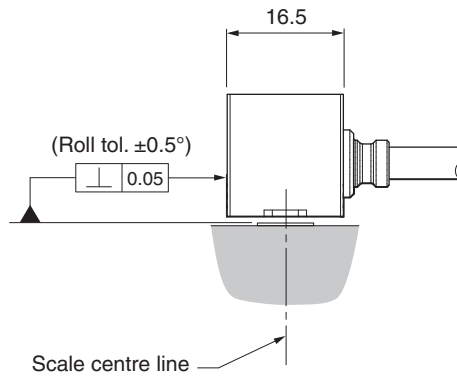
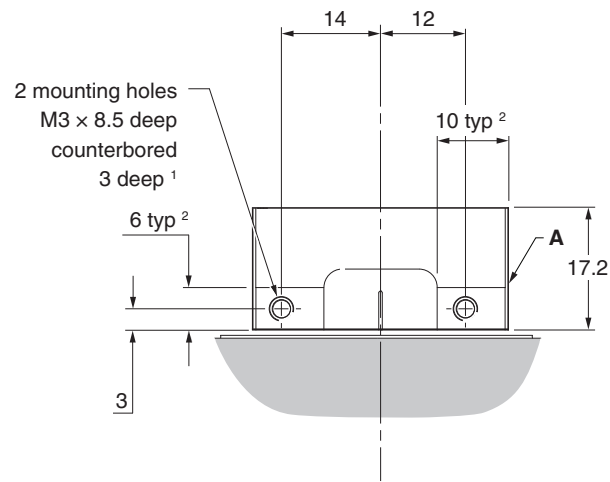
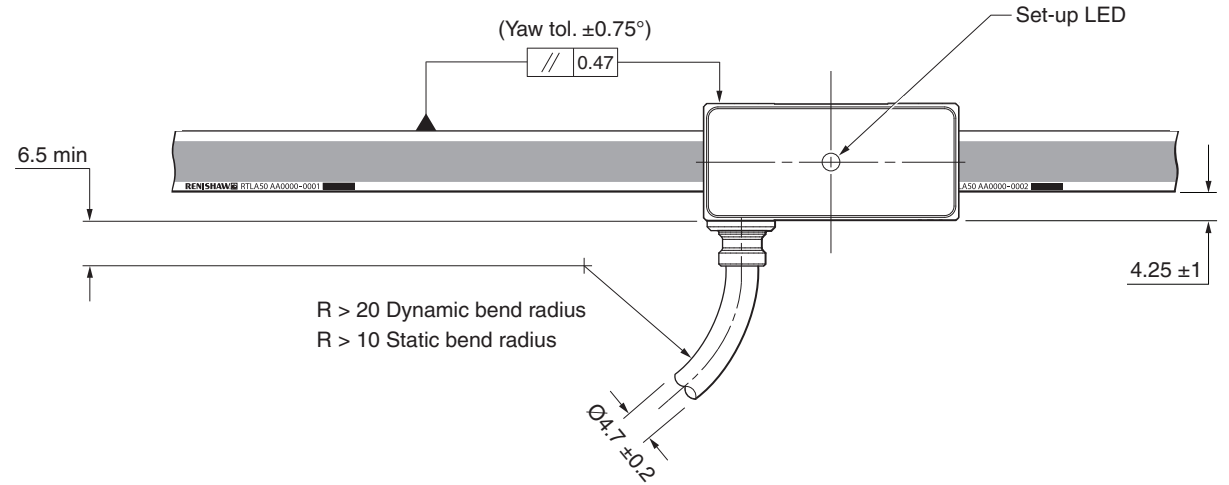
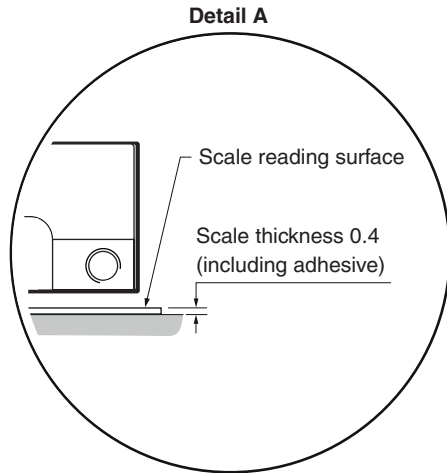


¹ Extent of mounting faces.

² Recommended thread engagement 5 mm (8 mm including counterbore). Recommended tightening torque 0.5 Nm to 0.7 Nm.

EVOLUTE readhead (side cable outlet) installation drawing

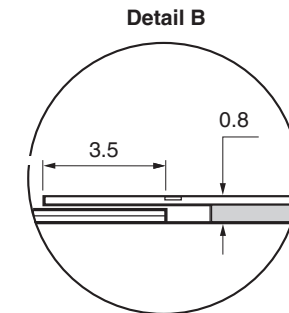
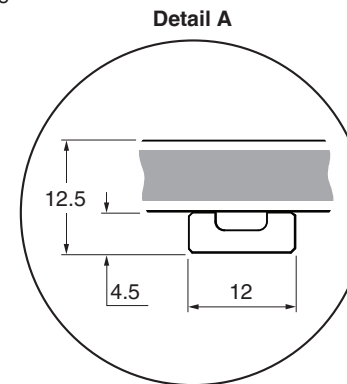
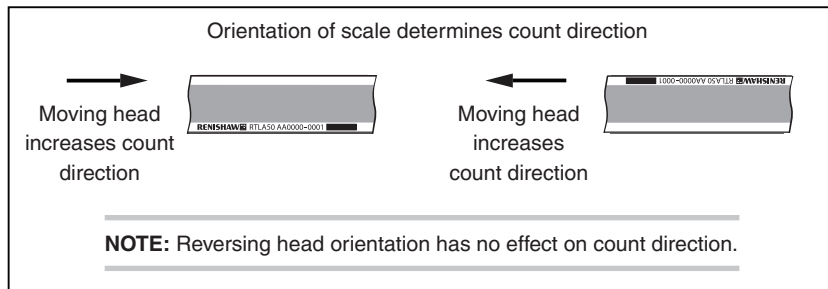
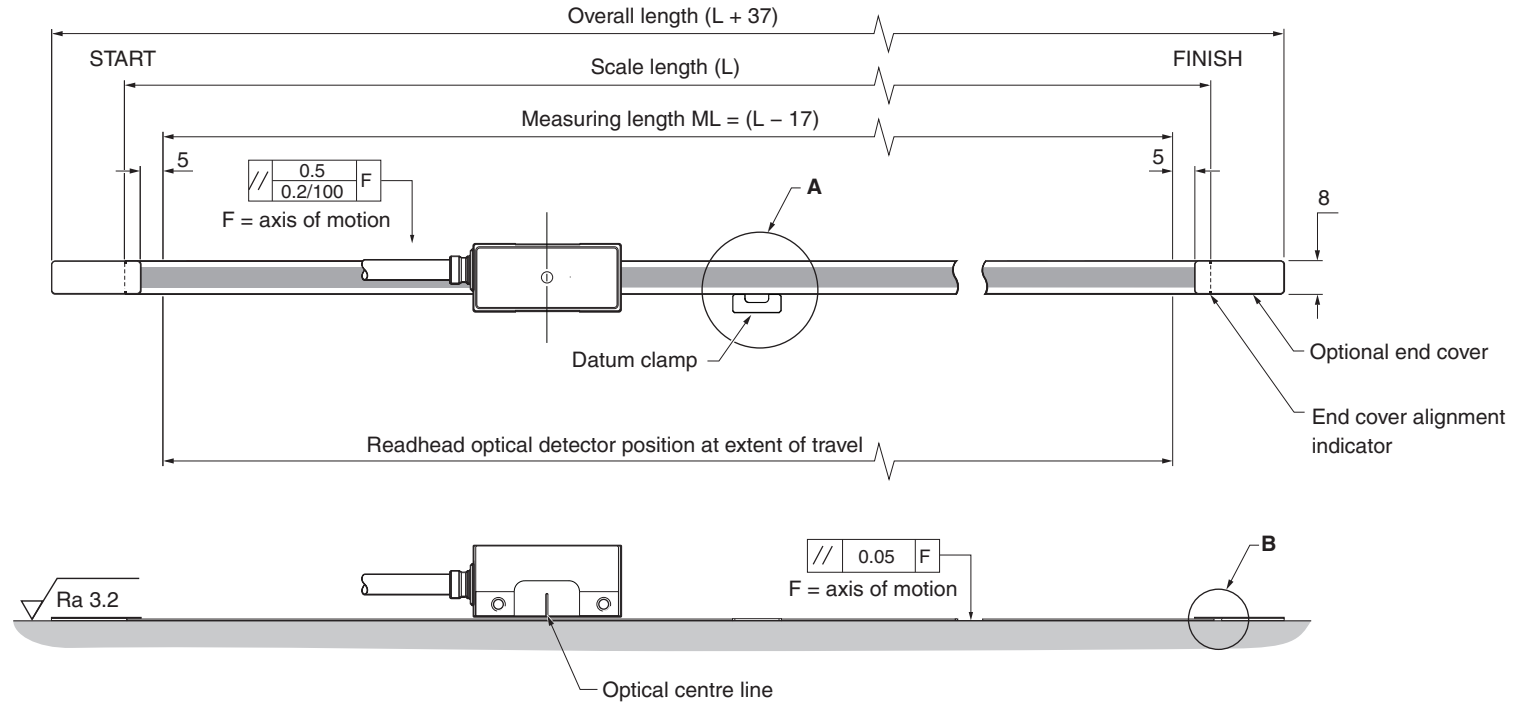
Dimensions and tolerances in mm



¹ Thread depth from mounting face. Recommended thread engagement 5 mm (8 mm including counterbore). Recommended tightening torque 0.5 Nm to 0.7 Nm.

² Extent of mounting faces.

RTLA50-S (with adhesive datum clamp) installation drawing



NOTE: All dimensions applicable when using EVOLUTE side cable outlet version.

RTLA50-S tape scale installation

Equipment

Required parts

- Appropriate length of RTLA50-S scale (see 'RTLA50-S (with adhesive datum clamp) installation drawing' on page 9)
- Datum clamp (Renishaw part no. A-9585-0028)
- Loctite® 435™ (Renishaw part no. P-AD03-0012)
- Appropriate cleaning solvents (see 'Storage and handling' on page 6)
- RTLA50-S scale applicator (Renishaw part no. A-9589-0095)
- 2 × M3 screws

Optional parts

- End cover kit (Renishaw part no. A-9585-0035)
- Renishaw scale wipes (Renishaw part no. A-9523-4040)
- Lint-free cloth
- Loctite 435 dispensing tip (Renishaw part no. P-TL50-0209)
- Guillotine (Renishaw part no. A-9589-0071) or shears (Renishaw part no. A-9589-0133) for cutting RTLA50-S to length required

Cutting scale

If required, cut scale to length using a guillotine or shears.

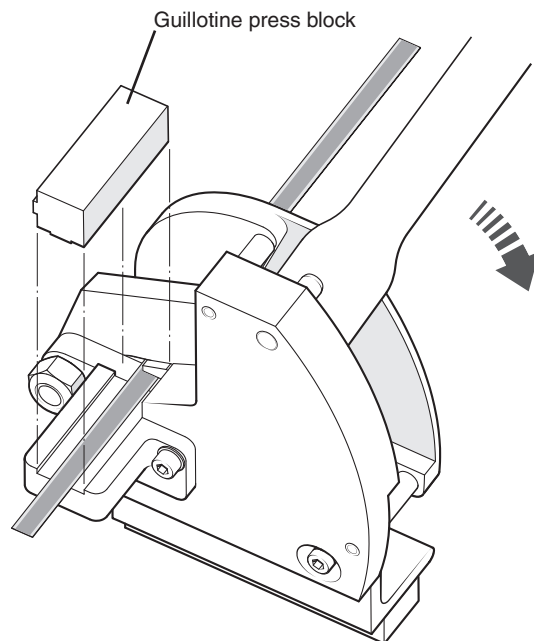
Using the guillotine

The guillotine should be held securely in place, using a suitable vice or clamping method.

Once secured, feed the RTLA50-S scale through the guillotine as shown, and place the guillotine press block down onto the scale. Ensure the block is in the correct orientation (as shown).

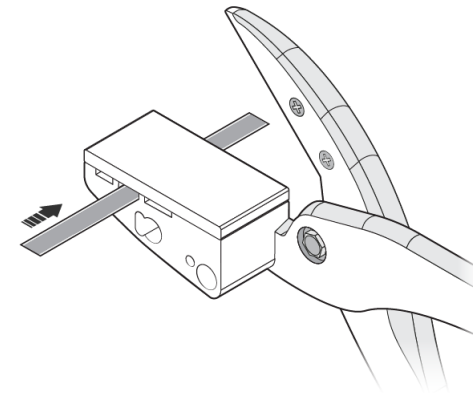
Whilst holding the block in place, in a smooth motion, pull down the lever to cut through the scale.

Guillotine press block orientation when cutting RTLA50-S scale



Using the shears

Feed the RTLA50-S scale through the middle aperture on the shears (as shown).

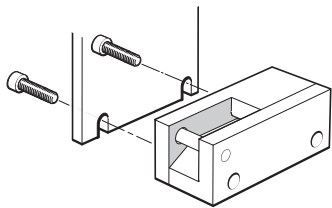


Hold the scale in place and close the shears in a smooth motion to cut through the scale.

Scale application

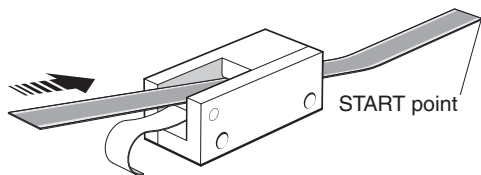
The scale applicator is designed specifically for use with EVOLUTE readheads and RTLA50-S scale.

1. Allow the scale to acclimatise to the installation environment prior to installation.
2. Mark out the start position for the scale on the axis substrate – ensure that there is room for the optional end covers if required (see 'RTLA50-S (with adhesive datum clamp) installation drawing' on page 9).
3. Thoroughly clean and degrease the substrate using recommended solvents (see 'Storage and handling' on page 6). Allow the substrate to dry before applying the scale.
4. Mount the scale applicator to the readhead mounting bracket. Place the shim supplied with the readhead between the applicator and the substrate to set the nominal height.

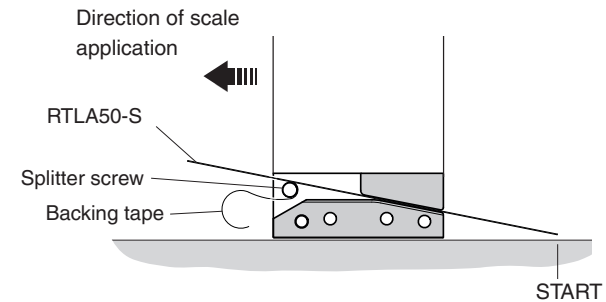


NOTE: The scale applicator can be mounted either way round to enable easiest orientation for scale installation.

5. Move the axis to the start of travel, leaving enough room for the scale to be inserted through the applicator, as shown below.
6. Begin to remove the backing paper from the scale and insert the scale into the applicator up to the start position. Ensure the backing tape is routed under the splitter screw.



7. Apply firm finger pressure via a clean, dry, lint-free cloth to ensure the scale end adheres well to the substrate.
8. Slowly and smoothly move the applicator through the entire axis of travel, ensuring the backing paper is pulled manually from the scale and does not catch under the applicator.



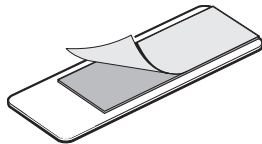
9. During installation, use light finger pressure to ensure the scale adheres to the substrate.
10. Remove the applicator and, if necessary, fit the remaining scale manually.
11. Apply firm finger pressure via a clean lint-free cloth along the length of the scale after application to ensure complete adhesion.
12. Clean the scale using Renishaw scale cleaning wipes or a clean, dry, lint-free cloth.
13. Fit end covers if required (see 'End covers' on page 13).
14. Allow 24 hours for complete adhesion of the scale before fitting the datum clamp (see 'Datum clamp' on page 13).

End covers

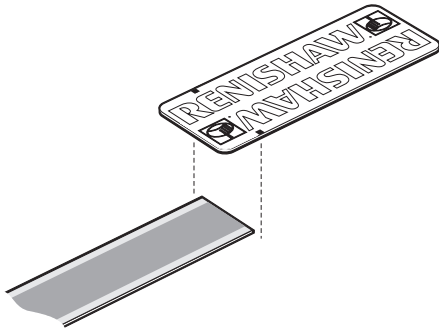
The end cover kit is designed to be used with RTLA50-S scale to provide protection for exposed scale ends.

NOTE: End covers are optional and can be fitted before or after readhead installation.

1. Remove the backing tape from the adhesive tape on the back of the end cover.



2. Align the markers on the edges of the end cover with the end of the scale and place the end cover over the scale.



NOTE: There will be a gap* between the end of the scale and the adhesive tape on the end cover.



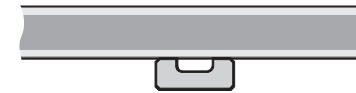
Datum clamp

The datum clamp fixes the RTLA50-S scale rigidly to the substrate at the chosen location.

IMPORTANT: The metrology of the system may be compromised if the datum clamp is not used.

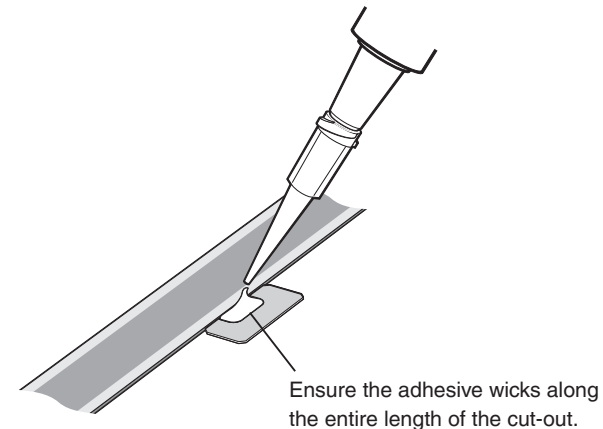
It can be positioned anywhere along the axis depending upon the customer's requirements.

1. Remove the backing paper from the datum clamp.
2. Place the datum clamp with the cut-out against the scale at the chosen location.



3. Place a small amount of adhesive (Loctite 435) in the cut-out on the datum clamp, ensuring none of the adhesive wicks onto the scale surface.

NOTE: Dispensing tips are available.



Readhead mounting/installation

Mounting brackets

The bracket must have a flat mounting surface, enable conformance to the installation tolerances, allow adjustment of the rideheight of the readhead, and be sufficiently stiff to prevent deflection or vibration of the readhead during operation.

Readhead set-up

Ensure that the scale, readhead optical window and mounting face are clean and free from obstructions.

NOTE: When cleaning the readhead and scale, apply cleaning fluid sparingly; do not soak.

To set nominal rideheight for RTLA50-S installations, use the readhead spacer.

IMPORTANT: Only use 0.8 mm blue spacer.

Adjust the readhead to maximise the signal strength along the full axis of travel to achieve a Green LED.

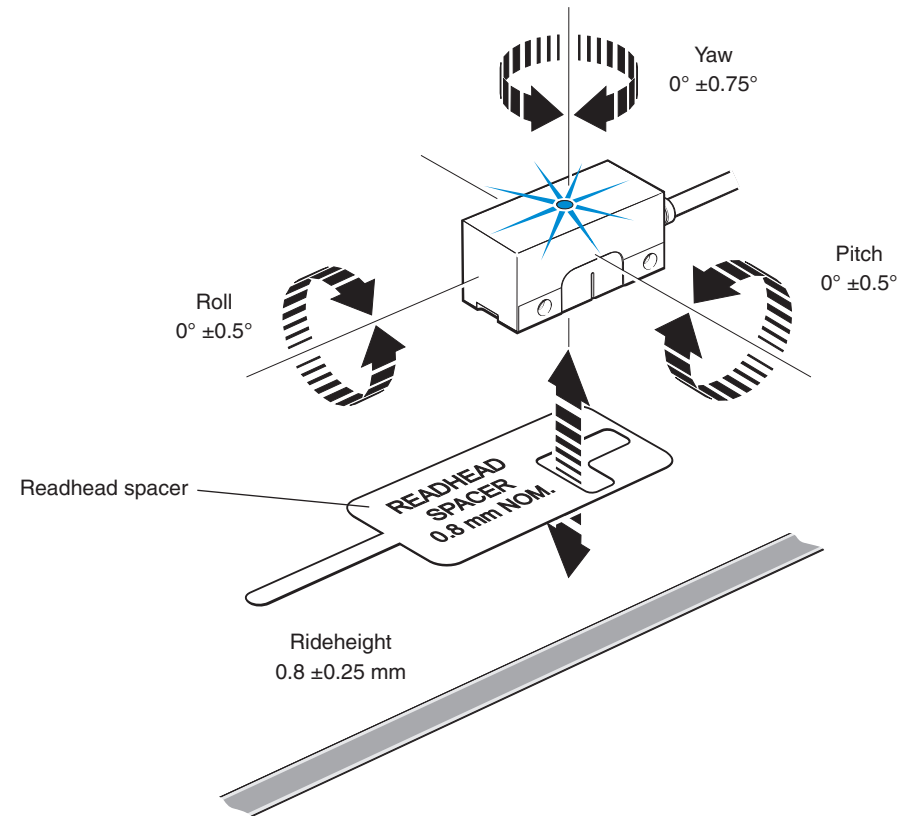
STATUS LED function

STATUS displays the readhead set-up status as shown on the readhead set-up LED.



RDY LED functions

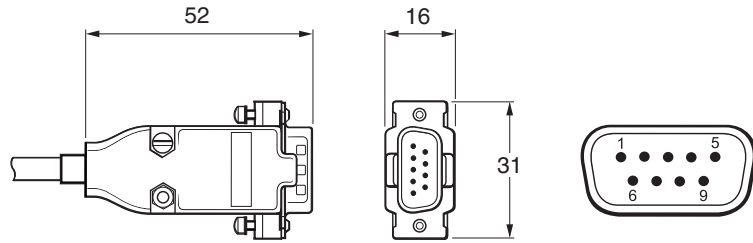
Colour	Status	Description
–	Off	Power supply is missing or outside of permissible tolerance range.
Green	Continuous light	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.
Orange	Continuous light	DRIVE-CLiQ communication is being established.
Red	Continuous light	At least one fault is present in this component. (The LED is activated regardless of whether the corresponding messages have been reconfigured.)
Green/Orange or Red/Orange	Flashing light	Component recognition via LED is activated (p0144). (Both options depend on the LED status when component recognition is activated via p0144=1.)



NOTE: A position error will trigger the set-up LED to flash continuously until the error is no longer present AND:

1. Power has been cycled OR
2. A position request has been received from the controller.

Output signals



9-way D-type plug

FANUC serial comms

Function	Signal	Wire colour	Pin
			9-way D-type
Power	5 V	Brown	4, 5
	0 V	White Green	8, 9
Serial communications	REQ	Violet	2
	*REQ	Yellow	3
	SD	Grey	6
	*SD	Pink	7
Shield	Shield	Shield	Case

BiSS C-mode serial comms

Function	Signal ¹	Wire colour	Pin
			9-way D-type
Power	5 V	Brown	4, 5
	0 V	White Green	8, 9
Serial communications	MA+	Violet	2
	MA-	Yellow	3
	SLO+	Grey	6
	SLO-	Pink	7
Shield	Shield	Shield	Case

¹ For details, refer to the data sheet *BiSS C-mode (unidirectional) for EVOLUTE encoders* (Renishaw part no. L-9517-9665).

Mitsubishi serial comms

Function	Signal	Wire colour	Pin
			9-way D-type
Power	5 V	Brown	4, 5
	0 V	White Green	8, 9
Serial communications	MR	Violet	2
	MRR	Yellow	3
Shield	Shield	Shield	Case
Reserved	Do not connect	Grey	6
		Pink	7

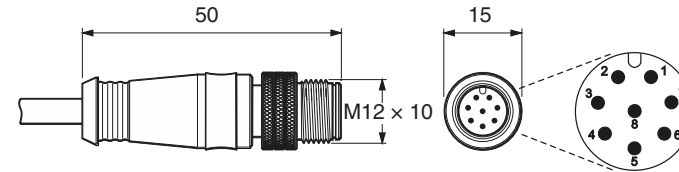
Panasonic serial comms

Function	Signal	Wire colour	Pin
			9-way D-type
Power	5 V	Brown	4, 5
	0 V	White	8, 9
Green			
Serial communications	PS	Violet	2
	\overline{PS}	Yellow	3
Shield	Shield	Shield	Case
Reserved	Do not connect	Grey	6
		Pink	7

Yaskawa serial comms

Function	Signal	Wire colour	Pin
			9-way D-type
Power	5 V	Brown	4, 5
	0 V	White	8, 9
Green			
Serial communications	S	Violet	2
	\overline{S}	Yellow	3
Shield	Shield	Shield	Case
Reserved	Do not connect	Grey	6
		Pink	7

Siemens DRIVE-CLiQ – output signals



M12 plug (Siemens DRIVE-CLiQ protocol only)

Signals between readhead and interface

Function	Signal	Wire colour	Pin
			M12
Power	5 V	Brown	2
	0 V	White	5, 8
Green			
Serial communications	A+	Violet	3
	A-	Yellow	4
Shield	Shield	Shield	Case
Reserved	Do not connect	Grey	7
		Pink	6

Interface output

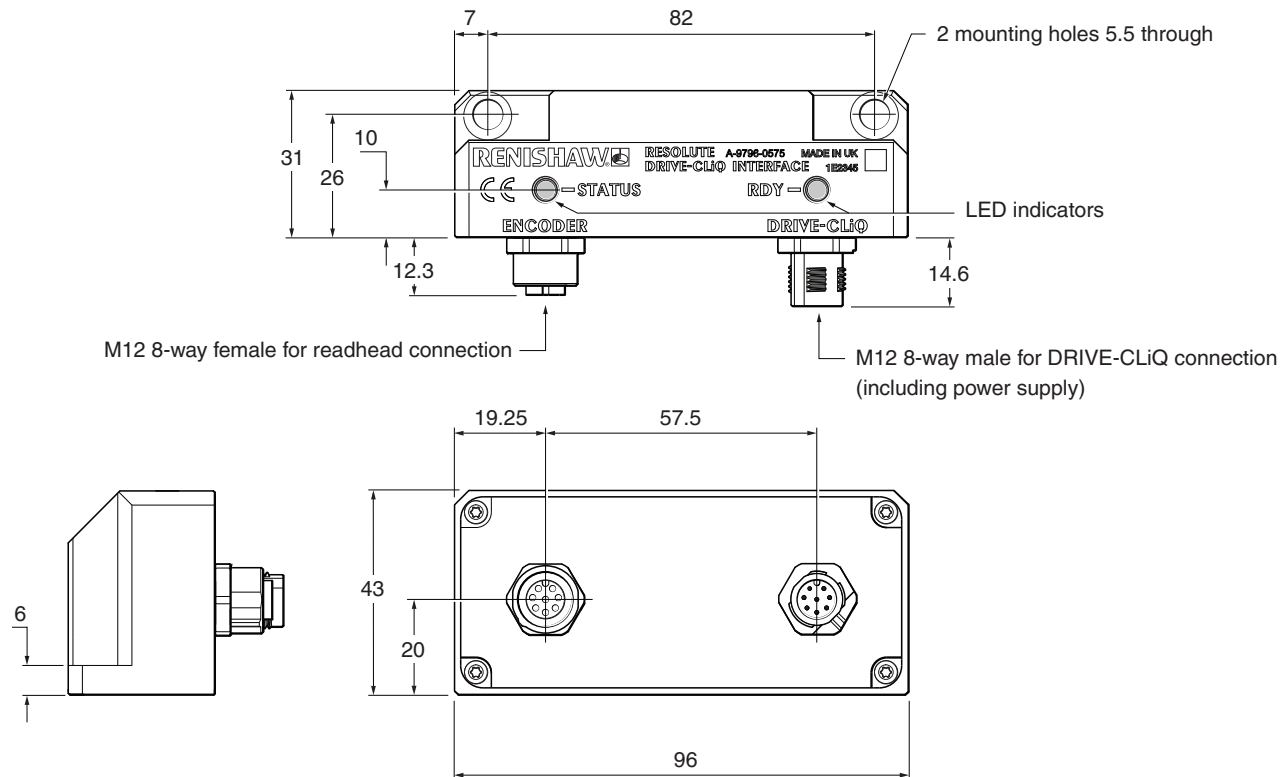
Function	Signal	Pin
		M12 ('A' code)
Power	24 V	1
	0 V	5
DRIVE-CLiQ communications	RX+	3
	RX-	4
	TX+	7
	TX-	6
Shield	-	Case

Siemens DRIVE-CLiQ interface (Renishaw part no. A-9796-0575)

DRIVE-CLiQ interface installation drawing

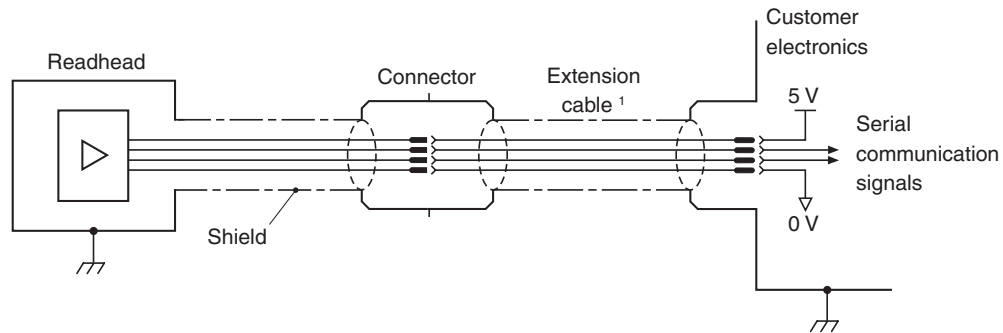


Dimensions and tolerances in mm



Electrical connections

EVOLUTE grounding and shielding



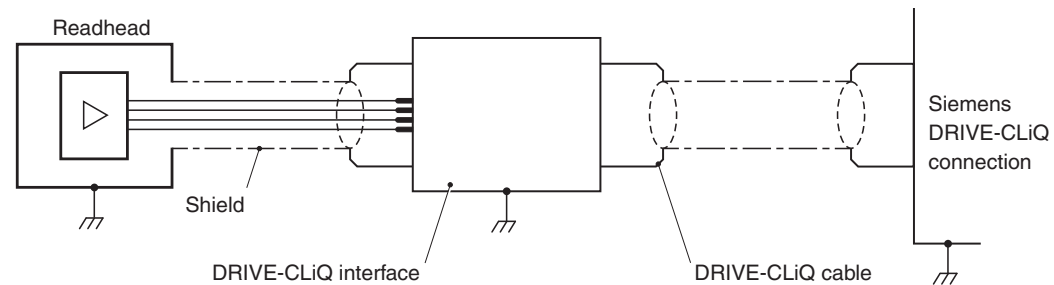
¹ For maximum extension cable length consult your local Renishaw representative.

IMPORTANT:

The shield should be connected to the machine Earth (Field ground).


If the connector is modified or replaced, the customer must ensure both 0 V cores (White and Green) are connected to 0 V.

EVOLUTE grounding and shielding – Siemens DRIVE-CLiQ protocol only



Specifications

General specifications

Power supply	5 V ±10%	1.25 W maximum (250 mA @ 5 V) ¹
Power supply (DRIVE-CLiQ system)	24 V	1.8 W maximum (75 mA @ 24 V), 24 V as per DRIVE-CLiQ specification. 24 V power is provided by the DRIVE-CLiQ network. ²
	Ripple	200 mVpp maximum @ frequency up to 500 kHz
Sealing (readhead) (DRIVE-CLiQ interface)		IP64 IP67
Acceleration (readhead)	Operating	500 m/s ² , 3 axes
Shock (readhead and interface)	Non-operating	1 000 m/s ² , 6 ms, ½ sine, 3 axes
Maximum acceleration of scale with respect to readhead ³		2 000 m/s ²
Vibration (readhead)	Operating	300 m/s ² , 55 Hz to 2 000 Hz, 3 axes
(DRIVE-CLiQ interface)	Operating	100 m/s ² , 55 Hz to 2 000 Hz, 3 axes
Mass	Readhead	18 g
	Cable	32 g/m
	Interface	218 g
Readhead cable		7 core, tinned and annealed copper, 28 AWG Single-shielded, outside diameter 4.7 ±0.2 mm Flex life > 40 × 10 ⁶ cycles at 20 mm bend radius UL recognised component 
Maximum readhead cable length ⁴		3 m

¹ Current consumption figures refer to terminated EVOLUTE systems. Renishaw encoder systems must be powered from a 5 Vdc supply complying with the requirements for SELV of standard IEC 60950-1.

² The Renishaw DRIVE-CLiQ interface must be powered from a 24 Vdc supply complying with the requirements for SELV of standard IEC 60950-1.

³ This is the worst case figure that is correct for the slowest communications clock rates. For faster clock rates, the maximum acceleration of scale with respect to the readhead can be higher. For more details, contact your local Renishaw representative.

⁴ Extension cables are available. Contact your local Renishaw representative for further details. Refer to Siemens DRIVE-CLiQ specifications for maximum cable length from interface to controller.

CAUTION: The EVOLUTE encoder system has been designed to the relevant EMC standards, but must be correctly integrated to achieve EMC compliance. In particular, attention to shielding arrangements is essential.



RTLA50-S scale technical specifications

Material	Hardened and tempered martensitic stainless steel fitted with a self-adhesive backing tape
Form (H × W)	0.4 mm × 8 mm (includes adhesive)
Datum fixing	Datum clamp (Renishaw part no. A-9585-0028) secured with Loctite 435
Accuracy (at 20 °C)	±10 µm/m, calibration traceable to International Standards
Coefficient of thermal expansion (at 20 °C)	10.1 ±0.2 µm/m/°C
Maximum length ¹	10.02 m

¹ For lengths > 2 m *FASTRACK* with RTLA50 is recommended.

www.renishaw.com/evolutedownloads

 #renishaw

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