

# FORTIS-N™ enclosed encoder system



## Specification

<b>Measuring standard</b>	Renishaw stainless-steel scale with single track absolute encoding
<b>Coefficient of thermal expansion</b> (at 20 °C)	10.1 ±0.2 µm/m/°C
<b>Thermal datum</b>	At centre position (encoder position of 0.5 × measuring length)
<b>Measuring lengths available (mm)</b>	70, 120, 170, 220, 270, 320, 370, 420, 470, 520, 570, 620, 670, 720, 770, 820, 920, 1020, 1140, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 2040 (mounting spar available – recommended for > 620 mm length)
<b>Accuracy grades</b>	High grade: ≤ ±3 µm Standard grade: ≤ ±5 µm
<b>Resolution <sup>1</sup></b>	0.5 nm, 1 nm, 1.25 nm, 10 nm, 12.5 nm, 25 nm, 50 nm
<b>Sub-Divisional Error (typical)</b>	±40 nm
<b>Jitter (RMS)</b>	10 nm
<b>Absolute position serial interface</b>	BiSS C, FANUC ( $\alpha/\alpha_i$ ), Mitsubishi, Panasonic, Siemens DRIVE-CLiQ (with external interface), Yaskawa
<b>Encoder electrical connection</b>	Cable connector M12 custom
<b>Controller electrical connection</b>	8-way M12, FANUC 20-way, 10-way Mitsubishi, 17-way M23, 9-way D-Type, 14-way LEMO, flying lead
<b>Cable length</b>	Up to 100 m (with extension cable)
<b>Power supply</b>	5 V ±10% 1.25 W maximum (250 mA @ 5 V)
<b>Set-up LED</b>	Signal strength indicator LED
<b>Maximum speed</b>	4 m/s
<b>Acceleration</b> (readhead relative to scale)	< 200 m/s <sup>2</sup> in measuring direction
<b>Moving force</b> (maximum force required to move the readhead through the seals)	< 4 N
<b>Vibration</b> (55 Hz to 2 000 Hz)	Readhead: < 300 m/s <sup>2</sup> to IEC 60068-2-6 Housing without mounting spar: < 200 m/s <sup>2</sup> to IEC 60068-2-6 Housing with mounting spar: < 300 m/s <sup>2</sup> to IEC 60068-2-6
<b>Shock 11 ms half-sine</b>	< 300 m/s <sup>2</sup> IEC 60068-2-27
<b>Operating temperature</b>	0 °C to 50 °C
<b>Environment protection</b>	IP53 when installed correctly, IP64 with air purge
<b>Air purge requirements</b>	Air supply pressure = 1 bar at encoder At correct supply pressure the supplied air connection fitting restricts the air flow rate to 2 l/min
<b>Weight</b>	0.11 kg + 0.45 kg/m

<sup>1</sup> See page 2.

# Resolution per accuracy grade and serial interface – standard options

Accuracy grade	Serial interface	Resolution nm	
		Single	Dual
3 µm	BiSS C, Mitsubishi, Panasonic, Siemens DRIVE-CLiQ, Yaskawa	1	
	FANUC		1 / 0.5
			10 / 1.25
5 µm	BiSS C, Mitsubishi, Panasonic, Siemens DRIVE-CLiQ, Yaskawa	10	
		50	
	FANUC		50 / 12.5
			50 / 25

**NOTE:** For BiSS C encoders, the standard position word length is 36 bits long. However, to accommodate controllers that require a shorter position word length, versions with 26 bit or 32 bit word length are also available (with standard 5 µm accuracy grade only).

Position word length	Nomenclature code	Accuracy grade	Resolution options (nm)		
			1	10	50
36 bit	36B	3 µm	OK	N/A	N/A
		5 µm	N/A	OK	OK
32 bit	32B		N/A	OK	N/A
26 bit	26B		N/A	N/A	OK

**NOTE:** For Siemens DRIVE-CLiQ encoders, the position word length is linked to the resolution, which in turn is linked to the accuracy grade. Here are the three options.

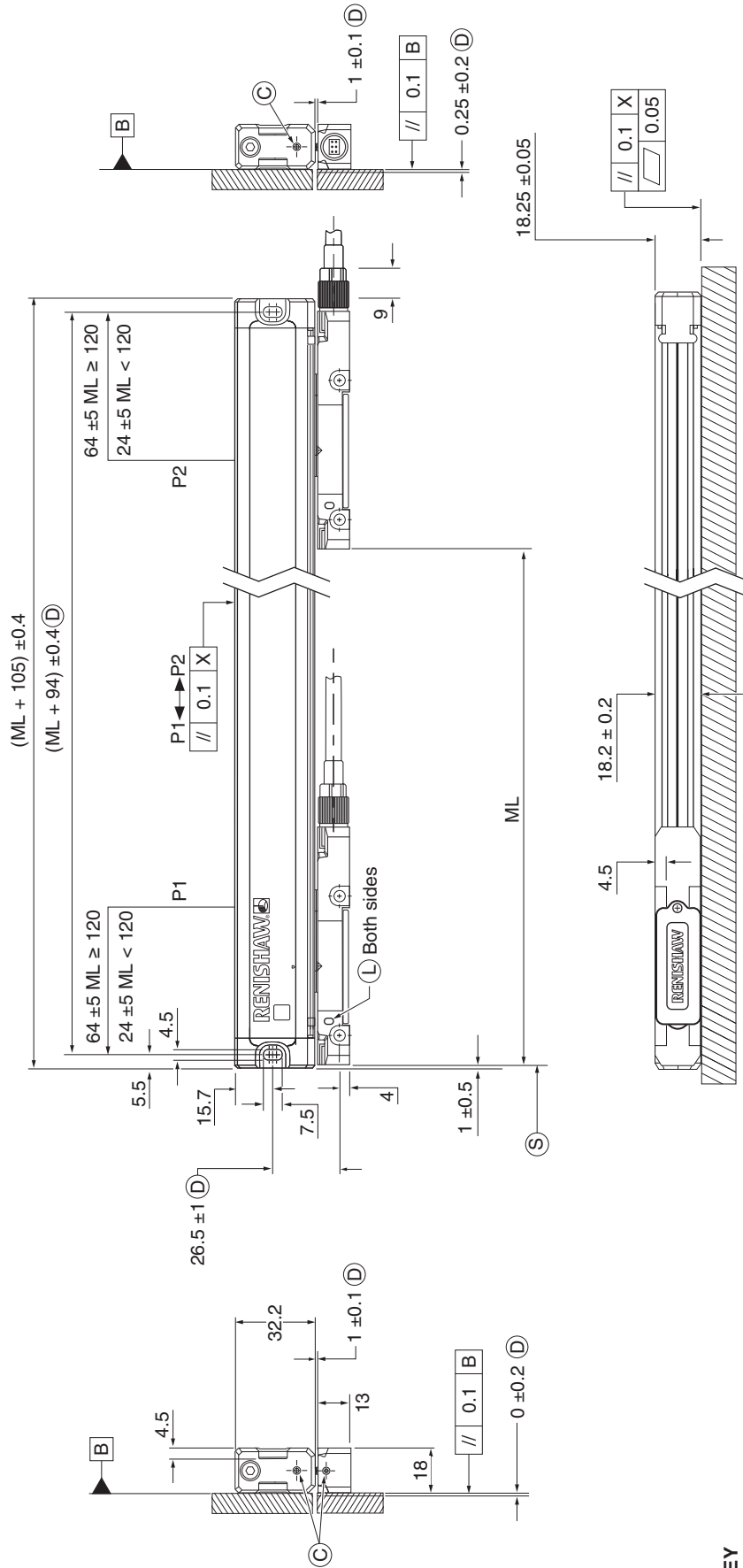
Position word length	Nomenclature code	Accuracy grade	Resolution options (nm)
34 bit	34D	3 µm	1
30 bit	30D	5 µm	10
28 bit	28D	5 µm	50



# System installation drawing – short end caps

(ML 320 mm shown)

Dimensions and tolerances in mm



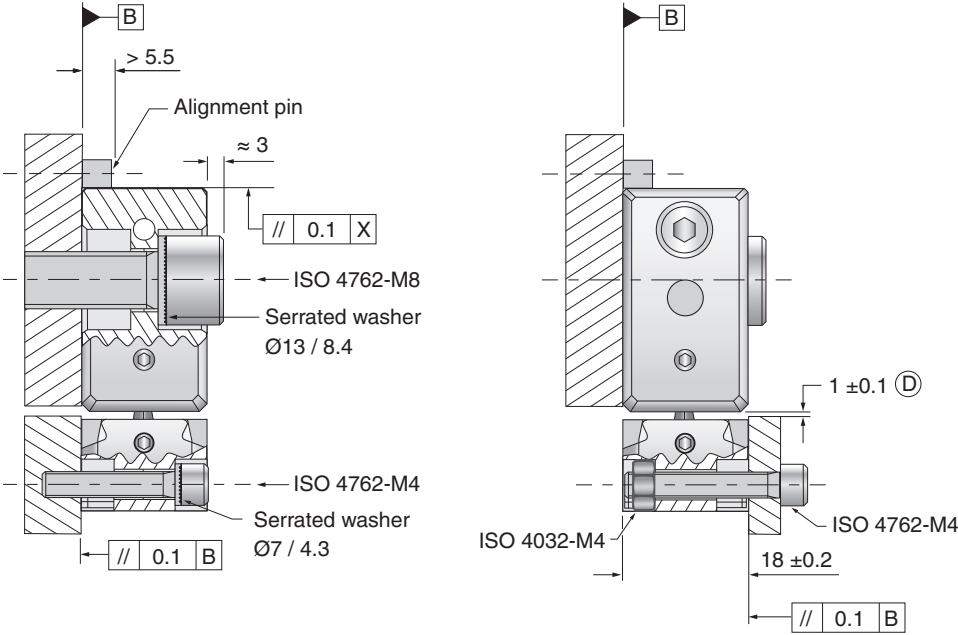
## KEY

- C = Compressed air inlet fitting
- D = Required mounting dimensions
- L = LED set-up illumination
- ML = Measuring length
- P = Gauging points for alignment
- S = Start of measuring length
- X = Machine guideway/axis datum

ML	70	120	170	220	270	320	370	420	470	520	570	620	670	720	770	820	880	920	1020	1140	1240	1340	1440	1540	1640	1740	1840	2040
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# Mounting orientations – standard end caps

Dimensions and tolerances in mm



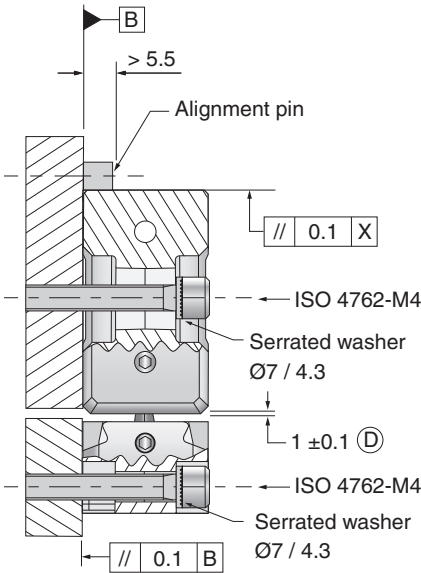
**KEY**

D = Required mounting dimensions  
X = Machine guideway/axis datum

**NOTES:**

1. Side elevations show alternative mounting orientations.
2. Alignment pin and machine edge mounting options to mate directly to the top face of the extrusion.

# Mounting orientations – short end caps



**KEY**

D = Required mounting dimensions  
X = Machine guideway/axis datum

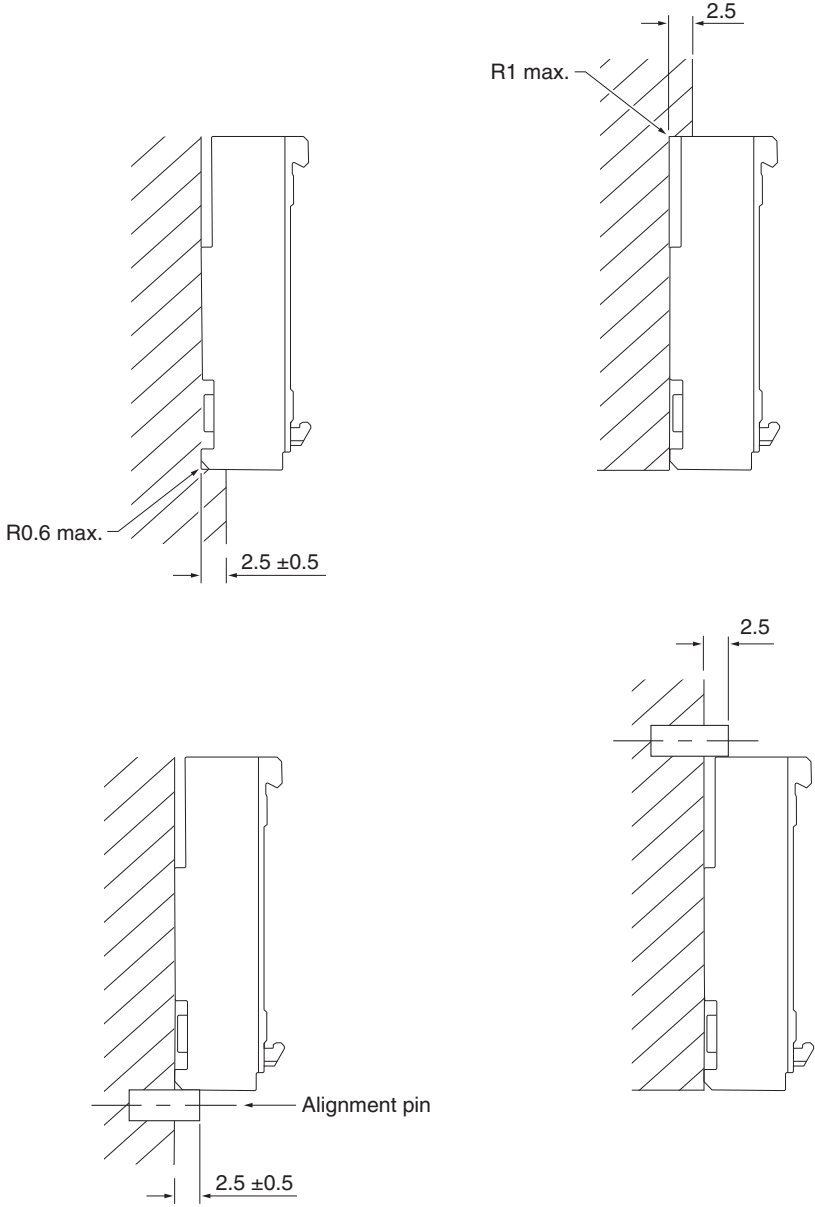
**NOTES:**

1. Side elevation shows alternative mounting orientation.
2. Extrusion mounting can be machine edge or dowel pins.

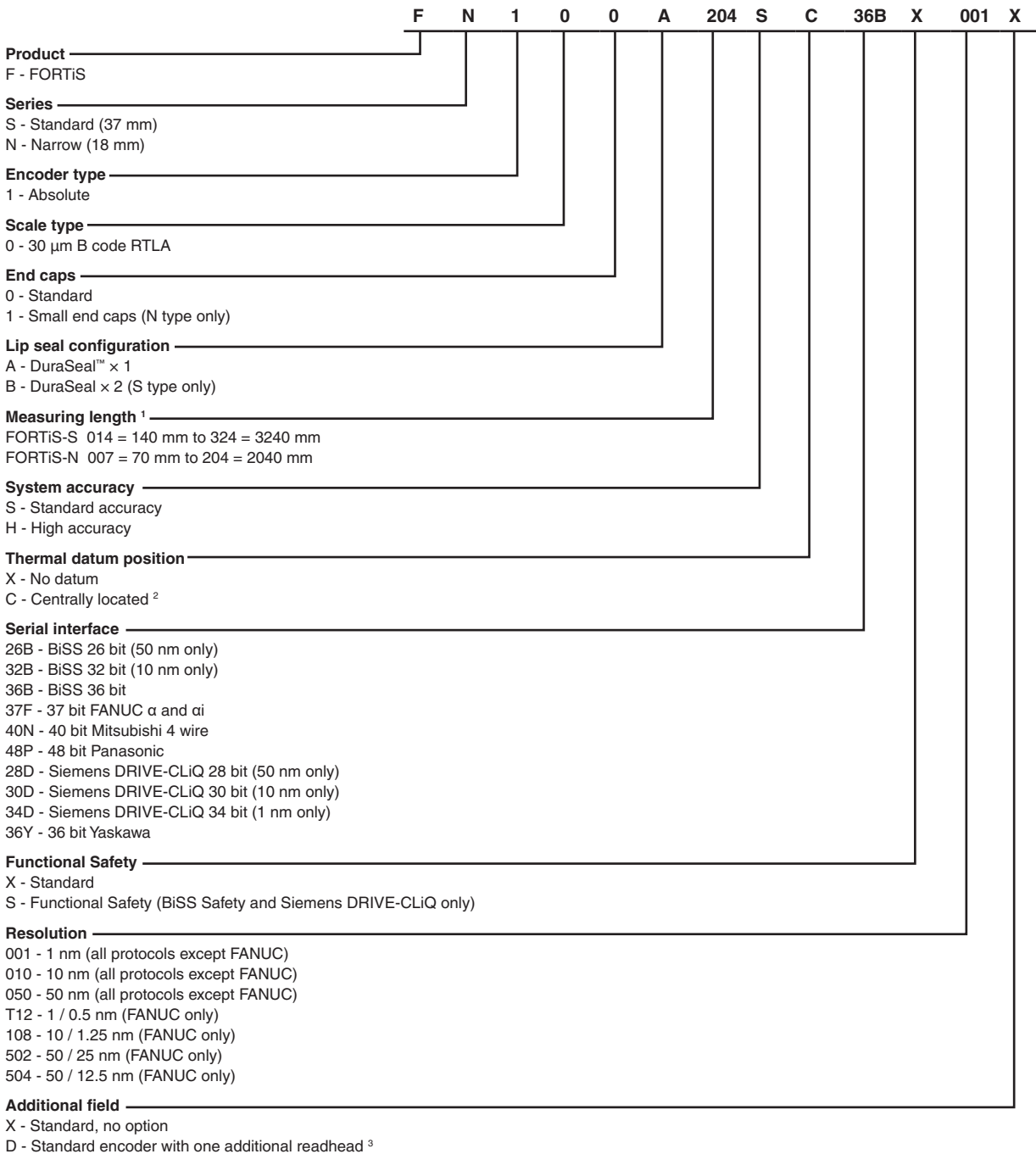


# Spar mounting options

Dimensions and tolerances in mm



# Nomenclature



<sup>1</sup> For all permissible measuring length options refer to specification table.

<sup>2</sup> For other datum requirements contact your local Renishaw representative.

<sup>3</sup> For further information see the manual *FORTiS-N enclosed encoder system with multiple readheads* (Renishaw part no. M-6725-9200).

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