

ABA-20 Optical, Absolute Encoder



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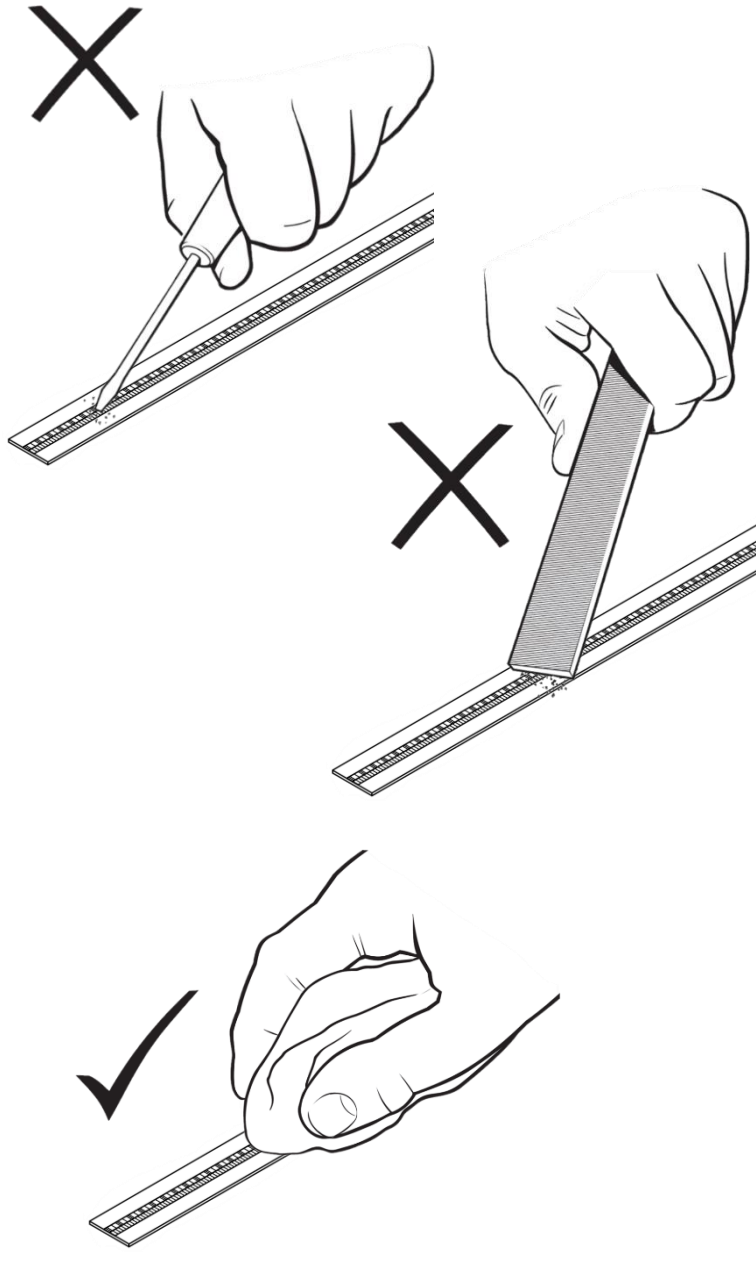
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Revision History

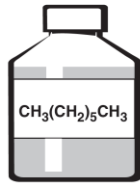
Revision No.	Date	Changelog
1.0	02 May 2021	Initial Release
1.1	09 June 2021	Updated encoder dimension Updated order code
1.2	29 June 2021	Changed encoder resolution
1.3	28 July 2021	Updated drawings
1.4	11 August 2021	Updated pinout
1.5	17 August 2021	- Page I Revised high speed from >5m/s to 10m/s - Page 3 Revised Typical current from 110mA to 90mA & add max current consumption
1.6	26 October 2021	Revised encoder max speed
1.7	29 November 2021	Removed Sodlime glass
1.8	11 April 2022	Changed rideheight tolerance from 0.3mm to 0.25mm
1.9	16 May 2022	Updated glass scale installation drawing
2.0	2 September 2022	Added glass scale application procedure
2.1	22 November 2022	Updated encoder dimension Updated installation drawings
2.2	06 December 2022	Added reference dimension for older revision
2.3	10 Jan 2023	Added jitter value

Storage and Handling

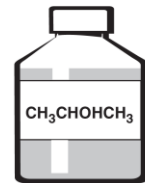


Scale and Readhead

N-heptane

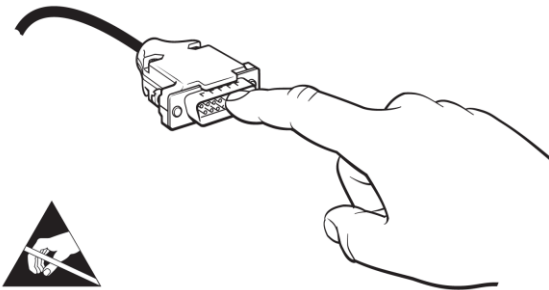
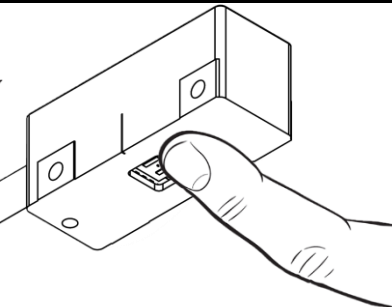
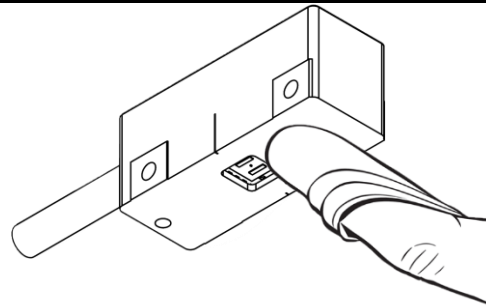
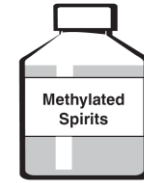
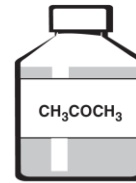


Propan-2-ol

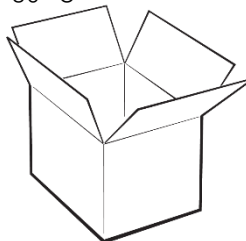
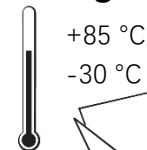


Readhead Only

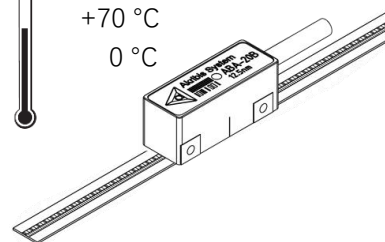
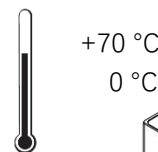
Acetone



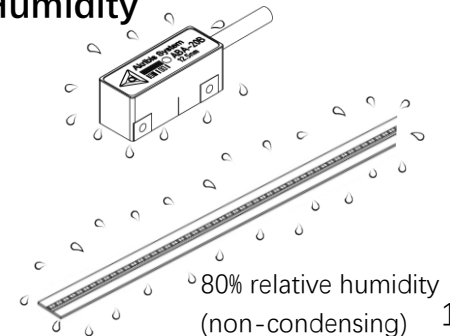
Storage



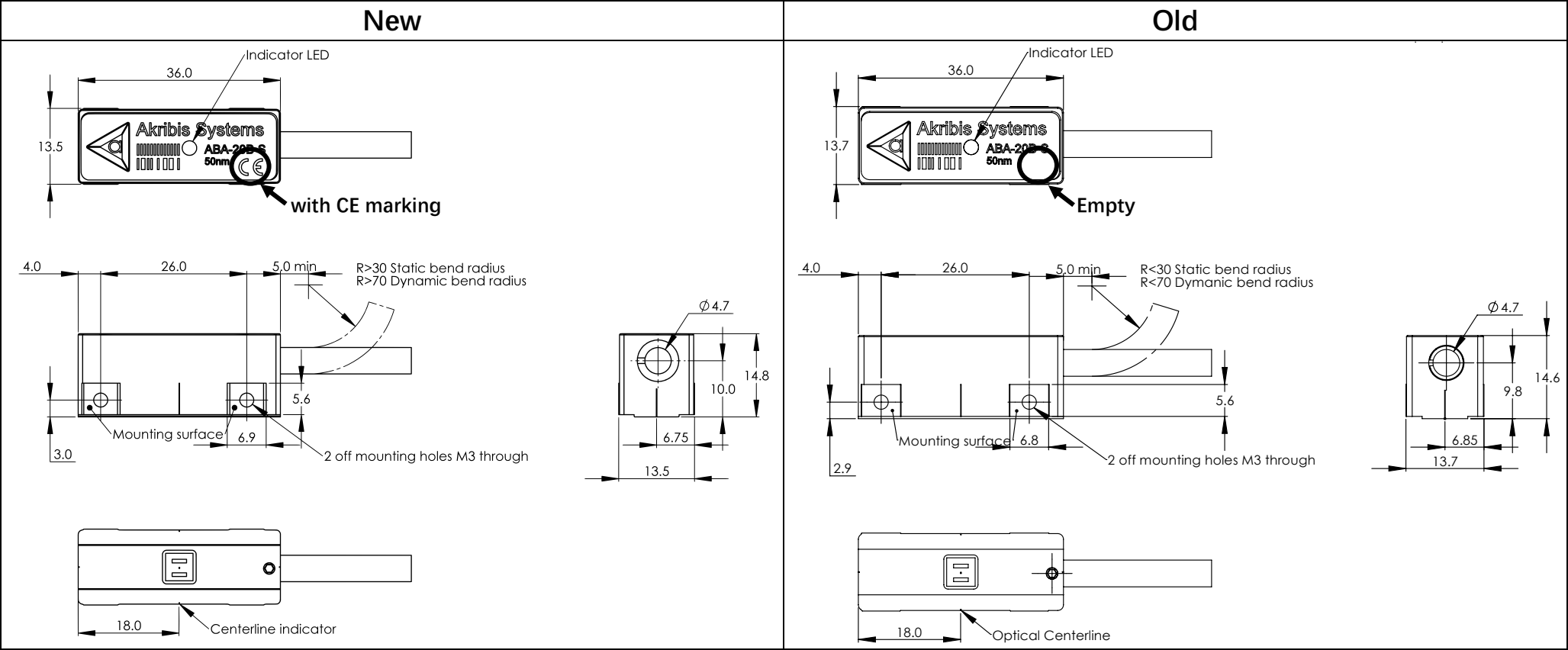
Operating



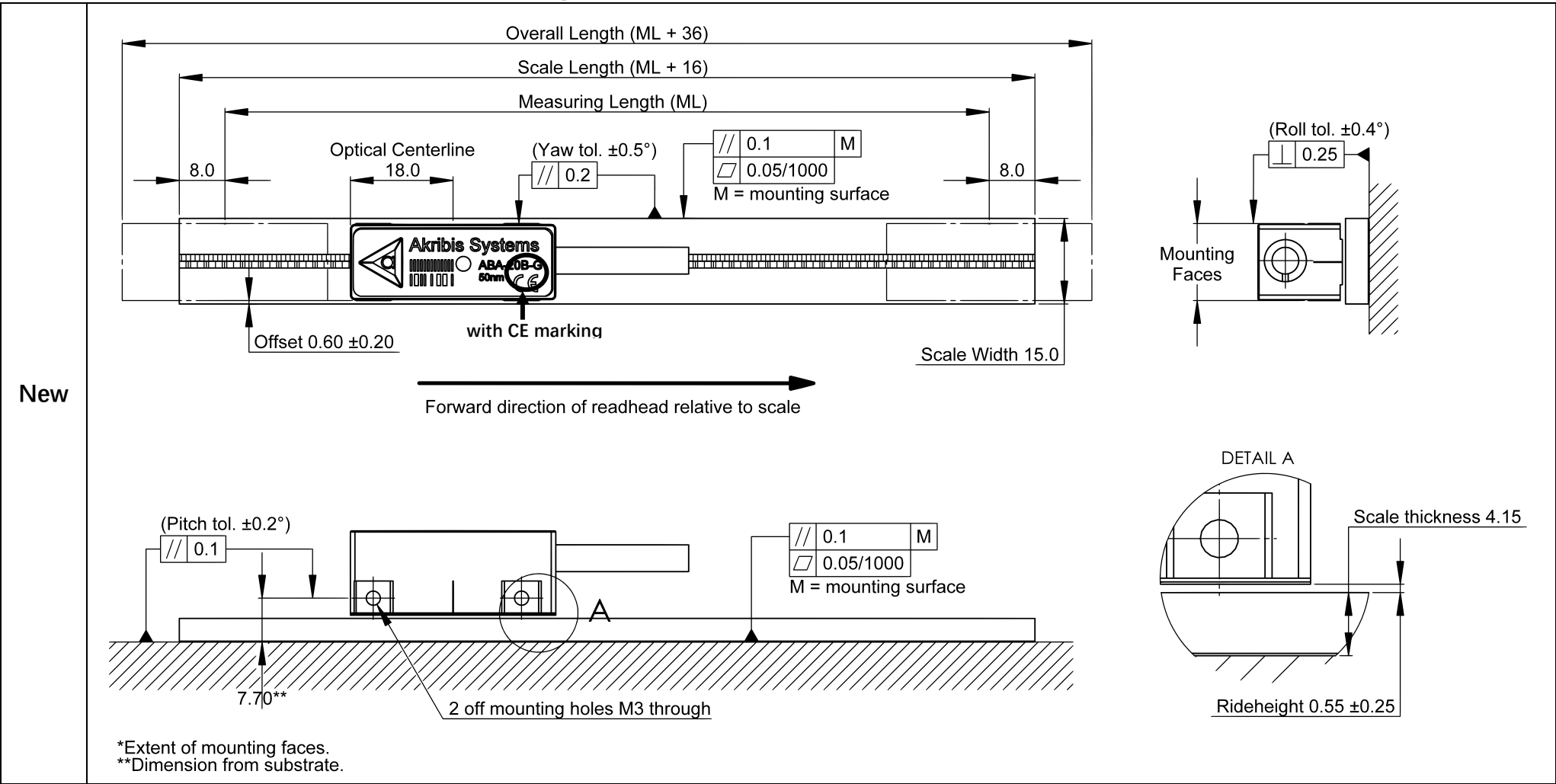
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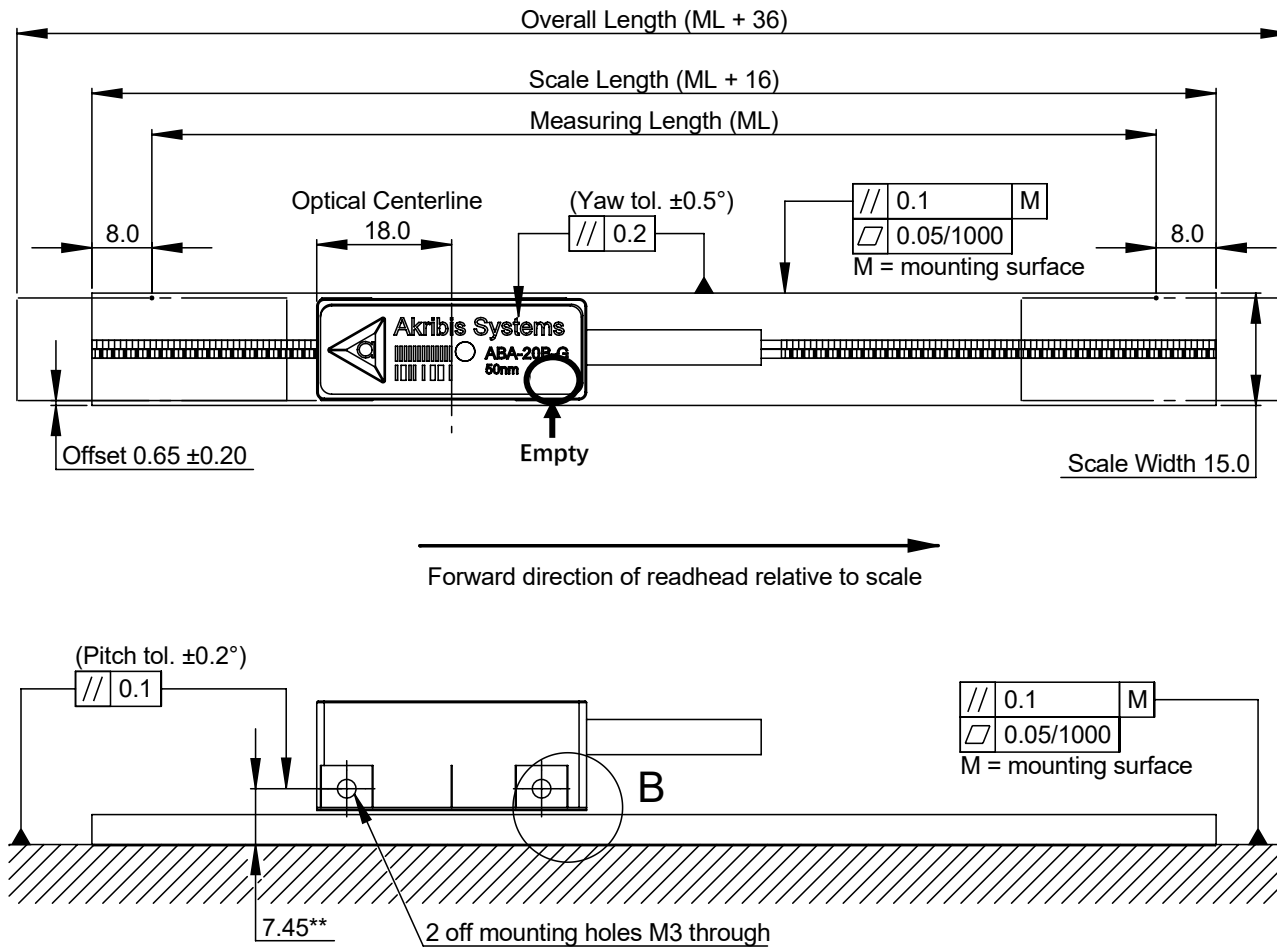
ABA-20 Readhead Dimension



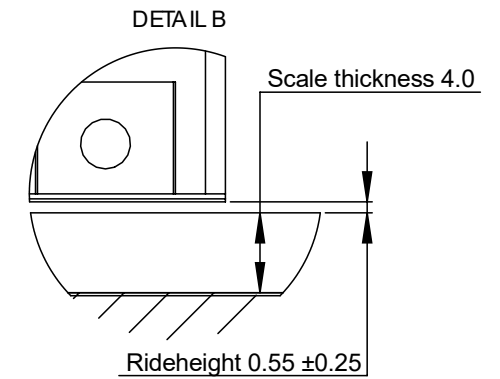
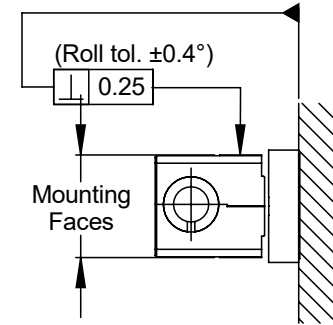
SA20-GX-LXXXX Installation Drawing



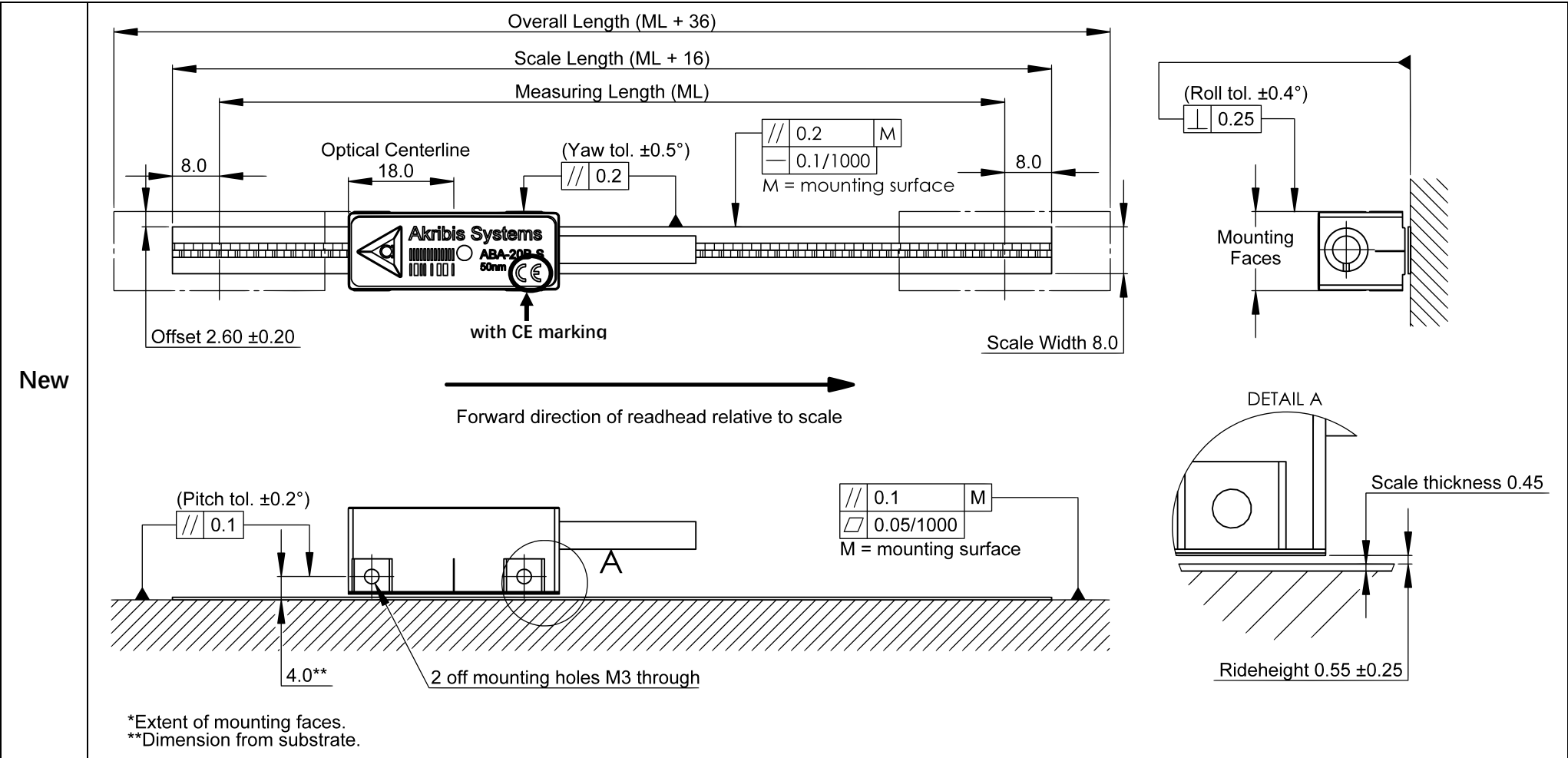
Old



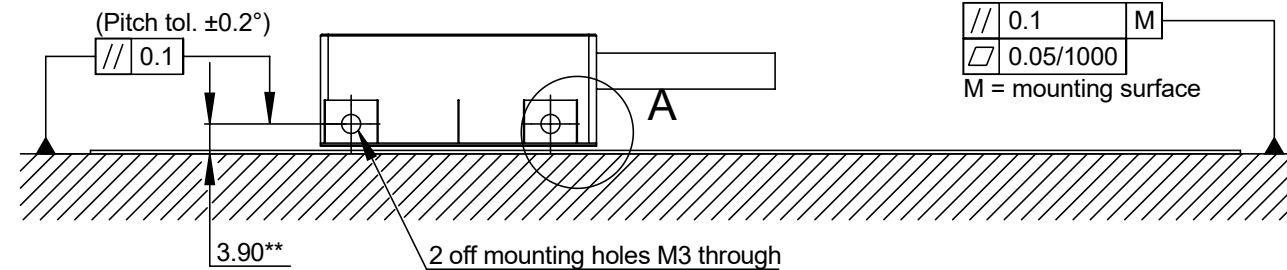
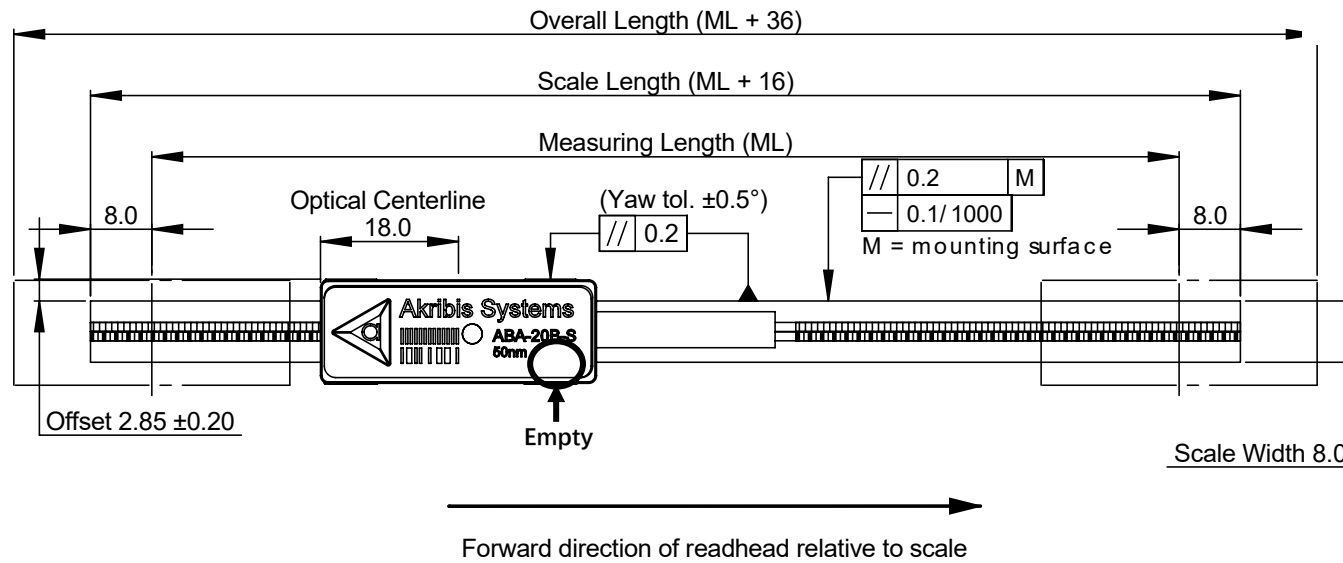
*Extent of mounting faces.
 **Dimension from substrate.



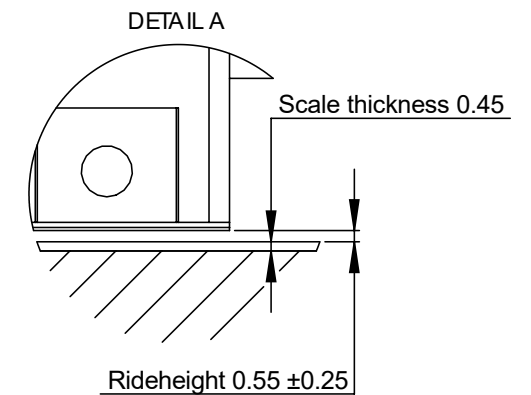
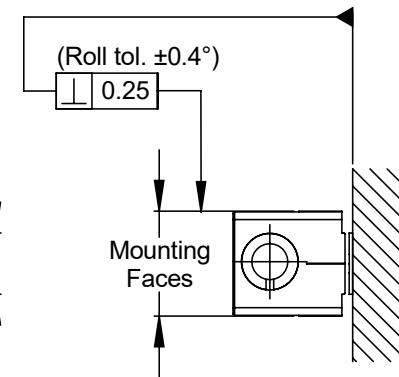
SA20-ST-LXXXX Installation Drawing



Old



*Extent of mounting faces.
 **Dimension from substrate.



Suggested Extension Cable

Wiring length	Number of paired 5V and GND connections	Wire size
Up to 5m	1 pair	AWG 22
Up to 10m	2 pairs	
Up to 20m	3 pairs	

Strain Relief

To avoid torque or tensile force, please always use strain relief, whenever necessary.

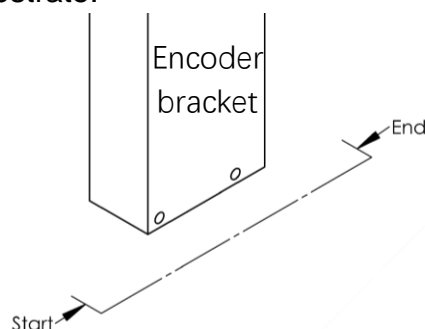
Handling Precautions

To avoid damaging the cable, apply force only to the connector during pulling or insertion. Ensure to tighten both screws of the connectors.

Steel Scale Application

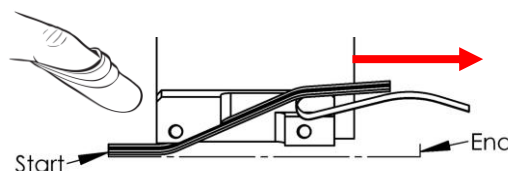
Scale mounting tool* (408124-01) is designed for use with SA20-ST-S-LXXXX scale.

1. Allow scale to acclimatise to installation environment prior to installation.
2. Mark out the 'START' and 'FINISH' points for the scale on the axis substrate.



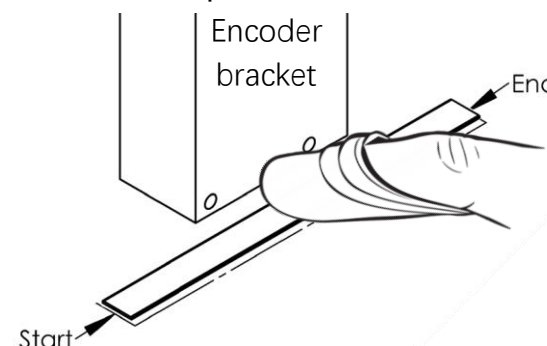
3. Thoroughly clean and degrease the substrate using recommended solvents (see [Storage and Handling](#)). Allow substrate to dry before applying scale.
4. Mount the scale mounting tool to the readhead mounting bracket using M3 screws. Place the spacer supplied with the readhead between the mounting tool and substrate to set the nominal height. NOTE: Scale mounting tool can be mounted either way round to enable easiest orientation for scale installation.

5. Move axis to scale 'START' position, leaving enough room for the scale to be inserted through the mounting tool
6. Begin to remove the backing paper from the scale and insert scale into the mounting tool up to the 'START' point.

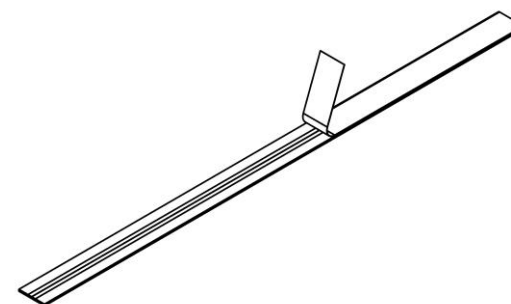


7. Apply finger pressure to the scale at the 'START' point, using a clean lint-free cloth, to ensure scale end adheres well to the substrate.
8. Slowly and smoothly move the mounting tool through the entire axis of travel.

9. Remove mounting tool and, if necessary, adhere the remaining scale manually. Apply firm finger pressure via a clean lint-free cloth along the length of the scale after application to ensure complete adhesion.



10. Strip away the protective foil of the scale.



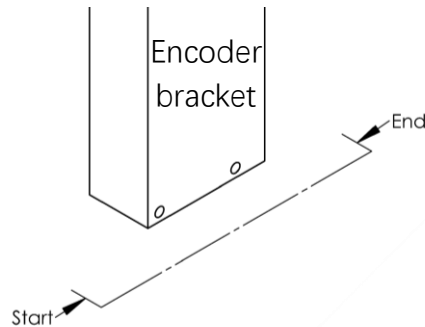
11. Clean scale using N-heptane and Propan-2-ol or a clean, dry, lint-free cloth.
12. Allow 24 hours for complete adhesion of scale.

* For ABA-20B-S-30C1 (New), please use 408124-02REV00 Applicator Tool
For ABA-20B-S-30C1 (Old), please use 408124-01REV01 Applicator Tool

Glass Scale Application

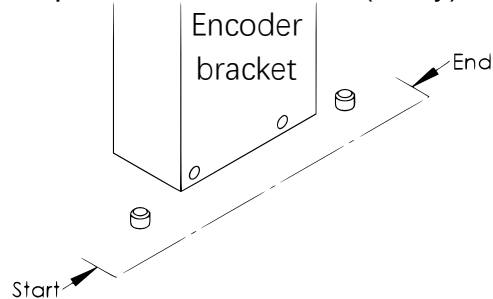
1. Allow scale to acclimatise to installation environment prior to installation.

2. Mark out the 'START' and 'FINISH' points for the scale on the axis substrate.

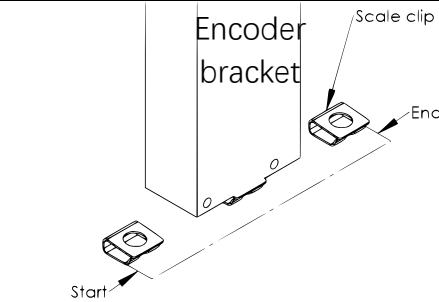


3. Thoroughly clean and degrease the substrate using recommended solvents (see [Storage and Handling](#)). Allow substrate to dry before applying scale.

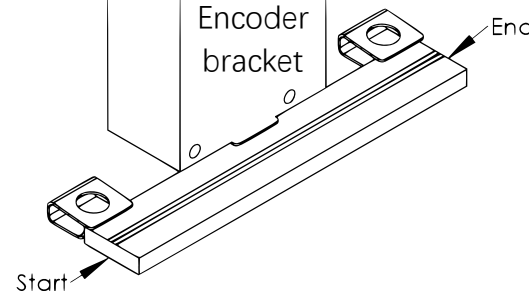
4. Mount the dowel pins or lower scale clamps onto the substrate (if any).



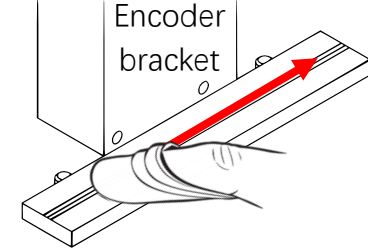
5. Remove the backing paper from the scale (if any). Tilt the scale by 45° to assist in alignment to dowel pins or shoulder and 'START' location.



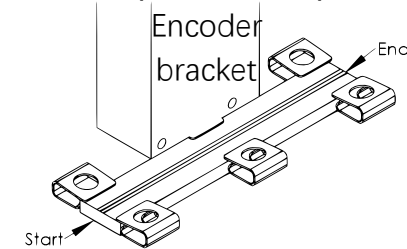
5. Slide the scale into the bottom scale clamps. Align the end of the scale to the 'START' point.



6. Apply firm finger pressure via a clean lint-free cloth along the length of the scale after application to ensure complete adhesion.

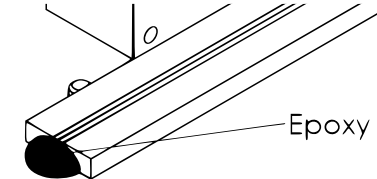


6. Screw on the top scale clamps.



7. Clean scale using N-heptane and Propan-2-ol or a clean, dry, lint-free cloth.

8. Apply your preferred epoxy to the reference point of the scale. Make sure the epoxy does not interfere with the readhead.



9. Allow 24 hours for complete adhesion of scale.

ABA-20B Quick-start Guide

This section is a quick start guide to installing an ABA-20B system.

INSTALLATION



Ensure scale, readhead optical window and mounting faces are clean and free from obstructions.



Install the readhead on the bracket.



Connect readhead to receiving driver or controller and indicator LED will power-up.



Move the axis across the whole measuring range and check the readhead status through the indicator LED.



If the indicator LED is green throughout, installation is complete.
If the indicator LED turns orange, the readhead is misaligned and calibration is needed.
If indicator LED turns red, position readout error.

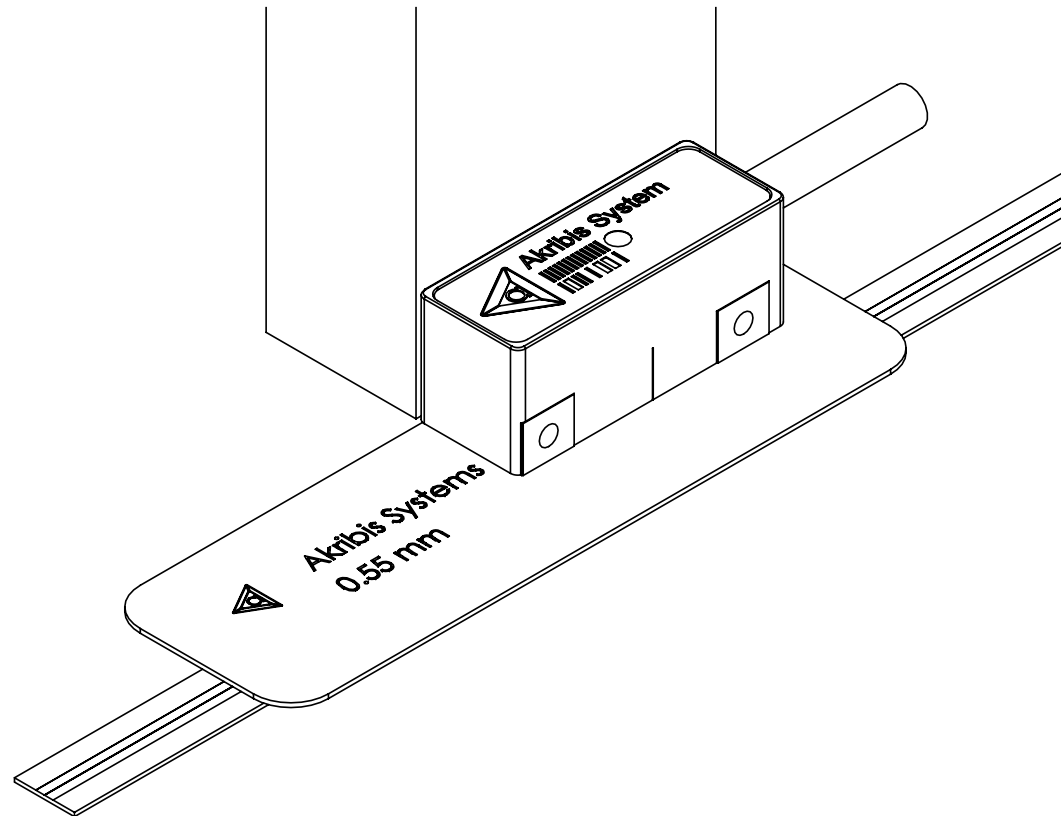
Readhead Mounting and Alignment

Mounting brackets

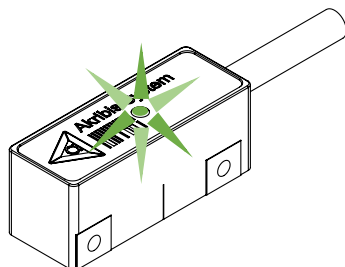
The bracket must have a flat mounting surface and should provide adjustment to enable conformance to the installation tolerances, allow adjustment to the rideheight of the readhead, and be sufficiently stiff to prevent deflection or vibration of the readhead during operation.

Readhead set-up

Ensure that the scale, readhead optical window and mounting face are clean and free from obstructions. To set nominal rideheight, place the 0.55mm spacer under the readhead during set-up procedure.



BiSS error and warning bits and LED definition



BiSS diagnostic bit		LED color	Meaning	Troubleshooting steps
Error	Warning			
Not active	Not active	Green	Encoder is functioning normally	-
Not active	Active	Orange	Error reading the absolute track ¹	1. Ensure scale is free from dust/grease or damage 2. Ensure encoder is installed within mechanical tolerances 3. Run sensor calibration procedure
			Temperature higher than (operating $>+70^{\circ}\text{C}$) or lower than (operating $<0^{\circ}\text{C}$)	1. Ensure encoder is decoupled from extreme temperature sources
			Dynamic calibration parameter(s) at boundary value	1. Run sensor calibration procedure 2. Ensure encoder is installed within mechanical tolerances
Active	Not active	Red	Error reading the scale	1. Ensure scale is installed in the correct orientation 2. Ensure encoder is installed within mechanical tolerances

¹Encoder will still work by switching to incremental mode using position from last known absolute position

Note: Warning (Orange LED) and error (Red LED) states are latched. Meaning, even when error/warning causes are removed, the LED light will maintain orange or red until the encoder is power cycled or error/warning register is reset via the BiSS interface.

Sensor calibration procedure

**Calibration is highly recommended to improve the readhead's signal integrity.*

1. Install readhead according to user guide.
2. Write 0xb0 to register 0x77 while manually moving the axis back and forth for at least 5 seconds at a speed no less than 0.2m/s. While calibration is in progress, register 0x77 will read 0xb0 or 0xb1. After successful calibration, register 0x77 will read 0x00. If calibration failed, 0x77 will read 0x80.
3. Repeat step 2 by writing 0xb1 to 0x77.
4. Write 0x20 to register 0x77 to reset warning/error.
5. Write 0x41 to register 0x77 to save calibration parameters to flash.

Note:

1. Please contact sales for configurator tool and GUI.
2. After calibration, calibration data must be saved to flash to persist across reboots.

Pinout (15 Way D-Type - Male)

ABA-20B

I/O Connector	Pinout	Signal	Function	Colour
	Pin 8	MA+	BiSS C Clock +	Yellow
	Pin 15	MA–	BiSS C Clock –	Green
	Pin 5	SLO+	BiSS C Data +	Amber
	Pin 13	SLO–	BiSS C Data –	Brown
	Pin 1	Sin+	Sine + Signal	Blue
	Pin 9	Sin–	Sine – Signal	Purple
	Pin 3	Cos+	Cosine + Signal	Grey
	Pin 11	Cos–	Cosine – Signal	White
	Pin 4	+5V	Encoder Supply (5V)	Red
	Pin 12	+5V (Short with Pin 4)	Encoder Supply (5V)	Red
	Pin 2	GND	Encoder Supply (0V)	Black
	Pin 10	GND (Short with Pin 2)	Encoder Supply (0V)	Black
	Case		Shield	

Speed

Parameter	Max speed (m/s)
Linear	5

General Specifications

Power Supply	5V DC ±10%	90 mA (Typical) 110 mA (Max)
Communication Interface		BiSS-C bidirectional (27-bits) SinCos 1Vpp
Temperature	Storage Operating	-30 °C to +85 °C 0 °C to +70 °C
Humidity		10 to 80% @ RH (Non-Condensing)
Acceleration	Operating	500 m/s ² , 3 Axes
Max Speed	Linear	5m/s
Shock	Non-Operating	1000 m/s ² , 6 ms
Vibration	Operating	500 m/s ² Max @ 55 to 2000 Hz
Mass	Readhead Cable	10 g 37 g/m
Bending Radius Static/Dynamic		30 mm/ 70 mm
Cable		10 Cores, Single Shielded
Connector Options	C1	15 Way D-Type - Male
Dimension		L36 mm * W13.5 mm * H14.8 mm * L36 mm * W13.7 mm * H14.6 mm
Sealing		IP40
Measuring Step		50 nm
Jitter		33 nm RMS
Compliance		CE & RoHS

* Upper value is for ABA-20 new dimensions

Scale Technical Specifications

Grating Compatibility	Absolute Linear	
Scale Length	Up to 1.5m (Glass Scale) Up to 3 m (Stainless Steel)	
Accuracy	±15 µm/m	
Form	Robax Stainless steel	W15.0 mm * H4.15 mm (includes adhesive) W 8.0 mm * H0.45 mm (includes adhesive)
Substrate Material	Robax Glass Stainless Steel	
Expansion Coefficient	0 ppm/°C (Robax) 11 ppm/°C (Stainless Steel)	
Weight	155 g/m (Robax Glass) 18 g/m (Stainless Steel)	