

# Datasheet

## General Features


Absolute linear encoder for CNC machine tools.

- FANUC  $\alpha$ i serial interface
- Resolutions up to 0.01  $\mu\text{m}$ .  
Accuracy grade up to  $\pm 2 \mu\text{m}$
- Central fixed expansion point (**FEP**).  
On request positioned on the right (**RT**)  
or on the left (**LT**), for a linear expansion  
consistent with the type of application
- Direct reading of absolute measure
- Small size, to allow installation in  
narrow spaces
- Connector on the transducer
- Pressurization from both sides  
of the scale or from the transducer



**FANUC**

## Technical Characteristics

Measuring support	Glass scale		
Grating pitch	20 μm		
Linear thermal expansion coefficient	8 x 10 <sup>-6</sup> °C <sup>-1</sup>		
Serial interface	FANUC αi		
Resolution absolute measure	1 - 0.1 – 0.05 - 0.01 μm		
Accuracy grade	± 5 μm * standard version ± 3 μm * high-accuracy version (± 2 μm for measuring length up to 670 mm)		
Interpolation error (SDE)	± 50 nm **		
Hysteresis	90 nm **		
Measuring length ML in mm	70, 120, 170, 220, 270, 320, 370, 420, 470, 520, 570, 620, 670, 720, 770, 820, 920, 1.020, 1.140, 1.240, 1.340, 1.440, 1.540, 1.640, 1.740, 1.840, 2.040 max.***		
Max. traversing speed	180 m/min		
Max. acceleration	50 m/s <sup>2</sup> in measuring direction		
Required moving force	≤ 2.5 N		
Vibration resistance (EN60068-2-6)	100 m/ s <sup>2</sup> [55 ÷ 2000 Hz]		
Shock resistance (EN60068-2-27)	150 m/s <sup>2</sup> [11 ms]		
Protection class (EN 60529)	IP 54 standard, IP 64 pressurized		
Operating temperature	0 °C ÷ 50 °C		
Storage temperature	-20 °C ÷ 70 °C		
Relative humidity	20 % ÷ 80 % (not condensed)		
Reading block sliding	by ball bearings ◎		
Power supply	5 VDC ±10 %		
Current consumption	250 mA max. (with R = 120 Ω)		
Max. cable length	30 m		
Electrical connections	see related table		
Connector	on the transducer		
Electrical protections	inversion of polarity and short circuits		
Weight	225 g + 610 g/m		

\* The declared accuracy grade of  $\pm X \mu\text{m}$  is referred to a measuring length of 1 m.

\*\* The error declared is subject to the respect of the alignment tolerances.

\*\*\* For measuring lengths higher than 1.340 mm it is necessary to use the supporting bar (optional for lower measuring lengths).

## Electrical Characteristics

- Connector on the transducer, easily disconnectable in case of need.
- Reading device with an infrared light emitter and receiving photodiodes.
- Serial protocol FANUC *αi*.
- Electrical protection against polarity inversion and short circuits on output ports.
- CABLE:
  - PUR cable with low friction coefficient, resistant to oil and suitable for continuous movements, 0.5 m standard length.
  - M12 8 Pin connector.

**The cable's bending radius should not be lower than 80 mm.**

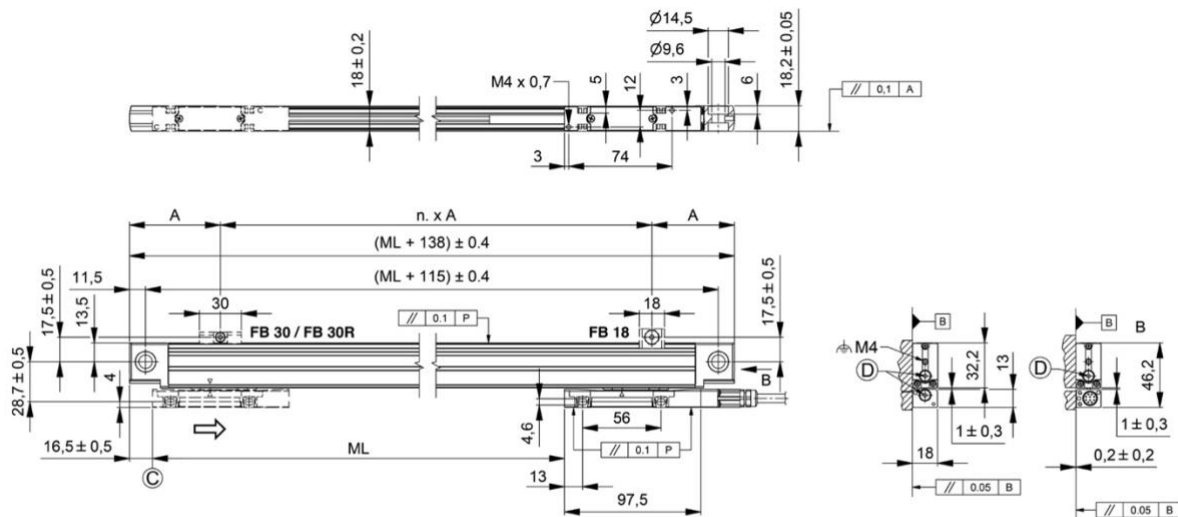
## Mechanical Characteristics

- **PROFILE** made of anodized aluminum.  
Dimensions 32.2 x 18 mm.
- **SPRING SYSTEM** for misalignment compensation and self-correction of mechanical hysteresis.
- Non-extendible **SEALING LIPS**, along the sliding side of the reader head.
- Pressurizable **READER HEAD**, consisting of tie rod and reading block, with fully protected place for electronic boards.
- **READING BLOCK** sliding through ball bearings.
- Die-cast **TIE ROD**, with nickel surface treatment.
- Absolute glass **GRATING**, placed in the scale housing.
- Elastomeric **GASKETS** which allow to reproduce the full protection in mechanical joints (in case of disassembling).
- **SUPPORTING BAR or INTERMEDIATE FIXING BLOCKS** for measuring lengths higher than 1.340 mm (optional for lower measuring lengths).
- **FULL POSSIBILITY** to disassemble and reassemble it.
- Possibility of direct **SERVICE**.

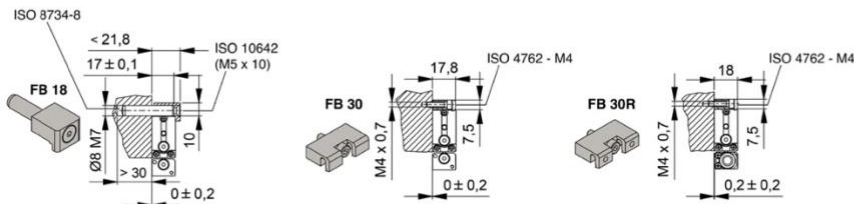
# Datasheet

## Dimensions

### STANDARD mounting

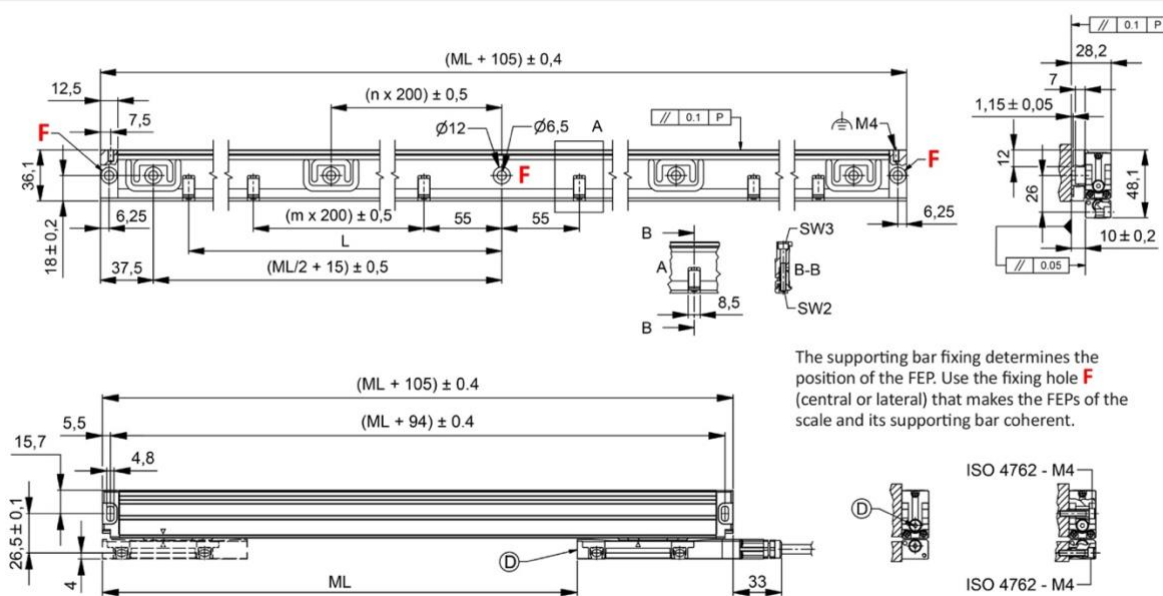


The intermediate fixing blocks FB 18 or FB 30 secure the scale to the machine and allow for its correct alignment.  
If the scale is mounted with the cable exit on the left (visible rear side), it is necessary to use the FB 30R blocks.



ML (mm)	N.	A
Up to 570	0	---
From 620 to 1240	2	(ML+138)/3
From 1340 to 1740	3	(ML+138)/4
From 1840 to 2040	4	(ML+138)/5

### Mounting with SUPPORTING BAR

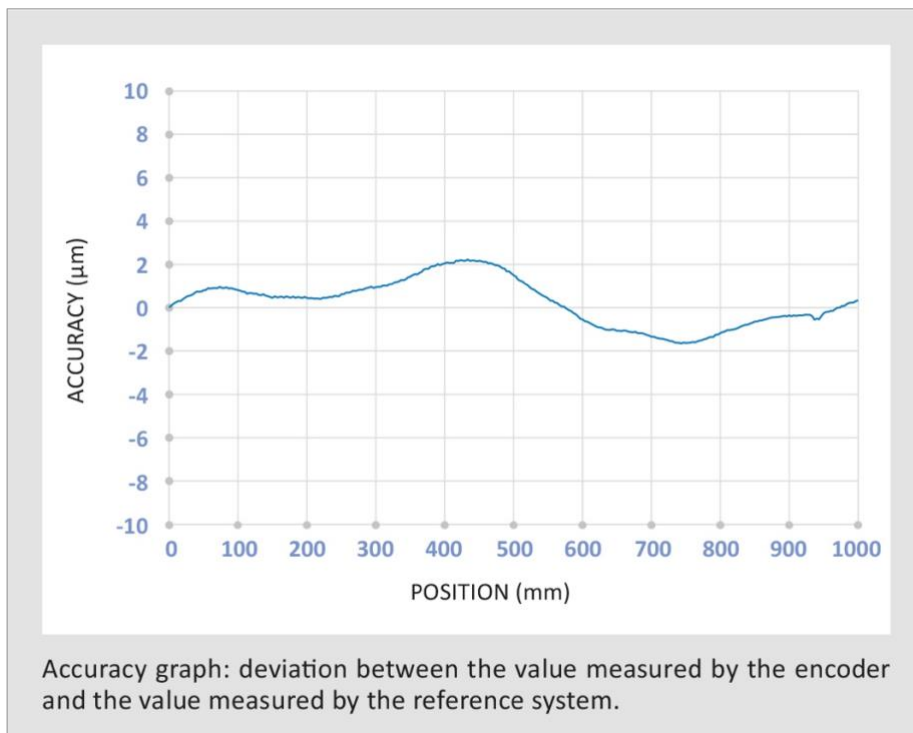


The supporting bar fixing determines the position of the FEP. Use the fixing hole **F** (central or lateral) that makes the FEPs of the scale and its supporting bar coherent.

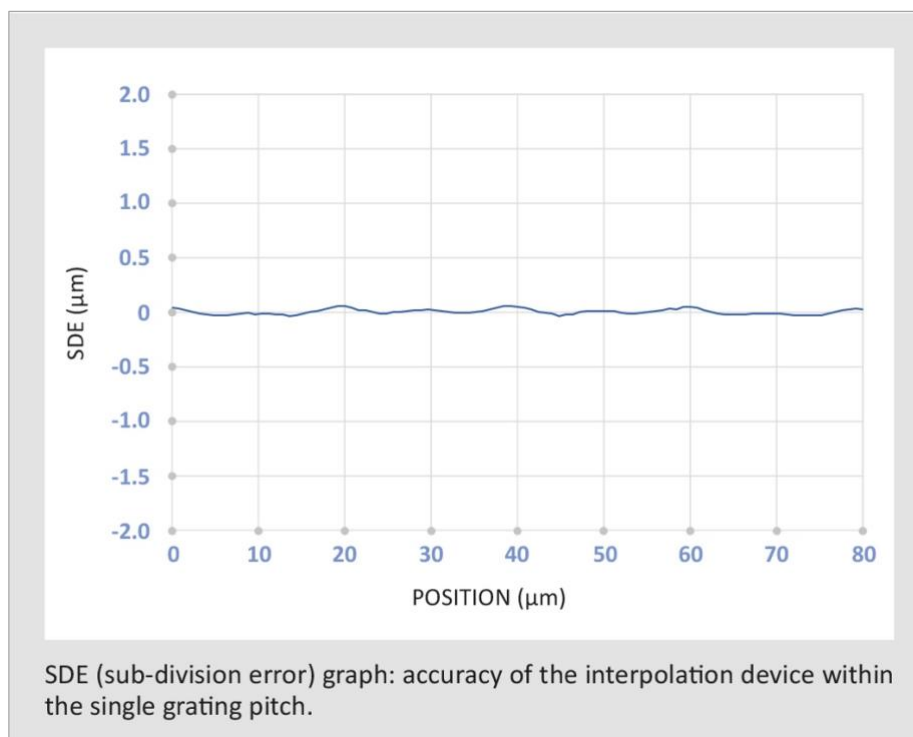
ML = MEASURING LENGTH P = MACHINE GUIDE (C) = MEASURING LENGTH START ML (20 mm ABSOLUTE) (D) = COMPRESSED AIR INLET M5 DIMENSIONS IN mm

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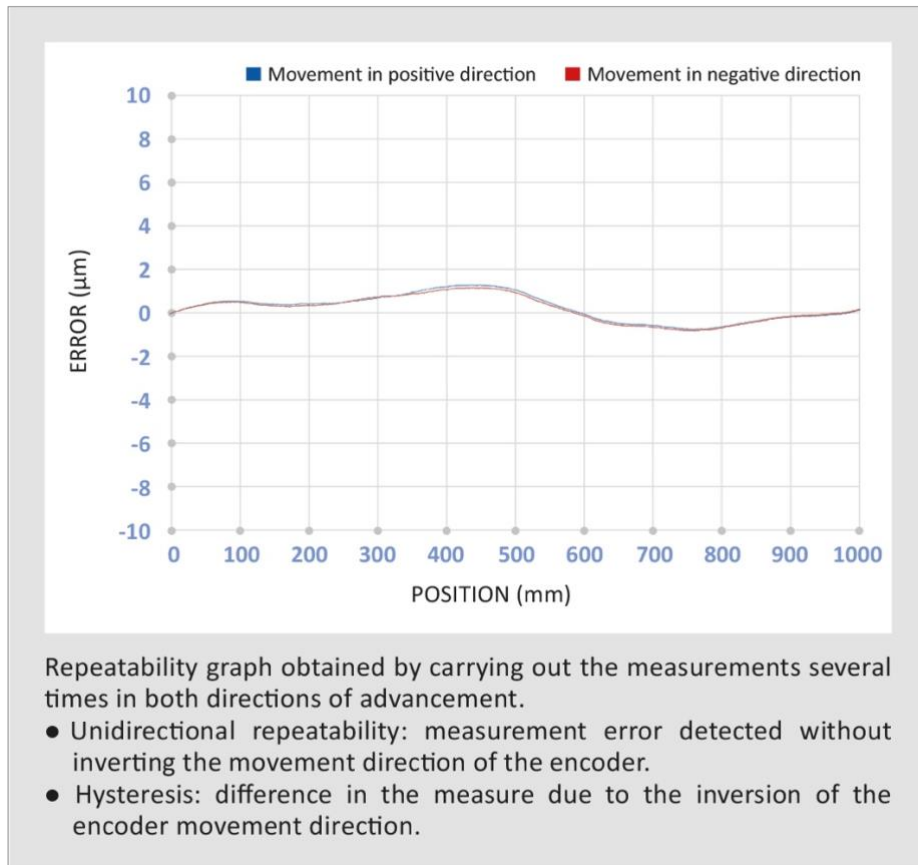
## Accuracy



## Interpolation - SDE



## Repeatability



The graphs show tests carried out in a metrological room under controlled climatic conditions:  
 $T = 20\text{ °C} \pm 0.1\text{ °C}$  and R.H. = 45 ÷ 55%. The reference system for the comparison of position measurements is interferometric with 1 nm resolution and equipped with an environmental compensation device.



GVS 508 is supplied with a Fixed Expansion Point (FEP) positioned in the middle (standard), on the left (LT) or on the right (RT). Based on the application, the customer can determine the linear thermal expansion direction, so as to maximize the machining accuracy and repeatability even in the presence of significant temperature changes. In case of a lateral FEP, the scale is provided with a special elastic end cap on the opposite side, that leaves the scale free to expand in the predetermined correct direction. Also in case of mounting with supporting bar, it is possible to determine the central or lateral position of the FEP through its specifically-designed elastic fixing.

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## Ordering Code

<b>Model</b>	<b>GVS 508</b>	-	<b>F1A</b>	-	<b>2040</b>	-		-	<b>V</b>	-	<b>F1</b>	-	<b>M0.5/S</b>	-	<b>CZ4</b>	-		-	
<b>Scale type, resolution</b>																			
<b>F1</b>	= 1 μm																		
<b>F01</b>	= 0.1 μm																		
<b>F005</b>	= 0.05 μm																		
<b>F001</b>	= 0.01 μm																		
<b>A</b>	= absolute																		
<b>Measuring length</b> [mm]																			
<b>2.040</b>	= max. measuring length*																		
<b>End cap*</b>																			
	= no code LP end cap (28 mm)																		
<b>SP</b>	= SP end cap (11.5 mm)																		
<b>Power supply</b>																			
<b>V</b>	= 5 Vdc																		
<b>Output signals</b>																			
<b>F1</b>	= FANUC <i>αi</i>																		
<b>Cable length, cable type</b>																			
<b>Mnn</b>	= length in m																		
<b>M0.5</b>	= 0.5 m (standard)																		
<b>S</b>	= PUR cable																		
<b>Connector, wiring</b>																			
<b>CZ4</b>	= M12 8 Pin																		
<b>FEP (fixed expansion point)</b>																			
No cod. = central FEP (standard)																			
<b>RT</b>	= right FEP																		
<b>LT</b>	= left FEP																		
<b>Special, pressurization</b>																			
No cod. = standard																			
<b>SPnn</b>	= special nn																		
<b>PR</b>	= pressurized																		

\* GVS 508 scales are supplied as standard with LP (large profile) end caps, but they can be requested with SP (small profile) end caps based on the customer's needs.  
 In case of installation with supporting bar, it is necessary to use SP end caps.



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## Ordering code accessories (supporting bar)

<b>Model</b>	<b>SB50</b>	<b>-</b>	<b>2040</b>
<b>SB50</b> = SB50			
<b>Measuring length</b> [mm]			
<b>2.040</b> = max. measuring length* (look to technical datas)			

\* For measuring lengths higher than 1.340 mm it is necessary to use the supporting bar (optional for lower measuring lengths).

### Accessories (supporting bar)



## Ordering code accessories (intermediate fixing blocks)

<b>Model</b>	<b>FB30</b>
<b>FB18</b> = FB18	
<b>FB30</b> = FB30	
<b>FB30R</b> = FB30R	

### Accessories (intermediate fixing blocks)



Without prior notice, the products may be subject to modifications that the Manufacturer reserves to introduce as deemed necessary for their improvement.