

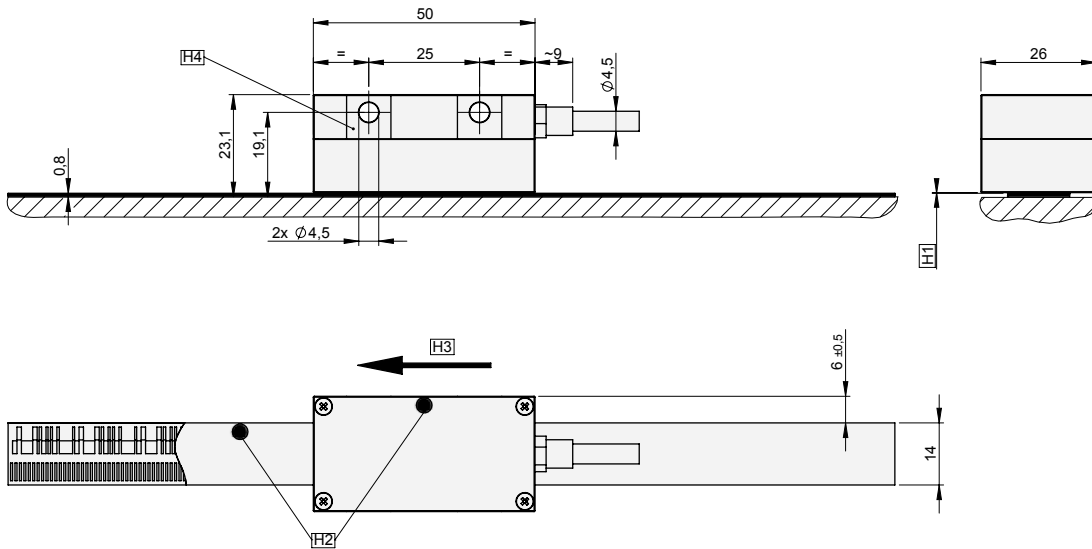
# Absolute linear encoders based on the inductive AMOSIN<sup>®</sup> – Measuring Principle



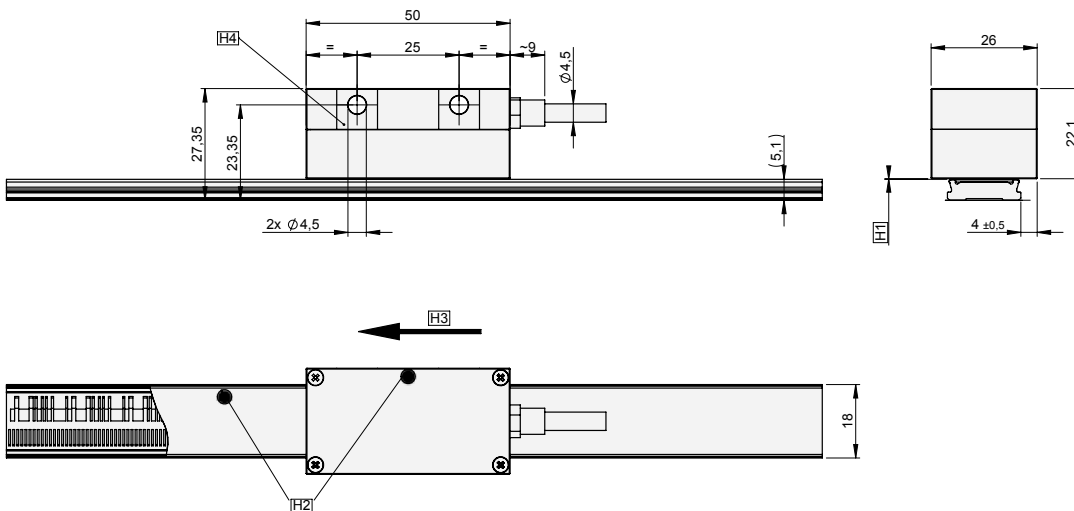
# LMKA - 2010 series

- Composed of Encoder LMKA-2010 and measuring scale
- Grating period 1000 $\mu$ m
- Encoder with integrated electronics

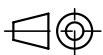
## Design 20 with measuring scale LMBA-1110



## Design 20 with measuring scale LMBA-1410



Tolerance principle in accordance with ISO 8015  
General tolerances in accordance with ISO 2768-fH  
All dimensions in mm



H1 = Air gap 0,15 ± 0,10mm, set with spacer foil  
H2 = Absolute track marking  
H3 = Direction of scanning head movement for positive counting  
H4 = Ground plane (both sides)

## Technical data

LMKA - scanning head for exposed linear encoders

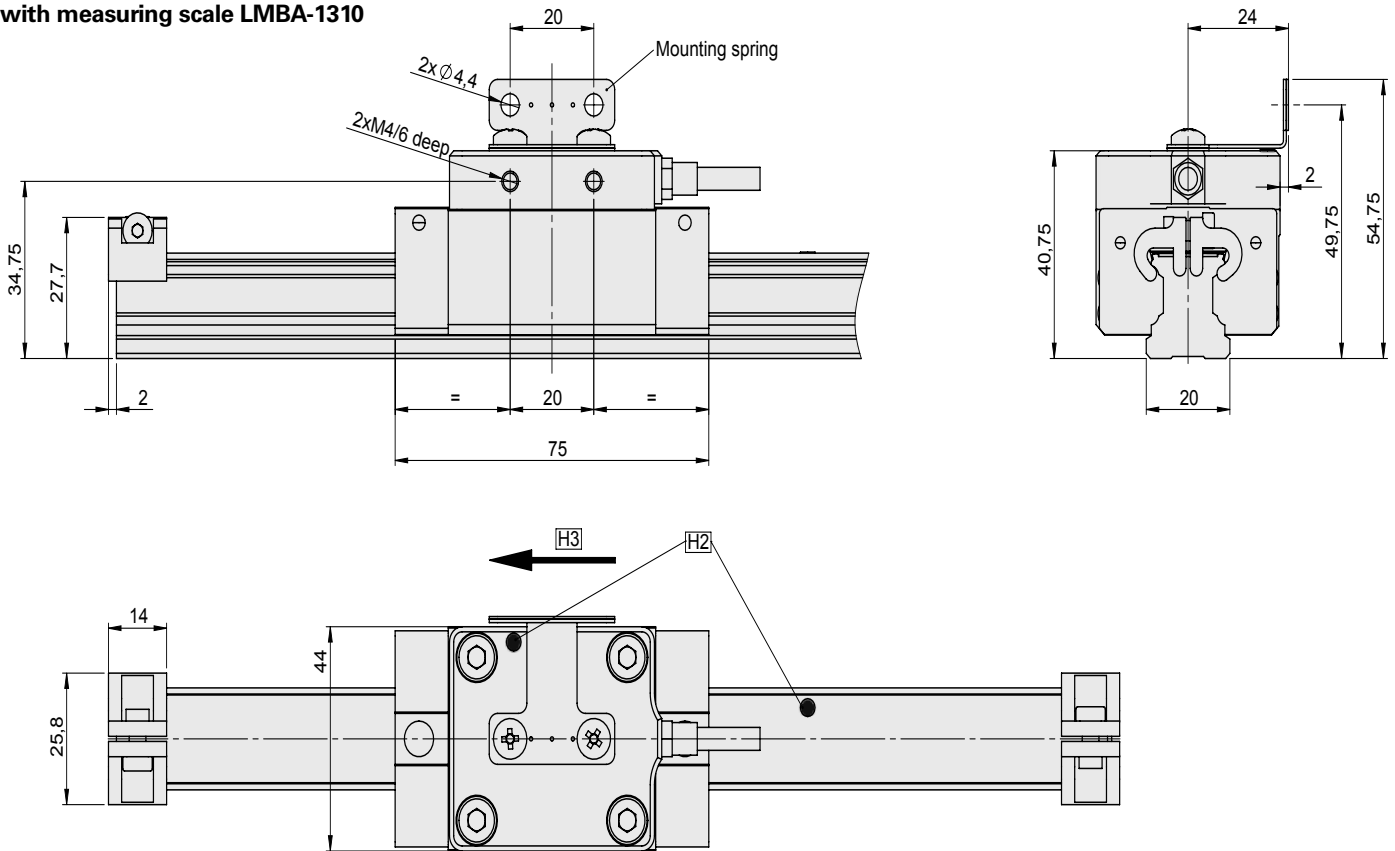
Grating period 1000 $\mu$ m

Scanning head		LMKA-2010		
Interface	EnDat 2.2	Fanuc $\alpha$	BiSS/C	SSI + 1Vpp
Designation	EnDat 22	Fanuc02	BiSS	SSI - 1Vpp
Clock frequency	$\leq 16$ MHz	-	$\leq 2,5$ MHz	$\leq 1$ MHz
<u>Measuring step</u>				
Standard	1 $\mu$ m oder 0,25 $\mu$ m			
High Accuracy	0,1 $\mu$ m			-
<u>Position deviation per grating pitch</u>				
Standard	$\pm 2\mu$ m			
High Accuracy	$\pm 0,5\mu$ m			-
Max. speed	20m/s			
Cable length on scanning head	0,5m to 6m			
Electrical Connection	Cable with M12 coupling, 8pin male			Cable with M23 coupling
Voltage supply	DC 3,6V to 14V			
Power consumption	$\leq 1,5$ W at 5V			
Typical current consumption	300mA at 5V			
Shock	$< 2000$ m/s <sup>2</sup> for 6m/s			
Vibration	$< 200$ m/s <sup>2</sup> 55Hz - 2000Hz			
Operating temperature	-10°C to 85°C			
Storage temperature	-20°C to 85°C			
Protection	IP67			
Weight	40g			

# LMKA - 3010 series

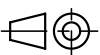
- Composed of Encoder LMKA-3010 and measuring scale
- Grating period 1000µm
- Guided encoder with integrated electronics

## Design 30 with measuring scale LMBA-1310



Tolerance principle in accordance with ISO 8015  
 General tolerances in accordance with ISO 2768-fH  
 All dimensions in mm

H2 = Absolute track marking  
 H3 = Direction of scanning head movement for positive counting



## Technical data

LMKA - scanning head for guided linear encoders

Grating period 1000 $\mu$ m

Scanning head		LMKA-3010		
Interface	EnDat 2.2	Fanuc $\alpha$	BISS/C	SSI + 1Vpp
Designation	EnDat 22	Fanuc02	BiSS	SSI - 1Vpp
Clock frequency	$\leq 16$ MHz	-	$\leq 2,5$ MHz	$\leq 1$ MHz
<u>Measuring step</u>				
Standard	1 $\mu$ m or 0,25 $\mu$ m			
High Accuracy	0,1 $\mu$ m			-
<u>Position deviation per grating pitch</u>				
Standard	$\pm 2\mu$ m			
High Accuracy	$\pm 0,5\mu$ m			-
Max. speed	3m/s, limited by the mechanics			
Cable length on scanning head	0,5m to 6m			
Electrical Connection	Cable with M12 coupling, 8pin male			Cable with M23 coupling
Voltage supply	DC 3,6V to 14V			
Power consumption	$\leq 1,5$ W at 5V			
Typical current consumption	300mA at 5V			
Shock	$< 2000$ m/s <sup>2</sup> for 6m/s			
Vibration	$< 200$ m/s <sup>2</sup> 55Hz - 2000Hz			
Operating temperature	-10°C to 85°C			
Storage temperature	-20°C to 85°C			
Protection	IP67			
Weight	40g			





# Interfaces

## Position values

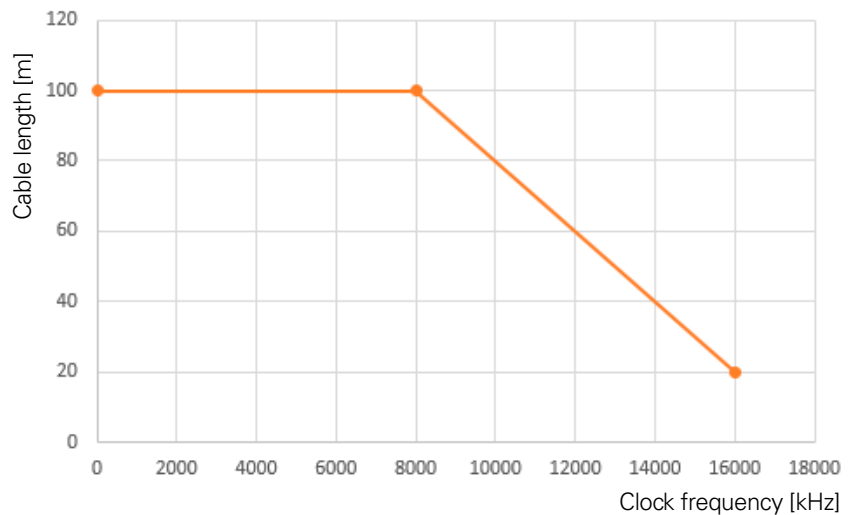
The EnDat-Interface is a digital, **bi-directional** Interface for measuring systems. With this interface you can read out position values and in the measuring system saved informations. This values can also be updated or new values can be saved. Due to the serial data transfer four signal wires are enough. The Data DATA gets transferred synchroniously to the from the subsequent electronics given clock frequency CLOCK. The selection from the mode of transmission (position values, parameter, diagnostics,...) is done with mode- commands which are sent from the subsequent electronics to the measuring system.

The clock frequency is variable - depending on the cable length (max. 100m). With propagation electronics, either clock frequencies up to 16 MHz are possible or cable length up to 100m. For EnDat encoders the maximum clock frequency is stored in the encoder memory. Propagation-delay compensation is provided for EnDat 22.





Transmission frequencies up to 16MHz in combination with large cable length place high technological demands on the cable. Greater cable lengths can be realized with an adapter cable no longer than 6m and an extension cable.

As a rule, the entire transmission path must be designed for the respective clock frequency.

Order Code	Instruction Set	Incremental signals
EnDat22	EnDat 2.2	Without



### Pin configuration

Electrical connection: 1SS08 8-pin coupling M12								
	Power supply				Absolute position values			
	8	2	5	1	3	4	7	6
	<b>U<sub>P</sub></b>	<b>Sensor U<sub>P</sub></b>	<b>0V</b>	<b>Sensor 0V</b>	<b>DATA+</b>	<b>DATA-</b>	<b>CLOCK+</b>	<b>CLOCK-</b>
	brown/green	blue	white/green	white	grey	pink	violet	yellow

**Cable Shield** is connected with the housing; **U<sub>P</sub>** = Power voltage supply

**Sensor:** The sensor wire is connected internally with the corresponding power supply. Non-used pins or wires must not be assigned!



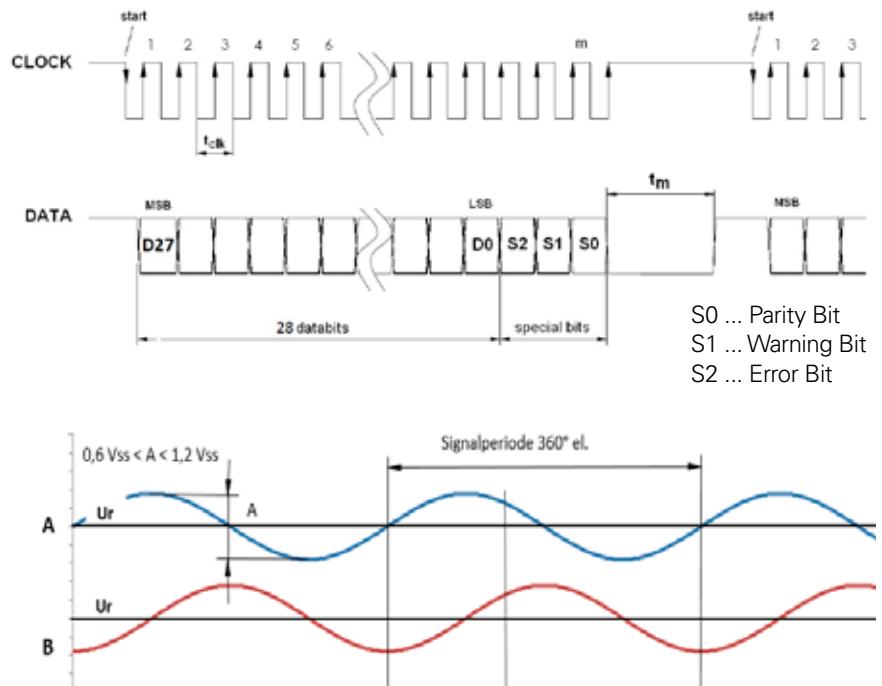
# Interfaces

SSI +  $\sim 1V_{pp}$

SSI Interface is an unidirectional Interface which can output position values. The Data DATA gets transferred synchronously to the from the subsequent electronics given Clock frequency CLOCK. Additionally three special Bits (Error, Warning and Parity) will be transferred.

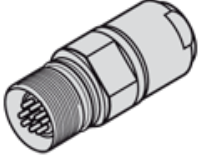

AMO-measuring systems with  $\sim 1V_{pp}$ -Interface are outputting signals which can be highly interpolated.



The sine shaped incremental signals A and B are electrically 90° phase shifted and have a signal strength from 1Vpp. The showed sequence of the outputed signals - B after A - is valid for the in the connection drawing stated movement direction.



## Pin configuration

**Electrical connection: 03S17**  
**17-pin coupling M23**

	Power supply				Incremental signals				Absolut position value			
	7	1	10	4	15	16	12	13	14	17	8	9
	<b>U<sub>P</sub></b>	<b>Sensor U<sub>P</sub></b>	<b>0V</b>	<b>Sensor 0V</b>	<b>A+</b>	<b>A-</b>	<b>B+</b>	<b>B-</b>	<b>DATA+</b>	<b>DATA-</b>	<b>CLOCK+</b>	<b>CLOCK-</b>
	brown/green	blue	white/green	white	brown	green	grey	pink	red	black	violet	yellow

**Cable Shield** is connected with the housing; **U<sub>P</sub>** = Power voltage supply  
**Sensor:** The sensor wire is connected internally with the corresponding power supply.  
Non-used pins or wires must not be assigned!

# Interfaces

## Pin layouts Fanuc and BiSS/C

### Fanuc

AMO measuring systems with Fanuc Interface are for connection to a Fanuc-Control.

#### Fanuc Serial Interface - $\alpha$ interface

Order code: Fanuc02  
normal and high speed, two-pair transmission



### BiSS / C

AMO measuring systems with BiSS/C<sup>®</sup> Interface are for connection to controls which have the BiSS/C Interface implemented.

#### BiSS/C bidirectional protocol

Order code: BiSS  
The Standard Encoder Profile - 32bit will be in use.

### Pin configuration

Electrical connection: 1SS08 8-pin coupling M12								
Power supply					Absolute position values			
	<b>8</b>	<b>2</b>	<b>5</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>7</b>	<b>6</b>
	<b>U<sub>P</sub></b>	<b>Sensor U<sub>P</sub></b>	<b>0V</b>	<b>Sensor 0V</b>	<b>DATA+</b>	<b>DATA-</b>	<b>CLOCK+</b>	<b>CLOCK-</b>
	brown/green	blue	white/green	white	grey	pink	violet	yellow

**Cable Shield** is connected with the housing; **U<sub>P</sub>** = Power voltage supply

**Sensor:** The sensor wire is connected internally with the corresponding power supply.

Non-used pins or wires must not be assigned!



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