



HEIDENHAIN



Product Information

LIC 4113

LIC 4193

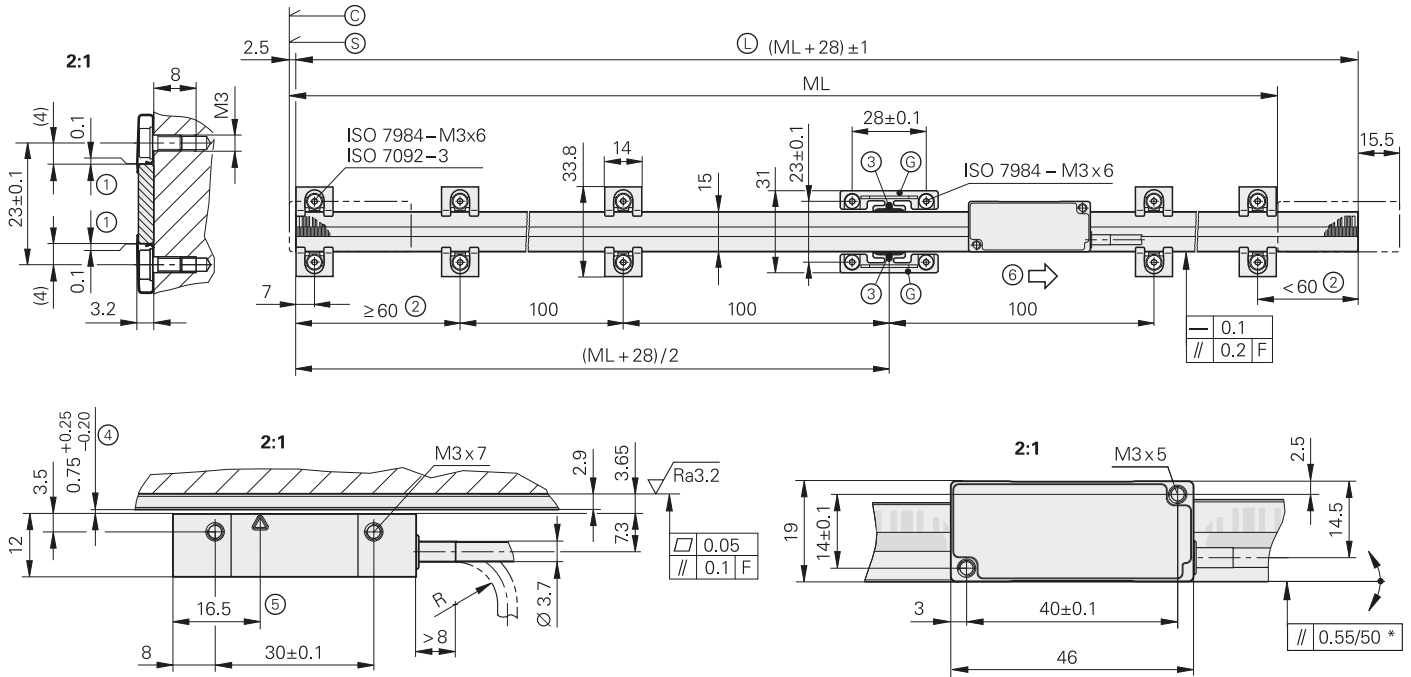
Absolute Exposed
Linear Encoders

November 2016

LIC 4113, LIC 4193

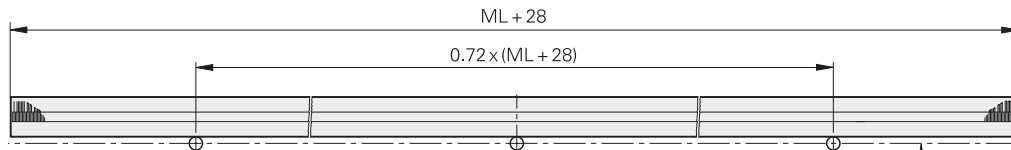
Absolute linear encoder for measuring lengths up to 3 m

- Measuring steps to 0.001 μm
- Measuring standard of glass or glass ceramic
- Measuring standard is fastened by fixing clamps
- Consists of scale and scanning head

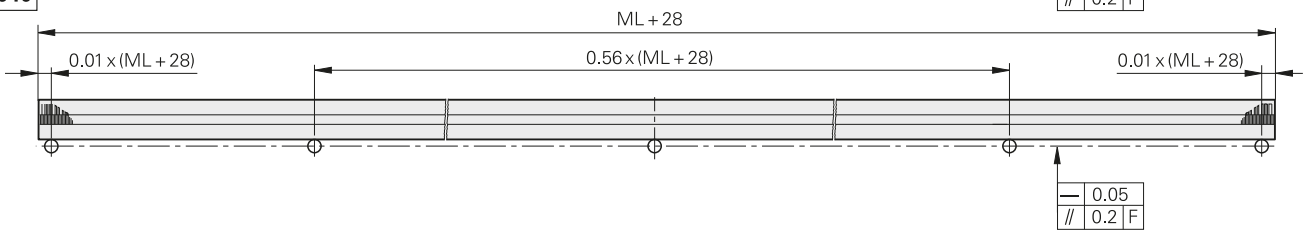


Position of the stop pins

ML ≤ 2040

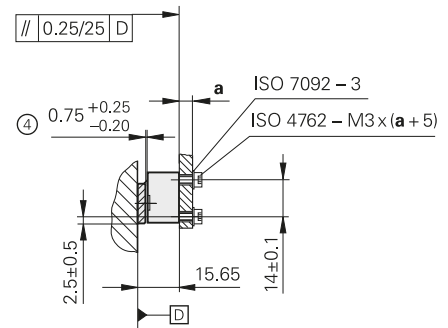
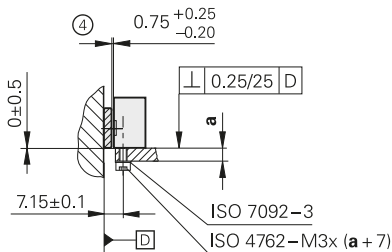
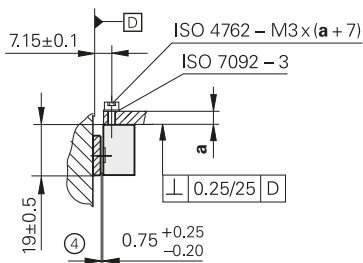


ML > 2040



Possibilities for mounting the scanning head

(shown without fixing clamps)



mm

Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

F = Machine guideway

* = Mounting error plus dynamic guideway error

Ⓢ = Code start value: 100 ± 1 mm

Ⓣ = Beginning of measuring length (ML)

Ⓛ = Scale length

Ⓜ = Fixed-point element for defining the thermal fixed point

Ⓝ = Gap is set with a spacer foil during assembly

Ⓞ = Use additional fixing clamp pairs depending on the measuring length (ML)

Ⓟ = Adhesive

Ⓠ = Mounting clearance between scanning head and scale

Ⓡ = Optical centerline

Ⓢ = Direction of scanning unit motion for output signals in accordance with interface description



Scale	LIC 4003
Measuring standard Coefficient of linear expansion*	METALLUR graduation on glass ceramic or glass $\alpha_{\text{therm}} \approx 8 \cdot 10^{-6} \text{ K}^{-1}$ (glass) $\alpha_{\text{therm}} = (0 \pm 0.5) \cdot 10^{-6} \text{ K}^{-1}$ (Robax glass ceramic)
Accuracy grade*	$\pm 1 \mu\text{m}$ (only for Robax glass ceramic), $\pm 3 \mu\text{m}$, $\pm 5 \mu\text{m}$
Baseline error	$\leq \pm 0.275 \mu\text{m}/10 \text{ mm}$
Measuring length ML* in mm	240 340 440 640 840 1040 1240 1440 1640 1840 2040 2240 2440 2640 2840 3040 (Robax glass ceramic up to max. ML 1640)
Mass	3 g + 0.1 g/mm measuring length

Scanning head	AK LIC 411	AK LIC 419F	AK LIC 419M	AK LIC 419P
Interface	EnDat 2.2	Fanuc Serial Interface α i Interface	Mitsubishi high speed interface	Panasonic Serial Interface
Ordering designation*	EnDat22	Fanuc05	Mit03-4	Mit02-2 Pana01
Measuring step*	0.01 μm (10 nm) 0.005 μm (5 nm) 0.001 μm (1 nm)		0,01 μm (10 nm) 0,005 μm (5 nm)	
Calculation time t_{cal} Clock frequency	$\leq 5 \mu\text{s}$ 16 MHz	–		
Traversing speed ¹⁾	$\leq 600 \text{ m/min}$			
Interpolation error	$\pm 20 \text{ nm}$			
Electrical connection*	Cable, 1 m or 3 m with 8-pin M12 coupling (male) or 15-pin D-sub connector (male)			
Cable length (with HEIDENHAIN cable)	$\leq 100 \text{ m}$	$\leq 50 \text{ m}$	$\leq 30 \text{ m}$	$\leq 50 \text{ m}$
Voltage supply	DC 3.6 V to 14 V			
Power consumption ¹⁾ (max.)	At 3.6 V: $\leq 800 \text{ mW}$ At 14 V: $\leq 900 \text{ mW}$	At 3.6 V: $\leq 950 \text{ mW}$ At 14 V: $\leq 1050 \text{ mW}$		
Current consumption (typical)	At 5 V: 75 mA (without load)	At 5 V: 95 mA (without load)		
Vibration 55 Hz to 2000 Hz Shock 6 ms	$\leq 500 \text{ m/s}^2$ (EN 60068-2-6) $\leq 1000 \text{ m/s}^2$ (EN 60068-2-27)			
Operating temperature	$-10 \text{ }^\circ\text{C}$ to $70 \text{ }^\circ\text{C}$			
Mass Scanning head Connecting cable Connector	$\leq 18 \text{ g}$ (without cable) 20 g/m M12 coupling: 15 g; D-sub connector: 32 g			


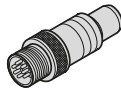
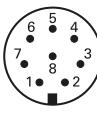

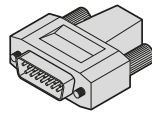
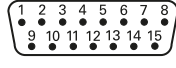



* Please select when ordering

¹⁾ See *General electrical information* in the brochure *Interfaces for HEIDENHAIN Encoders*

Robax is a registered trademark of Schott-Glaswerke, Mainz, Germany.

Electrical connection

EnDat pin layout


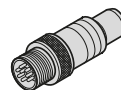


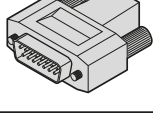
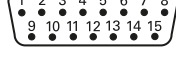



8-pin coupling, M12					15-pin D-sub connector				
									
	Voltage supply				Absolute position values				
	8	2	5	1	3	4	7	6	
	4	12	2	10	5	13	8	15	
	U_P	Sensor U _P	0V	Sensor 0V	DATA	DATA	CLOCK	CLOCK	
	Brown/Green	Blue	White/Green	White	Gray	Pink	Violet	Yellow	

Cable shield connected to housing; **U_P** = Power supply voltage

Sensor: The sensor line is connected in the encoder with the corresponding power line.

Vacant pins or wires must not be used.

Fanuc pin layout


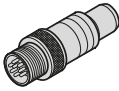


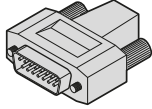
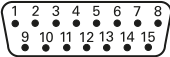



8-pin coupling, M12					15-pin D-sub connector				
									
	Voltage supply				Absolute position values				
	8	2	5	1	3	4	7	6	
	4	12	2	10	5	13	8	15	
	U_P	Sensor U _P	0V	Sensor 0V	Serial Data	Serial Data	Request	Request	
	Brown/Green	Blue	White/Green	White	Gray	Pink	Violet	Yellow	

Cable shield connected to housing; **U_P** = Power supply voltage

Sensor: The sensor line is connected in the encoder with the corresponding power line.

Vacant pins or wires must not be used.

Mitsubishi pin layout


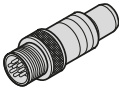


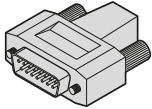
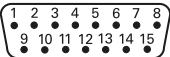



8-pin coupling, M12					15-pin D-sub connector			
								
	Voltage supply				Absolute position values			
	8	2	5	1	3	4	7	6
	4	12	2	10	5	13	8	15
Mit03-4	U_P	Sensor U_P	0V	Sensor 0V	Serial Data	Serial Data	Request Frame	Request Frame
Mit02-2					Vacant	Vacant	Request/ Data	Request/ Data
	Brown/Green	Blue	White/Green	White	Gray	Pink	Violet	Yellow

Cable shield connected to housing; U_P = Power supply voltage

Sensor: The sensor line is connected in the encoder with the corresponding power line.

Vacant pins or wires must not be used.

Panasonic pin layout

8-pin coupling, M12					15-pin D-sub connector			
								
	Voltage supply				Absolute position values			
	8	2	5	1	3	4	7	6
	4	12	2	10	5	13	8	15
	U_P	Sensor U_P	0V	Sensor 0V	Vacant ¹⁾	Vacant ¹⁾	Request Data	Request Data
	Brown/Green	Blue	White/Green	White	Gray	Pink	Violet	Yellow





Cable shield connected to housing; U_P = Power supply voltage


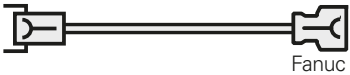



Sensor: The sensor line is connected in the encoder with the corresponding power line.

Vacant pins or wires must not be used.

¹⁾ Required for adjustment/inspection by PWM

Connecting cables

PUR connecting cables		$[(4 \cdot 0.14 \text{ mm}^2) + (4 \cdot 0.34 \text{ mm}^2)] \text{ } \varnothing 6 \text{ mm}; A_P = 0.34 \text{ mm}^2$	EnDat
Complete With M12 connector (female), 8-pin, and M12 coupling (male), 8-pin			368330-xx
Complete With M12 connector (female), 8-pin, and D-sub connector (female), 15-pin for IK 220			533627-xx
Complete With M12 connector (female), 8-pin, and D-sub connector (male), 15-pin for IK 215			524599-xx
With one M12 connector (female), 8-pin			634265-xx

PUR connecting cables		$[(4 \cdot 0.14 \text{ mm}^2) + (4 \cdot 0.34 \text{ mm}^2)]; A_P = 0.34 \text{ mm}^2$	Mitsubishi	Fanuc
Complete With M12 connector (female), 8-pin, and M12 coupling (male), 8-pin		$\varnothing 6 \text{ mm}$	368330-xx	
Complete With M12 connector (female), 8-pin, and Fanuc connector (female)		$\varnothing 6 \text{ mm}$	–	646807-xx
Complete With M12 connector (female), 8-pin, and Mitsubishi connector (female), 10-pin		$\varnothing 6 \text{ mm}$	647314-xx	–
Complete With M12 connector (female), 8-pin, and Mitsubishi connector (male), 20-pin		$\varnothing 6 \text{ mm}$	646806-xx	–
Cable only $[(2 \cdot 2 \cdot 0.14 \text{ mm}^2) + (4 \cdot 1 \text{ mm}^2)]$		$\varnothing 8 \text{ mm}$	354608-01	

A_P : Cross section of power supply lines

HEIDENHAIN

DR. JOHANNES HEIDENHAIN GmbH

Dr.-Johannes-Heidenhain-Straße 5

83301 Traunreut, Germany

☎ +49 8669 31-0

FAX +49 8669 32-5061

E-mail: info@heidenhain.de

www.heidenhain.de

This Product Information supersedes all previous editions, which thereby become invalid. The basis for ordering from HEIDENHAIN is always the Product Information document edition valid when the order is made.

Related documents: Comply with the information in the following documents to ensure the correct and intended operation of the encoder:

- Catalog *Exposed Linear Encoders* 208960-xx
- Catalog: *Interfaces of HEIDENHAIN Encoders* 1078628-xx
- Technical Information: *EnDat* 383942-xx