



HEIDENHAIN

**TRUE IMAGE
TECHNOLOGY**



Product Information

LC 116/LC 196
LC 416/LC 496

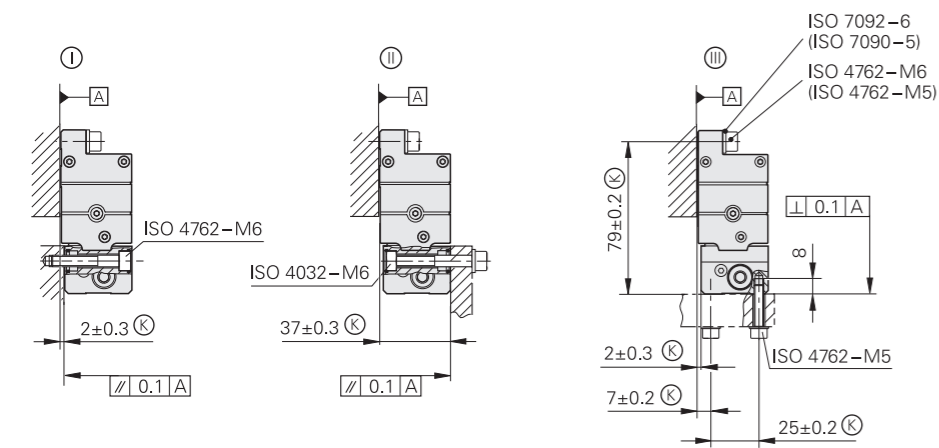
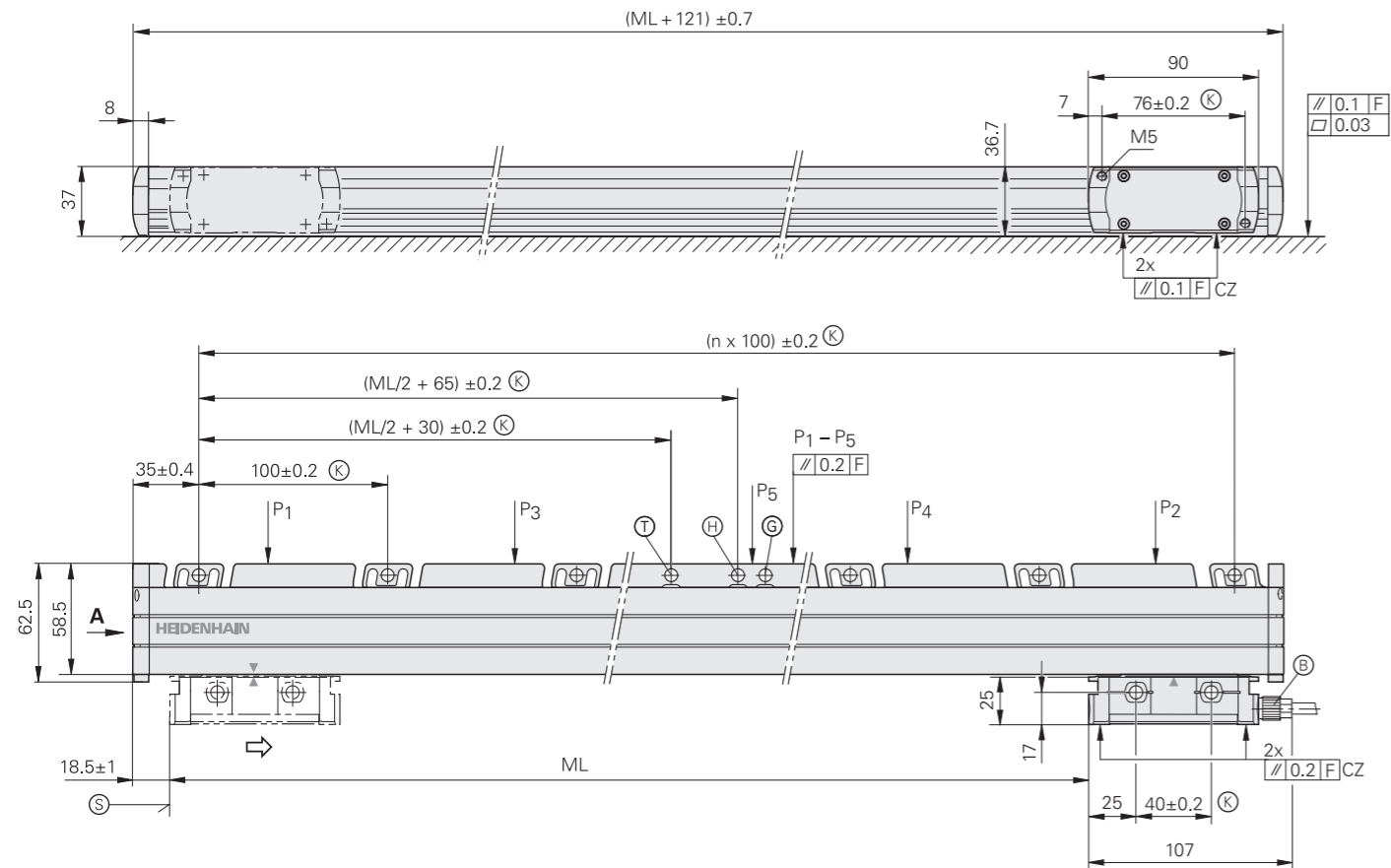
Absolute Linear Encoders
with Optimized Scanning

03/2025

LC 100 series

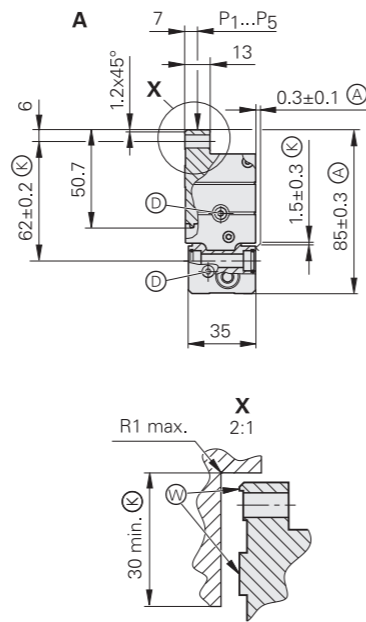
Absolute linear encoders with full-size scale housing

- High vibration tolerance
- Flat-lying installation possible
- With True Image Technology



mm
Tolerancing ISO 8015
ISO 2768:1989-mH
 ≤ 6 mm: ± 0.2 mm

- Ⓢ, Ⓣ, Ⓤ = Mounting options
- F = Machine guideway
- P = Measuring points for alignment
- Ⓚ = Required mating dimensions
- Ⓐ = Alternative mating dimensions
- Ⓑ = Cable connection, usable at either end
- Ⓓ = Compressed air inlet with integrated throttle, usable at either end
- Ⓗ = Mechanical fixed point (preferred)
- Ⓘ = Mechanical fixed point (compatible with predecessor model)
- ⓐ = Mechanical fixed point (repeated at an interval of 100 mm)
- Ⓢ = Beginning of measuring length ML (= 20 mm absolute)
- Ⓦ = Mating surfaces
- ⇒ = Direction of motion of the scanning unit for ascending position values



Specifications	LC 116	LC 196 S																																										
Measuring standard Coefficient of linear expansion	DIADUR glass scale with absolute track and incremental track; grating period: 275 μm $\alpha_{\text{therm}} \approx 8 \cdot 10^{-6} \text{ K}^{-1}$																																											
Accuracy grade	±3 μm up to a measuring length of 3040 mm; ±5 μm																																											
Measuring length (ML)* in mm	<table border="1"> <tr> <td>140</td><td>240</td><td>340</td><td>440</td><td>540</td><td>640</td><td>740</td><td>840</td><td>940</td><td>1040</td><td>1140</td><td>1240</td><td>1340</td><td>1440</td> </tr> <tr> <td>1540</td><td>1640</td><td>1740</td><td>1840</td><td>2040</td><td>2240</td><td>2440</td><td>2640</td><td>2840</td><td>3040</td><td>3240</td><td>3440</td><td>3640</td><td>3840</td> </tr> <tr> <td>4040</td><td>4240</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>		140	240	340	440	540	640	740	840	940	1040	1140	1240	1340	1440	1540	1640	1740	1840	2040	2240	2440	2640	2840	3040	3240	3440	3640	3840	4040	4240												
140	240	340	440	540	640	740	840	940	1040	1140	1240	1340	1440																															
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4040	4240																																											
Functional safety for applications with up to	<ul style="list-style-type: none"> • SIL 2, as per EN 61508 (further basis for testing: IEC 61800-5-3) • Category 3, PL "d", in accordance with EN ISO 13849-2015 																																											
PFH (per axis)	$\leq 20 \cdot 10^{-9}$; $ML > 3040 \text{ mm}$: $\leq 30 \cdot 10^{-9}$ (up to 2000 m above sea level)	$\leq 30 \cdot 10^{-9}$; $ML > 3040 \text{ mm}$: $\leq 40 \cdot 10^{-9}$ (up to 1000 m above sea level)																																										
Safe position ¹⁾	<i>Encoder</i> : ±4000 μm; $ML > 3040 \text{ mm}$: ±5000 μm (SM = 220 μm) <i>Mechanical coupling</i> : Fault exclusion for the loosening of the housing and scanning unit (identical to LC 1x5; see brochure)																																											
Interface	EnDat 2.2	DRIVE-CLiQ																																										
Ordering designation	EnDat22	DQ01																																										
Measuring step At ±3 μm At ±5 μm	0.001 μm 0.010 μm																																											
Clock frequency (calc. time t_{cal})	≤ 16 MHz (≤ 5 μs)	–																																										
Measurement of direct-drive motor temperature	With EIB 5211 or EIB 5181																																											
Electrical connection	Separate adapter cable (1 m/3 m/6 m/9 m), connectable at either end of mounting block																																											
Cable length	≤ 100 m ²⁾	≤ 30 m ³⁾																																										
Supply voltage	DC 3.6 V to 14 V	DC 10 V to 28.8 V																																										
Power consumption (max.)	3.6 V: ≤ 1.1 W; 14 V: ≤ 1.3 W	10 V: ≤ 1.5 W; 28.8 V: ≤ 1.7 W																																										
Traversing speed	≤ 180 m/min (max. acceleration in the direction of measurement ≤ 100 m/s ²)																																											
Required moving force	≤ 4 N																																											
Vibration 55 Hz to 2000 Hz acting on	<i>Housing</i> : ≤ 200 m/s ² (EN 60068-2-6) <i>Scanning unit</i> : ≤ 200 m/s ² (EN 60068-2-6)																																											
Shock 11 ms	≤ 300 m/s ² (EN 60068-2-27)																																											
Operating temperature	0 °C to 50 °C																																											
Protection rating EN 60529 ⁴⁾	IP54 when installed as per the mounting information in the brochure; IP64 when used with sealing air (air purity class [3:4:2] as per ISO 8573-1:2010)																																											
Mass	0.55 kg + 2.9 kg/m of measuring length																																											

Due to optimized scanning, the encoders have only one pair of sealing lips.

* Please select when ordering

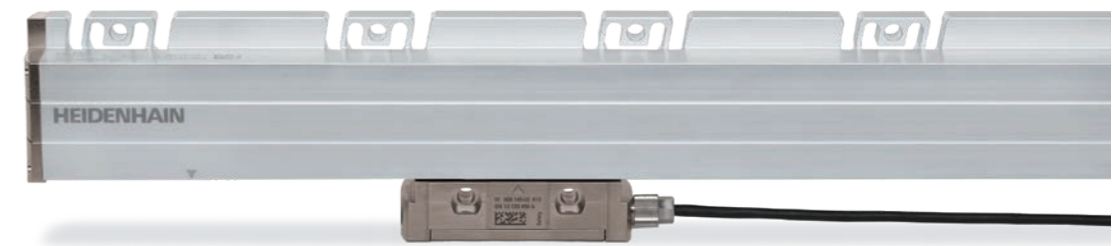
¹⁾ Further tolerances may arise in the downstream electronics after pos. value comparison (contact mfr. of downstream electronics)

²⁾ With cable from HEIDENHAIN (see *Interfaces of HEIDENHAIN Encoders* brochure)

³⁾ Longer cable lengths upon request

⁴⁾ In the application, the LC must be protected from the ingress of particles.

In addition, contamination level 3 must be complied with in the micro-environment (see EN 60664-1).



Specifications	LC 116	LC 196 F	LC 196 M
Measuring standard Coefficient of linear expansion	DIADUR glass scale with absolute track and incremental track; grating period: 20 µm $\alpha_{\text{therm}} \approx 8 \cdot 10^{-6} \text{ K}^{-1}$		
Accuracy grade	±3 µm up to a measuring length of 3040 mm (LC 196 M: up to 2040 mm); ±5 µm		
Measuring length (ML)* in mm	140 240 340 440 540 640 740 840 940 1040 1140 1240 1340 1440 1540 1640 1740 1840 2040 2240 2440 2640 2840 3040 3240 3440 3640 3840 4040 4240		
Functional safety for applications up to	–		
PFH (per axis)	–		
Safe position	–		
	<i>Mechanical coupling:</i> Fault exclusion for the loosening of the housing and scanning unit (identical to LC 1x5; see brochure)		
Interface	EnDat 2.2	Fanuc Serial Interface/αi Interface	Mitsubishi high speed interface
Ordering designation	EnDat22	Fanuc05	Mit03-04
Measuring step <i>At ±3 µm</i> <i>At ±5 µm</i>	0.001 µm 0.010 µm	αi interface/α interface 0.00125 µm/0.010 µm 0.0125 µm/0.050 µm	0.001 µm 0.010 µm
Clock frequency (calc. time t_{cal})	≤ 16 MHz (≤ 5 µs)	–	–
Measurement of direct-drive motor temperature	–	–	–
Electrical connection	Separate adapter cable (1 m/3 m/6 m/9 m), connectable at either end of mounting block		
Cable length	≤ 100 m ¹⁾	≤ 50 m	≤ 30 m
Supply voltage	DC 3.6 V to 14 V		
Power consumption (maximum)	3.6 V: ≤ 1.1 W; 14 V: ≤ 1.3 W		
Traversing speed	≤ 180 m/min (max. acceleration in the direction of measurement ≤ 100 m/s ²)		
Required moving force	≤ 4 N		
Vibration 55 Hz to 2000 Hz <i>acting on</i> Shock 11 ms	<i>Housing:</i> ≤ 200 m/s ² (EN 60068-2-6) <i>Scanning unit:</i> ≤ 200 m/s ² (EN 60068-2-6) ≤ 300 m/s ² (EN 60068-2-27)		
Operating temperature	0 °C to 50 °C		
Protection rating EN 60529 ²⁾	IP53 when installed as per the mounting information in the brochure; IP64 with sealing air (air purity class [3:4:2] as per ISO 8573-1:2010)		
Mass	0.55 kg + 2.9 kg/m of measuring length		

Due to optimized scanning, the encoders have only one pair of sealing lips.

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¹⁾ With cable from HEIDENHAIN (see *Interfaces of HEIDENHAIN Encoders* brochure)

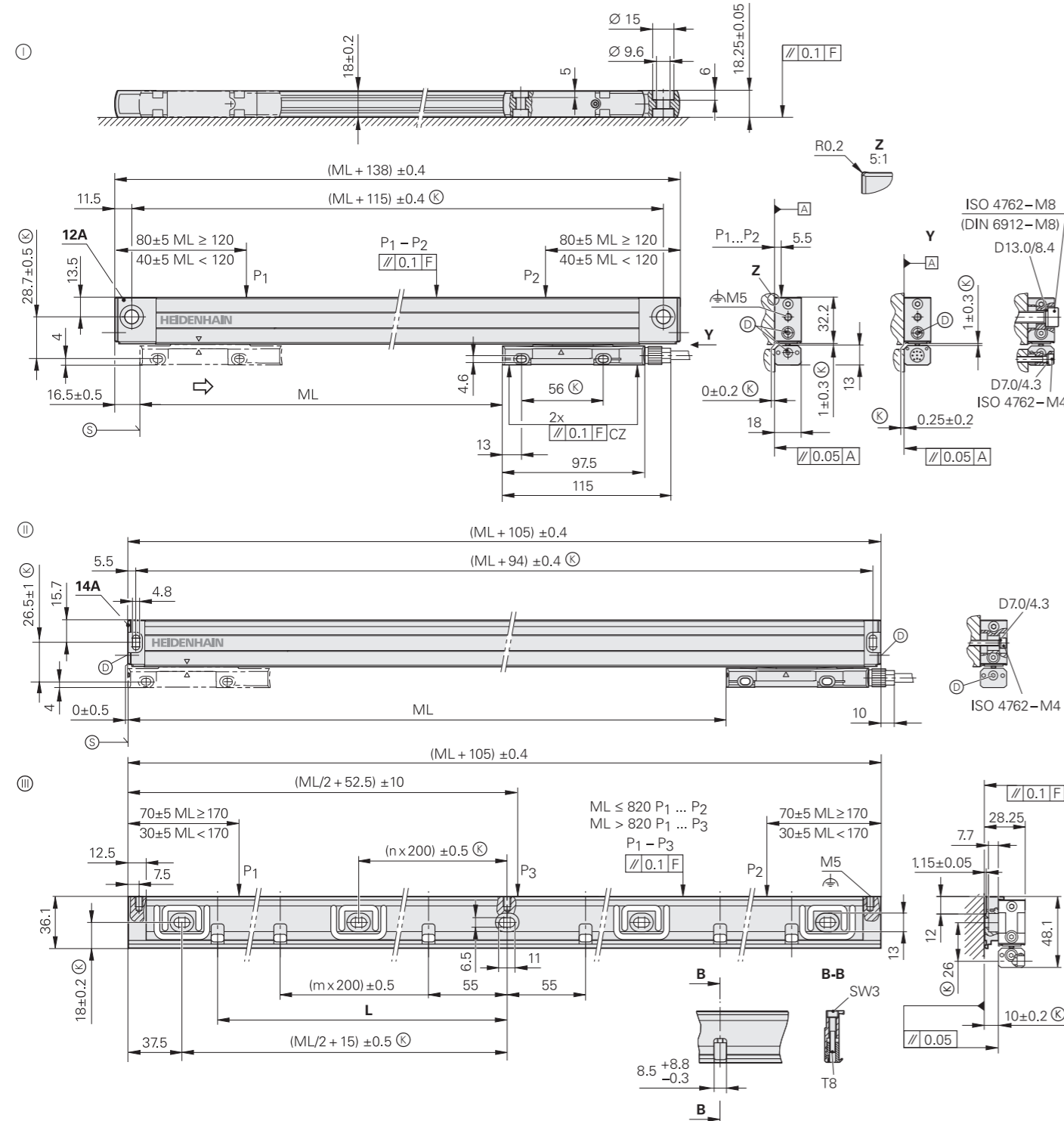
²⁾ In the application, the LC must be protected from the ingress of particles.

In addition, contamination level 2 must be complied with in the micro-environment (see EN 60664-1).

LC 400 series

Absolute linear encoders with slimline scale housing

- Low installation space requirements
- With True Image Technology



ML	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
L	37.5	55	75	100	115	140	175	200	225	250	275	300	325	350	375	400	450	500	555	610	655	710	760	810	855	910	1010

- mm
 Tolerancing ISO 8015
 ISO 2768:1989-mH
 ≤ 6 mm: ±0.2 mm
- ⓪ = 12A end block; for mounting with and without mounting spar
 - ⓫ = 14A end block; for mounting with mounting spar (if directly attached with M4 screws, then specifications are subject to constraints)
 - ⓬ = MSL 41 mounting spar
 - F = Machine guideway
 - P = Measuring points for alignment
 - Ⓜ = Required mating dimensions
 - Ⓝ = Compressed air inlet with integrated throttle
 - Ⓞ = Beginning of measuring length ML (= 20 mm absolute)
 - = Direction of motion of the scanning unit for ascending position values

Specifications	LC 416	LC 496 S
Measuring standard Coefficient of linear expansion	DIADUR glass scale with absolute track and incremental track; grating period: 27.5 μm $\alpha_{\text{therm}} \approx 8 \cdot 10^{-6} \text{ K}^{-1}$ (mounting type ⓪/⓫); with mounting spar: $\alpha_{\text{therm}} \approx 9 \cdot 10^{-6} \text{ K}^{-1}$ (mounting type ⓬)	
Accuracy grade	±3 μm, ±5 μm	
Measuring length (ML)* in mm	Mounting spar* or clamping elements* up to ML 1240 optional; necessary for ML 1340 or greater 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	
Functional safety for applications with up to	<ul style="list-style-type: none"> • SIL 2 as per EN 61508 (further basis for testing: IEC 61800-5-3) • Category 3, PL "d", in accordance with EN ISO 13849-2015 	
PFH (per axis)	≤ 20 · 10 ⁻⁹ (up to 2000 m above sea level)	≤ 30 · 10 ⁻⁹ (up to 1000 m above sea level)
Safe position ¹⁾	Encoder: ±4000 μm (safety-related measuring step SM = 220 μm) Mechanical coupling: Fault exclusion for the loosening of the housing and scanning unit (identical to LC 4x5; see brochure)	
Interface	EnDat 2.2	DRIVE-CLiQ
Ordering designation	EnDat22	DQ01
Measuring step At ±3 μm At ±5 μm	0.001 μm 0.010 μm	
Clock frequency (calc. time t _{cal})	≤ 16 MHz (≤ 5 μs)	–
Measurement of direct-drive motor temperature	With EIB 5211 or EIB 5181	–
Electrical connection	Separate adapter cable (1 m/3 m/6 m/9 m), connectable at either end of mounting block	
Cable length	≤ 100 m ²⁾	≤ 30 m ³⁾
Supply voltage	DC 3.6 V to 14 V	DC 10 V to 28.8 V
Power consumption (max.)	3.6 V: ≤ 1.1 W; 14 V: ≤ 1.3 W	10 V: ≤ 1.5 W; 28.8 V: ≤ 1.7 W
Traversing speed	≤ 180 m/min (max. acceleration in the direction of measurement ≤ 100 m/s ²)	
Required moving force	≤ 5 N	
Vibration 55 Hz to 2000 Hz acting on	Scanning unit: ≤ 200 m/s ² (EN 60068-2-6) Housing without mounting spar: ≤ 100 m/s ² (EN 60068-2-6)	
Shock 11 ms	Housing with mounting spar; cable outlet on the right: ≤ 150 m/s ² , or left: ≤ 100 m/s ² (EN 60068-2-6) ≤ 300 m/s ² (EN 60068-2-7)	
Operating temperature	0 °C to 50 °C	
Protection rating EN 60529 ⁴⁾	IP54 when installed as per the mounting information in the brochure; IP64 when used with sealing air (air purity class [3:4:2] as per ISO 8573-1:2010)	
Mass	Encoder: 0.2 kg + 0.55 kg/m of measuring length; mounting spar: 0.9 kg/m	

Due to optimized scanning, the encoders have only one pair of sealing lips.

* Please select when ordering
 1) Further tolerances may arise in the downstream electronics after pos. value comparison (contact mfr. of downstream electronics)
 2) With cable from HEIDENHAIN (see *Interfaces of HEIDENHAIN Encoders* brochure)
 3) Longer cable lengths upon request
 4) In the application, the LC must be protected from the ingress of particles. In addition, contamination level 3 must be complied with in the micro-environment (see EN 60664-1).



Specifications	LC 416	LC 496 F	LC 496 M
Measuring standard Coefficient of linear expansion	DIADUR glass scale with absolute track and incremental track; grating period: 20 µm $\alpha_{\text{therm}} \approx 8 \cdot 10^{-6} \text{ K}^{-1}$ (mounting type ①/②); <i>with mounting spar</i> : $\alpha_{\text{therm}} \approx 9 \cdot 10^{-6} \text{ K}^{-1}$ (mounting type ③)		
Accuracy grade	±3 µm, ±5 µm		
Measuring length (ML)* in mm	Mounting spar* or clamping elements* up to ML 1240 optional; necessary for ML 1340 or greater 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		
Functional safety for applications up to	–		
PFH (per axis)	–		
Safe position	–		
	<i>Mechanical coupling</i> : Fault exclusion for the loosening of the housing and scanning unit (identical to LC 1x5; see brochure)		
Interface	EnDat 2.2	Fanuc Serial Interface/αi Interface	Mitsubishi high speed interface
Ordering designation	EnDat22	Fanuc05	Mit03-04
Measuring step <i>At ±3 µm</i> <i>At ±5 µm</i>	0.001 µm 0.010 µm	αi interface/α interface 0.00125 µm/0.010 µm 0.0125 µm/0.050 µm	0.001 µm 0.010 µm
Clock frequency (calc. time t_{cal})	≤ 16 MHz (≤ 5 µs)	–	–
Measurement of direct-drive motor temperature	–	–	–
Electrical connection	Separate adapter cable (1 m/3 m/6 m/9 m) connectable on mounting block		
Cable length	≤ 100 m ¹⁾	≤ 50 m	≤ 30 m
Supply voltage	DC 3.6 V to 14 V		
Power consumption (maximum)	3.6 V: ≤ 1.1 W; 14 V: ≤ 1.3 W		
Traversing speed	≤ 180 m/min (max. acceleration in the direction of measurement ≤ 100 m/s ²)		
Required moving force	≤ 5 N		
Vibration 55 Hz to 2000 Hz <i>acting on</i>	<i>Scanning unit</i> : ≤ 200 m/s ² (EN 60068-2-6) <i>Housing without mounting spar</i> : ≤ 100 m/s ² (EN 60068-2-6) <i>Housing with mounting spar and cable outlet on the right</i> : ≤ 150 m/s ² , <i>or left</i> : ≤ 100 m/s ² (EN 60068-2-6)		
Shock 11 ms	≤ 300 m/s ² (EN 60068-2-27)		
Operating temperature	0 °C to 50 °C		
Protection rating EN 60529 ²⁾	IP53 when installed as per the mounting information in the brochure; IP64 with sealing air (air purity class [3:4:2] as per ISO 8573-1:2010)		
Mass	<i>Encoder</i> : 0.2 kg + 0.55 kg/m of measuring length; <i>mounting spar</i> : 0.9 kg/m		

* Please select when ordering

¹⁾ With cable from HEIDENHAIN (see *Interfaces of HEIDENHAIN Encoders* brochure)

²⁾ In the application, the LC must be protected from the ingress of particles.

In addition, contamination level 2 must be complied with in the micro-environment (see EN 60664-1).

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This Product Information document 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 placed.



More information:

To ensure proper and intended use, comply with the specifications in the following documents:

- Brochure: *Linear Encoders for Numerically Controlled Machine Tools* 571470-xx
- Brochure *Interfaces of HEIDENHAIN Encoders* 1078628-xx
- Brochure: *Cables and Connectors* 1206109-xx
- Product overview: *Interface Electronics* 598160-xx
- Product-specific operating instructions