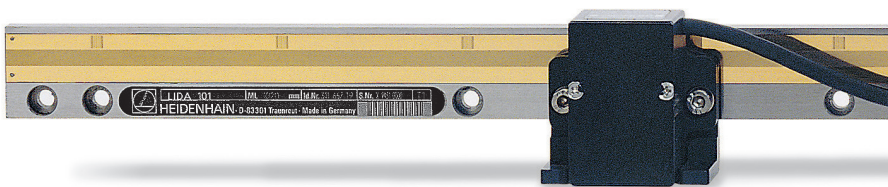




# HEIDENHAIN



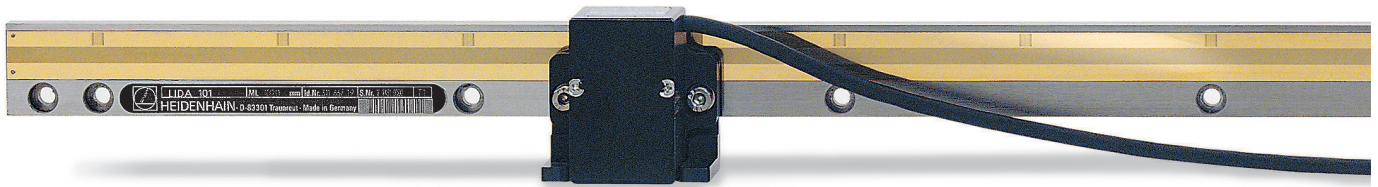
## Product Information

### LIDA 100 Series

Exposed Linear Encoder

February 2008





Specifications	LIDA 181	LIDA 171											
<b>Measuring standard</b> Expansion coefficient	Steel scale with AURODUR graduation $\alpha_{\text{therm}} \approx 10 \times 10^{-6} \text{ K}^{-1}$												
<b>Accuracy grade*</b>	$\pm 5 \mu\text{m}, \pm 3 \mu\text{m}$												
<b>Measuring length ML*</b> in mm	220 1240	270 1440	320 1640	370 1840	420 2040	470	520	620	720	770	820	920	1020
Reference marks* <i>LIDA 1x1 R</i> <i>LIDA 1x1 C</i>	Selectable with magnets every 50 mm Distance-coded												
<b>Incremental signals</b>	$\sim 1 \text{ V}_{\text{PP}}$		$\square$ TTL										
Grating period	40 $\mu\text{m}$												
Integrated interpolation* Signal period	– 40 $\mu\text{m}$		5-fold 8 $\mu\text{m}$			10-fold 4 $\mu\text{m}$							
Cutoff frequency –3dB	$\geq 200 \text{ kHz}$		–										
Scanning frequency* Edge separation <i>a</i>	–		200 kHz $\geq 0.23 \mu\text{s}$	100 kHz $\geq 0.48 \mu\text{s}$	50 kHz $\geq 0.98 \mu\text{s}$	100 kHz $\geq 0.23 \mu\text{s}$	50 kHz $\geq 0.48 \mu\text{s}$	25 kHz $\geq 0.98 \mu\text{s}$					
<b>Power supply</b> without load	5 V $\pm$ 5%/ < 150 mA		5 V $\pm$ 5 %/< 200 mA										
<b>Electrical connection</b>	Cable 3 m with M23 coupling		Cable, 3 m with M23 connector										
<b>Cable length</b> <sup>1)</sup>	$\leq 150 \text{ m}$		$\leq 100 \text{ m}$										
<b>Traversing speed</b>	$\leq 480 \text{ m/min}$	$\leq 480 \text{ m/min}$	$\leq 240 \text{ m/min}$	$\leq 120 \text{ m/min}$	$\leq 240 \text{ m/min}$	$\leq 120 \text{ m/min}$	$\leq 60 \text{ m/min}$						
<b>Vibration</b> 55 to 2000 Hz <b>Shock</b> 11 ms	$\leq 200 \text{ m/s}^2$ (EN 60068-2-6) $\leq 500 \text{ m/s}^2$ (EN 60068-2-27)												
<b>Operating temperature</b>	0 °C to 50 °C												
<b>Weight</b> Scanning head Selector magnet Scale Connecting cable	70 g (without connecting cable) 10 g Approx. 1.5 g/mm measuring length 37 g/m												

\* Please indicate when ordering

<sup>1)</sup> With HEIDENHAIN cable

# LIDA 175

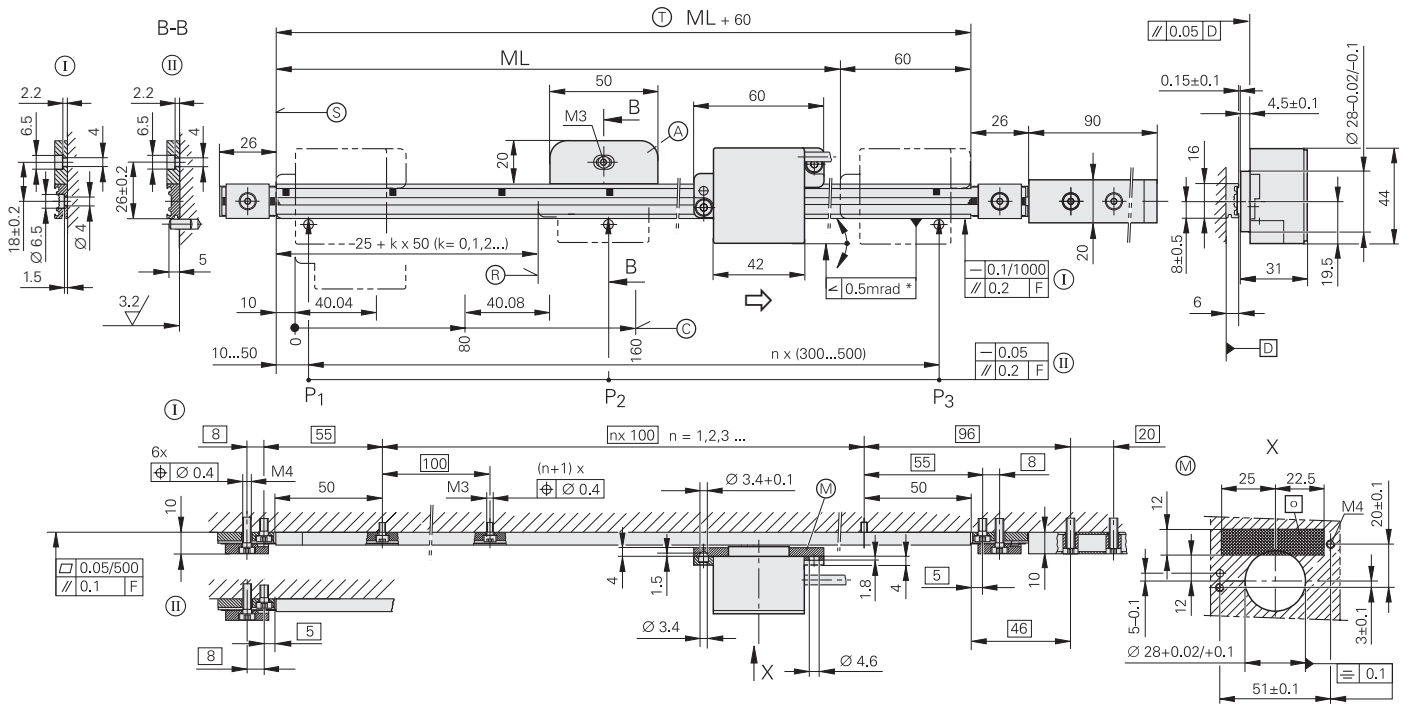
# LIDA 185

Incremental linear encoders for high traversing speeds

- For long measuring ranges up to 30 m
- For measuring steps of 1  $\mu\text{m}$  to 0.1  $\mu\text{m}$
- Steel scale tape drawn into aluminum extrusion and tensioned

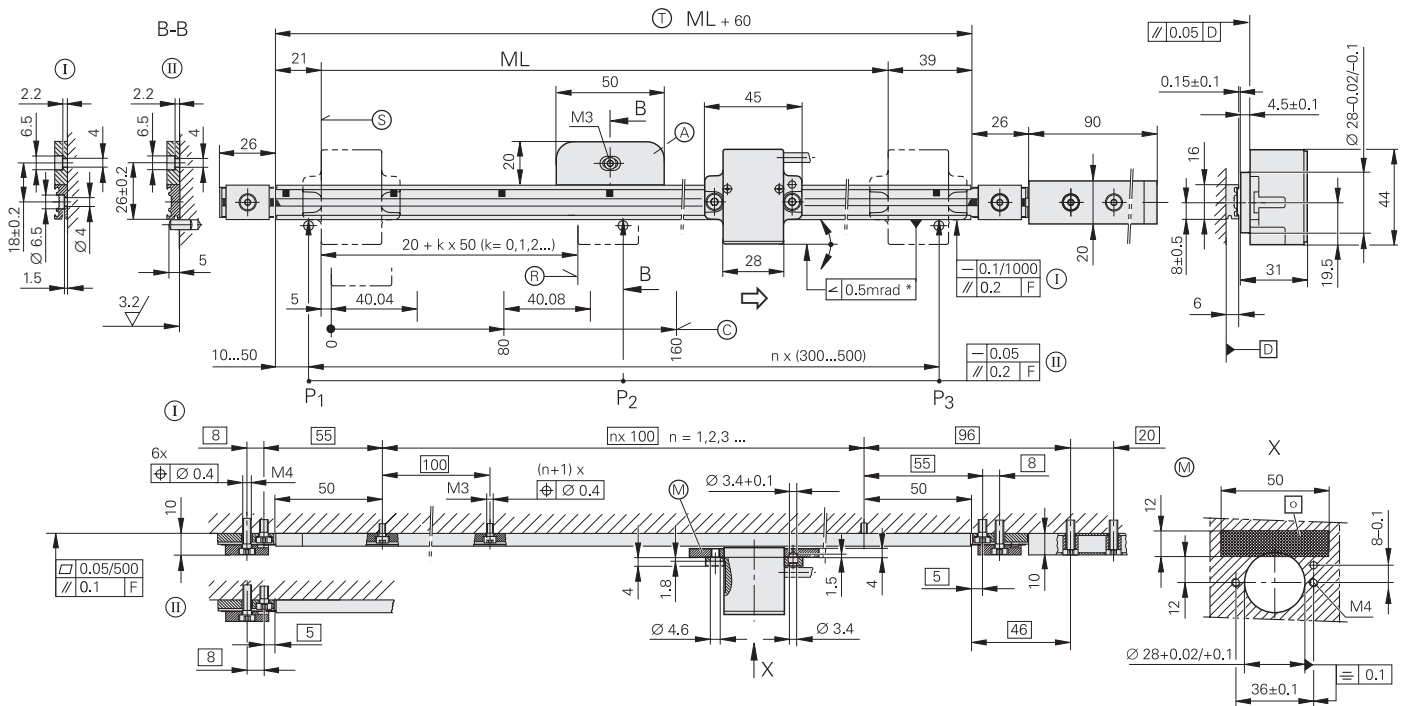
## LIDA 175

ML  $\leq$  2040



## LIDA 185

ML  $>$  2040



Dimensions in mm



Tolerancing ISO 8015  
ISO 2768 - m H  
< 6 mm:  $\pm 0.2$  mm

- ⊙ = Scale carrier sections fixed with screws
- ⊖ = Scale carrier sections fixed with PRECIMET
- F = Machine guideway
- ⊖ = Adjust or set
- \* = Max. change during operation
- P = Gauging points for alignment
- ⊙ = Reference mark position
- ⊙ = Beginning of measuring length (ML)
- ⊙ = Selector magnet for limit switch
- ⊙ = Carrier length
- ⊙ = Spacer for measuring lengths from 3040 mm
- ⇒ = Direction of scanning head motion for output signals in accordance with interface description

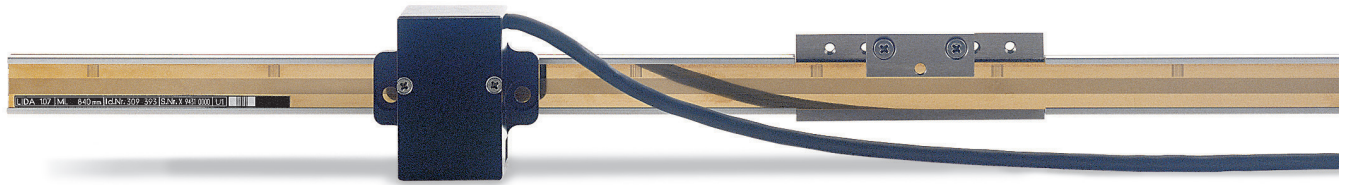


Specifications	LIDA 185	LIDA 175									
<b>Measuring standard</b> Expansion coefficient	Steel scale tape with AURODUR graduation $\alpha_{\text{therm}} \approx 10 \times 10^{-6} \text{ K}^{-1}$										
<b>Accuracy grade*</b>	$\pm 5 \mu\text{m}$										
<b>Measuring length ML*</b> in mm	140 1240	240 1340	340 1440	440 1540	540 1640	640 1740	740 1840	840 1940	940 2040	1040	1140
	Larger measuring lengths up to 30040 mm with a single-section scale tape and individual scale-carrier sections										
Reference marks* <i>LIDA 1x5</i> <i>LIDA 1x5C</i>	Selectable with magnets every 50 mm Distance-coded										
<b>Incremental signals</b>	$\sim 1 \text{ V}_{\text{PP}}$	$\square$ TTL									
Grating period	40 $\mu\text{m}$										
Integrated interpolation* Signal period	– 40 $\mu\text{m}$	5-fold 8 $\mu\text{m}$			10-fold 4 $\mu\text{m}$						
Cutoff frequency –3dB	$\geq 200 \text{ kHz}$	–									
Scanning frequency* Edge separation <i>a</i>	–	200 kHz $\geq 0.23 \mu\text{s}$	100 kHz $\geq 0.48 \mu\text{s}$	50 kHz $\geq 0.98 \mu\text{s}$	100 kHz $\geq 0.23 \mu\text{s}$	50 kHz $\geq 0.48 \mu\text{s}$	25 kHz $\geq 0.98 \mu\text{s}$				
<b>Power supply</b> without load	5 V $\pm 5\%$ / < 150 mA	5 V $\pm 5\%$ / < 200 mA									
<b>Electrical connection</b>	Cable 3 m with M23 coupling	Cable, 3 m with M23 connector									
<b>Cable length</b> <sup>1)</sup>	$\leq 150 \text{ m}$	$\leq 100 \text{ m}$									
<b>Traversing speed</b>	$\leq 480 \text{ m/min}$	$\leq 480 \text{ m/min}$	$\leq 240 \text{ m/min}$	$\leq 120 \text{ m/min}$	$\leq 240 \text{ m/min}$	$\leq 120 \text{ m/min}$	$\leq 60 \text{ m/min}$				
<b>Vibration</b> 55 to 2000 Hz <b>Shock</b> 11 ms	$\leq 200 \text{ m/s}^2$ (EN 60068-2-6) $\leq 500 \text{ m/s}^2$ (EN 60068-2-27)										
<b>Operating temperature</b>	0 °C to 50 °C										
<b>Weight</b> Scanning head Selector magnet Scale Connecting cable	70 g (without connecting cable) 10 g Approx. 115 g + 0.25 g/mm measuring length 37 g/m										

\* Please indicate when ordering

<sup>1)</sup> With HEIDENHAIN cable





Specifications	LIDA 187	LIDA 177												
<b>Measuring standard</b> Expansion coefficient	Steel scale tape with AURODUR graduation $\alpha_{\text{therm}} \approx 10 \times 10^{-6} \text{ K}^{-1}$													
<b>Accuracy grade</b>	$\pm 15 \mu\text{m}$ $\pm 5 \mu\text{m}$ after linear length-error compensation in the evaluation electronics													
<b>Measuring length ML*</b> in mm	240 3040 5840	440 3240 6040	640 3440	840 3640	1040 3840	1240 4040	1440 4240	1640 4440	1840 4640	2040 4840	2240 5040	2440 5240	2640 5440	2840 5640
Reference marks* <i>LIDA 1x7</i> <i>LIDA 1x7C</i>	Selectable with magnets every 50 mm Distance-coded													
<b>Incremental signals</b>	$\sim 1 \text{ V}_{\text{PP}}$		TTL											
Grating period	40 $\mu\text{m}$													
Integrated interpolation* Signal period	– 40 $\mu\text{m}$		5-fold 8 $\mu\text{m}$			10-fold 4 $\mu\text{m}$								
Cutoff frequency –3dB	$\geq 200 \text{ kHz}$		–											
Scanning frequency* Edge separation <i>a</i>	–		200 kHz $\geq 0.23 \mu\text{s}$	100 kHz $\geq 0.48 \mu\text{s}$	50 kHz $\geq 0.98 \mu\text{s}$	100 kHz $\geq 0.23 \mu\text{s}$	50 kHz $\geq 0.48 \mu\text{s}$	25 kHz $\geq 0.98 \mu\text{s}$						
<b>Power supply</b> without load	5 V $\pm 5\%$ / < 150 mA		5 V $\pm 5\%$ / < 200 mA											
<b>Electrical connection</b>	Cable 3 m with M23 coupling		Cable, 3 m with M23 connector											
<b>Cable length</b> <sup>1)</sup>	$\leq 100 \text{ m}$		$\leq 150 \text{ m}$											
<b>Traversing speed</b>	$\leq 480 \text{ m/min}$	$\leq 480 \text{ m/min}$	$\leq 240 \text{ m/min}$	$\leq 120 \text{ m/min}$	$\leq 240 \text{ m/min}$	$\leq 120 \text{ m/min}$	$\leq 60 \text{ m/min}$							
<b>Vibration</b> 55 to 2000 Hz <b>Shock</b> 11 ms	$\leq 100 \text{ m/s}^2$ (EN 60068-2-6) $\leq 500 \text{ m/s}^2$ (EN 60068-2-27)													
<b>Operating temperature</b>	0 °C to 50 °C													
<b>Weight</b> Scanning head Selector magnet Scale Connecting cable	70 g (without connecting cable) 10 g Approx. 25 g + 0.1 g/mm measuring length 37 g/m													

\* Please indicate when ordering

<sup>1)</sup> With HEIDENHAIN cable

# LIDA 179

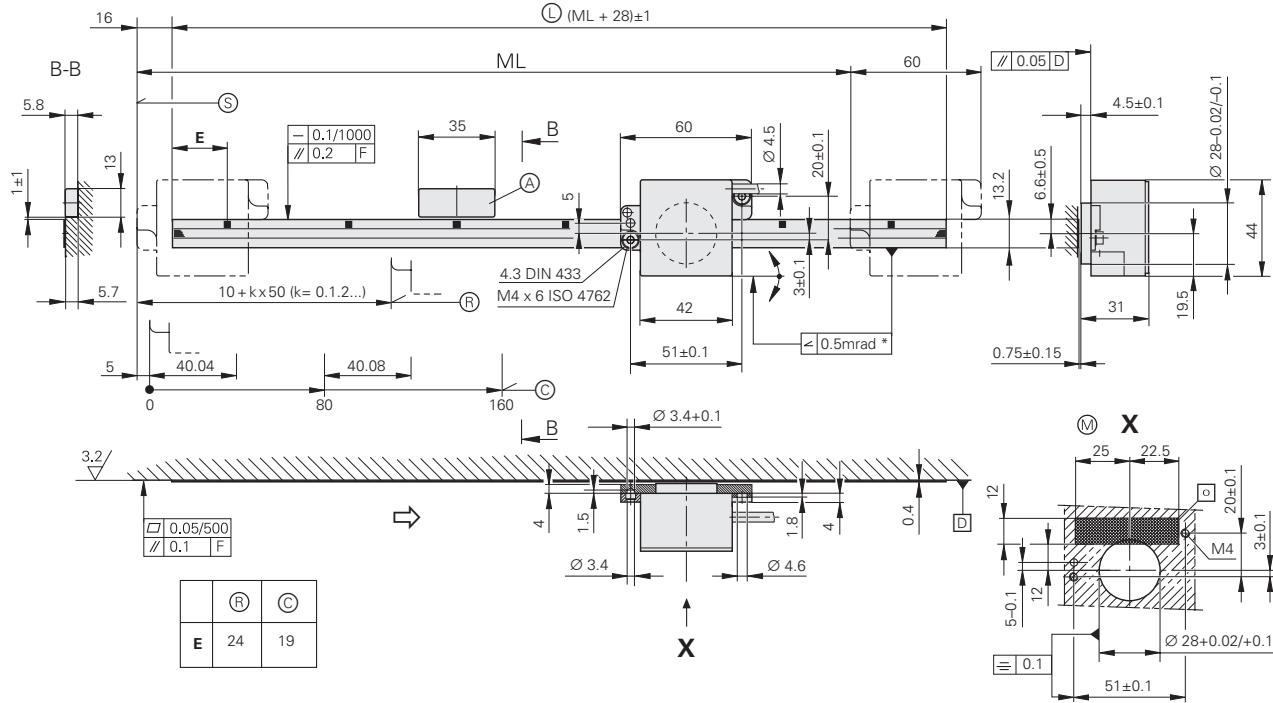
# LIDA 189

Incremental linear encoders for high traversing speeds

- For measuring steps of 1  $\mu\text{m}$  to 0.1  $\mu\text{m}$
- Scale tape fixed with PRECIMET adhesive film

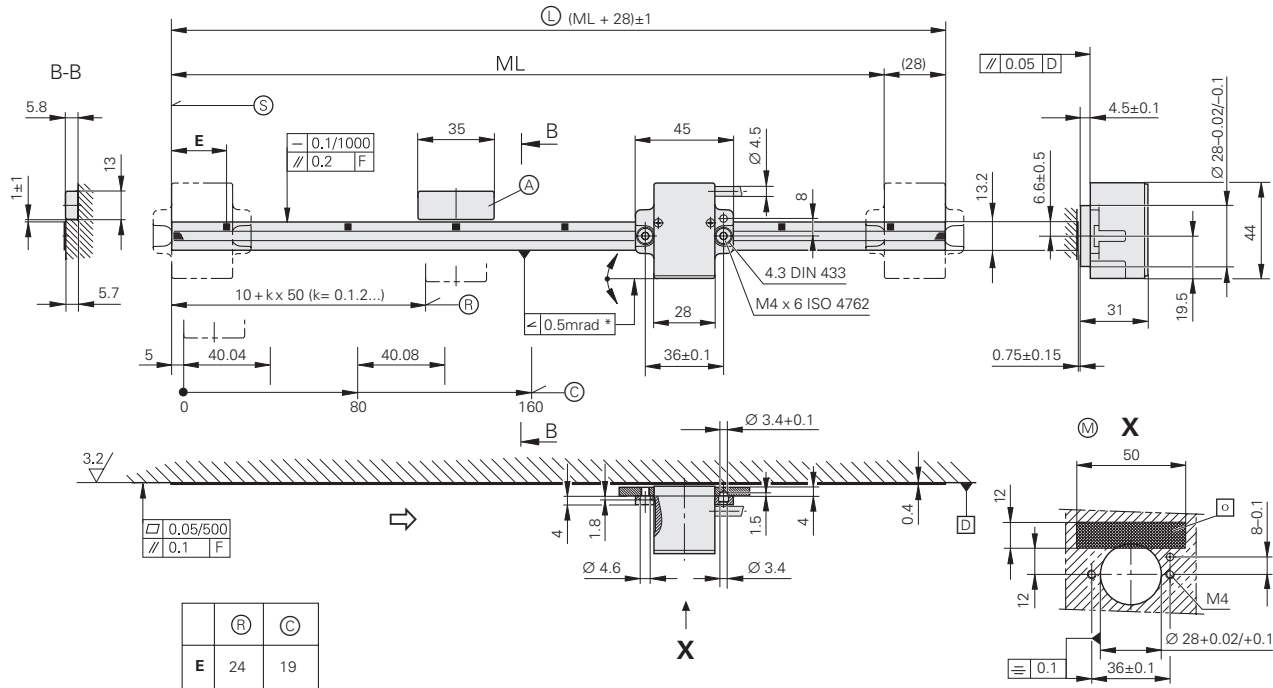
LIDA 179

ML  $\leq$  2040



LIDA 189

ML  $>$  2040



Dimensions in mm



Tolerancing ISO 8015  
ISO 2768 - m H  
< 6 mm:  $\pm$ 0.2 mm

- F = Machine guideway
- \* = Max. change during operation
- (R) = Reference-mark position on LIDA 1x1
- (C) = Reference mark position on LIDA 1x1C
- (S) = Beginning of measuring length (ML)
- (M) = Mounting surface for scanning head
- (V) = Mounting bracket (special accessory)
- (D) = Selector magnet
- (L) = Scale length
- (X) = On (R) version no steel permitted in this area
- (M) = Direction of scanning head motion for output signals in accordance with interface description



Specifications	LIDA 189	LIDA 179					
<b>Measuring standard</b> Expansion coefficient	Steel scale tape with AURODUR graduation $\alpha_{\text{therm}} \approx 10 \times 10^{-6} \text{ K}^{-1}$						
<b>Accuracy grade</b>	$\pm 15 \mu\text{m}$ $\pm 5 \mu\text{m}$ after linear length-error compensation in the evaluation electronics						
<b>Scale tape cut from roll*</b>	5 m, 10 m, 15 m, 20 m						
Reference marks* <i>LIDA 1x9R</i> <i>LIDA 1x9C</i>	Selectable with magnets every 50 mm Distance-coded						
<b>Incremental signals</b>	$\sim 1 V_{\text{PP}}$	$\square \square \text{TTL}$					
Grating period	40 $\mu\text{m}$						
Integrated interpolation* Signal period	– 40 $\mu\text{m}$	5-fold 8 $\mu\text{m}$			10-fold 4 $\mu\text{m}$		
Cutoff frequency –3dB	$\geq 200 \text{ kHz}$	–					
Scanning frequency* Edge separation <i>a</i>	–	200 kHz $\geq 0.23 \mu\text{s}$	100 kHz $\geq 0.48 \mu\text{s}$	50 kHz $\geq 0.98 \mu\text{s}$	100 kHz $\geq 0.23 \mu\text{s}$	50 kHz $\geq 0.48 \mu\text{s}$	25 kHz $\geq 0.98 \mu\text{s}$
<b>Power supply</b> without load	5 V $\pm$ 5%/ < 150 mA	5 V $\pm$ 5 %/< 200 mA					
<b>Electrical connection</b>	Cable, 3 m with M23 coupling	Cable, 3 m with M23 connector					
<b>Cable length</b> <sup>1)</sup>	$\leq 150 \text{ m}$	$\leq 100 \text{ m}$					
<b>Traversing speed</b>	$\leq 480 \text{ m/min}$	$\leq 480 \text{ m/min}$	$\leq 240 \text{ m/min}$	$\leq 120 \text{ m/min}$	$\leq 240 \text{ m/min}$	$\leq 120 \text{ m/min}$	$\leq 60 \text{ m/min}$
<b>Vibration</b> 55 to 2000 Hz <b>Shock</b> 11 ms	$\leq 200 \text{ m/s}^2$ (EN 60068-2-6) $\leq 500 \text{ m/s}^2$ (EN 60068-2-27)						
<b>Operating temperature</b>	0 °C to 50 °C						
<b>Weight</b> Scanning head Selector magnet Scale Connecting cable	70 g (without connecting cable) 10 g Approx. 1.5 g/mm measuring length 37 g/m						


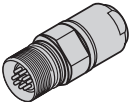
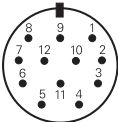

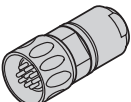
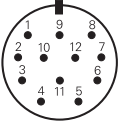



\* Please indicate when ordering

<sup>1)</sup> With HEIDENHAIN cable

# Electrical Connection

## Pin Layout



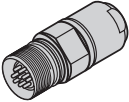
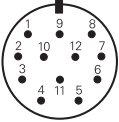

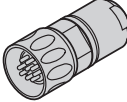
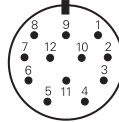



### LIDA 17x

12-pin coupling, M23					12-pin connector, M23									
														
	Power supply				Incremental signals						Other signals			
		12	2	10	11	5	6	8	1	3	4	9	7	/
	$U_P$	Sensor $U_P$	0V	Sensor 0V	A+	A-	B+	B-	R+	R-	Vacant	Vacant	Vacant	
	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	/	Violet	Yellow	

**Shield** on housing;  $U_P$  = power supply voltage

**Sensor:** The sensor line is connected internally with the corresponding power line



### LIDA 18x


12-pin flange socket or coupling, M23					12-pin connector, M23										
															
	Power supply				Incremental signals						Other signals				
		12	2	10	11	5	6	8	1	3	4	7	/	9	
	$U_P$	Sensor $U_P$	0V	Sensor 0V	$U_{a1}$	$\overline{U}_{a1}$	$U_{a2}$	$\overline{U}_{a2}$	$U_{a0}$	$\overline{U}_{a0}$	$\overline{U}_{aS}^{1)}$	Vacant	Vacant <sup>2)</sup>		
	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	Violet	/	Yellow		

**Shield** on housing;  $U_P$  = power supply voltage

**Sensor:** The sensor line is connected internally with the corresponding power line

<sup>1)</sup> LS 323/ERO 14xx: Vacant      <sup>2)</sup> **Exposed linear encoders:** Switchover TTL/11  $\mu A_{PP}$  for PWT

for  
 1V<sub>PP</sub> and  TTL

<b>PUR connecting cables</b>		<b>12-pin: [4(2 × 0.14 mm<sup>2</sup>) + (4 × 0.5 mm<sup>2</sup>)] Ø 8 mm</b>	
<b>Complete</b> with connector (female) and coupling (male)		298401-xx	
<b>Complete</b> with connector (female) and connector (male)		298399-xx	
<b>Complete</b> with connector (female) and D-sub connector (female) for IK 220		310199-xx	
<b>With one</b> connector (female)		309777-xx	
<b>Complete</b> with Coupling (female) and connector (male)		298400-xx	
<b>With one</b> Coupling (female)		298402-xx	
<b>Cable without connectors</b> , Ø 8 mm		244957-01	
<b>Mating element on connecting cable to connecting element on encoder</b> for LIDA 17x	<b>Connector (female)</b> for cable Ø 8 mm	291698-02	
<b>Mating element on connecting cable to connecting element on encoder</b> for LIDA 18x	<b>Connector (female)</b> for cable Ø 8 mm	291697-05	
<b>Connector</b> for connection to subsequent electronics or LIDA 17x encoder cable	<b>Connector (male)</b> for cable Ø 8 mm Ø 6 mm Ø 4.5 mm	291697-08 291697-07 291697-06	
<b>Coupling</b> on connecting cable or LIDA 18x encoder cable	<b>Coupling (male)</b> for cable Ø 3.7 mm Ø 4.5 mm Ø 6 mm Ø 8 mm	291698-14 291698-14 291698-03 291698-04	
<b>Flange socket</b> for mounting on the subsequent electronics	<b>Flange socket (female)</b>	315892-08	
<b>Mounted couplings</b>	<b>With flange (female)</b>  Ø 6 mm Ø 8 mm	291698-17 291698-07	
	<b>With flange (male)</b>  Ø 6 mm Ø 8 mm	291698-08 291698-31	
	<b>With central fastening (male)</b>  Ø 6 mm	291698-33	
<b>Adapter connector</b>  1V <sub>PP</sub> /11 μA <sub>PP</sub> For converting the 1 V <sub>PP</sub> signals to 11 μA <sub>PP</sub> ; M23 connector (female) 12-pin and M23 connector (male) 9-pin		364914-01	

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# HEIDENHAIN

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**[www.heidenhain.de](http://www.heidenhain.de)**

## Additional information:

- Brochure: *Exposed Linear Encoders*