

# System for Contactless Optical Distance Measurement

## Laser-based Optical Sensor and Evaluation Electronics



### D-780 with E-856

- Noncontact distance measuring with small form factor and very small measurement spot size (2  $\mu\text{m}$ )
- Nanometer resolution with large standoff distance (up to 37.5 mm)
- Measuring ranges 20  $\mu\text{m}$ , 100  $\mu\text{m}$ , 500  $\mu\text{m}$
- Absolute position sensing
- Variety of digital interfaces for readout and configuration
- Software support

### Fields of application

Industry and research. Semiconductor manufacturing and inspection. Nanometrology. Precision machining. Autofocus.

### Specifications—Preliminary

	E-856.1L1K	D-780.020	D-780.100	D-780.500
Function	Evaluation electronics for contactless optical distance sensors	Contactless measuring optical distance sensor	Contactless measuring optical distance sensor	Contactless measuring optical distance sensor
Channels	1	1	1	1

Measurement	E-856.1L1K	D-780.020	D-780.100	D-780.500
Sensor type	Optical laser unit, absolute-measuring	Optical laser unit, absolute-measuring	Optical laser unit, absolute-measuring	Optical laser unit, absolute-measuring
Laser	-	Class 3B (4 mW @ 780 nm)	Class 3B (4 mW @ 780 nm)	Class 3B (4 mW @ 780 nm)
Measuring range	Depends on sensor	20 $\mu\text{m}$	100 $\mu\text{m}$	500 $\mu\text{m}$
Standoff	Depends on sensor	7.1 mm	16.6 mm	37.5 mm
Spot size	-	2 $\mu\text{m}$	2 $\mu\text{m}$	2 $\mu\text{m}$
Sensor bandwidth	max. 25 kHz adjustable via parameter	Depends on electronics	Depends on electronics	Depends on electronics
Temperature stability	<10 nm/K (with 100 $\mu\text{m}$ sensor)	150 nm/K	50 nm/K	30 nm/K
Maximum permissible tilting of the sensor against the target	-	$\pm 0.5^\circ$ / < $\pm 10$ mrad	$\pm 0.5^\circ$ / < $\pm 10$ mrad	$\pm 0.5^\circ$ / < $\pm 10$ mrad
Required reflectivity of the target	-	4 % to 99.9% @ 780 nm	4 % to 99.9% @ 780 nm	4 % to 99.9% @ 780 nm

Measurement	E-856.1L1K	D-780.020	D-780.100	D-780.500
Static resolution*	-	<0.2 nm (RMS; middle of meas. range) <1 nm (RMS; end of meas. range)	<1 nm (RMS; middle of meas. range) <3 nm (RMS; end of meas. range)	<5 nm (RMS; middle of meas. range) <5 nm (RMS; end of meas. range)
Dynamic resolution*	-	<4 nm (RMS; middle of meas. range) <20 nm (RMS; end of meas. range)	<30 nm (RMS; middle of meas. range) <100 nm (RMS; end of meas. range)	<150 nm (RMS; middle of meas. range) <200 nm (RMS; end of meas. range)
Linearity error**	-	<1 %	<1 %	<1 %

Electrical properties	E-856.1L1K
Output voltage Analog Out	0 to 10 V; in-range indicator of the sensor
Output signal Analog Out	1 k $\Omega$ / 10 nF
Output voltage Pos Signal Out	-10 to 10 V; scaled to the sensor's measuring range
Output signal Pos Signal Out	100 $\Omega$

Interfaces and operation	E-856.1L1K	D-780.020, .100, .500
Sensor connection	D-sub 15 (f)	D-sub 15 (m)
Analog interfaces	Analog Out: LEMO EPG.00.302.NLN Pos Signal Out: LEMO EPG.00.302.NLN	-
Digital interface	Digital I/O: LEMO EPG.00.302.NLN	-
Communication interfaces	Ethernet: RJ45 USB: Mini-USB SPI: Display port BiSS-C: D-sub 15 (f) (Digital Interface)	-
Power connector	M8	-
Display and indicators	Power LED (green) Mid Range LED (yellow; sensor in the middle of the measuring range) Error LED (red; error of the PI GCS)	-
Supported functions	Data recorder, polynomial linearization, configuration via parameters	-
Command set	PI General Command Set (GCS)	-
User software	PI MikroMove, PIFirmwareUpdater, PITerminal, PIPython	-

Miscellaneous	E-856.1L1K	D-780.020, .100, .500
Operating voltage	24 V (500 mA); external power adapter included in the scope of delivery)	-
Maximum power consumption	System, typ.: 7.5 W System, max.: 10 W	Typ. <100 mW
Operating temperature range	5 to 40 °C	5 to 40 °C, non condensing
Mass	890 g	120 g (incl. cable and connector)
Dimensions	204 mm x 130 mm x 55 mm	d = 12 mm L = 56 mm without cable; 1.0 m with cable

\* With E-856 evaluation electronics; static bandwidth 10 Hz; dynamic bandwidth 25 kHz; 1 m cable; reflexion > 90 % (decrease in reflectivity increases the noise)

\*\*Linearity error in the nominal measuring range

## Ordering Information—Preliminary

### **E-856.1L1K**

Evaluation electronics for optical distance sensors, 1 channel, including a low-noise power adapter

### **D-780.020**

Contactless optical distance sensor, 20  $\mu\text{m}$  measuring range

### **D-780.100**

Contactless optical distance sensor, 100  $\mu\text{m}$  measuring range

### **D-780.500**

Contactless optical distance sensor, 500  $\mu\text{m}$  measuring range