

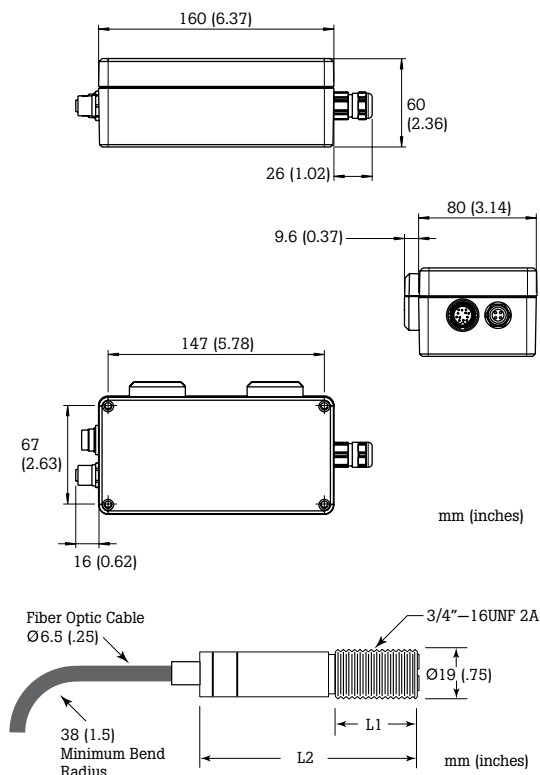
Endurance®

Fiber-Optic Datasheet

Highlights

- Rugged non-contact fiber-optic pyrometer measurement systems
- 4 year warranty
- Wide temperature range:
250 to 3200 °C (482 to 5792 °F)
- Multiple fixed focus lens options for different mounting distances
- Sighting options: Laser aiming
- Superior optical resolution to 100:1
- LAN/Ethernet interface with PoE for communication with the sensor (ASCII and Webserver)
- Profinet and EtherNet/IP interface options
- Programmable relay output
- Fail safe alarm
- Isolated analog input/output
- Rugged electronics box housing, IP65 (NEMA-4) rated
- Endurance software for remote configuration, remote monitoring and field calibration
- Single color and two colors models

Dimensions



Model	L1	L2
EF1ML, EF1MM, EF1MH, EF2ML, EF2MH	25 mm (1")	62 mm (2.46")
EF1RL, EF2RL, EF2RH	28 mm (1.1")	69 mm (2.7")
EF1RM, EF1RH	36 mm (1.4")	79 mm (3.1")



Electrical Specifications

Inputs Contact input (peak/valley reset, Laser), Analog input 0/4-20 mA (emissivity, e-slope, background temperature)

Outputs Ethernet, Profinet, EtherNet/IP, 0/4-20 mA, max. load: 500 Ω, RS485* (2/4 wire half duplex), networkable relay, 48 V, 300 mA,

Power Supply 20 to 48 VDC, 500 mA
Power over Ethernet (PoE)

General Specifications

Environmental Rating IP65 (IEC529) / NEMA-4

Ambient Temperature

Electronics housing 0 to 60 °C

with water cooling 0 to 150 °C
2 liter per minute @ 16 °C

Fiber cable/Optical head 0 to 200 ° standard temperature rating;
0 to 315 °C high temperature option

Cable Protection Rated up to 200 °C; stainless steel armor; PTFE coating, rubber "boot", and IP65 (IEC529) NEMA-4 (not available on high temperature cable); provision for conduit to protect fiber cable

Air purge 0.5 to 1.5 l/s (1-3 CFM)

Storage Temperature

Electronics housing -20 to 70 °C

Relative Humidity 10 to 95 %, non-condensing

Shock

Electronics housing IEC 68-2-27

Vibration

Electronics housing IEC 68-2-6

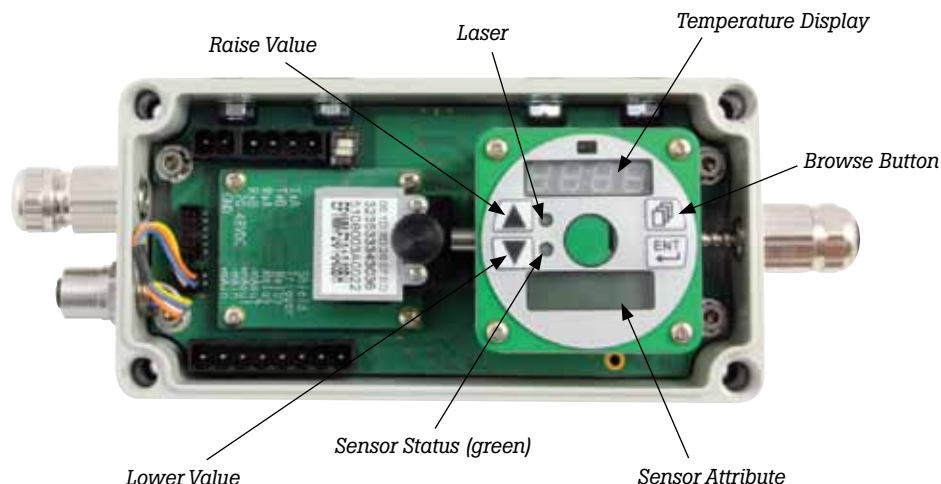
Weight

Electronics housing 0.71 kg

Optical head 0.10 kg

***Note:** RS485 4 wire only available when "Inside connector option" electronics box is used

User Interface



Measurement Specifications

	EF1R	EF2R	EF1M	EF2M
Temperature Range and Optical Resolution <small>(see table below for minimum spot sizes)</small>	EF1RL 500 to 1100 °C 20:1	EF2RL 275 to 1000 °C 20:1	EF1ML 475 to 900 °C 20:1	EF2ML 250 to 800 °C 20:1
	EF1RM 700 to 1500 °C 40:1		EF1MM 800 to 1900 °C 100:1	
	EF1RH 1000 to 3200 °C 65:1	EF2RH 350 to 1300 °C 40:1	EF1MH 1200 to 3000 °C 100:1	EF2MH 400 to 1700 °C 40:1
Spectral Response	1.0 μm nominal one/two color	1.6 μm nominal one/two color	1.0 μm nominal single color	1.6 μm nominal single color
Sighting	Laser Optional			
Accuracy	±(0.3% T _{meas.} +2 °C) with no attenuation		±(0.3% T _{meas.} +2 °C)	
Repeatability	±1 °C			
Temperature Resolution	Digital Output 0.1°C, Current Output <0.03°C / 16 bit			
Response Time	10 ms (95%)	20 ms (95%)	10 ms (95%)	10 ms (95%)
Emissivity	0.100 to 1.150			
E-Slope	0.850 to 1.150		N/A	
Signal Processing	Peak Hold, Valley Hold, Averaging			

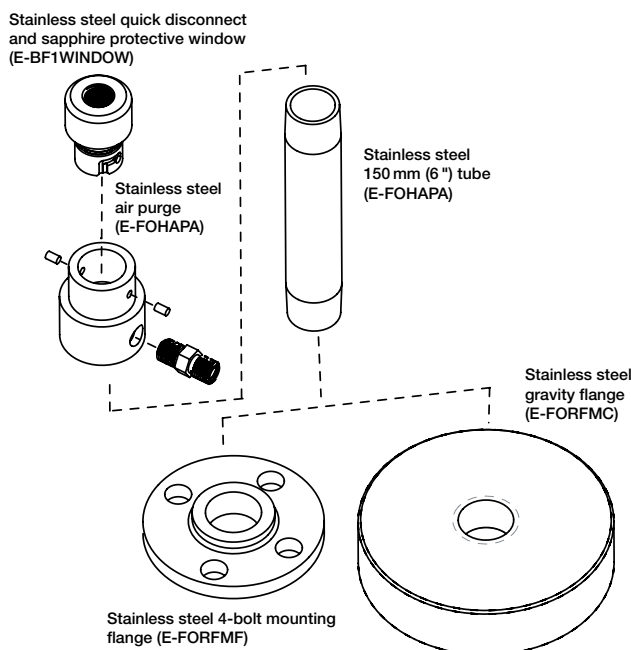
Lens Options <small>(All lenses fixed focus)</small>	F0	F1	F2
20:1	5 mm @ 100 mm	15 mm @ 300 mm	250 mm @ 5000 mm
40:1	2.5 mm @ 100 mm	7.5 mm @ 300 mm	125 mm @ 5000 mm
65:1	1.5 mm @ 100 mm	4.5 mm @ 300 mm	77 mm @ 5000 mm
100:1	1 mm @ 100 mm	3 mm @ 300 mm	50 mm @ 5000 mm

Accessories

Additional accessories are available as shown below (refer to the Endurance Accessory datasheet).

- Adjustable bracket (**E-FOMB**)
- Air purge collar and stainless steel sighting tube, 150 mm (6 in.) long, 25 mm (1 in.) diameter. (**E-FOHAPA**)
- Rooftop Mounting/Purging available with flange or gravity-held base (**E-FORFMC**) and quick-release fitting for optical head, sapphire window, stainless steel pipe-cap or flanged mounting base. (**E-FORFMF**)
- Aiming-light (battery powered) for fiber-optic front end (ships standard with all units). This is best suited for "L" range models. Includes adapter to fiber cable (**E-FAFAL**)
- Rugged fiber-optic roof mount air purge, with quick-release fitting and sapphire window (**E-FORFQP**)
- Rugged fiber-optic roof mount air purge, with quick-release fitting, sapphire window and 150 mm stainless steel sight tube (**E-FORFAP**)
- Protective Sapphire window mounted in stainless steel bezel (**E-BF1WINDOW**)
- High temperature fiber-optic housing with air-knife purge and sapphire protective window, 3 meter air/protection hose. For extreme environments. Ambient Temperature $\leq 450^{\circ}\text{C}$ (842°F) (**E-FOXH3**)
- High temperature fiber-optic housing with air-knife purge and sapphire protective window, 6 meter air/protection hose. For extreme environments. Ambient Temperature $\leq 450^{\circ}\text{C}$ (842°F) (**E-FOXH6**)
- Electronics box cooling plate for ambient applications up to 150°C (300°F) (**E-CP**)
- Terminal block (**E-TB**)

- Switching power supply 24 VDC 1.3 A industrial power supply, DIN rail mount (**E-SYSPS**)
- Switching power supply in NEMA-4 enclosure 100 / 240 VAC 24 VDC, 1.1 A (**E-PS**)
- Power over Ethernet (PoE) Injector provides power and acts as a single Ethernet hub (100/240 VAC input) (**E-PoE**)
- USB/RS485 Converter (**E-USB485**)



The Fluke Process Instruments Guarantee

The Endurance Series is supported by a 4 year warranty. With a network of trained representatives and agents in over one hundred countries and offices located in the U.S., Germany and China, we provide local service and support.

Fluke Process Instruments

Americas

Everett, WA USA
Tel: +1 800 227 8074 (USA and Canada, only)
+1 425 446 6300
solutions@flukeprocessinstruments.com

EMEA

Berlin, Germany
Tel: +49 30 4 78 00 80
info@flukeprocessinstruments.de

China

Beijing, China
Tel: +8610 6438 4691
info@flukeprocessinstruments.cn

Japan

Tokyo, Japan
Tel: +81 03 6714 3114
info@flukeprocessinstruments.jp

Asia East and South

India Tel: +91 22 6249 5028
Singapore Tel: +65 6799 5578
sales.asia@flukeprocessinstruments.com

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