FLUKE®

Process Instruments

Endurance®

Datasheet

Highlights

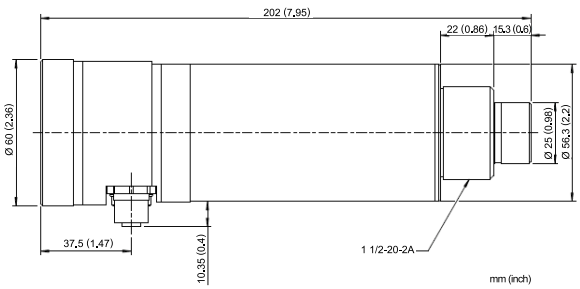
- 4 year warranty
- Wide temperature range:
  50 to 3200 °C (122 to 5792 °F)
- Sighting options:

  Laser through the lens and
  Visible through the lens – Manual Variable focus

  Video Camera through the lens and
  Visible through the lens – Manual Variable focus

  LED through the lens and
  Visible through the lens – Manual Variable focus
- Superior optical resolution to 300:1
- LAN/Ethernet interface with PoE for communication with the sensor (ASCII, Video, and Webserver)
- Profinet and EtherNet/IP interface options
- Programmable relay output
- Fail safe alarm
- Isolated analog input/output
- Ambient temperatures to 315 °C (600 °F) with ThermoJacket enclosure
- Rugged stainless steel housing, IP65 (NEMA 4) rated
- Unique “dirty window” alarm
- Endurance software for remote configuration, remote monitoring and field calibration
- Single color and two colors models

Dimensions



Electrical Specifications

Inputs	Contact input (peak/valley reset, Laser, LED), Analog input (emissivity, e-slope, background temperature) 0/4–20 mA
Outputs	Ethernet, Profinet, EtherNet/IP, 0/4–20 mA, max. load: 500 Ω RS485 (2-wire half duplex), networkable Relay, 48 V, 300 mA, response time < 2 m
Power Supply	20 to 48 VDC, 500 mA Power over Ethernet (PoE)

General Specifications

Environmental Rating	IP65 (IEC529) / NEMA-4
Ambient Temperature	
without cooling	0 to 65 °C (32 to 149 °F)
E2R without cooling	0 to 60 °C (32 to 140 °F)
with air cooling	0 to 120 °C (32 to 250 °F)
with water cooling	0 to 175 ° (32 to 350 °F)
with ThermoJacket	0 to 315 °C (32 to 600 °F)
Storage Temperature	-20 to 70 °C (-4 to 158 °F)
Relative Humidity	10 to 95 %, non-condensing
Shock	IEC 68-2-27
Vibration	IEC 68-2-6
Weight	
Optical head	1220 g (2.69 lbs)
With air/water cooled housing	2980 g (6.57 lbs)

User Interface

Measurement Specifications

	E1R	E2R	E1M	E2M	E3M
Temperature Range and **Optical Resolution** (90 % energy)	**E1RL** 600 to 1800 °C (1112 to 3272 °F) (2 color mode) 550 to 1800 °C (1022 to 3272 °F) (single color mode) 100 : 1 (95 % energy) **E1RH** 1000 to 3200 °C (1832 to 5792 °F) 150 : 1 (95 % energy)	**E2RL** 250 to 1200 °C (482 to 2192 °F) 75 : 1	**E1ML** 400 to 1740 °C (752 to 3164 °F) 160 : 1 **E1MH** 540 to 3000 °C (1004 to 5432 °F) 300 : 1	**E2ML** 250 to 1100 °C (482 to 2012 °F) 160 : 1 **E2MM** 250 to 1400 °C (482 to 2552 °F) 160 : 1 **E2MH** 450 to 2250 °C (842 to 4082 °F) 300 : 1	**E3ML** 50 to 1000 °C (122 to 1832 °F) 100 : 1 **E3MH** 150 to 1800 °C (302 to 3272 °F) 300 : 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	2.4 µm nominal single color
Lens Options	600 mm – ∞ (24" – ∞) **(F2)**, 300 - 600 mm (12 - 24") **(F1)**, 190–300 mm (7.5 - 12") **(F0)**				
Sighting	Visual/Laser, Visual/Camera, Visual/LED				
Accuracy*	**E1RL** ±(0.5 % +2 °C) no attenuation **E1RH** ±(0.5 % +2 °C) for T_{meas} < 3000°C (5432°F) no attenuation Temperature indication only for T_{meas} ≥ 3000°C (5432 °F)	**E2RL** ±(0.5 % +2 °C) for T_{meas} ≥ 270°C (518°F) no attenuation T_{meas} in °C	**E1ML** ±(0.3 % + 1 °C) for T_{meas} ≥450°C (842°F) ±(2 % + 2 °C) for T_{meas} <450°C (842°F) **E1MH** ±(0.3 % + 1 °C) for T_{meas} ≥ 650°C (1202°F) ±(2 % + 2 °C) for T_{meas} < 650°C (1202°F)	**E2ML** ±(0.3 % + 2 °C) **E2MM** ±(0.3 % + 2 °C) for T_{meas} ≥ 350°C (662°F) ±(1 % + 2 °C) for T_{meas} <350°C (662°F) **E2MH** ±(0.3 % + 1 °C)	**E3ML** ±(0.3 % + 1 °C) for T_{meas} ≥ 100°C ±(1 % + 2 °C) for T_{meas} < 100°C **E3MH** ±(0.3 % + 1 °C)
Repeatability*	±(0.3 % +1°C) no attenuation T_{meas} in °C	±(0.3 % +1°C) for T_{meas} ≥ 270°C (518°F) no attenuation T_{meas} in °C	**E1ML** ±(0.1 % + 1 °C) for T_{meas} ≥450°C (842°F) ±(1 % + 1 °C) for T_{meas} <450°C (842°F) **E1MH** ±(0.1 % + 1 °C) for T_{meas} ≥ 650°C (1202°F) ±(1 % + 1 °C) for T_{meas} < 650°C (1202°F)	**E2ML** ±(0.1 % + 1 °C) **E2MM** ±(0.1 % + 1 °C) for T_{meas} ≥ 350°C (662°F) ± (1% + 1°C) for T_{meas} <350°C (662°F) **E2MH** ± (0.1 % + 1 °C)	**E3ML** ±(0.1 % + 1 °C) for T_{meas} ≥ 100°C (212°F) ±(1 % + 1 °C) for T_{meas} < 100°C (212°F **E3MH** ± (0.1 % + 1 °C)
Temperature Resolution	Digital Output 0.1 °C, Current Output <0.03 °C / 16 bit				
Response Time	10 ms (95 %)	20 ms (95 %)	2 ms (95 %)	2 ms (95 %)	20 ms (95 %)
Emissivity	0.100 to 1.100				
E-Slope	0.850 to 1.150		N/A		
Signal Processing	Peak Hold, Valley Hold, Averaging, Ambient background temperature compensation				

***** at ambient temperature 23 °C ± 5 °C (73 °F ± 9 °F), emissivity = 1.0 and calibration geometry, T_{meas} in °C

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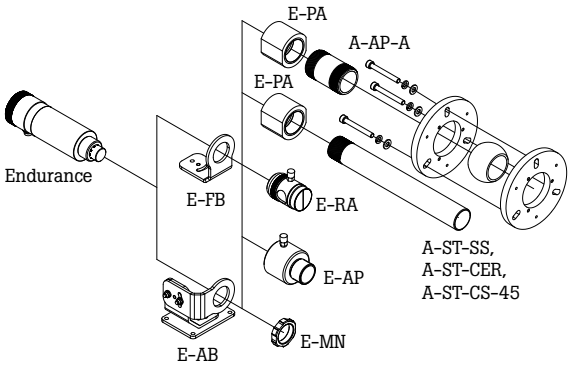

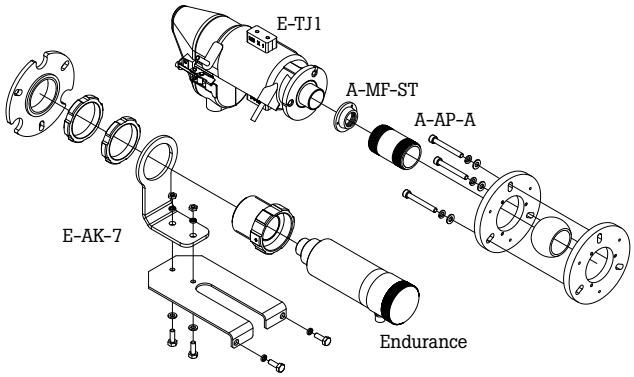

Endurance.....Endurance
E-FB .....Fixed bracket
E-AB.....Adjustable bracket
E-PA .....Pipe adapter
E-RA.....Right angle mirror
E-AP .....Air purge collar
E-MN.....Mounting nut
A-AP-A .....Adjustable pipe adapter assembly

A-MF-ST .....Mounting flange for sighting tubes
A-ST-SS .....30.4 cm (12") Stainless steel sighting tube
A-ST-CER.....30.4 cm (12") Ceramic sighting tube
A-ST-CS-45.....30.4 cm (12") Carbon steel sighting tube with 45° end cut
E-AK-7.....Adapter kit for mounting Endurance into existing WJ-5 water jacket installations
E-TJ1.....ThermoJacket

Options

Options must be specified at time of order.

- Water-cooled housing, including air purge collar
- Profinet, EtherNet/IP communications

Accessories

The model includes a mounting nut, fixed bracket, end cap for display, operator's manual and Endurance software. Additional accessories are available (refer to the Endurance Accessory datasheet).

- Adjustable bracket (**E-AB**)
- Air purge collar (**E-AP**)
- SpotScan™ Accessory (**SSA or SSB**) to allow Endurance sensors to scan over a line
- ThermoJacket enclosure for ambient temperatures to 315 °C (600 °F) (**E-TJ1**) – *see ThermoJacket documentation.*
- Polarizing filter end cap (**E-PFEC**)
- 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 (IP65) enclosure 100/240 VAC to 24 VDC, 1.1 A (**E-PS**)
- Power over Ethernet (**PoE**) Injector provides power and also acts as a single Ethernet hub (100/240 VAC input) (**E-PoE**)
- USB/RS485 Converter (**E-USB485**)
- Protective front window including ring (**E-PW**)

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

Worldwide Service

Fluke Process Instruments offers services, including repair and calibration. For more information, contact your local office.

www.flukeprocessinstruments.com

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