FLUKE®
Process Instruments

Endurance®

Datasheet

Highlights

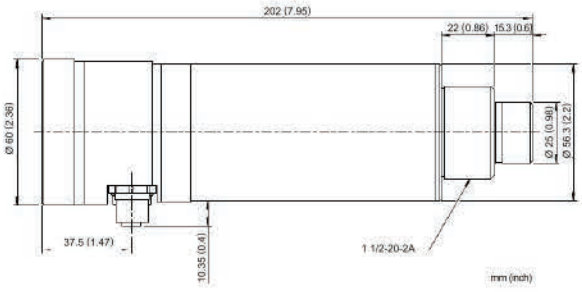
- 4 year warranty
- Wide temperature range:
  50 to 3200 °C (122 to 5792 °F)
- Sighting options:

  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

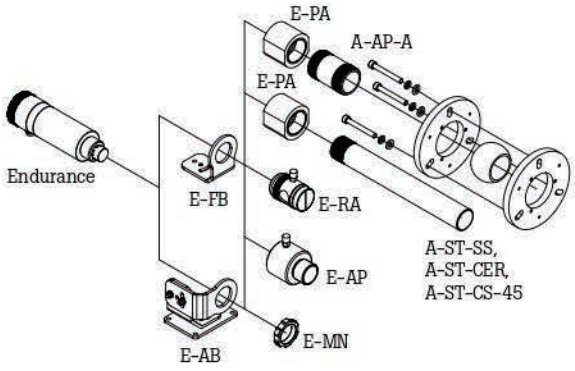
Environmental Rating	IP65 (IEC529) / NEMA-4
Ambient Temperature	
without cooling	0 to 65 °C (32 to 149 °F)
E2R without cooling	0 to 60 °C (32 to 140 °F)
with air cooling	0 to 120 °C (32 to 250 °F)
with water cooling	0 to 175 ° (32 to 350 °F)
with ThermoJacket	0 to 315 °C (32 to 600 °F)
Storage Temperature	-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)

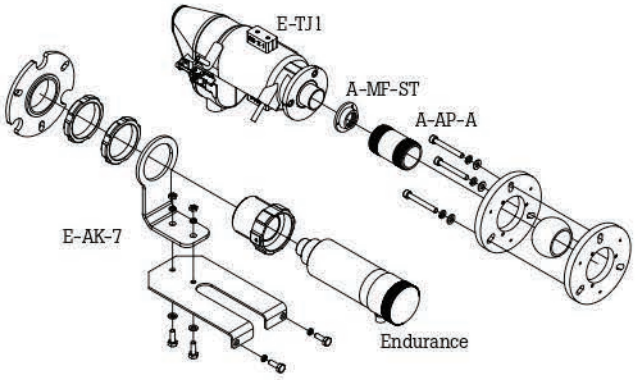
User Interface

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





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 O-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.

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