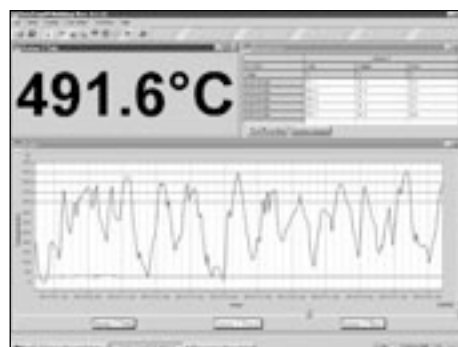


# FA1/FA2

## Datasheet

Raytek MARATHON SERIES

### Fiber-Optic Thermometers



*FA model shown with optional Adjustable Mounting Bracket*

## FA1/FA2 Highlights

- Rugged fiber optic measurement systems
- Laser aiming available (selected models)
- Fiber cable rated to 315°C (600°F) available (selected models)
- Programmable relay output (dual-temperature setpoints or "fail-safe")
- Simultaneous analog and digital outputs
- Bi-directional RS485 communications
- Supports up to 32 Marathon Series sensors on a multipoint network
- Windows® DataTemp® software for data acquisition, display, and analysis (operates under WIN 3.1/95/98/NT4 Windows 2000, XP)
- Field Calibration Software

Marathon fiber optic infrared thermometers (FA1/FA2) consist of a rugged fiber optic cable plus optical head assembly connected to an electronics housing containing the detector, processing electronics, internal user interface/LED display, and termination connections for field wiring. FA1/FA2 thermometers permit measurement of targets in harsh industrial environments that are otherwise inaccessible by non-fiber optic thermometers.

FA1/FA2 thermometers maintain their high accuracy over the ambient operating temperature range from 0° to 60°C (32° to 140°F).

The fixed-focus optical head consists of a small stainless steel cylindrical housing and lens assembly. The optical head accommodates an air-purge accessory to prevent lens contamination and the fiber optic cable is protected by metal armor. The assembly accommodates a small bend radius for threading through tight spaces.

The Marathon FA1G sensor, specifically designed for measuring glass temperature from 750° to 1675°C (1382° to 3047°F), permits measurement of melter, refiner, regenerator, and fore-hearth temperatures.

## Specifications

### Measurement

Models	Temperature Range
FA1A	475° to 900°C (887° to 1652°F)
FA1B	800° to 1900°C (1472° to 3452°F)
FA1C	1200° to 3000°C (2192° to 5432°F)
FA1G	750° to 1675°C (1384° to 3047°F)
FA2A	250° to 800°C (482° to 1472°F)
FA2B	400° to 1700°C (752° to 3092°F)
Spectral Response/Detector	
FA1	1.0 μm (Si detector)
FA2	1.6 μm (InGaAs detector)
Fiber Cable Lengths	
1m (3'), 3m (10'), 6m (19'), and 10m (32'); consult factory for other lengths.	
Accuracy	
FA1/FA2	±(0.3%T <sub>meas</sub> + 2°C); T <sub>meas</sub> in °C
FA1G	±3°C (±5.4°F)
Repeatability	
±1°C	
Temperature Resolution	
±0.05°C (±0.1°F)	
Response Time	
10 mSec; averaging selectable to 10 sec	
Emissivity	
0.1 to 1.0 in 0.01 increments	
Signal Processing	
Peak Hold, Valley Hold, Averaging	

### Optical

Models D:S*	Focus Distance		
	CF1	CF2	SF0
**FA1A 20	4mm@102mm (0.17"@4")	15mm@305mm (0.60"@12")	76mm@1524mm (3"@60")
FA1B 100	1mm@102mm (0.04"@4")	2.08mm@305mm (0.11"@12")	160mm@1524mm (0.62"@60")
FA1C 100	1mm@102mm (0.04"@4")	2.08mm@305mm (0.11"@12")	160mm@1524mm (0.62"@60")
FA1G 100	1mm@102mm (0.04"@4")	NA	NA
**FA2A 20	4mm@102mm (0.17"@4")	15mm@305mm (0.60"@12")	76mm@1524mm (3"@60")
FA2B 40	2.5mm@102mm (0.1"@4")	7mm@305mm (0.26"@12")	38mm@1524mm (1.5"@60")

\*At 95% energy Recommend: Target diameter Spot size diameter ≥ 1.4 \*\*Available with laser aiming

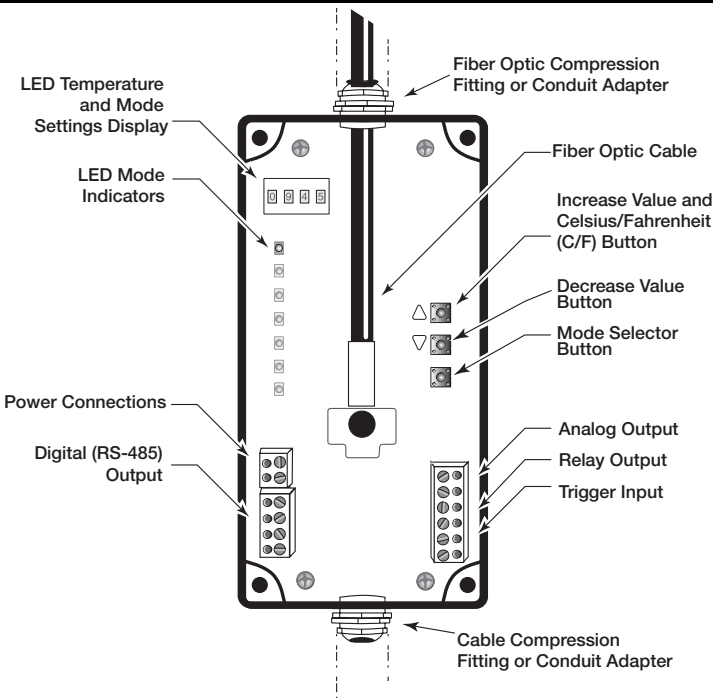
### Electrical

Outputs	0/4–20 mA; RS-485, 2-wire/4-wire, networkable to 32 sensors; Relay (SPST 48V, 300 mA, response time < 2 mSec)
Power Requirements	24 VDC, 250 mA, ±20%
Compliance	CE low voltage directive; EN 61326

### General

Environmental Rating	NEMA-4 (IEC 529, IP 65)
Ambient Temperature	0° to 60°C (32° to 140°F)
Electronics housing	0° to 150°C (32° to 300°F); 2 l (0.5 gal) per minute 16°C (62°F)
Fiber cable/Optical head	0° to 200°C (32° to 392°F); standard temperature rating 0° to 315°C (32° to 600°F); high-temperature option
Air purge	0.5 to 1.5 l/sec (1-3 CFM)
Storage Temperature	-20° to 70°C (-4° to 158°F)
Relative Humidity	10% to 95% non-condensing
Shock	(Electronics Housing) MIL-STD-810D (IEC 68-2-27)
Vibration	(Electronics Housing) MIL-STD-810D (IEC 68-2-6)
Weight	Electronics Housing 0.71 kg (25 oz) Optical Head 0.10 kg (3 oz)
Cable protection	Rated to 200°C; stainless steel armor; Viton coating, rubber "boot", and NEMA-4 (not available on high temperature cable); provision for conduit to protect fiber cable

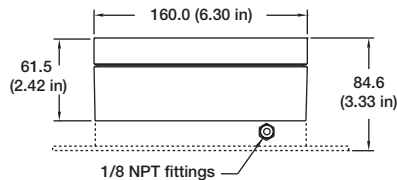
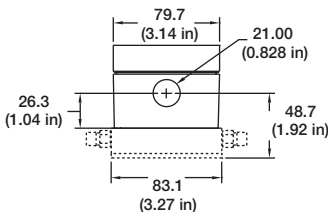
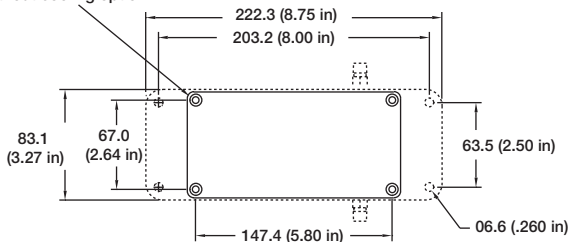
# User Interface



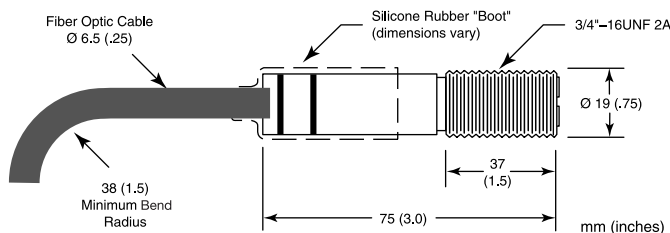
# Physical Dimensions

## Electronics Housing (Cooling Platform option "W" shown as a dotted line)

Mounting hole diameter 5mm (0.188 in)  
Fastner head diameter 8mm (0.31 in) MAX  
for units without cooling option



## Optical Head



# Accessories

## Adjustable Mounting Bracket (XXXFOMB)

Adjustable mounting bracket for FA/FR optical head.

## Fiber-Optic Accessory Kit (XXXMFAK)

EMT conduit fitting for electronics housing, and rubber gland to seal fiber-cable at enclosure.

## Air Purge Collar

Air purge collar and stainless steel sighting-tube, 150mm (6 in) long, 25mm (1 in) diameter: (XXXFOHAPA).  
Air purge collar without sighting tube: (XXXCIACAP)

## Air Purge Fitting (XXXFOCAPF)

Fiber-Optic conduit provides an NPT threaded T-fitting to allow purging via std. electrical conduit (*conduit not supplied*).

## Right Angle Mirror (XXXCIACRA)

Connects to Optical Head.

## Sighting Tube Conduit Accessory (XXXFOSTCA)

Length: 300mm (12 in); Diameter: 32mm (1.25 in) with connection to standard electrical conduit.

## Rooftop Mounting/Purging

Available with flange (XXXFORFMF) or gravity-held base (XXXFORFMC) with quick-release fitting for Optical Head, sapphire window, stainless steel pipe-cap or flanged mounting base.

## NIST Calibration Certification XXXFACERT

Power Supply (24VDC, 110/220VAC input) and Marathon Terminal Block mounted in a NEMA 4 (IP65) enclosure (RAYMAPB)

Power Supply 24VDC 1.1A Switching power supply with universal input (110/220V) (XXX2CDCPSS)

## Spare Marathon Terminal Block Accessory (XXXMATB)

Spare Marathon Terminal Block in a NEMA-4 enclosure (XXXMATBN4)

## SMART RS485/RS232 CONVERTERS

DB25 to Terminal Strip Interface Converter, recommended for direct wiring between a serial interface and the Marathon terminal block (XXX485CVT)

## TEFLON 12-CONDUCTOR CABLE (XXXHTCB □□ )

High temperature (200°C rated), 12-conductor Teflon jacketed cable suitable for providing connections to all inputs/outputs of the FR/FA electronics. The cable is cut to specified lengths. One end of the 12-conductor cable has its wires stripped and prepared for termination into the FR/FA terminal strip.

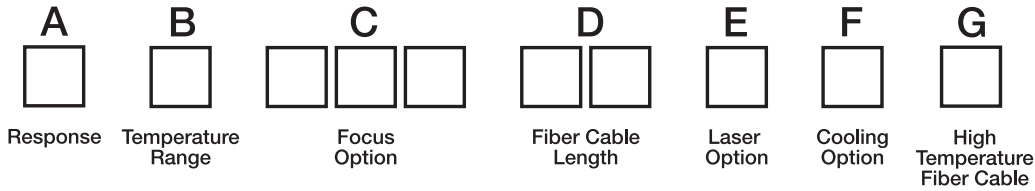
□□ Cable length (in meters) = 1,3,5,10,15,20,...,60

## PVC 4-CONDUCTOR CABLE (XXXLTCB □□ )

For installations requiring only 24VDC and 0/4-20mA output, 4-conductor PVC wiring cables (2 twisted pairs; each pair shielded) provides connection to 24VDC power, ground, and the +mA and -mA output of the FR/FA electronics. Nominal temperature rating is -20°C to 60°C. The cable is cut to specified lengths (see below). One cable end has wires stripped and prepared for termination into the FR/FA terminal strip.

□□ Cable length (in meters) = 1,3,5,10,15,20,...,60

**RAYFA**



Model	Description		
RAYFA	Raytek Fiber-optic Thermometer		
Code A	Response		
1	1 micron spectral response		
2	1.6 micron spectral response		
Code B	Temperature Range (FA1)	Code B	Temperature Range (FA2)
A	475° to 900°C (752° to 1652°F) 20:1 D:S	A	250° to 800°C (482° to 1472°F)
B	800° to 1900°C (1472° to 3092°F) 100:1 D:S	B	400° to 1700°C ( 752° to 3092°F)
C	1200° to 3000°C (2192° to 5432°F) 100:1 D:S		
G	750° to 1675°C (1382° to 3047°F) 100:1* D:S		
Code C	Focus Option		
SF0	Standard Focus Optical Head Focused at "infinity"*		
CF1	Close Focus Optical Head Focused distance at 100mm (4 inch)		
CF2	Close Focus Optical Head Focused distance at 300mm (12 inch)		
Code D	Fiber Cable Length		
01	1m (≈ 3') length fiber-optic cable with connector		
03	3m (≈ 10') length fiber-optic cable with connector		
06	6m (≈ 19.7') length fiber-optic cable with connector		
10	10m (≈ 32.8') length fiber-optic cable with connector		
Code E	Laser Aiming Option**		
L	Laser aiming available on FA1A and FA2A models		
Code F	Cooling Platform Option		
W	Water cooled mounting platform for FA housing		
Code G	High Temperature Fiber Cable		
H	Rated to 315°C (600°F) (Not available on FA2); option excludes Teflon Sheath and NEMA-4 rating		
Typical Model Number	FA1ACF103LW		

\* The FA1G is available only with SF0 optics \*\* Contact factory for availability of special FA1B or FA1C laser models

## Raytek Automation Products: Noncontact Temperature Measurement for Industrial Applications

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