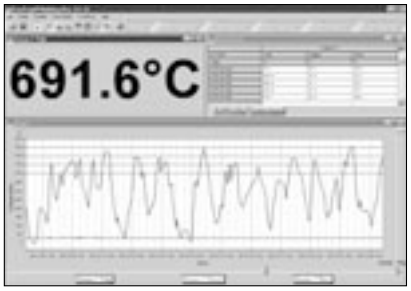
# MR1S
## Datasheet

## High Performance Infrared Ratio Thermometers


*MR1S model shown with optional ThermoJacket*

Raytek®
A Fluke Company

# MR1S Highlights

- Provides accurate measurement of targets that are: partially occluded, obstructed by smoke, steam, or particulates, moving, smaller than the instrument field of view.
- Measures from 600º to 3000ºC (932º to 4532ºF) with three models
- Fast response time down to 10 mSec
- One-color or two-color operation
- Simultaneous analog and digital outputs
- Programmable relay output (dual-temperature setpoints or "fail-safe")
- Unique "dirty window" alarm (attenuation measurement US Patent No. 5,815,410)
- Bi-directional RS485 communications
- Supports up to 32 Marathon Series sensors on a multipoint network
- Windows® DataTemp Multidrop Software (operates under WIN 3.1/95/98/NT4 Windows 2000, XP)
- Field Calibration Software

Marathon Ratio Thermometers (MR1S) use two-color measurement to provide superior accuracy in demanding applications. The MR1S thermometers features an advanced electro-optical design, digital electronics and built-in user interface—all combined in a rugged, compact housing. MR1S thermometers are ideal in situations where the target may be obstructed due to atmospheric smoke or other particulates, where the target is moving, or where the target is smaller than the field-of-view.

MR1S thermometers allow users to switch between one-color and two-color operation, which simplifies setup and provides continued measurement flexibility.

All Marathon Series thermometers include bidirectional, RS-485 serial communications between the sensor (or a local area network of sensors) on the factory floor and a personal computer in the control room. This enables remote setup, monitoring, calibration, and maintenance, especially valuable for installation in hard-to-reach locations.

# Specifications

| | |
|---|---|
| Temperature Ranges: | |
| MR1SA | 600ºC to 1400°C (1112ºF to 2552°F) |
| MR1SB | 700ºC to 1800°C (1292ºF to 3632°F) |
| MR1SC | 1000ºC to 3000°C (1832ºF to 5432°F) |
| Detector | Si/Si layered detector, nominal 1µm |
| Accuracy | ±(0.5% Tmeas +2º C); Tmeas in ºC* |
| Repeatability | ±0.3% full scale |
| Temperature Resolution | 1°C or °F |
| Response Time | 10 mSec |
| Emissivity one-color | 0.10 to 1.0 in 0.01 increments |
| Slope two-color | 0.85 to 1.150 in 0.001 increments |
| Signal Processing | Peak Hold and Averaging |

* No attenuation

## Optical

**Typical Spot Size at Minimum Focus Distance**

| Models | D:S* | Minimum Spot Size Diameter* |
|---|---|---|
| MR1SASF | 44:1 | 14 mm (0.55 inch) @ 600mm (24 inch) |
| MR1SBSF | 82:1 | 7.3 mm (0.29 inch) @ 600mm (24 inch) |
| MR1SCSF | 130:1 | 4.6 mm (0.19 inch) @ 600mm (24 inch) |
| MR1SACF | 44:1 | 7.0 mm (0.28 inch) @ 300mm (12 inch) |
| MR1SBCF | 82:1 | 3.7 mm (0.15 inch) @ 300mm (12 inch) |
| MR1SCSF | 130:1 | 2.3 mm (0.09 inch) @ 300mm (12 inch) |

***Typical spot size diameter=Minimum Focus Distance / Typical D:S**
100% Best performance realized when % signal reduction <95% Consult MR1S Operator's Manual for further information.

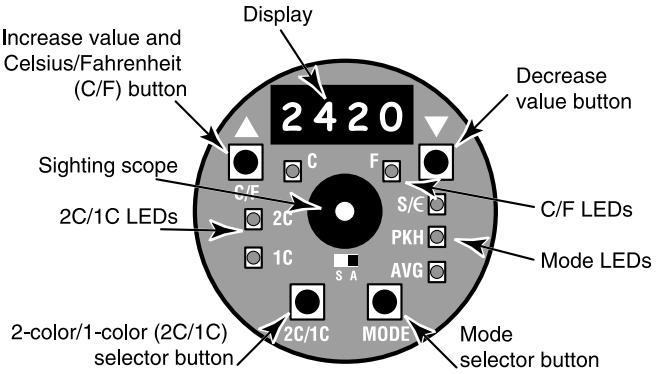
## Electrical

| | |
|---|---|
| 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, 500 mA, ±20% |
| Compliance | CE low voltage directive; EN 61326 |

## General

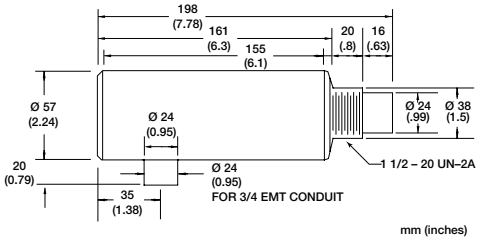
| | |
|---|---|
| Environmental Rating | NEMA-4 (IEC 529, IP 65) |
| Ambient Temperature | |
| Without cooling option | 10º to 65ºC (50º to 150ºF) |
| With air cooling | 10º to 120ºC (50º to 250ºF) |
| With water cooling | 10º to 175ºC (50º to 350ºF) |
| With ThermoJacket (water cooled) | 10º to 315ºC (50º to 600ºF) |
| Storage Temperature | -20º to 70ºC (-4º to 158ºF) |
| 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 | |
| Sensing Head | 0.48kg (17oz) |
| With air/water cooled housing | 0.8kg (28oz) |

# User Interface

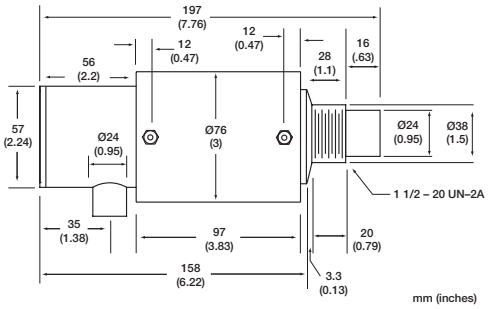



# Physical Dimensions

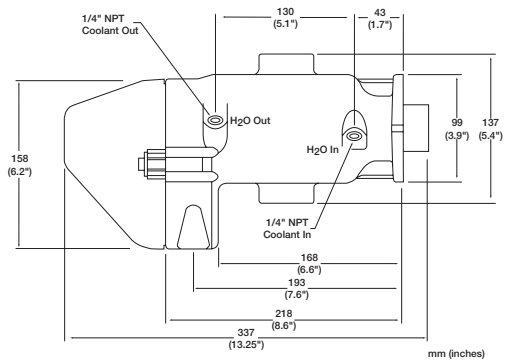
**MR1S Housing**




**MR1S Housing with Air and Water Cooling ("W" option)**




**ThermoJacket Housing**




# Accessories

**Polarizing filter end cap** reduces visual light intensity in high temperature applications **(XXXTPFEC)**

**Air purge collar (XXXTXXACAP) ***

**Swivel bracket (XXXTXXACSB) ***

**Right angle sighting accessory** (MA1S, MA2S, MR1S) **(XXXTXXACRS) ***

**Pipe adapter** (Compatible with Sighting Tubes) **(XXXTXXACPA) ***

**Adjustable Pipe Adapter Assembly** (Compatible with Sighting Tubes) **(A9WTXXAPA) ***

**Compatible with standard unit and "W" option (not ThermoJacket)*

## Flow Regulators

**Water flow regulator** (water cooling) **(XXXTXXWR)**

**Air purging flow/regulator** assembly with air filter **(XXXTXXAR)**

**Cooling air flow regulator** (high capacity) **(XXXTXXCAFR)**

## Thermojacket Housing Rated to 315 °C (600 °F)

**ThermoJacket housing**; for Marathon MA/MR **(RAYTXXTJ1)**

**Mounting Flange for ThermoJacket (XXXTXXMF)****

**Adjustable mounting base (XXXTXXMB)****

**Adjustable Pipe Adapter assembly (XXXTXXAPA) ****

**Mounting flange** for use with sighting tubes **(XXXTXXMST)****

*** For use with ThermoJacket only*

## Sighting Tubes

**300mm (12in.) SIGHTING TUBE**, ceramic (up to 1500°C) **(XXXTSTC12)**

**300mm (12in.) SIGHTING TUBE** stainless steel (up to 800°C) **(XXXTST12)**

**300mm (12in.) SIGHTING TUBE**, carbon steel; 45 degree end-cut with slotted weep hole at base. **(BEESIGHTT)**

**NIST Calibration Certification XXXMACERT**

**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)**

**RS485/RS232 CONVERTER**
DB25 to Terminal Strip Interface Converter, for direct wiring between a serial interface and the Marathon terminal block **(XXX485CVT)**

**TEFLON 12-CONDUCTOR CABLE (XXXHTCB ☐☐)**
High temperature (200ºC rated), 12-conductor Teflon jacketed cable suitable for providing connections.
☐☐ 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. Temperature rating is -20ºC to 60ºC.
☐☐ Cable length (in meters) = 1,3,5,10,15,20,...,60

RAYMR1S

| A | B | C |
|---|---|---|
| Temperature Range | Focus Options | Cooling Options |

| Model | Description |
|---|---|
| RAYMR1S | Raytek Infrared Ratio Thermometer |
| **Code A** | **Temperature Range** |
| A | 600ºC to 1400ºC (1112ºF to 2552ºF) 44:1 D:S |
| B | 700ºC to 1800ºC (1292ºF to 3272ºF) 82:1 D:S |
| C | 1000ºC to 3000ºC (1832ºF to 5432ºF) 130:1 D:S |
| **Code B** | **Focus Option** |
| SF | Standard focus variable optics 600mm (24") to ∞ |
| CF | Close focus variable optics 300mm (12") to 600mm (24") |
| **Code C** | **Cooling Option** |
| W | Coolable Housing for cooling in ambient temperatures up to 175ºC (350ºF), includes Lens Air Purge Collar; NOTE: For cooling in ambient temperatures in excess of 175ºC (350ºF), see ThermoJacket |
| **XXXMRCERT** | NIST Calibration Certification (must be ordered with MR1S as a separate line item) |
| **Typical Model Number** | **MR1SBCF** |

Raytek Automation Products: Noncontact Temperature Measurement for Industrial Applications

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