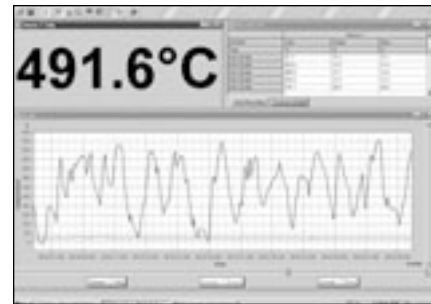




MA1/MA2

Datasheet

High-Performance Infrared Thermometers



MA1/MA2 model shown with optional ThermoJacket

MA1/MA2 Highlights

- Programmable relay output (dual-temperature setpoints or “fail-safe”)
- Simultaneous analog and digital outputs
- Laser aiming available
- Bi-directional RS485 communications
- Supports up to 32 Marathon Series sensors on a multipoint network
- Field Calibration Software
- Rugged design, NEMA-4 rated
- Optical resolution to 300:1
- Fast response time down to 1mSec
- Windows® DataTemp Multidrop Software for data acquisition, display and analysis (operates under WIN 3.1/95/98/NT4 Windows 2000, XP)

Marathon™ Series thermometers (MA1S and MA2S) combine superior specifications with digital technology to provide high performance temperature measurement. MA1S and MA2S thermometers offer an advanced electro-optical design, digital electronics and a built-in user interface—enclosed in a rugged, compact housing. These one-piece units provide superior temperature measurement for applications such as metals, heat treating, steel production, foundries, and kilns.

Proprietary signal processing electronics in the MA1S and MA2S enable user-selectable response times down to 1 mSec. This high speed is coupled with superior optical resolution for measuring small or distant targets. The entire electro-optical system has been optimized to perform over a wide measurement and ambient temperature range.

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. This enables remote setup, monitoring, calibration, and maintenance, especially valuable for installations in hard-to-reach locations.

Specifications

Temperature Ranges:

MA1SA	500° to 1400°C (932° to 2552°F)
MA1SB	600° to 2000°C (1112° to 3632°F)
MA1SC	750° to 3000°C (1382° to 5432°F)
MA2SA	250° to 1000°C (482° to 1832°F)
MA2SB	300° to 1400°C (572° to 2552°F)
MA2SC	350° to 2000°C (662° to 3632°F)

Nominal Spectral Response:

MA1S/MA2S	1.0 μm /1.6 μm
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Accuracy*	±{0.30% Tmeas + 2°C}, Tmeas in C
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Repeatability	±{0.10% Tmeas + 1°C}; Tmeas in K
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Temperature Resolution	1°C or °F
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Response Time	1 mSec or 10 mSec selectable
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Emissivity	0.10 to 1.0 in 0.01 increments
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Signal Processing	Peak Hold, Valley Hold, and Averaging
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*Applies to all models but the MA2SA, which has a 2°C offset in the accuracy expression; assumes known emissivity and blackbody calibration.

Optical

Models	D:S*	Standard Focus Distance	Close Focus Distance
MA1SA	80	600 mm (24 in) to ∞	275 to 450 mm (11 to 18 in)*
MA1SB	300	600 mm (24 in) to ∞	275 to 450 mm (11 to 18 in)
MA1SC	300	600 mm (24 in) to ∞	275 to 450 mm (11 to 18 in)
MA2SA	80	675 mm (27 in) to ∞	300 to 550 mm (12 to 22 in)
MA2SB	200	675 mm (27 in) to ∞	300 to 550 mm (12 to 22 in)
MA2SC	300	675 mm (27 in) to ∞	300 to 550 mm (12 to 22 in)

At 95% energy CF=close focus; SF=standard focus ** Available with laser aiming

Smallest Spot Size at Minimum Focus Distance

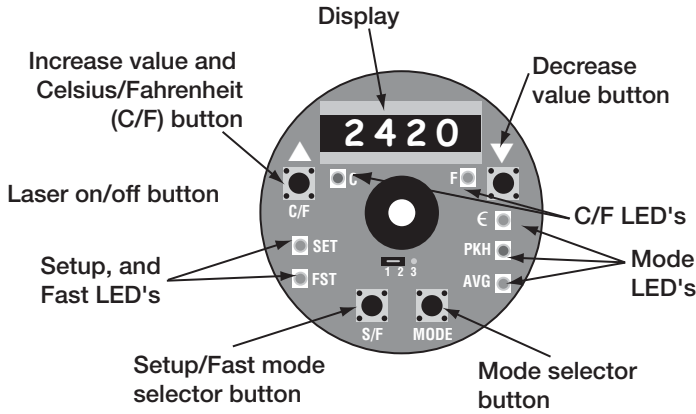
Models	Smallest Spot Size Diameter Standard Focus Distance	Smallest Spot Size Diameter Close Focus Distance
MA1SA	7.5 mm (0.30 in) @ 280mm (11")	3.50 mm (0.14 in) @ 600mm (24")
MA1SB	2.0 mm (0.08 in) @ 280mm (11")	0.92 mm (0.04 in) @ 600mm (24")
MA1SC	2.0 mm (0.08 in) @ 280mm (11")	0.92 mm (0.04 in) @ 600mm (24")
MA2SA	8.5 mm (0.34 in) @ 300mm (12")	3.75 mm (0.15 in) @ 650mm (27")
MA2SB	3.4 mm (0.14 in) @ 300mm (12")	1.50 mm (0.06 in) @ 650mm (27")
MA2SC	2.3 mm (0.09 in) @ 300mm (12")	1.00 mm (0.04 in) @ 650mm (27")

*Smallest spot size diameter = Minimum Focus Distance / Minimum D:S
Recommendation: (Target Size Dia.) (Spot Size Dia.) ≥ 1.4

General

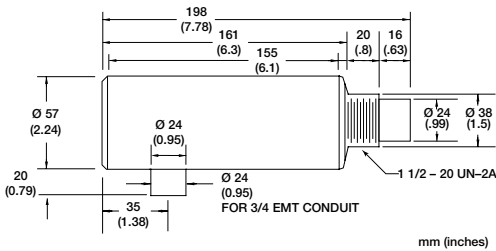
Environmental Rating	NEMA-4 (IEC 529, IP 65)
Ambient Temperature	
Without cooling option	10° to 65°C (50° to 150°F)
With air cooling	10° to 120°C (50° to 250°F)
With water cooling	10° to 175°C (50° to 350°F)
With ThermoJacket (water cooled)	10° to 315°C (50° to 600°F)
Storage Temperature	-20° to 70°C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

User Interface

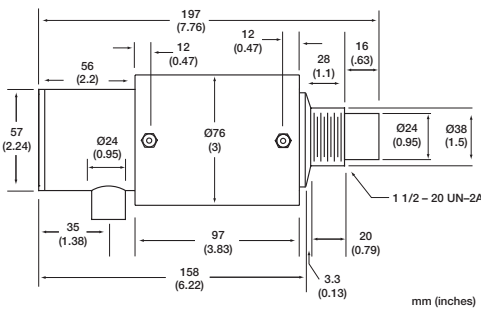


Physical Dimensions

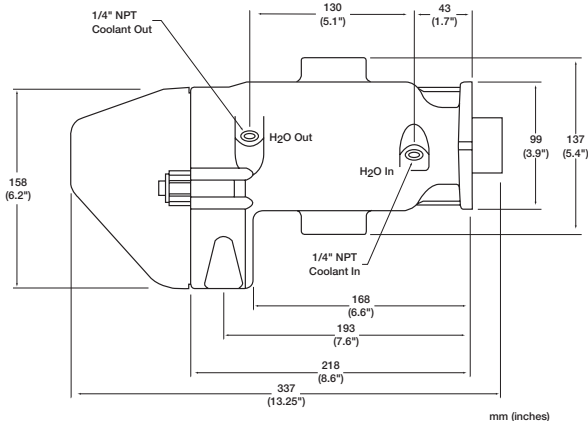
MA1/MA2 Housing



MA1/MA2 Housing with Air and Water Cooling ("W" option)



Thermo Jacket 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 (200°C rated), 12-conductor Teflon jacketed cable suitable for providing connections.

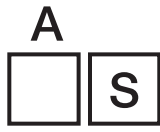
□□ Cable length (in meters) = 1,3,5,10,15,20,...,60

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 -20°C to 60°C.

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

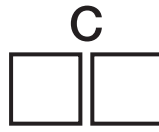
RAYMA



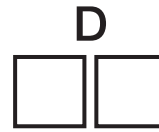
Model



Temperature Range



Focus Options



Options

Model	Description	
RAYMA	Raytek Infrared Thermometer (1-color)	
Code A	Response Code	
1	MA1S 1-micron response	
2	MA2S 1.6-micron response	
Code B	Temperature Range MA1	Temperature Range MA2
A	500° to 1400°C (932° to 2552°F) 80:1 D:S	250° to 1000°C (482° to 1832°F) 80:1 D:S
B	600° to 2000°C (1112° to 3632°F) 300:1 D:S	300° to 1400°C (572° to 2552°F) 200:1 D:S
C	750° to 3000°C (1382° to 5432°F) 300:1 D:S	350° to 2000°C (662° to 3632°F) 300:1 D:S
Code C	Focus Option	
SF	Standard Focus	
CF	Close focus variable optics	
Code D	Options	
L	Laser aiming option	
W	Coolable Housing for cooling in ambient temperatures up to 175°C (350°F), includes Lens Air Purge Collar; NOTE: For cooling in ambient temperatures in excess of 175°C (350°F), see ThermoJacket	
XXXMACERT	NIST Calibration Certification (must be ordered with MA as a separate line item)	
Typical Model Number	MA2SBCFL	

Raytek Automation Products: Noncontact Temperature Measurement for Industrial Applications

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