

### Heat Spy® Monitor R40 Series Fixed Infrared Sensor

Inaccurate measuring of surface temperatures is easy to do and can result in a less than high quality product no matter what you're aiming at. Utilizing the Wahl Heat Spy Monitor R40 will result in consistent measurement and greater confidence in process results.



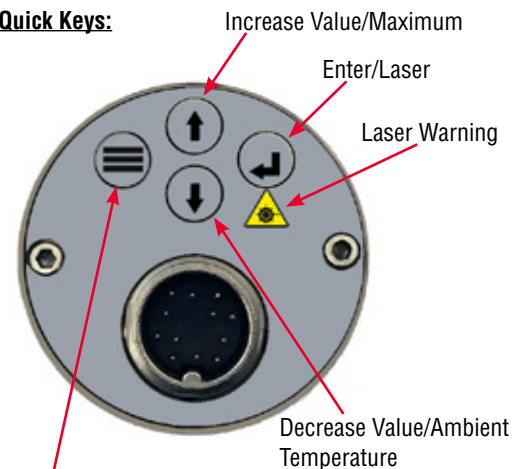
R40 Infrared - Front View

A high technology non-contact infrared sensor, designed to meet all application requirements by offering high performance and advanced functionality. Rugged, IP65 (NEMA 4) sealed single-piece system, with optics and electronics built into one housing, the R40 is easy to install and has the flexibility to handle nearly any application.

The R40 includes signal processing features including Peak Hold, Valley Hold and Averaging, all of which are adjustable on-site via the keypad or controlled remotely when interfaced with user's software.

#### R40 MENU

##### Quick Keys:



##### LCD Display Menu Selections to view and set:

- Real Time Temperature
- Emissivity
- Transmission
- Average/Peak/Valley Select
- Average/Peak/Valley Time Setting
- Analog Output Selection
- High End of mA T Range
- Low End of mA T Range
- Laser Setting
- Alarm Low
- Alarm High
- Multiple Sensor ID
- Baud Rate
- Temperature Unit °F/°C

Micron Spectral Range to Cover Application				
		Spectral Range	Temperature Span	Application
1M	Molten Metal	1.0µm	400° to 3000°C (752° to 5432°F)	Molten Glass Molten Metal Molten Ceramics Hot Graphite Ferrous Metal
2M	Hot Metal	1.6µm	300° to 2300°C, (572° to 4172°F)	Hot Metal Hot Ceramic Non-Ferrous Metal
3M	Cold Metal	2.4µm	50° to 1000°C, (122° to 1832°F)	Low Temp Metal
P3	Plastics	3.43µm	100° to 500°C (212 °to 932°F)	Plastic Thin Film (1 to 3 mil), Polyethylene Films and all types of its category: Polyethylene (PE) Polypropylene (PP) Polyamide (Nylon) Polystyrene (PS) Polyvinyl Chloride (PVC) Polyurethane Vinyl / Acrylic / Polycarbonate Cellophane
MT	Thru Flame	3.9µm	600° to 1500°C (1112° to 2732°F)	Thru hot furnace gases and clean burning gas flames, indicates correct temperatures of substances during warm up process in industrial furnaces
F4	Burning Gas	4.11 - 4.72µm	400° to 1600°C, (752° to 2912°F)	CO <sub>2</sub> Gas (4.24 Micron) in chimney NO <sub>2</sub> Gas (4.55 Micron) in combustion Hot CO Gas (4.66 Micron) in combustion Flame temperature in Boiler /Furnace Utility Power Station Biomass Boilers Hazardous Waste / Garbage Incinerators Kilns / Furnaces
G5	Glass	5.1µm	400° to 2250°C (752° to 4082°F)	Glass above 1 mm thickness Flat Glass production Bulb production Glass bending Car glass assembly
P7	Plastics	7.9µm	40° to 600°C (104° to 1112°F)	Plastic Thin Film, (1 to 3 mil) Polyester Films and all types of it's category: Polyester Cellulose Acetate Polyurethane Teflon (Fluoroplastic FEP) Polyvinyl Chloride (PVC) Acrylic / Polycarbonate Polyamide (Nylon) Polyester (>10 µm)
G7	Thin Glass		40° to 1000°C (104° to 1832°F)	Thin Glass Below 1 mm thickness Light bulb production Medical vial production
LT	Low Temp	8 to 14µm	-40° to 800°C (-40° to 1472°F)	Organic materials Painted metal surfaces Rubber / Paper / Textiles Thicker plastics

Specifications subject to change without notice.

Heat Spy® is a registered trademark of Palmer Wahl Instruments Inc.

March 2021

Palmer Wahl Instruments, Inc. • Toll Free: 800-421-2853 • Phone: 828-658-3131 • www.palmerwahl.com



## R40 FEATURES AND SPECIFICATIONS

Back-lit 5-Digit LCD display with 4-Key Pad for convenient on-site viewing and setting.

12-Pin connection cable for simultaneous analog/digital input and output.

- 0-20 or 4-20 mA Linear Current Loop, sub-range programmable, user selectable.
- RS485 for networking, up to 32 sensors.
- Relay for alarm and PLC control, user programmable.
- External Input for reset and parameter adjusting of AVG, PEAK HOLD and VALLEY HOLD.

Built-in Laser to simplify alignment operation. (Not available on Models P3 or F4)

Programmable for OEM applications through RS485 for remote setup and monitoring.

Optional non-contact Thermocouple Type IR tube with extremely long life is available as an alternative to traditional contact thermocouples, (see pg 6).

Sensor Specifications	
<b>Ambient Temperature</b>	0° to 65°C, (32° to 149°F)
with Air Cooling	0° to 120°C, (32° to 250°F)
with Water Cooling	0° to 175°C, (32° to 350°F)
<b>Storage</b>	-20° to 70°C (-4° to 158°F)
<b>Relative Humidity</b>	10% to 95% non-condensing
<b>Protection Class</b>	IP65 (NEMA-4)
<b>Laser Sight</b>	650 nm <1mW, Class II
<b>Shock &amp; Vibration</b>	MIL-STD-810D
<b>Housing Material</b>	ANSI 304 Stainless Steel
<b>Housing Dimensions</b>	45mm Dia. x 183mm (1.77 x 7.20 in)
<b>Weight</b>	0.72 kg (1.58 lbs)

Electronic Specifications	
<b>LCD</b>	5-Digit, 1° Resolution
<b>Keyboard</b>	4 - Key
<b>Analog Output</b>	0-20mA, 4-20mA
<b>Digital Output</b>	RS485
<b>Alarm</b>	High or Low
<b>Signal Processing</b>	AVG / PEAK HOLD / VALLEY HOLD
<b>Relay</b>	User Programmable
<b>Cable</b>	12-pin Connection Cable
<b>Power Supply</b>	24 VDC Nominal, (10 - 32 VDC)

Measuring Specifications		
	1M / 2M / 3M	P3 <sup>4</sup> / MT / F4 / G5 / P7 / G7 / LT
<b>Accuracy</b> <sup>1</sup>	± 0.25% of reading	± 0.6% of reading or ± 1°C, whichever is higher
<b>Repeatability</b> <sup>2</sup>	± 0.10% of reading or ± 1°C, whichever is greater	± 0.3% of reading or ± 0.3°C, whichever is greater
<b>LCD Resolution</b>	1°C / 1°F	1°C / 1°F
<b>Response Time</b> <sup>3</sup>	5 mS	150 mS
<b>Emissivity</b>	0.10 to 1.00	0.10 to 1.00

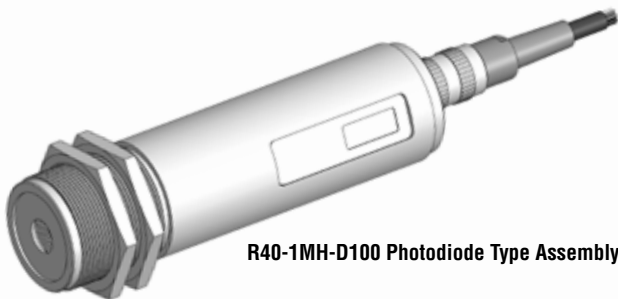
<sup>1</sup> at ambient temperature 23°C, e =1.0, NIST transfer standard.

<sup>2</sup> at ambient temperature 23°C.

<sup>3</sup> 90% of value.

<sup>4</sup> after 20 minute warm-up.

## R40 ASSEMBLY



R40-1MH-D100 Photodiode Type Assembly



R40-LTM-D30 Thermopile Type Assembly

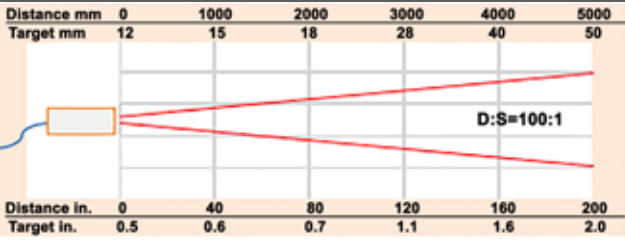


R40 Fixed Infrared Optics Diagrams

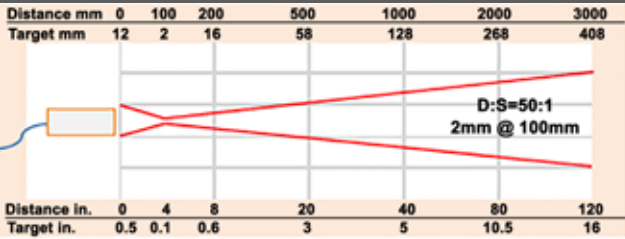
Photodiode Models

1M / 2M / 3M OPTICS - Photodiode Sensor

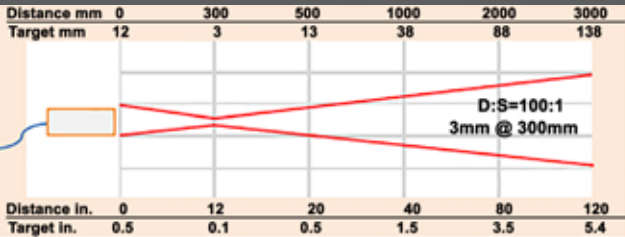
Optics Code: D100



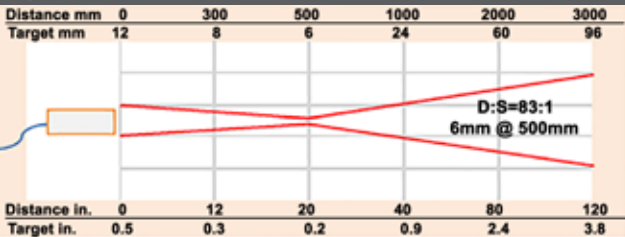
Optics Code: F100



Optics Code: F300



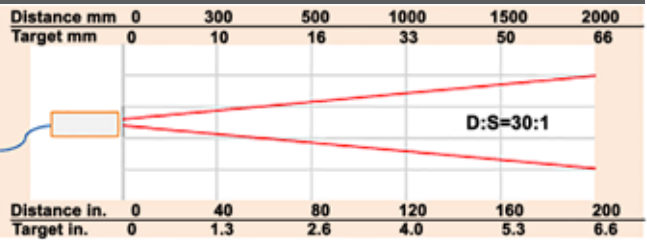
Optics Code: F500



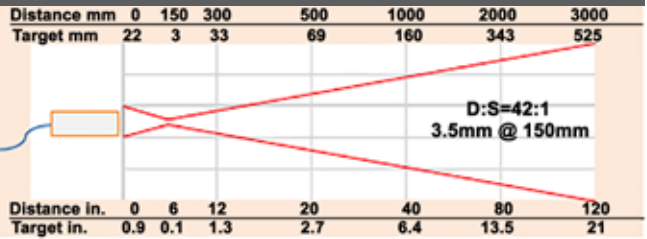
Thermopile Models

P3 / MT / F4 / G5 / P7 / G7 / LT OPTICS - Thermopile Sensor

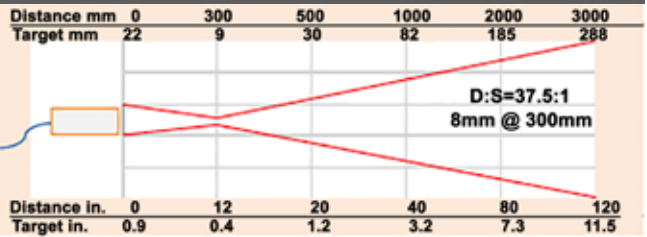
Optics Code: D30



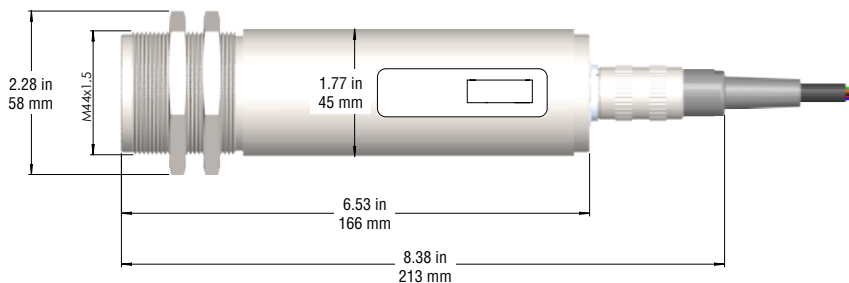
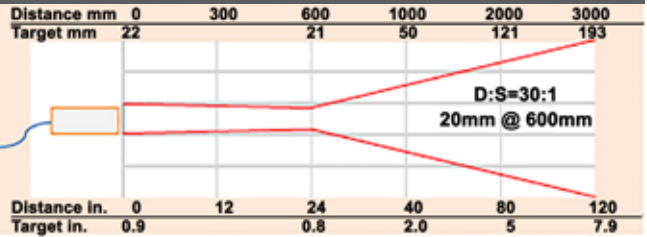
Optics Code: F150



Optics Code: F300



Optics Code: F600



R401MMD100 Assembly - Dimensions



Specifications subject to change without notice.

# R40 Fixed Infrared Ordering Guide

## PHOTODIODE MODELS - Step 1 - Select: Series

<b>R40</b>	Fixed Infrared, includes: Certificate of Conformance and User Manual
------------	--

## Step 2 - Select: Spectral and Temperature Range

Code	Spectral Range	Temperature Range	Application
<b>1ML</b>	1.0µm	400° to 1800°C, (752° to 3272°F)	Molten Metal/Ceramics
<b>1MM</b>		600° to 1800°C, (1112° to 3272°F)	Hot Graphite
<b>1MH</b>		600° to 3000°C, (1112° to 5432°F)	Ferrous Metal
<b>2ML</b>	1.6µm	300° to 1400°C, (572° to 2552°F)	Hot Metal
<b>2MM</b>		400° to 1600°C, (752° to 2912°F)	Hot Ceramic
<b>2MH</b>		400° to 2300°C, (752° to 4172°F)	Non-Ferrous Metal
<b>3ML</b>	2.4µm	50° to 1000°C, (122° to 1832°F)	Cold Metal

## Step 3 - Select Optics

Code	Optics	
<b>D100</b>	100:1	
<b>F100</b>	2mm@100mm	50:1
<b>F300</b>	3mm@300mm	100:1
<b>F500</b>	6mm@500mm	83:1

## Step 4 - Select Connection Cable Length

Code	Cable Length
<b>CB1</b>	Cable, 1 meter, (3.28 feet) Standard
<b>CB3</b>	Cable, 3 meters, (9.84 feet)
<b>CB5</b>	Cable, 5 meters, (16.40 feet)
<b>CB8</b>	Cable, 8 meters, (26.24 feet)
<b>CB15</b>	Cable, 15 meters, (49.21 feet)
<b>CBX</b>	Cable, Customer Specified Length (100m (300 ft) Max)

Add desired Accessories (shown on page 6) as separate line items.

Series	Spectral/Temp Range Code	Optics Code	Connection Cable Length Code
<b>R40</b>			
Insert Codes in boxes above to build part number			

### Model # Example:

**R401MLF500CB3:** R40 Series, 1.0µm Spectral Range, 400° to 1800°C, (752° to 3272°F) Temperature Range, 6mm@500mm Focal Point, 83:1 D to S, 3 meter Connection Cable Length.



**We build to order:  
if your process requires  
an option not shown here  
please call  
Customer Service.**

Specifications subject to change without notice.

# R40 Fixed Infrared Ordering Guide

## THERMOPILE MODELS - Step 1 - Select Series

<b>R40</b>	Fixed Infrared, includes: Certificate of Conformance and User Manual		
<b>Step 2 - Select: Spectral and Temperature Range</b>			
Code	Spectral Range	Temperature Range	Application
<b>P3M</b>	3.43µm	100° to 300°C, (212 °to 572°F)	Plastics
<b>P3H</b>		100° to 500°C, (212° to 932°F)	
<b>MTM</b>	3.9µm	600° to 1300°C, (1112° to 2372°F)	Thru Flame
<b>MTH</b>		600° to 1500°C, (1112° to 2732°F)	
<b>F4M</b>	4.11 to 4.72µm	400° to 1500°C, (752° to 2732°F)	Burning Gas
<b>F4H</b>		400° to 1600°C, (752° to 2912°F)	
<b>G5M</b>	5.1µm	400° to 1600°C, (752° to 2912°F)	Glass
<b>G5H</b>		400° to 2250°C, (752° to 4082°F)	
<b>P7</b>	7.9µm	40° to 600°C, (104° to 1112°F)	Plastics
<b>G7</b>		40° to 1000°C, (104° to 1832°F)	Thin Glass
<b>LTL</b>	8 to 14µm	-40° to 600°C, (-40° to 1112°F)	Low Temperature
<b>LTM</b>		-40° to 800°C, (-40° to 1472°F)	Medium Temperature

Step 3 - Select Optics		
Code	Optics	
<b>D30</b>	30:1	
<b>F150</b>	3.5mm@150mm	42:1
<b>F300</b>	8mm@300mm	37.5:1
<b>F600</b>	20mm@600mm	30:1

Step 4 - Select Connection Cable Length	
Code	Cable Length
<b>CB1</b>	Cable, 1 meter, (3.28 feet) (Standard)
<b>CB3</b>	Cable, 3 meters, (9.84 feet)
<b>CB5</b>	Cable, 5 meters, (16.40 feet)
<b>CB8</b>	Cable, 8 meters, (26.24 feet)
<b>CB15</b>	Cable, 15 meters, (49.21 feet)
<b>CBX</b>	Cable, Customer Specified Length (100m (300 ft) Max)

Add desired Accessories (shown on page 6) as separate line items.

Series	Spectral/Temp Range Code	Optics Code	Connection Cable Length Code
<b>R40</b>			
Insert Codes in boxes above to build part number			

**Model # Example:**  
**R40P3HF150CB5:** R40 Series, 3.43µm Spectral Range, 100° to 500°C, (212° to 932°F) Temperature Range, 7mm@150mm Focal Point, 50:1 D to S, 5 meter Connection Cable Length.

*Specifications subject to change without notice.*

**IP65**  
COMPLIANT

TWO YEAR  
**2**  
WARRANTY

Palmer Wahl

BEYOND THE SCALE

5

## R40 Fixed Infrared Accessories

### MOUNTING SYSTEM OPTIONS

#### SURFACE MOUNT

##### R40 Surface Mount Brackets:

**16451** - R40 Surface Mount Bracket, Fixed, Diameter: 45mm (1.77")

**16453** - R40 Surface Mount Bracket, Adjustable, Dia: 45mm (1.77")



16451 - Surface Mount Bracket, Fixed



16453 - Surface Mount Bracket, Adjustable

#### WALL MOUNT

##### R40/60 Series Mounting Flange:

**16483** - R40/60 Series Wall Mount Flange - M30x1 Male on Fixed IR/Air Purge side



16483 - Wall Mount Flange

#### SIGHTING / IR TUBES

##### R40/60 Series Sighting Tube for use with R40 Optics Code D100 (D to S: 100:1). M30 x 1, Length: 11.81 in. (300 mm)

**16491-1** - SS304, 1500°F (800°C)

**16491-2** - Inconel, 2000°F (1100°C)

**16491-3** - Silicon Carbide, 3000°F (1600°C)

**16491-4** - High Purity Alumina, (99.8%), 3500°F (1900°C)

**16491-5** - Glassy Carbon, 5430°F (3000°C)



Use a Sighting Tube to avoid reflected energy in temperature measurement environments. Sighting tubes should be used when the target is blocked by fumes or flames. Use together with an air purge system for a clean viewing path from target to the thermometer.

##### R40/60 Series Thermocouple IR Tube for use with R40 Optics Code F300 (D to S: 100:1). M30 x 1, Length: 11.81 in. (300 mm)

**16492-1** - SS304, 1500°F (800°C)

**16492-2** - Inconel, 2000°F (1100°C)

**16492-3** - Silicon Carbide, 3000°F (1600°C)

**16492-4** - High Purity Alumina, (99.8%), 3500°F (1900°C)

**16492-5** - Glassy Carbon, 5430°F (3000°C)



The Thermocouple IR Tube includes a protective thermowell, infrared lens, fiber optic cable and remote electronics. Infrared radiation from the bottom of the well is transmitted by the optical fiber to the detector.



#### AIR PURGE

##### R40 Air Purge:

**16472** - R40 Air Purge, M44x1.5 to M30x1



16472 - Air Purge

An Air Purge is used to eliminate dust, dirt, heat, steam, smoke, fumes, particles or vapors from the front of the optical head, and to keep the lens clean.

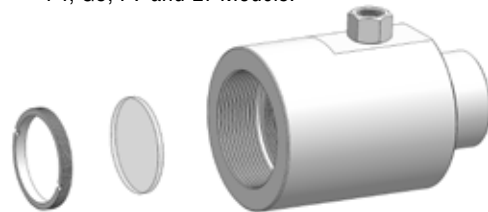
#### PROTECTION WINDOWS

##### R40 Protection Windows (includes Locking Ring):

**16465-1** - BK7 Protection Window for R40 for use with 1M and 2M Models.

**16465-2** - Sapphire Protection Window for R40 for use with 1M, 2M, MT, F4 and G5 Models.

**16465-3** - ZnSe Protection Window for R40 for use with P3, MT, F4, G5, P7 and LT Models.



Shown above: Locking Ring and Protection Window with Air Purge

Protection windows are necessary in excessively harsh environments. Window not needed on 3M units.

#### AIR/WATER COOLING JACKET

##### R40 Air/Water Cooling Jacket:

**16460** - R40 Air/Water Cooling Jacket



For a detector installed in a very hot environment a cooling jacket is used to cool the electronics.

#### POWER SUPPLY

##### Power Supply:

**16116** - Compact AC/DC Power Supply, 24V, 31W (for use outside control box)

**16117** - AC/DC Power Supply, 24V, 25 to 150 W (for use inside control box)



16116



16117

Specifications subject to change without notice.