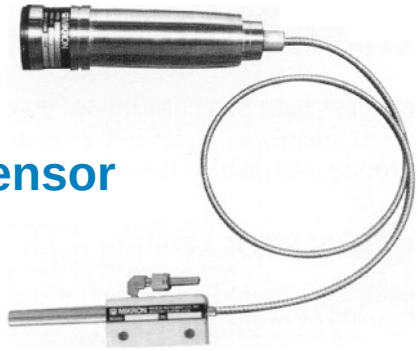
MIKRON INFRARED

M68 Infraducer

Fiber Optic Infrared Temperature Sensor



non-contact temperature measurement
600° to 5400°F (350° to 3000°C)

TYPICAL APPLICATIONS

- Glass Melt Tanks and Forehearths
- Induction Heat Treating
- Monitoring Silicon Crystal Growth
- Hazardous Environments
- Metal Melting and Hot Forming
- Vacuum Melting
- Process Heating
- Semiconductor Processing

GENERAL

The M68 Infraducer is a self-contained fiber optic temperature sensor that provides a 4-20mA linear output designed for 2 wire operation from available power supplies of 18 to 40VDC.

The M68 consists of a stainless steel sensor head which is equipped with a fiber optic cable of length up to 18m (60'). Attached to this cable is your choice of one of two lens assemblies or rigid extension tip. They are available in stainless steel, ceramic or pure crystal.

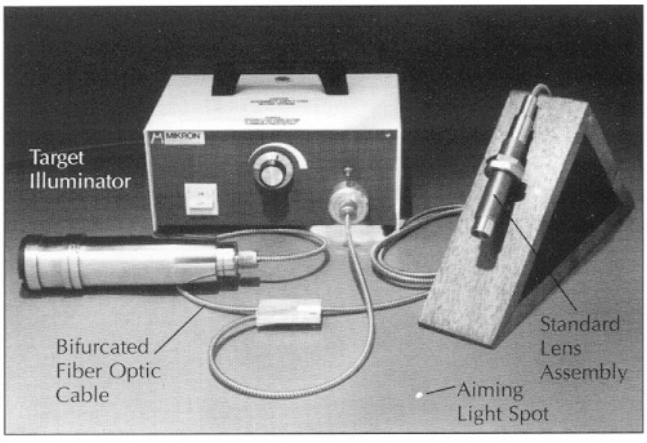
The Standard Lens Assembly is designed for rugged industrial applications in extremely harsh environments. The barrel of the lens assembly is threaded for convenient mounting in any location. This assembly is especially suited for vacuum applications when placed inside the vacuum chamber using a vacuum bushing for fiber optic feed thru. The standard lens assembly can be used with a wide variety of accessories and, when mounted within its companion cooling jacket, it can withstand ambient temperatures of up to 480°C (900°F).

The Mini Lens Assembly is designed for applications where mounting space is limited. It features integrated air purging and cooling and can withstand ambient temperatures of up to 315°C (600°F).

Rigid Extension Tips are also available to provide access to targets that may be constructed by other equipment or insulation. The small diameter rigid tip can be inserted between heater coils or through small openings. They are available in stainless steel or ceramic.

Features:

- Exceptional flexibility – can be used in applications where direct sighting with conventional infrared instrumentation is difficult or impossible
- Unaffected by RF or EMI interference
- Can function in high ambient temperature environments – up to 315°C (600°F) without cooling; up to 480°C (900°F) with water cooling.
- Can operate in corrosive or murky environments and where fumes and other atmosphere pollutants are present
- Can be placed inside vacuum vessels for temperature measurement
- Field interchangeability of the sensor, fiber optic cable, lens assemblies and exterior tips of same model and length



Model Selection:

To order the right unit, just follow these simple steps and insert the proper codes in the boxes following the basic Model No., which is M68.

SELECTION PROCEDURE

1. Select the desired temperature range and units (°C or °F) from the first row in the chart. Enter these figures and units in the Box [1], filling in all blanks with zeros.
2. Insert in Box [2] the spectral response code for the temperature range selected.
3. Enter the output code, (L) for 4-20mA linear output or (U) for other.
4. Choose the proper fiber optic cable from the chart which lists available lengths for both single and bifurcated cables. Enter the code for your selection in the Box [4].
5. Next choose the specific lens assembly. For rugged applications where a variety of hardware is required, specify the standard lens assembly. For ambient conditions below 315°C (600°F) where mounting space is limited, specify the miniature lens assembly. Then choose the proper field of view from the diagrams. Enter the type of lens assembly and field of view code in Box [5]. If, however, an extension tip (with an FOV of 3:1) is to be used, the code number to be entered in Box [5] will be that selected from the chart under Rigid Extension Tips listing both ceramic and stainless tips available.
6. Select list of accessories and list part numbers.

EXAMPLE:

The Model No. for the M68 Infraducer indicated in the boxes designates a unit for a temperature range of 900° to 1600°C (1) with a spectral response of 0.78 to 1.06 microns (2); a 4-20mA linear output (3); using a 2m length of single flexible fiber optic cable (4); a standard lens assembly with an FOV ratio of 90:1 (5).

TEMPERATURE RANGE (see note 1) °C	°F
500 to 900	1050 to 1600
650 to 1000	1150 to 1800
700 to 1100	1300 to 2000
750 to 1200	1400 to 2200
800 to 1300	1500 to 2500
900 to 1600	1800 to 3200
1100 to 2000	2000 to 4000
1500 to 3000	2700 to 5400
350 to 600	600 to 1000
450 to 800	750 to 1400
550 to 1100	1000 to 2000

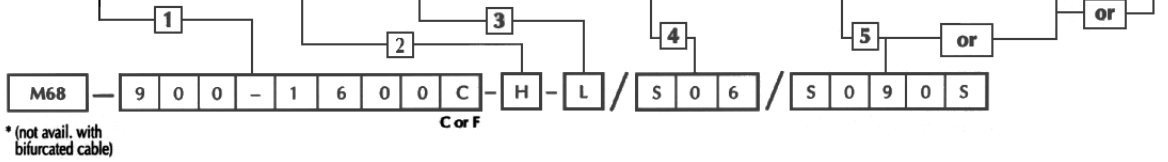
SPECTRAL RESPONSE MICRONS	CODE
0.78-1.06	H
1.0-1.6	Q

OUTPUT TYPE	CODE
4-20mA LINEAR	L
OTHERS (see note 4)	U

FLEXIBLE FIBER OPTIC CABLE (see note 1, 2 & 3) TYPE	LENGTH	CODE
SINGLE BUNDLE FOR STANDARD APPLICATION	1m (3')	S03
	2m (6')	S06
	4m (12')	S12
	6m (18')	S18
	8m (24')	S24
	10m (30')	S30
BIFURCATED FOR LIGHT BEAM TARGETING WHILE MEASURING TEMPERATURE (see note 5)	1m (3')	B03
	2m (6')	B06
	4m (12')	B12

LENS ASSEMBLY TYPE FOV RATIO	CODE
Standard Lens Assembly	
30:1 Min. Focussable Dist: 25.0cm (5.0")	S030S
90:1 Min. Focussable Dist: 25.0cm (5.0")	S090S
180:1* Min. Focussable Dist: 25.0cm (5.0") (see note 1)	S180S
Mini Lens Assembly	
30:1 Min. Focussable Dist: 2.5cm (1.0")	M030S
90:1 Min. Focussable Dist: 7.6cm (3.0") (see note 1)	M090S

RIGID EXTENSION TIPS (see note 6) OUTSIDE DIAMETER	STAINLESS STEEL LENGTH	CODE	CERAMIC LENGTH	CODE
5mm (3/16") 4.76mm (0.188")	77mm (3")	S033	77mm (3")	C033
	153mm (6")	S063	153mm (6")	C063
	305mm (12")	S123	305mm (12")	C123
	607mm (24")	S243	607mm (24")	C243
4mm (1/8") 3.175mm (0.125")	77mm (3")	S032	77mm (3")	C032
	153mm (6")	S062	153mm (6")	C062
	305mm (12")	S122		
	607mm (24")	S242		



Notes:

1. Temperature ranges in bold are not available with FOV's in bold or with fiber optic cable lengths in bold.
2. Minimum bend radius of fiber optic cable 51mm (2").
3. Non-standard fiber length available. Maximum length 18m (60') for limited temperature ranges.
4. For details see specification under "output" on page 4
5. Not recommended for use without lens assembly. Mikron target illuminator is required as light source (see accessories section).
6. All mounting brackets and necessary hardware are supplied by Mikron.

Optical Data:

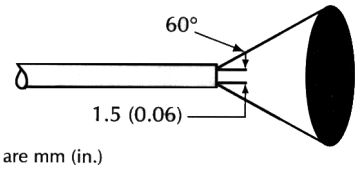
STANDARD LENS ASSEMBLY

FOV RATIO	FIELD OF VIEW DIAGRAMS
30:1 Min. Focussable Distance: 12.7cm (5.0″)	TARGET DISTANCE CM: 0, 76, 140 / TARGET DIA. CM: .40, 2.5, 5.7 / TARGET DIA. IN.: .40, 1.0, 2.5 / TARGET DISTANCE IN.: 0, 30, 60
90:1 Min. Focussable Distance: 12.7cm (5.0″)	TARGET DISTANCE CM: 0, 230, 460 / TARGET DIA. CM: 1.0, 2.5, 6.4 / TARGET DIA. IN.: .40, 1.0, 2.5 / TARGET DISTANCE IN.: 0, 90, 180
180:1 Min. Focussable Distance: 12.7cm (5.0″)	TARGET DISTANCE CM: 0, 460, 915 / TARGET DIA. CM: 1.0, 2.5, 6.1 / TARGET DIA. IN.: .40, 1.0, 2.5 / TARGET DISTANCE IN.: 0, 180, 360

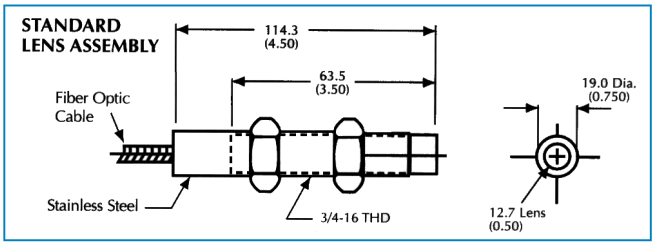
MINI LENS ASSEMBLY

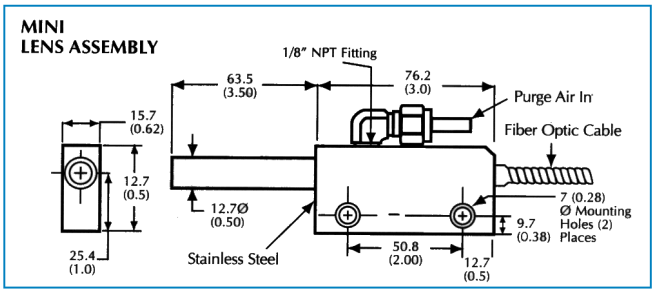
FOV RATIO	FIELD OF VIEW DIAGRAMS
30:1 Min. Focussable Distance: 2.5cm (1.0″)	TARGET DISTANCE CM: 0, 76, 140 / TARGET DIA. CM: .40, 2.5, 5.7 / TARGET DIA. IN.: .40, 1.0, 2.5 / TARGET DISTANCE IN.: 0, 30, 60
90:1 Min. Focussable Distance: 7.6cm (3.0″)	TARGET DISTANCE CM: 0, 230, 460 / TARGET DIA. CM: 1.0, 2.5, 6.4 / TARGET DIA. IN.: .40, 1.0, 2.5 / TARGET DISTANCE IN.: 0, 90, 180

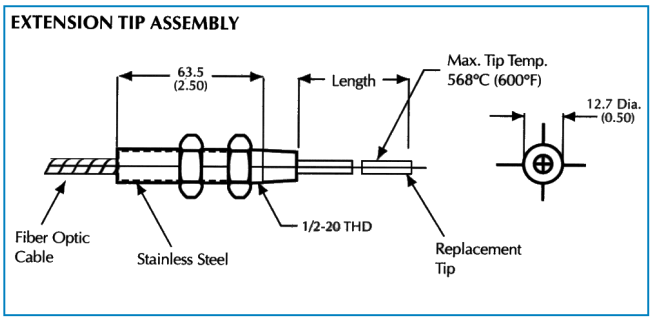
EXTENSION TIP FIELD OF VIEW



All dimensions are mm (in.)







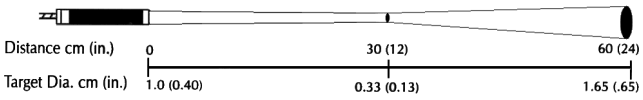
CLOSE FOCUS FIELD OF VIEW DIAGRAM

When non-standard focus distance is desired, such as close focus, insert code"U" instead of "S" and describe desired focus distance in writing. Minimum target size is determined by the formula.

$$\text{Minimum Target size} = \frac{\text{Focussed Distance from Lens Assembly}}{\text{FOV Ratio}}$$

Example: Min. target size for focus distance of 300mm (12″) and FOV ratio of 90:1, is

$$\text{Minimum Target diameter} = \frac{30}{90} = 0.33\text{cm } (0.13″)$$



Technical Data:

SPECIFICATIONS

Accuracy*: ±0.75% of full scale or 2.2°C (4°F), whichever is greater
Repeatability: ±0.25% of full scale span (FSS)
Resolution: ±0.1% of FSS
Emissivity: Digital setting 0.10 to 0.99 with 0.01 step
Input Voltage: 24VDC nominal
Input Voltage Range: 18V to 40VDC
Effect of Input Voltage Change on Accuracy: 0.01% of FSS/Volt
Output Current Span:
Standard: 4-20mA linear
Optional: 10-50mA linear or 4-20mA non-linear 50 msec; Optional: 10 msec
Response Time: 10 msec to 10 seconds internally adjustable. Response time defined as time required for output to reach 95% of final value
Load Resistance Max: 100 ohms for 18V input voltages, 500 ohms for 24V input voltages, 1300 ohms for 40V input voltages
Effect of Load Resistance Change on Accuracy: 0.0005% FSS/ohm
Electrical Connections: Two terminal screws molded into high strength, high temperature thermoplastic
Operating Ambient Temperature:
Model 68 sensor head
1. Without cooling jacket 0° to 60°C (32° to 140°F)
2. With cooling jacket up to 315°C (600°F)
Standard Lens and Tip Assembly:
1. Without cooling jacket 0° to 315°C (32° to 600°F)
2. With cooling jacket up to 480°C (900°F)
Mini Lens Assembly
Up to 315°C (600°F)
Ambient Storage Temperature: -30° to 80°C (-20° to 160°F)
Relative Humidity: 90% non-condensing
Vibration: 3g any axis continuous
Shock: 50g
Housing Material: Stainless steel
Weight of M68 Housing: 0.90kg (1.9 lbs.)
Mounting: Support block with four 5mm (0.200") dia. holes and "U" clamp. For more secure mounting, use of protective jacket is recommended.

*1. Accuracy is stated for target emissivity of 1.0 at specified focussed distance and target having sufficient diameter to eliminate background influence.
*2. Accuracy is stated for input voltage of 24VDC and load resistance of 250 ohms.
*3. Influence of ambient temperature on accuracy is 0.027% of full scale span/1°F for deviation from 25°C or 0.015% of full scale span/1°F for deviation from 77°F.

OPTIONAL ACCESSORIES (MECHANICAL)

Protective Cooling Jacket and Air Purge Assembly: Provides air purging of optics, aiming and localized cooling of standard lens assembly.
Aiming Flange Assembly: Provides durable mounting of standard lens assembly while allowing adjustment of optical path up to 5° in any direction.
Protective Jacket and End Cap: Protects Infraducer from physical damage in dangerous environments. Cooling capability is mandatory when ambient temperature exceeds rated temperature of the sensor head.
Intrinsically Safe System: Can be provided to accommodate FM approved barriers enough for 6 M68 sensors.
Fiber Optic Vacuum Bushing: Permits placing a fiber optic cable inside vacuum vessel and allows for removal of cable on either side of window without losing vacuum.
Miniature Air Purge Assembly: Provides localized cooling and protection for the lens. An air flow of only 2.5CFH (100CFH) is sufficient for ambient temperature of up to 315°C (600°F).

OPTIONAL ACCESSORIES (ELECTRICAL)

Power Supply: Low profile, sealed and rugged package with current limiting feature. Available for input voltage 115VAC and 230VAC and output voltage 24VAC and 40VAC with 100mA load current.
Process Meters: The M60TS ⅛ DIN digital process meter features front panel keyboard programmability and is available in 3½ digit and 4 digit versions. The M60TDS has all the features of the 60TS plus adjustable high and low set points.
Fiber Optic Illuminator: Provides precision illumination of target areas. Features a quick disconnect for fiber cable, easy access to lamp replacement, cooling fan and variable intensity control.
Portable Fiber Optic Illuminator: Small/compact with rechargeable batteries and built-in AC adapter. Includes variable intensity control.

Mikron Infrared Inc.

16 Thornton Road
Oakland, NJ 07436

Tel: (201) 405-0900
Fax: (201) 405-0090

E-Mail: info@mikroninfrared.com
Internet: www.mikroninfrared.com

MIKRON INFRARED

M68 Rev. 1.5 e 021104