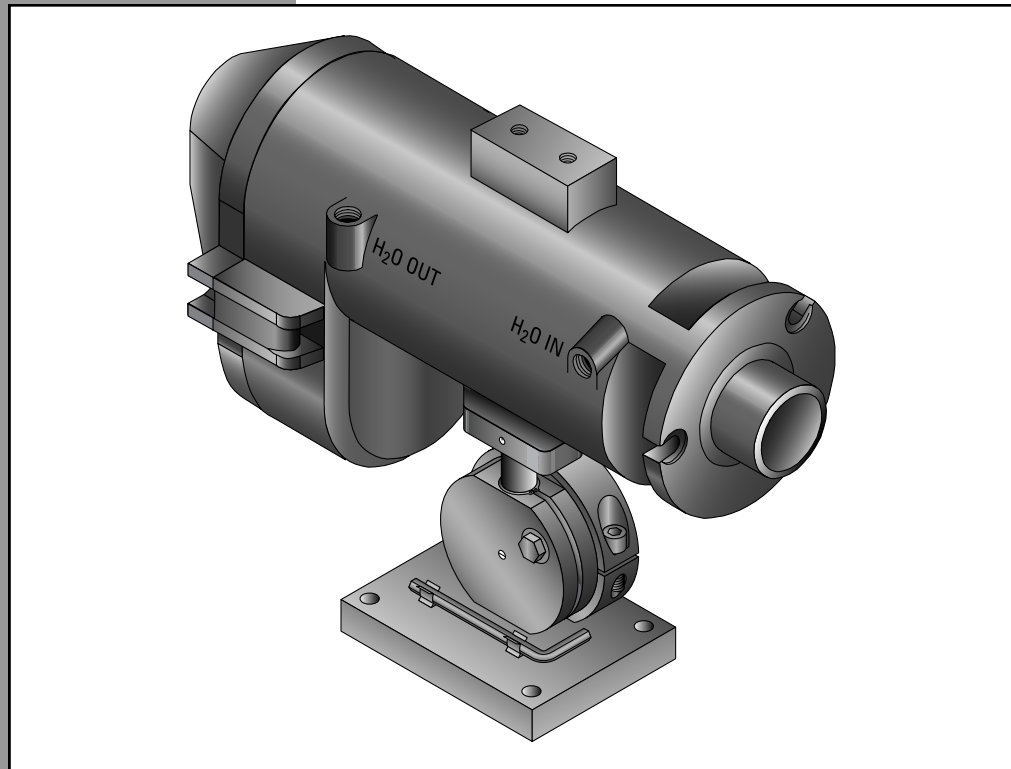


THERMOJACKET

INSTALLATION GUIDE



 **Raytek**[®]

Rev. F
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Worldwide Headquarters

Raytek Corporation
Santa Cruz, CA USA
Tel: 1 800 227 8074
1 831 458 1110
Fax: 1 831 458 1239
automation@raytek.com

Raytek de Mexico, S.A. de C.V.
Puebla, Pue. Mexico
Tel: 52 2 230 4380
Fax: 52 2 230 4438

Raytek China Company
Beijing, China
Tel: 86 10 6437 0284
Fax: 86 10 6437 0285

Raytek Japan, Inc.
Osaka, Japan
Tel: 81 6 4390 5015
Fax: 81 6 4390 5016

South American Headquarters
Raytek do Brasil
Sorocaba, SP Brasil
Tel: 55 15 233 6338
Fax: 55 15 233 6826

European Headquarters

Raytek GmbH
Berlin, Germany
Tel: 49 30 4 78 00 80
Fax: 49 30 4 71 02 51

Raytek United Kingdom
Milton Keynes, UK
Tel: 44 1908 630800
Fax: 44 1908 630900

Raytek France
Palaiseau, France
Tel: 33 1 64 53 1540
Fax: 33 1 64 53 1544

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1.0 INTRODUCTION

The ThermoJacket™ gives you the ability to use regular sensing and sighting sensing heads, as well as smart and basic sensors, in ambient temperatures up to 315°C/600°F. The ThermoJacket's rugged cast aluminum housing completely encloses the head and provides water and/or air cooling and air purging in one unit. Sensing heads can be installed or removed from the ThermoJacket housing in its mounted position.

A nose adapter is supplied with the ThermoJacket for your sensing head. An additional rear adapter and a spacer ring are also supplied if you're using regular sensing heads or smart or basic sensors.

1.1 TOOLS REQUIRED

To install the ThermoJacket, one or all of the following tools are needed:

- 3/16" hex key
- 1/8" hex key (regular sensing heads only)
- 1/4" hex key (adjustable mounting base)

1.2 FACILITIES REQUIRED

Be sure the following facilities are available prior to installation of the ThermoJacket:

- 80 psi (550 kPa) filtered or instrument air
- 40 psi (275 kPa) water

1.3 METRIC VERSION ADAPTERS

The following metric adapters and hex keys are supplied with the Metric Version ThermoJacket:

- 3 - 1/4" NPT metric adapters (2 water and 1 air)
- 1 - 3/16" hex key (used for the ThermoJacket end cap)
- 1 - 1/8" hex key (used for the rear adapter)
- 1 - 3/4" NPT cable gland
(Use with cable diameters between 5 and 12mm. Tighten the cable with a 22mm wrench and attach the cable gland to the ThermoJacket with a 32 mm wrench.)

1.4 ACCESSORIES

A full range of ThermoJacket accessories is available for various applications and industrial environments (see Figure 1). Order needed accessories at any time and install on-site.

The following accessories are available:

- Mounting Flange
- Adjustable Mounting Base
- Sighting Tube Mounting Flange
- Stainless Steel Sighting Tube
- Ceramic Sighting Tube
- Blast Gate
- Adjustable Pipe Adapter Accessory
- Air Flow Regulator (for cooling/purging—see figure 14)
- Air Pressure Regulator (for purging—see figure 15)
- Water Flow Regulator (for cooling—see figure 16)

For installation convenience, measured drawings of the ThermoJacket and ThermoJacket accessories are located at the end of this manual (see Figures 4–16).

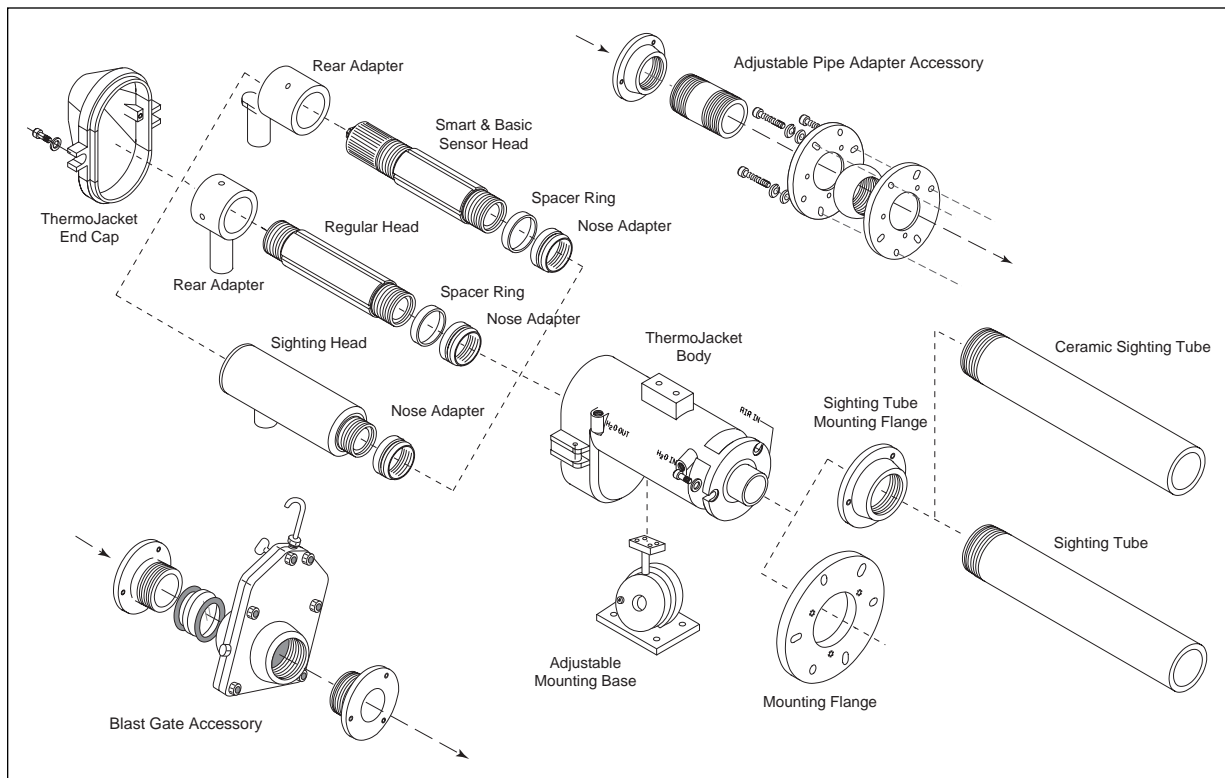


Figure 1: ThermoJacket and Accessories

2.0 INSTALLATION

The following sections describe the installation processes for sighting heads, regular heads, smart and basic sensors. Mechanical installation, facility hookups (air and water), and sighting adjustment accessories are covered.

2.1 MECHANICAL

2.1.1 Installing a Sighting Head or a Plastics Head

1. Use the 3/16" hex key to loosen the two ThermoJacket end cap screws and unlatch the ThermoJacket end cap. Pull the end cap from the ThermoJacket body.
2. Firmly screw the nose adapter onto the sensing head.

Application hint: Lightly coat the outer groove on the nose adapter with silicon grease. In cycling environments, a light coat of grease may make removal easier.

3. Route the cable connector through the bottom of the ThermoJacket body. Connect and tighten the cable connector to the sensing head, and slide the head into the ThermoJacket body cavity, lens first. Make sure the connector post on the sensing head is touching or nearly touching the low end of the cam ramp located on the inside of the ThermoJacket body.
4. Place the ThermoJacket end cap back onto the body, latch the end cap to the body, and tighten the 3/16" end cap screws.
5. Removal of the sensing head is the reverse of installation. To aid removal, firmly rotate the head so the head connector post slides across (up) the cam ramp.

2.1.2 Installing a Regular Head or Smart or Basic Sensor

1. Use the 3/16" hex key to loosen the two ThermoJacket end cap screws and unlatch the ThermoJacket end cap. Pull the end cap from the ThermoJacket body.
2. Firmly secure the spacer ring and nose adapter onto the lens end of the regular sensing head or smart sensor.

Application hint: Lightly coat the outer groove on the nose adapter with silicon grease. In cycling environments, a light coat of grease may make removal easier.

3. Place the rear adapter over the connector end of the sensing head, and slide it forward until it rests against the sensing head body.
4. Tighten the rear adapter set screws with a 1/8" hex key to secure it to the head. Do not exceed 25 in-lbf (2.8 N-m) torque.
5. Route the cable connector through the bottom of the ThermoJacket body. Connect and tighten the cable connector to the sensing head and slide the head into the ThermoJacket body cavity, lens first.
6. Place the ThermoJacket end cap onto the body, latch the end cap to the body, and tighten the 3/16" end cap screws.
7. Removal of a regular sensing head or smart sensor is the reverse of installation.

2.2 FACILITY HOOKUPS

The ThermoJacket body is equipped with one female 1/4" NPT H2O-in port and one female 1/4" NPT H2O-out port. These ports are designed to use either air or water, based on the application. The ThermoJacket body is also equipped with one female 1/4" NPT AIR-in port for purging.

Note: Care should be taken to properly insulate air purge and coolant lines.

2.2.1 Connecting a Water Line for Water Cooling

Connect the water supply line into the female 1/4" NPT H2O-in port and the water return line into the female 1/4" NPT H2O-out port. (See Section 4.0 to determine approximate flow rates at given ambient temperatures. Flow may be increased to compensate for greater water inlet temperatures.)

To control water pressure, use the water flow regulator accessory. The water flow regulator is equipped with two female 1/4" NPT ports. To ensure leak-free connections, use pipe seal or equivalent water pipe sealant to plumb the ThermoJacket and water flow regulator.

Note: Refer to Section 2.4 for proper water flow specifications.

2.2.2 Connecting an Air Line for Air Cooling

Connect the air supply line into the female 1/4" NPT H2O-in port and the air return line into the female 1/4" NPT H2O port. To ensure leak-free connections, use Teflon[®] tape or equivalent pipe sealant to plumb air connections to the ThermoJacket ports. (See Section 4.0 to determine approximate flow rates at given ambient temperatures. Flow may be increased to compensate for greater air inlet temperatures.)

To control air flow, use the air flow regulator accessory. The air flow regulator is equipped with two female 1/4" NPT ports. To ensure leak-free connections, use pipe seal or equivalent water pipe sealant to plumb the ThermoJacket and air flow regulator.

Note: Refer to Section 2.4 for proper air flow specifications.

2.2.3 Connecting an Air Line for Air Purging

Connect the air line to the female 1/4" NPT air-in port. Control the air flow with an air flow regulator. Air flow for purging should be approximately 100 CFH (2850 liters/hr) and filtered through a pressure regulator with an integral filter to prevent oil and contaminant build-up on the sensor lens. Connect the air flow regulator between the ThermoJacket and the air pressure regulator. To ensure leak-free connections, use Teflon tape or equivalent pipe sealant.

Note: Refer to Section 2.4 for proper air pressure specifications.

2.3 SIGHTING ADJUSTMENT ACCESSORIES

Sighting adjustments are easily accomplished with either an adjustable pipe adapter accessory or an adjustable mounting base accessory.

2.3.1 Adjustable Mounting Base Accessory (XXXTXMB)

The adjustable mounting base provides stable, permanent placement of the ThermoJacket while allowing the ThermoJacket to pivot 360° and position 90° forward. Mount the adjustable mounting base onto nearly any surface.

Installing the Adjustable Mounting Base to the ThermoJacket

1. Mount the adjustable mounting base (item 6) onto the desired surface with four 1/4" 20 UNC screws.
2. Loosen the capscrew (item 3) with the 1/4" hex key.
3. Unscrew the setscrew (item 2) with a screwdriver.
4. Remove the adapter (item 1) from the journal.
5. Attach the adapter (item 1) to the ThermoJacket (either bottom or top) with two 1/4" 20 UNC screws (item 7).
6. Insert the ThermoJacket with adapter (item 1) attached back into the journal (item 4).
7. Tighten the 1/4" capscrew (item 3).

Adjusting the Mounting Base

1. Loosen the collar (item 5) and the capscrew (item 3) with the 1/4" hex key enough to allow the adapter (item 1) to pivot and the journal (item 4) to rotate.
2. Adjust the ThermoJacket sighting by rotating and pivoting the ThermoJacket body.
3. Tighten the collar (item 5) first, then tighten the capscrew (item 3).

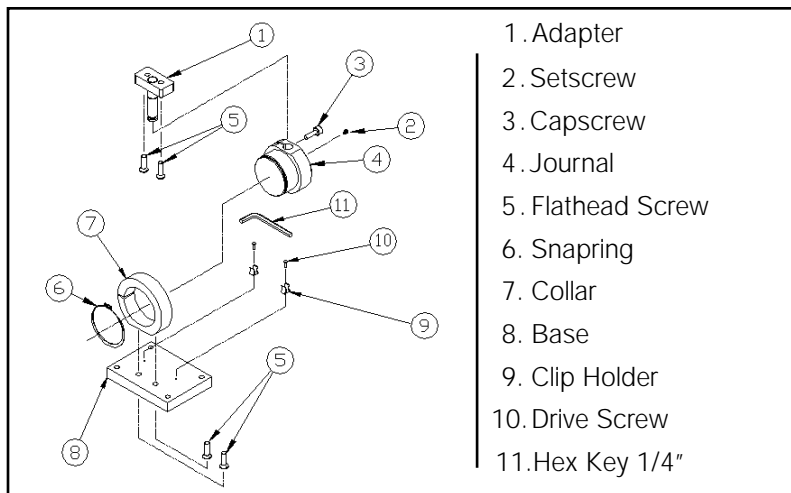


Figure 2: Adjustable Mounting Base

2.3.2 Mounting Flange Accessory (XXTXXMF)

The adjustable mounting flange accessory is spring-loaded to allow flexibility in sighting adjustment. The adjustable mounting flange is attached directly onto the face of the ThermoJacket and is bulkhead or wall-mountable. Tighten or loosen the three adjustable mounting flange spring-loaded screws individually to adjust sighting.

2.3.3 Adjustable Pipe Adapter Accessory (XXTXXAPA)

The adjustable pipe adapter accessory can be permanently placed on a surface and aimed in any direction within a 45° radius.

The accessory kit includes:

- 2 Mounting flanges
- 1 Circular pipe adapter
- 1 2" pipe nipple
- 1 Sighting tube mounting flange
- bolts and washers

Fasten the adjustable pipe adapter to the ThermoJacket with the sighting tube mounting flange. (Refer to Figure 1 for an illustration of the accessory.)

2.3.4 Blast Gate Accessory

The blast gate is equipped with a quartz window (XXTXXGTQ), (an Amtir window {XXTXXGTA} is also available) and a metal shutter. Use the blast gate accessory to protect the sensor, and perform tasks without exposure to hot or explosive target areas.

Close the blast gate's metal shutter to perform maintenance, change the sensor or sensor settings, or remove the sensor and/or ThermoJacket.

Maximum Temperature	288°C (550°F)
Amtir Window (OPT) max. temperature	300°C (572°F)
Quartz Window (STD) max. temperature	871°C (1600°F)

2.4 OTHER ACCESSORIES

2.4.1 Air Flow, Water Flow, and Air Pressure Regulators

Use the air pressure regulator to regulate air purging. Use the air flow regulator to regulate air cooling and the water flow regulator to regulate water cooling.

Air Pressure Regulator (XXXTXAR)

Maximum pressure	1.033 MPa (150 psig)
Maximum temperature	50°C (125°F)
Filter size	5 micron

Note: Part number XXXTXXAR includes both the pressure regulator (with filter) and the airflow regulator.

Air Flow Regulator (XXXTXXCAFR)

Maximum pressure	700 kPa (100 psig)
Maximum temperature	38°C (100°F)

Water Flow Regulator (XXXTXXWR)

Maximum pressure	700 kPa (100 psig)
Maximum temperature	38°C (100°F)

Note: Refer to section 4.0 for air and water flow, and air pressure specifications.

2.4.2 Sighting Tube Mounting Flange and Sighting Tubes

Use a sighting tube with the sighting tube mounting flange in temperature measurement environments where reflected energy is a problem.

- Stainless Steel Sighting Tube (XXXTST12)
- Ceramic Sighting Tube (XXXTSC12)
- Sighting Tube Mounting Flange (XXXTXXMST)

Mounting the Sighting Tube

1. Mount the mounting flange directly to the ThermoJacket face.
2. Screw the sighting tube into the sighting tube mounting flange.

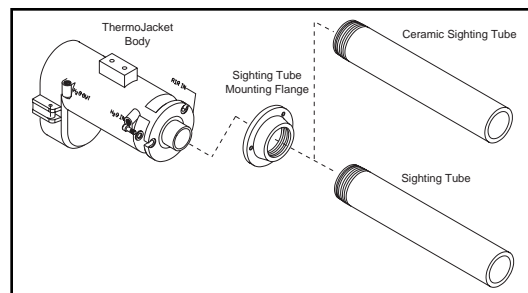


Figure 3 : Sighting Tubes and Mounting Flange

IMPORTANT

When using a customer supplied sighting tube, use caution in specifying the inside diameter and length. Your sensing head determines what diameter/length combinations are possible without impeding the optical field of view.

3.0 MAINTENANCE

The following sections cover ThermoJacket servicing and maintenance.

3.1 CHANGING SENSING HEADS

For routine sensing head change-overs, follow the steps outlined in Section 2.1.

3.2 CLEANING THE LENS

Keep the lens clean at all times. Any foreign matter on the window will affect measurement accuracy. However, care should be taken when cleaning the window.

Follow these steps to clean the window:

1. Lightly blow off loose particles.
2. Gently brush off any remaining particles with a soft camel hair brush or a soft lens tissue (available from camera supply stores).
3. Clean remaining "dirt" using a cotton swab or soft lens tissue dampened in distilled water. Do not scratch the surface.

For finger prints or other grease, use any of the following:

- Denatured alcohol
- Ethanol
- Kodak lens cleaner

Apply any of the above cleansers to the window. Wipe gently with a soft, clean cloth until you see colors on the surface, then allow to air dry. Do not wipe the surface dry—this may scratch the surface

Note: Incorrect temperature measurement readings can result from unclean lenses.

3.3 CLEANING THE AIR PURGE SLEEVE

The air purge sleeve requires cleaning only if water and/or oily build-up appear on the air purge sleeve or within the sighting tube.

Follow these steps to access the air purge sleeve:

1. Remove the adjustable mounting flange (or sighting tube mounting flange) from the ThermoJacket face.
2. Unscrew the black air purge sleeve.
3. Degrease the sleeve and sighting tube to remove any oily build up.
4. Re-install to the ThermoJacket.

Note: Always replace the air pressure regulator filter with a clean filter when cleaning the air purge sleeve.

3.4 SPARE PARTS

Replacement air filters, spare adapter kits, and other parts are available on request.

4.0 SPECIFICATIONS

The following sections show air, water, and temperature specifications for the ThermoJacket and accessories. The illustrations on the following pages (Figures 4 through 16) show dimensioned drawings.

4.1 THERMOJACKET

Air Flow (air purging)	2135-2850 LPH (75-100 CFH)
Coolant Pressure (min/max)	
Water cooling	275 kPa (40 psig)/860 kPa (125 psig)
Air cooling	550 kPa (80 psig)/827 kPa (120 psig)
Maximum Ambient Temperatures	
ThermoJacket w/water cooling	315°C (600°F)
ThermoJacket w/3.45 micron sensor	230°C (450°F)

Table 1: Approximate Required Coolant Flow Versus Outside Ambient
(assumes water/air temperature of 20°C/68°F at inlet)

AMBIENT	WATER COOLING	AIR COOLING
@ 93°C (200°F)	19 LPH (5 GPH)	5700 LPH (200 CFH)
@ 121°C (250°F)	38 LPH (10 GPH)	6410 LPH (225 CFH)
@ 149°C (300°F)	57 LPH (15 GPH)	7120 LPH (250 CFH)
@ 232°C (450°F)	76 LPH (20 GPH)	---
@ 315°C (600°F)	114 LPH (30 GPH)	---

4.2 DIMENSIONS

Figures 4 through 16 on the following pages show dimensioned drawings of the ThermoJacket and the accessories.

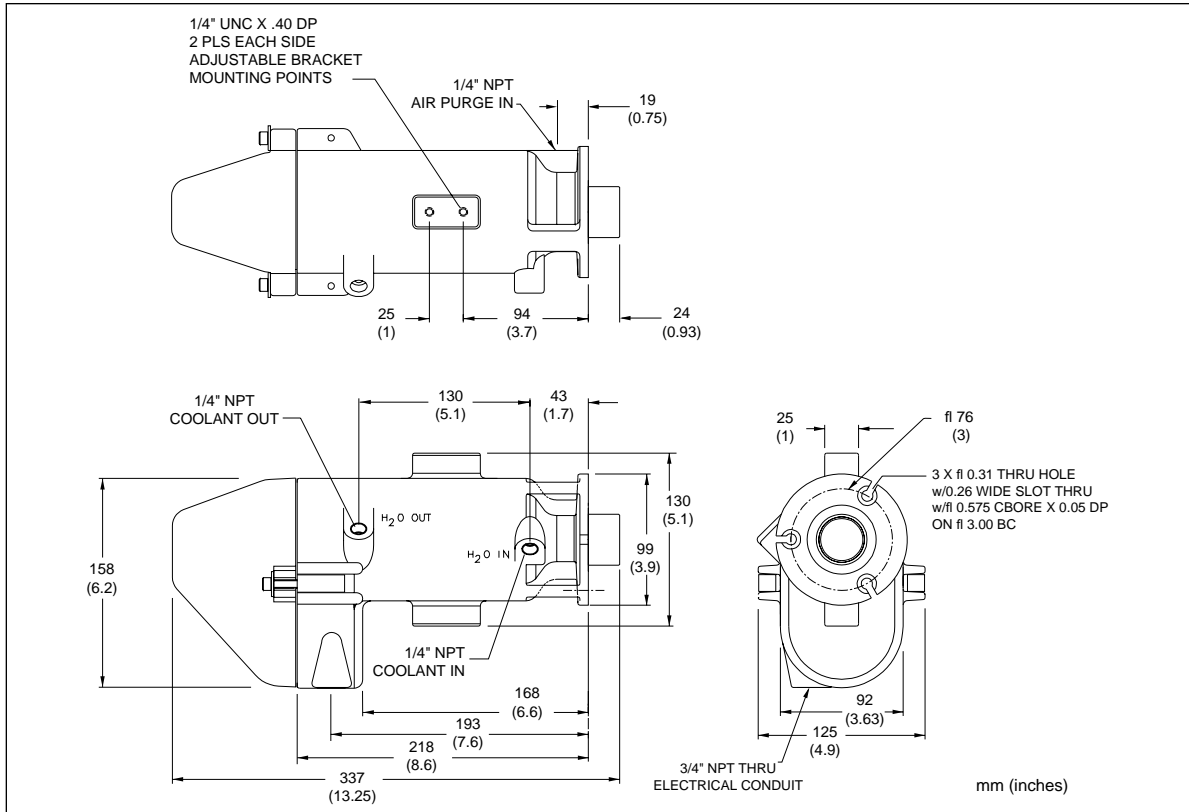


Figure 4: ThermoJacket Body

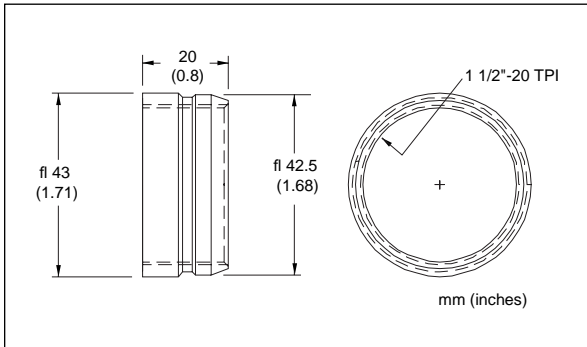


Figure 5: Nose Adapter

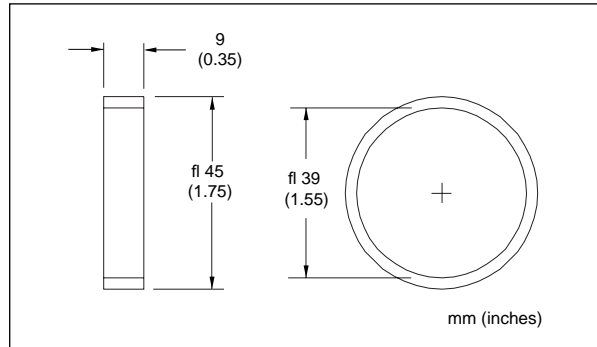


Figure 6: Spacer Ring

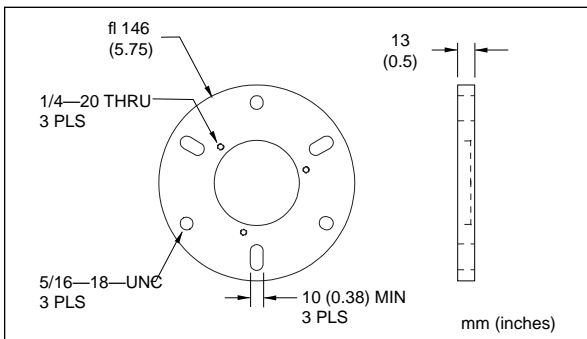


Figure 7: Mounting Flange

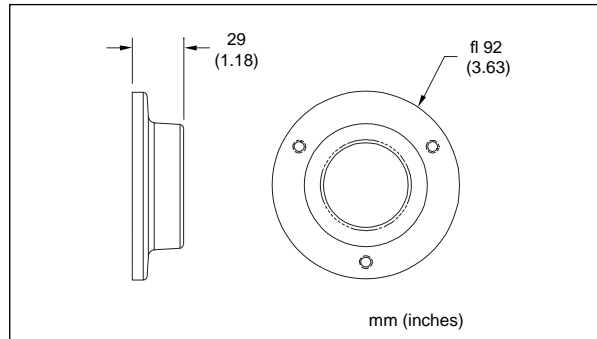


Figure 8: Sighting Tube Mounting Flange

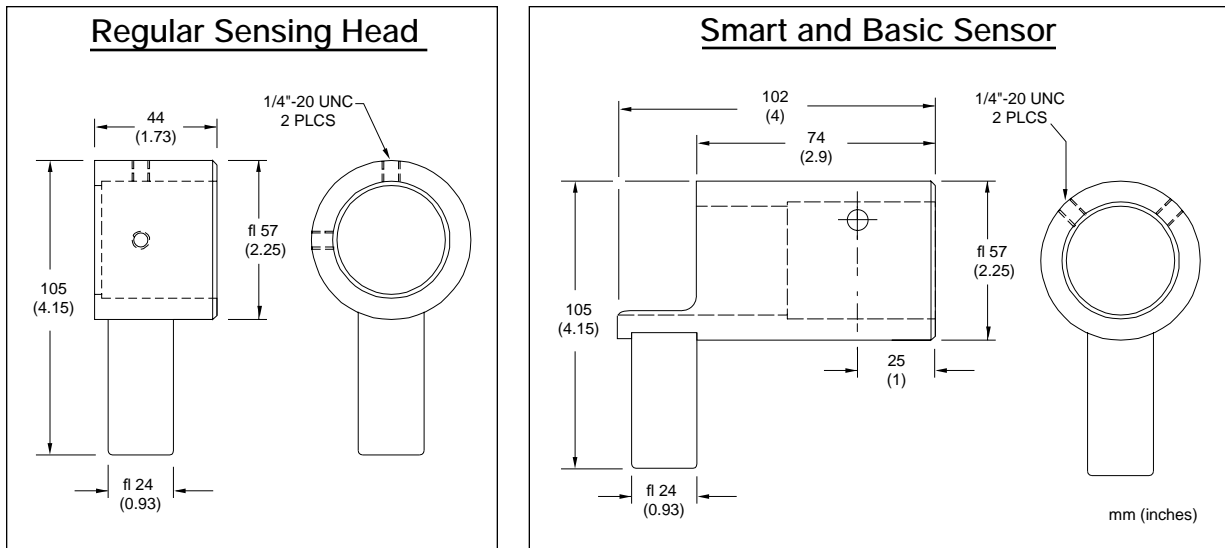


Figure 9: Rear Adapters

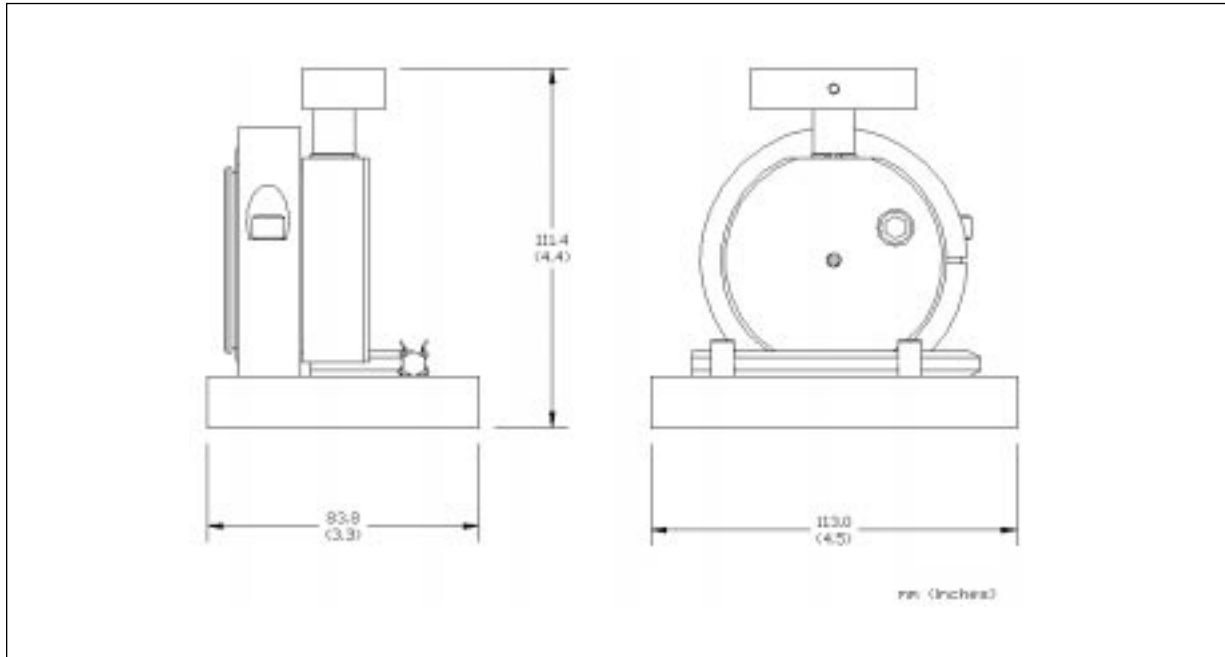


Figure 10: Adjustable Mounting Base

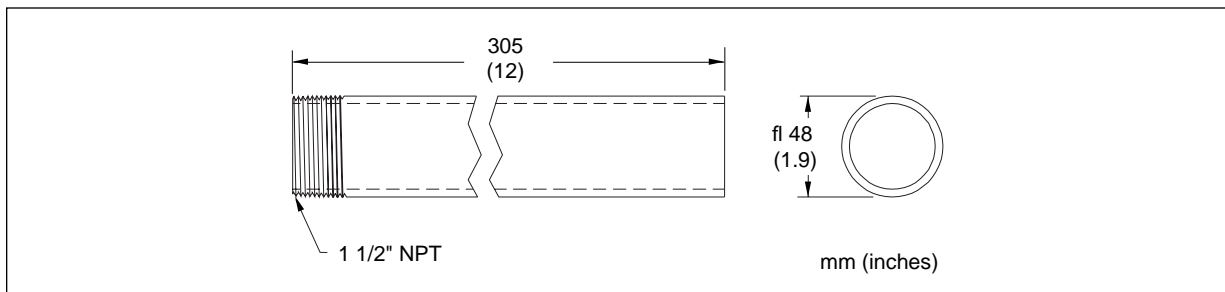


Figure 11: Sighting Tube and Ceramic Sighting Tube

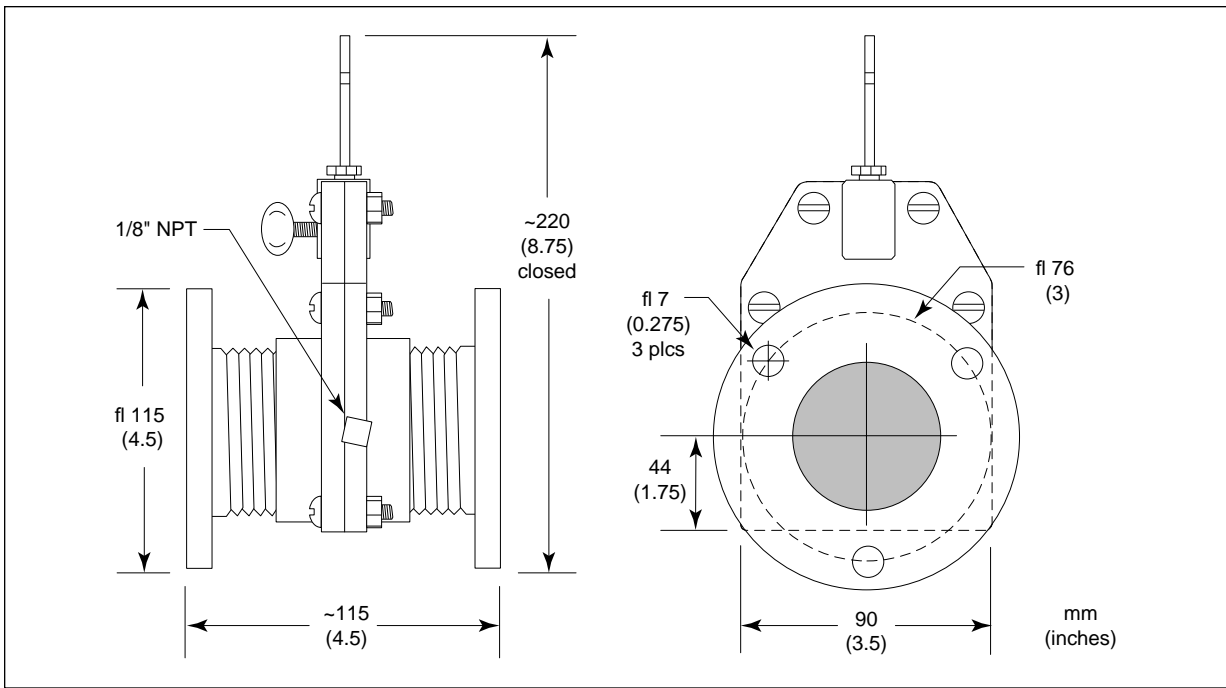


Figure 12: Blast Gate Accessory

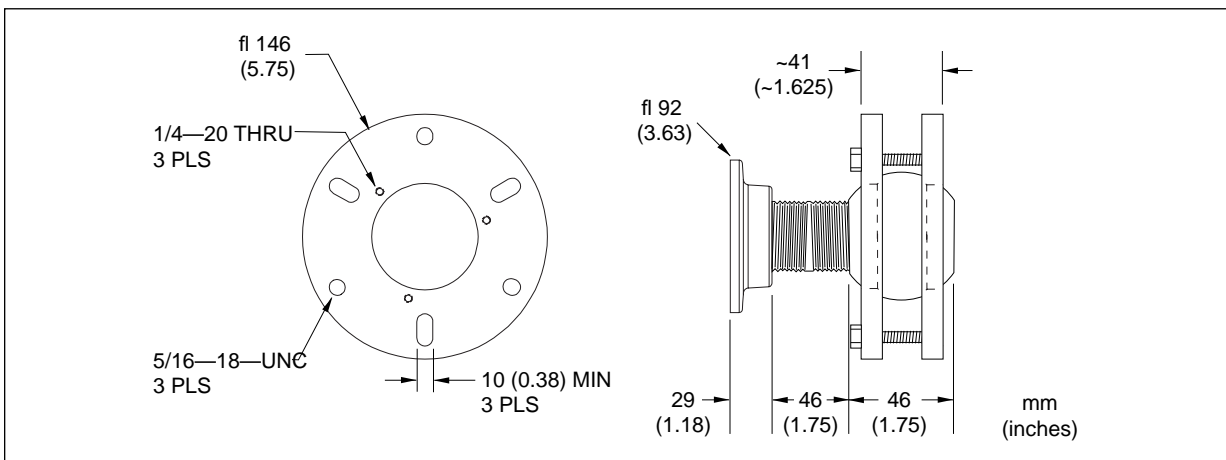


Figure 13: Adjustable Pipe Adapter Accessory

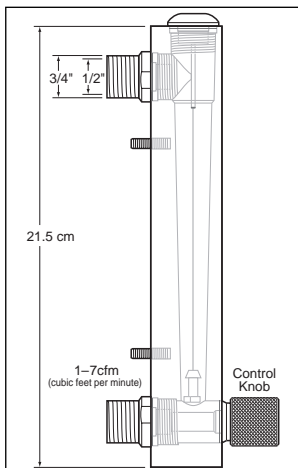


Figure 14: Air Flow Regulator

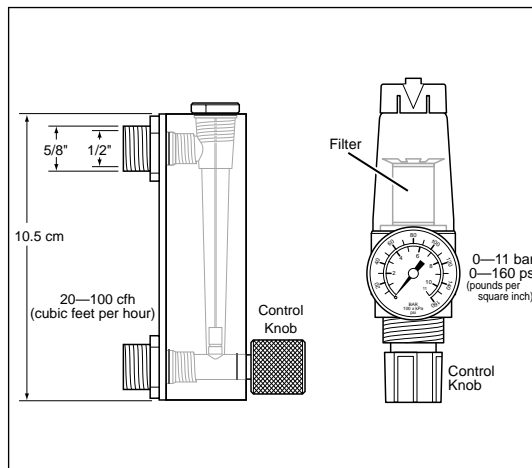


Figure 15: Air Pressure Regulator and Air Flow Regulator

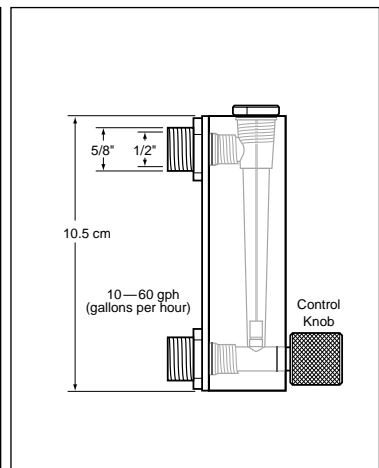


Figure 16: Water Flow Regulator

APPENDIX A: HIGH PERFORMANCE INSTALLATION OF INFRARED THERMOMETERS INSIDE A HIGH TEMPERATURE ENVIRONMENT

The ThermoJacket requires water and/or air cooling and air purging to protect the sensor inside ovens or other variable, cycling, or periodic high temperature environments. Additional components may also be needed to regulate the temperature of the ThermoJacket, itself. There are many ways to install the ThermoJacket into such an environment. The description below and the schematic on the opposing page (figure A-1), demonstrates one ThermoJacket installation in an oven environment.

Note: Although multiple ThermoJackets can be installed in series, the water return from each unit is kept separate to avoid using heated water as a coolant for the next sensor.

A.1 Air Purging

Air is first sent through the air-pressure regulator (which may include a filter); an additional dryer or filter may be required depending on the cleanliness of the air. The air is then sent to the air flow regulator to control air flow to the ThermoJacket. Adjust air pressure and air flow to the proper settings to avoid turbulence or vortex effects.

Note: Part number XXXTXXAR includes both the pressure regulator (with filter) and the airflow regulator.

A.2 Water Cooling

Water is first sent through a softener and filter to remove contaminants that may eventually clog the ThermoJacket coolant tubing. In the simplest installation, the water is directed through a water-flow regulator (part number XXXTXXWR) to regulate the flow rate to insure proper cooling.

Note: The water pressure may need to be regulated to prevent damage to other flow regulating components.

A.3 Additional Components

In an environment with periodic changes, such as an oven, it's important to manage the temperature of the ThermoJacket. If water flow and oven heaters are shut off at the same time, the residual oven heat may quickly destroy the instrument. If water flow is not shut off, over-cooling may develop, resulting in condensation that may damage the ThermoJacket sensor. In figure A-1 an additional thermocouple, monitoring the air temperature of the oven, is used as a sensor in conjunction with other components to control water flow.

Figure A-1: Infrared Thermometer Installation inside an Oven

