

# ThermoJacket®

## Protective Enclosure




## Operating Instructions



Rev. I1 04/2011  
56501



 (01943) 602001

 sales@issltd.co.uk

 [www.issltd.co.uk](http://www.issltd.co.uk)

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## WARRANTY

The manufacturer warrants this instrument to be free from defects in material and workmanship under normal use and service for the period of two years from date of purchase. This warranty extends only to the original purchaser. This warranty shall not apply to fuses, batteries, or any product which has been subject to misuse, neglect, accident, or abnormal conditions of operation.

In the event of failure of a product covered by this warranty, the manufacturer will repair the instrument when it is returned by the purchaser, freight prepaid, to an authorized Service Facility within the applicable warranty period, provided manufacturer's examination discloses to its satisfaction that the product was defective. The manufacturer may, at its option, replace the product in lieu of repair. With regard to any covered product returned within the applicable warranty period, repairs or replacement will be made without charge and with return freight paid by the manufacturer, unless the failure was caused by misuse, neglect, accident, or abnormal conditions of operation or storage, in which case repairs will be billed at a reasonable cost. In such a case, an estimate will be submitted before work is started, if requested.

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**Specifications subject to change without notice!**

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# Safety Instructions

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## 1 Safety Instructions

This document contains important information, which should be kept at all times with the instrument during its operational life. Other users of this instrument should be given these instructions with the instrument. Updates to this information must be added to the original document. The instrument can only be operated by trained personnel in accordance with these instructions and local safety regulations.

### Acceptable Operation

This instrument is intended only as accessory for selected Raytek infrared point sensors. The instrument operates reliably in demanding conditions, such as in high environmental temperatures, as long as the documented specifications are adhered to. Compliance with the operating instructions is necessary to ensure the expected results.

### Unacceptable Operation

The instrument should not be used for other purposes.

### Replacement Parts and Accessories

Use only original parts and accessories approved by the manufacturer. The use of other products can compromise the operational safety and functionality of the instrument.

### Instrument Disposal



Disposal of old instruments should be handled according to professional and environmental regulations as electronic waste.

### Operating Instructions

The following symbols are used to highlight essential safety information in the operation instructions:



Helpful information regarding the optimal use of the instrument.



Warnings concerning operation to avoid instrument damage and personal injury.



## 2 Introduction

The ThermoJacket™ gives you the ability to use sensing heads from the series MR, MM, TX or XR 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 needed.

## 3 Technical Data

### 3.1 General Specifications

<b>Air purge flow</b>	35 – 48 l / min (9.25 gallon / min. to 12.68 gallon / min.)
<b>Ambient temperatures</b>	
water cooling	315°C (600°F)
air cooling	115°C (240°F)
<b>Coolant pressure (min./max.)</b>	
water cooling	275 kPa (40 psi) to 860 kPa (125 psi)
air cooling	550 kPa (80 psi) to 827 kPa (120 psi) - filtered or „instrument-clean“ air required

Ambient	Water Cooling	Air Cooling
93°C (200°F)	0,3 l / min (0.08 gallon / min)	95 l / min (25 gallon / min)
121°C (250°F)	0,6 l / min (0.16 gallon / min)	110 l / min (29 gallon / min)
149°C (300°F)	1,0 l / min (0.26 gallon / min)	120 l / min (31.7 gallon / min)
232°C (450°F)	1,3 l / min (0.34 gallon / min)	
315°C (600°F)	2,0 l / min (0.53 gallon / min)	

**Table 1: Approximate required coolant flow versus outside ambient**  
(assumes water/air temperature of 20°C/68°F at inlet)



# Technical Data

## 3.2 Dimensions

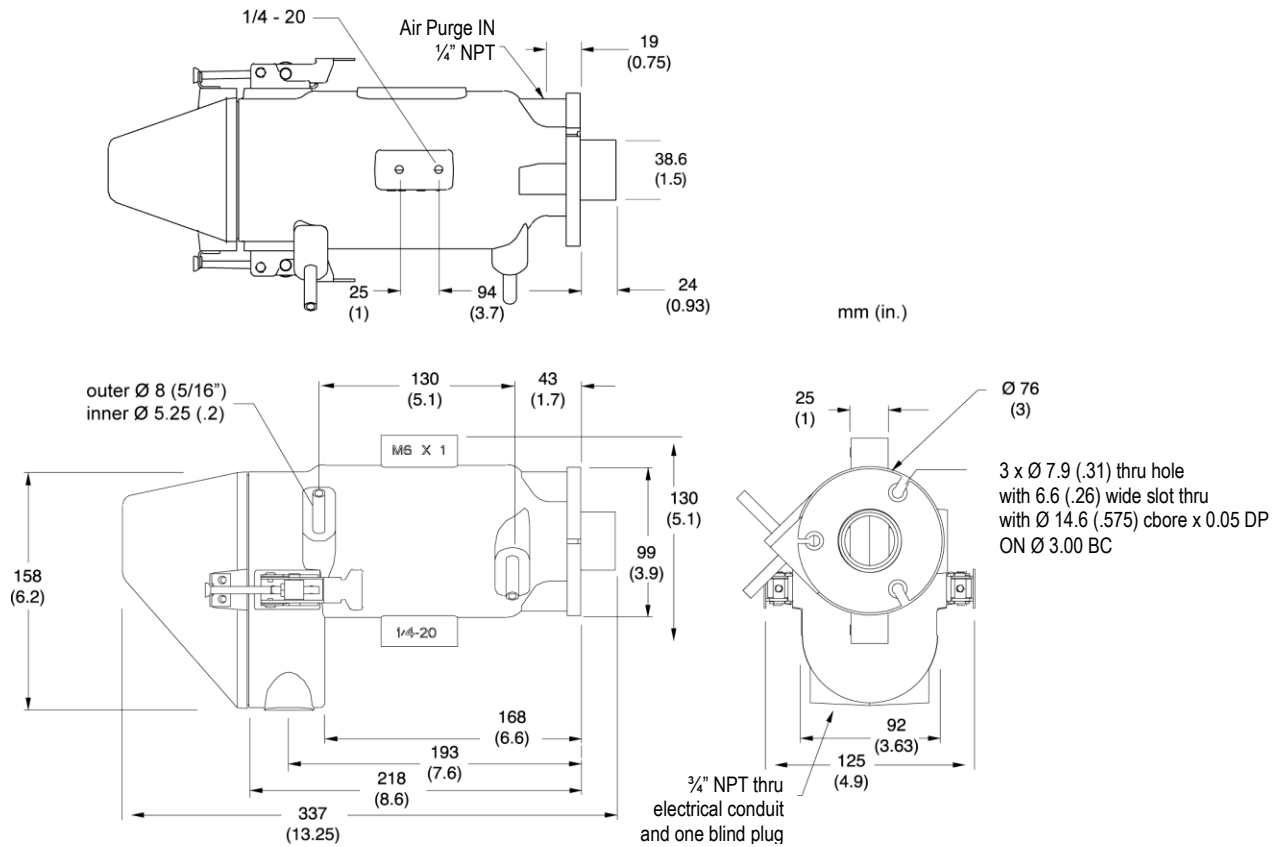


Figure 1: Dimensions for ThermoJacket

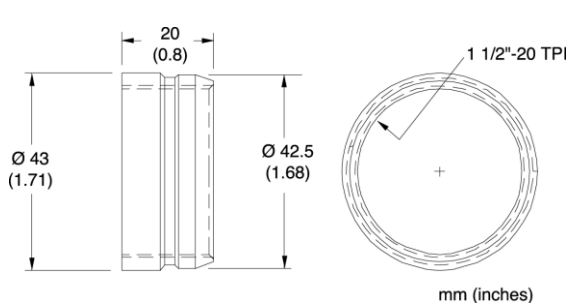


Figure 2: Nose Adapter

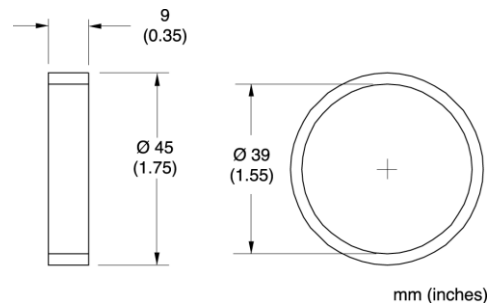


Figure 3: Spacer Ring

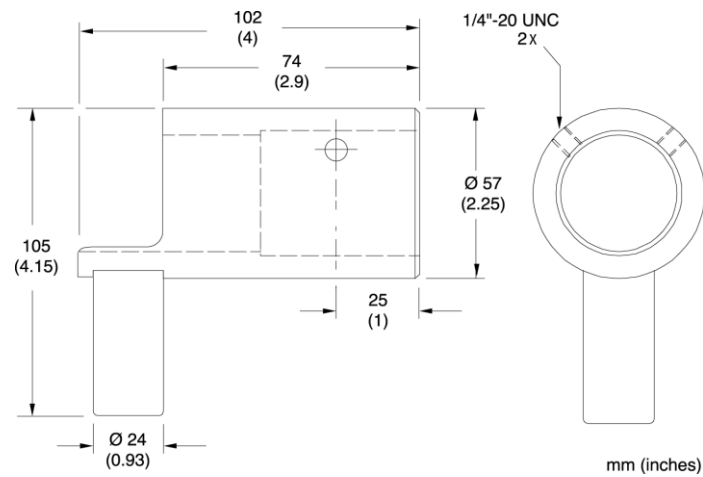


Figure 4: Rear Adapter for TX and XR Sensing Heads

### 3.3 Scope of Delivery

The following items are supplied with the ThermoJacket:

- 2x Swage lock fittings (Parker Hannifin Corp. 5FSC4N-316)
- 1/4" NPT metric adapter (for air purge)
- 3/4" NPT Cable compression gland fitting for cable diameter between 5 to 12 mm (0.2 to 0.47 in.)



# Installation

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## 4 Installation

### 4.1 Mechanical

**All sensors:**

1. Unlatch the ThermoJacket end cap. Pull the end cap from the ThermoJacket body.

**TX, XR only:**

2. Firmly screw the spacer ring onto the sensing head.

**MR, TX, XR only:**

3. Firmly screw the nose adapter onto the sensing head.

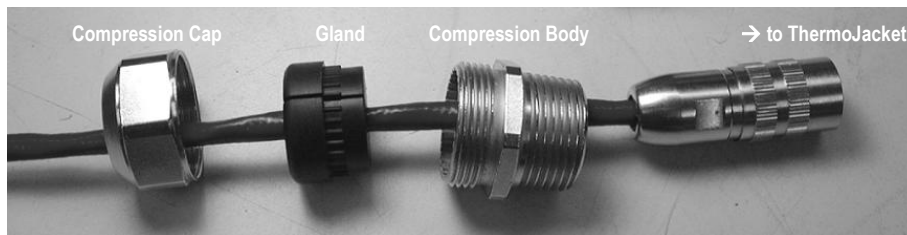
*Hint: Lightly coat the outer groove on the nose adapter with silicon grease to make a later removal easier.*

**TX, XR only:**

4. Place the rear adapter over the connector end of the sensing head, and slide it forward until it rests against the sensing head body. Tighten the rear adapter set screws with a 1/8" hex key to secure it to the head. Do not exceed 2.8 Nm (25 lbf in) torque.

**All sensors:**

5. The cable compression fitting has a split gland that fits over the sensor cable with a cap and body that slide over the connector to facilitate installation.



**Figure 5: Cable Compression Fitting**

Remove cable compression gland assembly from the ThermoJacket. Disassemble the cable compression gland assembly (30 mm wrench required). Slide compression cap and then the body over the cable connector and down the cable. Slip gland around the cable in between the cap and body. Route the cable connector through the bottom of the ThermoJacket body.

Attach compression body to ThermoJacket. Tighten cap to body.

Connect and tighten the cable connector to the sensing head, and slide the head into the ThermoJacket body cavity, lens first. For MR sensors: 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.

**All sensors:**

6. Place the ThermoJacket end cap back onto the body, and latch the end cap to the body.

**All sensors:**

7. Removal of the sensor is the reverse of installation.

**MR, MM only:**

8. To aid removal, firmly rotate the head so the head connector post slides across (up) the cam ramp.



## 4.2 Water Cooling

The ThermoJacket body is equipped with one H<sub>2</sub>O-in port and one H<sub>2</sub>O-out port. These stainless steel tubes have an outer diameter of 5/16" (8 mm) or can be connected to existing plumbing with the two supplied fittings (Parker Hannifin Corp., part number 5FSC4N-316). These fittings made from stainless steel 316 SS couple directly to the stainless steel tube and have a female 1/4" NPT for field connections.

If the 1/4" NPT is not acceptable for your installation, then direct connection to the stainless steel tubes is possible or Parker Hannifin Corp. offers numerous swage-lock fittings.

Connect the water supply line to the stainless steel tube H<sub>2</sub>O-in port and the water return line to the stainless steel tube H<sub>2</sub>O-out port. To determine approximate flow rates at given ambient temperatures see section 3.1 [General Specifications](#), Seite 7. 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 Teflon® tape or equivalent water pipe sealant to plumb the ThermoJacket and water flow regulator.

An installation overview you can find in section 7 [Exemplary Installation](#), Seite 22.



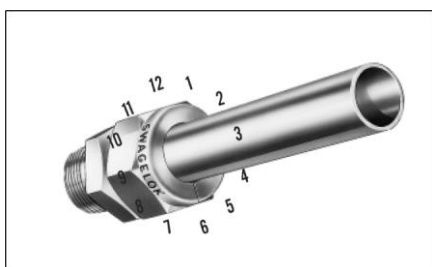
**Care should be taken to properly insulate coolant lines!**

### 4.2.1 Installation of the Tube Fittings

The following steps explain the installation of the tube fittings to the stainless steel cooling tubes of the linescanner.



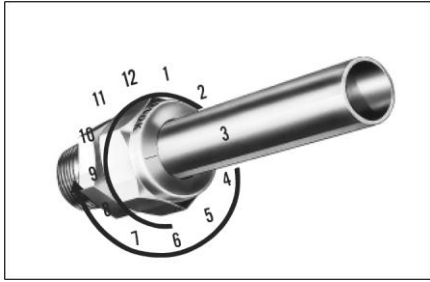
1. Insert tubing into the Swagelok tube fitting.
2. Make sure that the tubing rests firmly on the shoulder of the tube fitting body and that the nut is finger-tight.



3. Scribe the nut at the 6 o'clock position.

## Installation

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4. While holding the fitting body steady with a back-up wrench, tighten the nut  $1 \frac{1}{4}$  turns to the 9 o'clock position.



## 4.2.2 Reassembly of the Tube Fittings

You may disassemble and reassemble a Swagelok tube fitting as often as required.



1. Insert tubing with pre-swaged ferrules into the fitting body until the front ferrule seats.
2. Rotate the nut with a wrench to the previously pulled-up position. At this point, a significant increase in resistance will be encountered.
3. Tighten slightly with a wrench.

## 4.3 Air Cooling

The H<sub>2</sub>O ports are also designed to use air for cooling, for further information see section 4.2 [Water Cooling](#), Seite 11.

To control air flow, use the air flow regulator accessory, see section 5.8 [Air Flow Regulator](#), Seite 19.

## 4.4 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 2800 l/h (100 foot<sup>3</sup>/h) 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.

# Accessories

## 5 Accessories

A full range of accessories for various applications and industrial environments are available. Accessories include items that may be ordered at any time and added on-site. These include the following:

Mounting Flange	XXXTXXMF
Adjustable Mounting Base	XXXTXXMB
Adjustable Pipe Adapter	XXXTXXAPA
Sighting Tubes	
Mounting Flange for Sighting Tube	XXXTXXMST
Blast Gate	
with Quartz Window	XXXTXXGTQ
with Amtir Window	XXXTXXGTA
Water Flow Regulator	XXXTXXWR
Air Flow Regulator	XXXTXXCAFR
Air Pressure Regulator	XXXTXXAR

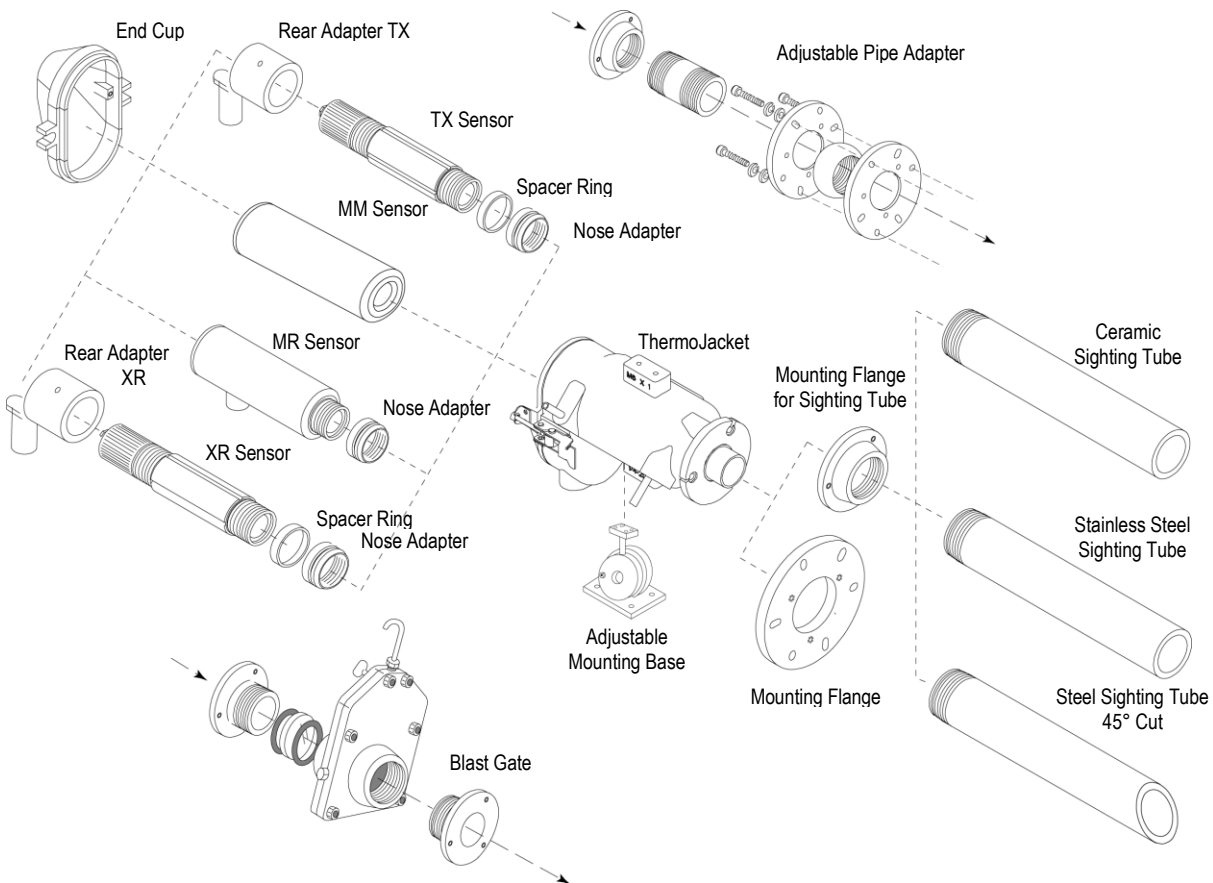


Figure 6: ThermoJacket and Accessories

## 5.1 Mounting Flange

The mounting flange accessory can be used independently to mount the ThermoJacket to walls, existing ports or flanges. This mounting flange has a variety of mounting holes to accommodate various mounting configurations.

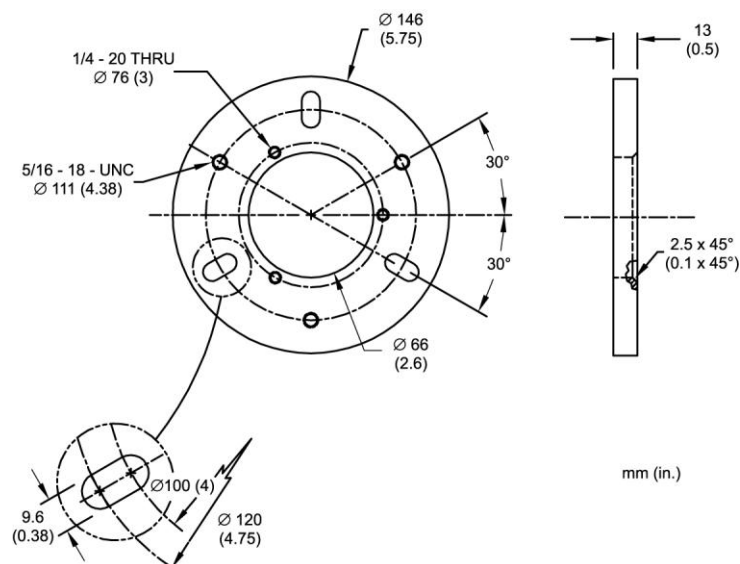


Figure 7: Mounting Flange

## 5.2 Adjustable Mounting Base

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

Der Anschlusskopf des Montagefußes wird mit zwei Schrauben 1/4-20 UNC (amerikanische Gewindenorm) oder M6 x 1 (metrisch) am ThermoJacket angebracht. Die Montageflächen befinden sich entsprechend oben als auch unten am Gehäuse des ThermoJacket.

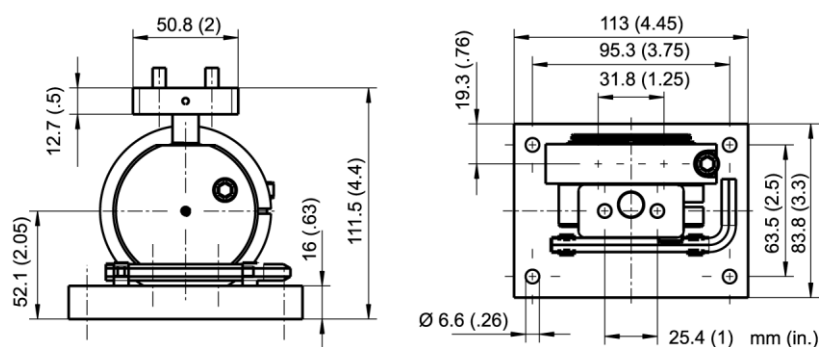


Figure 8: Adjustable Mounting Base

### Installing the Adjustable Mounting Base to the ThermoJacket:

1. Mount the adjustable mounting base (item 6) onto the desired surface with four screws (1/4" 20 UNC or M6 x 1).
2. Loosen the capscrew (item 3) with the 1/4" hex key.

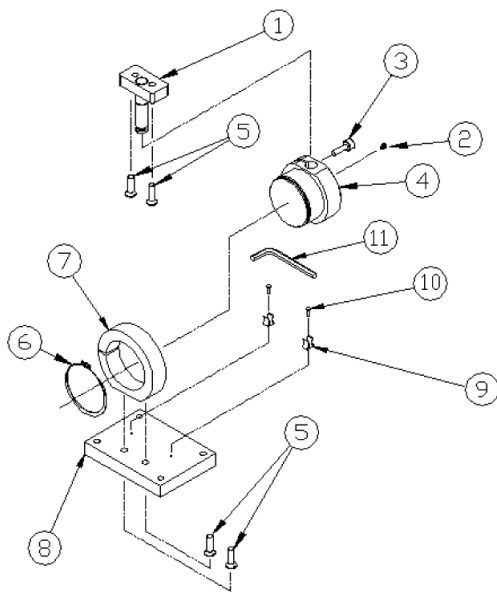
# Accessories

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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 screws (1/4" 20 UNC or M6 x 1) (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:

8. 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.
9. Adjust the ThermoJacket sighting by rotating and pivoting the ThermoJacket body.
10. Tighten the collar (item 5) first, then tighten the capscrew (item 3).



1. Adapter
2. Setscrew
3. Capscrew (for horizontal adjustment)
4. Journal
5. Flathead screw
6. Snapping
7. Collar (for vertical adjustment)
8. Base
9. Clip Holder
10. Drive screw
11. Hex key 1/4"

Figure 9: Adjustable Mounting Base

## 5.3 Adjustable Pipe Adapter

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 two mounting flanges, a circular pipe adapter, a 2" pipe nipple, a mounting flange for sighting tube, and all necessary bolts and washers.



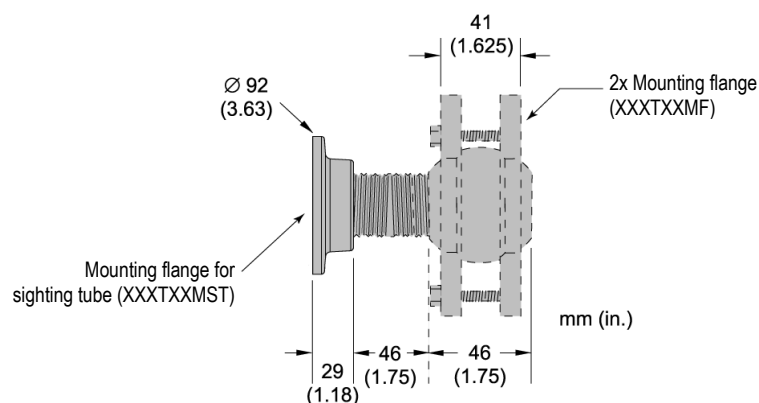


Figure 10: Adjustable Pipe Adapter

## 5.4 Sighting Tubes

Use a sighting tube with the sighting tube mounting flange in temperature measurement environments where reflected energy is a problem. Mount the mounting flange directly to the ThermoJacket face. Screw the sighting tube into the mounting flange for sighting tube XXXTXXMST.

Available tubes:

- Ceramic Sighting Tube, 305 mm (12 in.) long (XXXTST12)
- Stainless Steel Sighting Tube, 305 mm (12 in.) long (XXXTSTC12)
- Steel Sighting Tube with 45° cut, 305 mm (12 in.) long (BEESIGHT)



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!

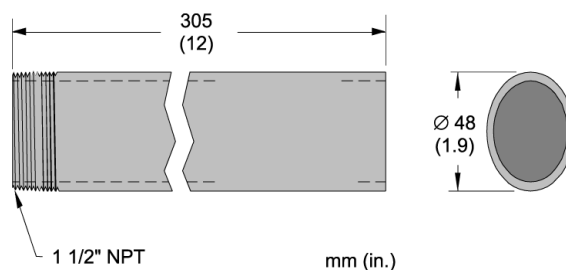


Figure 11: Sighting Tube (XXXTST12 and XXXTSTC12)



# Accessories

## 5.5 Mounting Flange for Sighting Tube

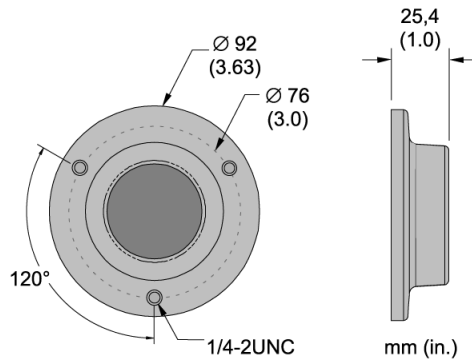


Figure 12: Mounting Flange for Sighting Tube

## 5.6 Blast Gate

The blast gate is equipped with a window 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. Two versions are available:

- Blast Gate with Quartz Window, max. 870°C (1600°F), for 1M, 2M and HT (XXXTXXGTQ)
- Blast Gate with Amtir Window, max. 300°C (570°F), for LT, MT, G5, and P7 (XXXTXXGTA)

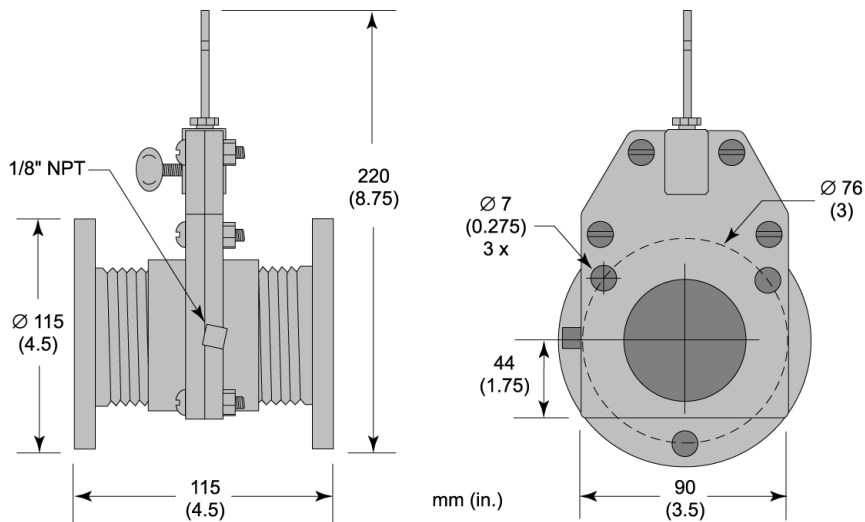
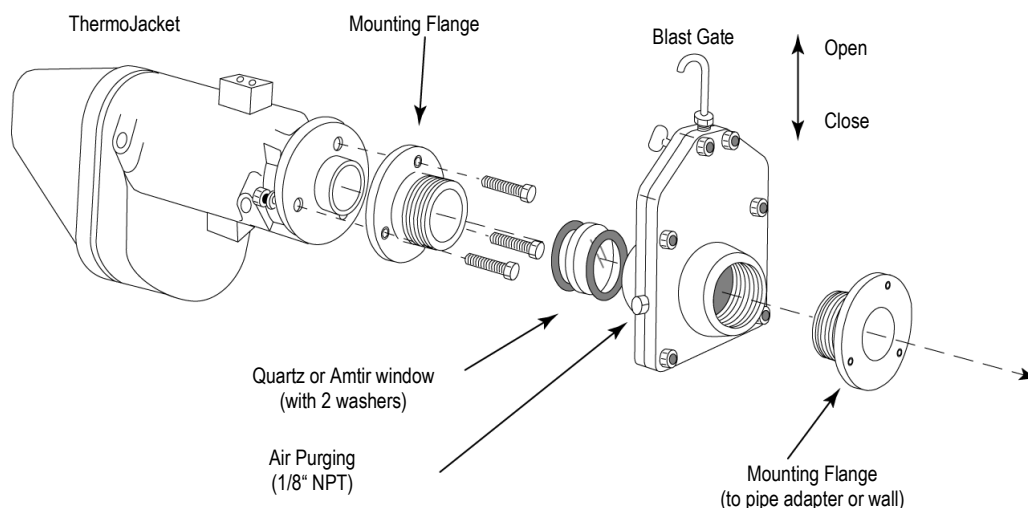


Figure 13: Dimensions

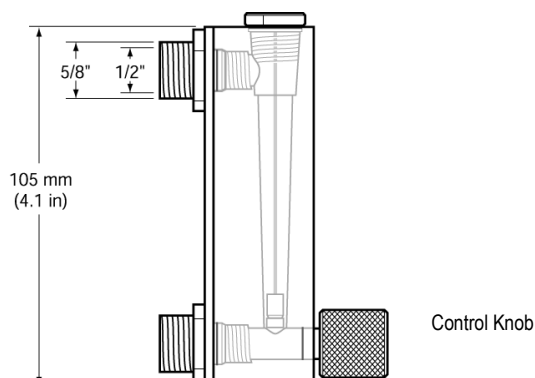


**Figure 14: Mounting**

## 5.7 Water Flow Regulator

Water Flow Regulator for regulating the water cooling:

Max. pressure:	7 bar (100 psi)
Max. temperature:	38°C (100°F)
Control range:	38 bis 230 l / h (10 to 60 gallon/hour)



**Figure 15: Water Flow Regulator**

## 5.8 Air Flow Regulator

Air Flow Regulator for regulating the water cooling:

Max. pressure:	7 bar (100 psi)
Max. temperature:	38°C (100°F)
Control range:	28 bis 200 l/min (1 to 7 foot <sup>3</sup> /min)

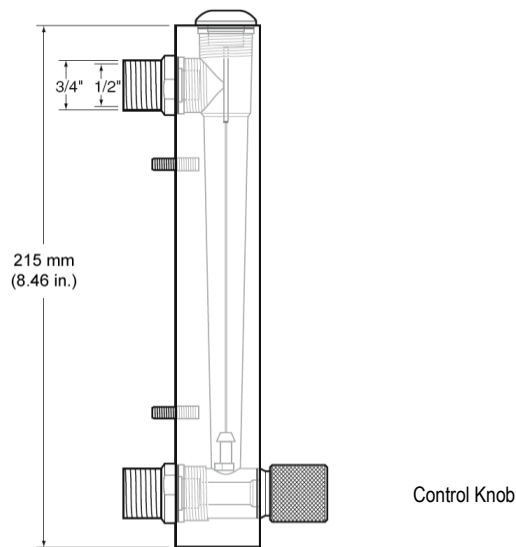


Figure 16: Air Flow Regulator

## 5.9 Air Pressure Regulator

Air pressure regulator for regulating the air purging:

- Max. Druck: 10 bar (150 psi)
- Max. Temperatur: 50°C (122°F)
- Filtergröße: 5 µm

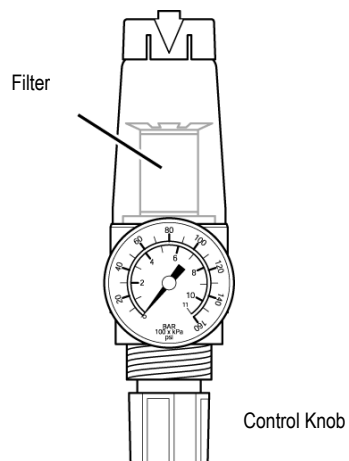


Figure 17: Air Pressure Regulator



## 6 Maintenance

### 6.1 Changing Sensing Heads

For routine sensing head change-overs, follow the steps outlined in section 4.1 [Mechanical](#), Seite 10.

### 6.2 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. Please follow the cleaning instructions given in the manual of the sensing head. Incorrect temperature measurement readings can result from unclean lenses.

### 6.3 Cleaning the Air Purge

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.



**Always replace the air pressure regulator filter with a clean filter when cleaning the air purge sleeve!**



# Exemplary Installation

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## 7 Exemplary Installation

In the following exemplary installation you can see 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 demonstrates one ThermoJacket installation in an oven environment.



**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!**

### 7.1 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.

### 7.2 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 to regulate the flow rate to insure proper cooling.



**The water pressure may need to be regulated to prevent damage to other flow regulating components!**

### 7.3 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 the following figure an additional thermocouple, monitoring the air temperature of the oven, is used as a sensor in conjunction with other components to control water flow.



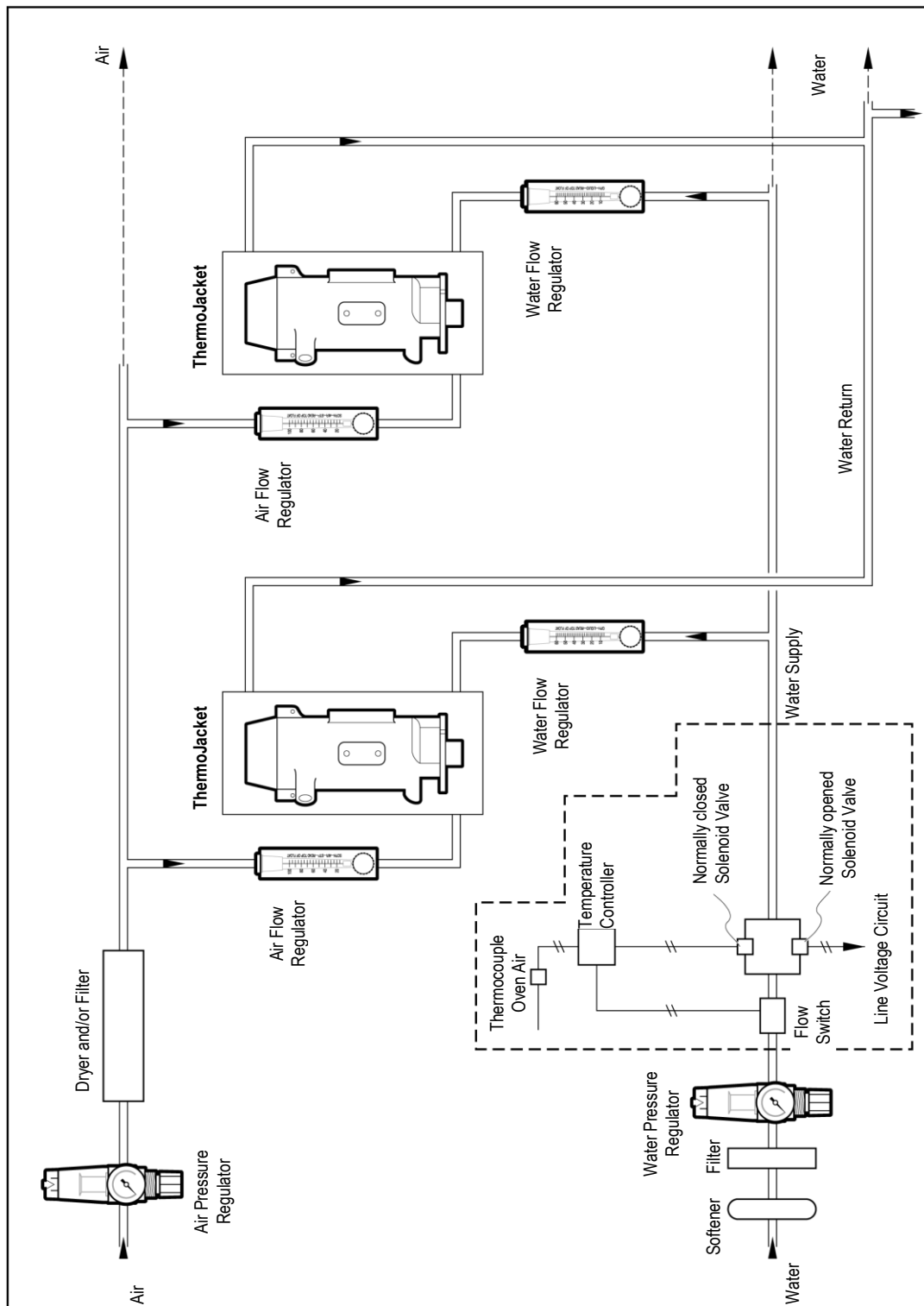


Figure 18: Installation of the ThermoJacket inside an Oven