

# ThermoJacket<sup>®</sup>

Protective Enclosure



## Users Manual

## **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.

The foregoing warranty is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability, fitness, or adequacy for any particular purpose or use. The manufacturer shall not be liable for any special, incidental or consequential damages, whether in contract, tort, or otherwise.

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## Compliance Statement



The device complies with the requirements of the European Directives:  
EC – Directive 2011/65/EU – RoHS II

EN 50581: 2012

Technical documentation for the evaluation of electrical products with respect to restriction of hazardous substances (RoHS)

## Safety Information

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. Eventual 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 Fluke 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 medical diagnosis.

### Replacement Parts and Accessories

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

Safety Symbol	Description
	Protective ground
	Disposal of old instruments should be handled according to professional and environmental regulations as electronic waste.



**To prevent possible electrical shock, fire, or personal injury follow these guidelines:**

- Read all safety Information before you use the product.
- Use the product only as specified, or the protection supplied by the product can be compromised.
- Carefully read all instructions.
- Do not use and disable the product if it is damaged.
- Do not use the product if it operates incorrectly.
- To prevent possible electrical shock, fire, or personal injury make sure that the product is grounded before use.

## Contacts

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#### Worldwide Service

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For more information, contact your local office.

[www.flukeprocessinstruments.com](http://www.flukeprocessinstruments.com)

## 1 Description

The ThermoJacket® gives you the ability to use sensing heads from the Fluke Process Instruments Series Endurance or Thermalert 4.0 in ambient temperatures up to 315°C (600°F). The ThermoJacket's rugged cast aluminum housing completely encloses the sensing head and provides water and/or air cooling and air purging. Sensing heads can be installed or removed from the ThermoJacket housing in its mounted position. All necessary mounting accessories are supplied with the ThermoJacket for your sensing head.

The ThermoJacket is available in the following versions:

- A-TJ-T40 – ThermoJacket with mounting material for Thermalert 4.0 sensors
- E-TJ1 – ThermoJacket with mounting material for Endurance sensors

**Figure 1-1: ThermoJacket**



## 2 Technical Data

### 2.1 General Specifications

**Air purge flow** 35 – 48 l / min (1.24 to 1.7 foot<sup>3</sup> / min.)

**Ambient temperatures**

water cooling 315°C (600°F)

air cooling 115°C (240°F)

**Coolant pressure (min./max.)**

water cooling 2.7 bar (40 psi) to 8.6 bar (125 psi)

air cooling 5.5 bar (80 psi) to 8.3 bar (120 psi)  
 filtered or instrument-clean air is required

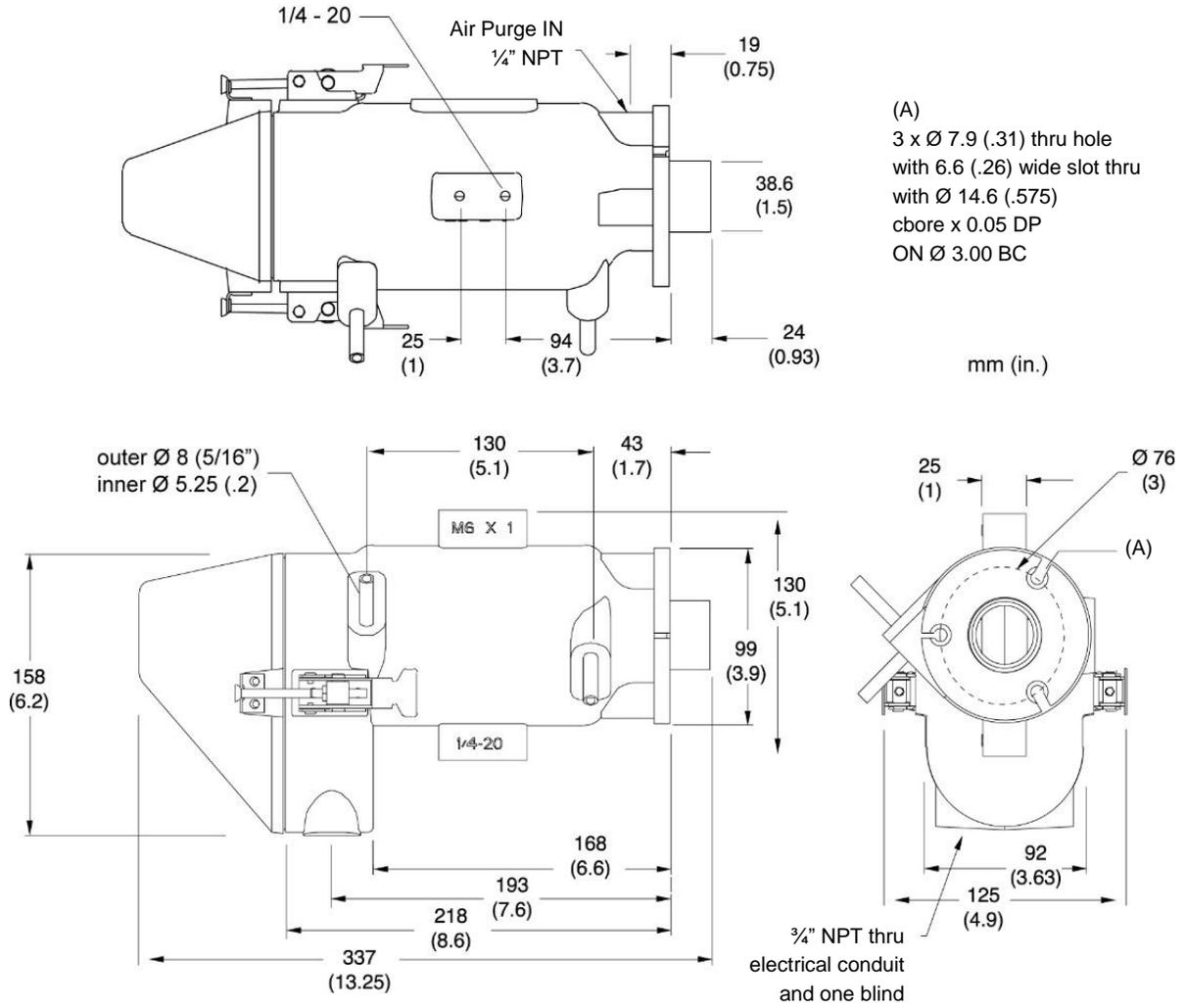
**Table 2-1: Ambient Temperatures versus Coolant Flow**

Max. Ambient Temperature	Water Cooling Flow	Air Cooling Flow
93°C (200°F)	0.3 l / min (0.01 foot <sup>3</sup> / min)	95 l / min (3.3 foot <sup>3</sup> / min)
121°C (250°F)	0.6 l / min (0.02 foot <sup>3</sup> / min)	110 l / min (3.9 foot <sup>3</sup> / min)
149°C (300°F)	1.0 l / min (0.035 foot <sup>3</sup> / min)	
232°C (450°F)	1.3 l / min (0.046 foot <sup>3</sup> / min)	
315°C (600°F)	2.0 l / min (0.07 foot <sup>3</sup> / min)	

Water/air temperature of 20°C (68°F) at inlet assumed.

**2.2 Dimensions**

**Figure 2-1: Dimensions for the ThermoJacket**



## 2.3 Scope of Delivery

The following items are supplied with the ThermoJacket:

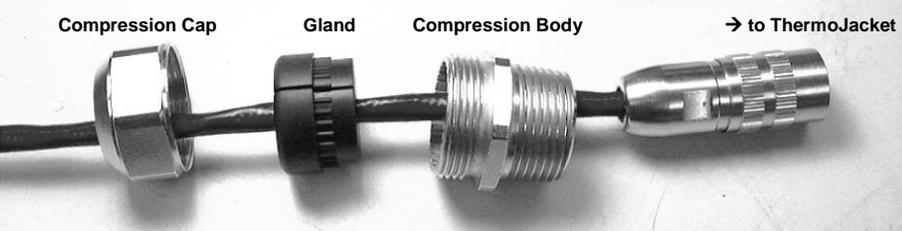
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2x Swage lock fittings (Parker Hannifin Corp. 5FSC4N-316)	
1/4" NPT metric adapter (for air purge)	
3/4" NPT cable compression gland fitting for cable diameter between 5 to 12 mm (0.2 to 0.47 in.)	
ThermoJacket for Thermalert 4.0 sensors (A-TJ-T40)	
	   
	Nose adapter    Spacer ring    Rear adapter    not to use
ThermoJacket for Endurance sensors (E-TJ1)	
	 
	Nose adapter    Extraction tool

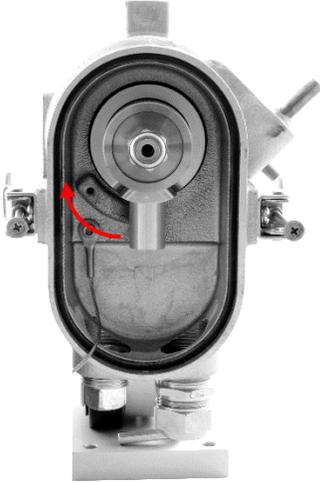
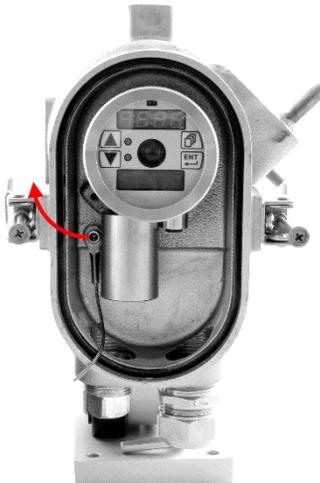
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### 3 Installation

#### 3.1 Assembly

Thermalert 4.0	Endurance
<p>Unlatch the ThermoJacket end cap. Pull the end cap from the ThermoJacket body.</p>	
<p>Firmly screw the spacer ring followed by the nose adapter onto the sensing head. <i>Hint: Lightly coat the outer groove on the nose adapter with silicon grease to make a later removal easier.</i></p>	
<p>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 in hex key to secure it to the head. Do not exceed 2.8 Nm (25 lbf in) torque.</p> <p><b>Figure 3-1: Sensor with Rear Adapter, Spacer Ring, and Nose Adapter</b></p> 	<p>Firmly screw the nose adapter onto the sensing head. <i>Hint: Lightly coat the outer groove on the nose adapter with silicon grease to make a later removal easier.</i></p> <p><b>Figure 3-2: Sensor with Nose Adapter</b></p> 
<p>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.</p>	
<p><b>Figure 3-3: Cable Compression Fitting</b></p> 	
<p>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 Endurance 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.</p>	
<p>Place the ThermoJacket end cap back onto the body, and latch the end cap to the body.</p>	

### 3.2 Disassembly

Thermalert 4.0	Endurance
Removal of the sensor is the reverse of installation.	
To aid removal, firmly rotate the head so the head connector post slides across (up) the cam ramp.	To aid removal, firmly rotate the head so the head connector post slides across (up) the cam ramp. If needed, use the extraction tool E-TJET available as accessory.
<p data-bbox="329 569 748 594"><b>Figure 3-4: Sensor with Rear Adapter</b></p> 	<p data-bbox="919 569 1365 594"><b>Figure 3-5: Sensor with Extraction Tool</b></p>  <p data-bbox="854 1182 1430 1241">For more information, see section 4.6 <a href="#">Extraction Tool for Endurance (E-TJET)</a>, page 26.</p>

### 3.3 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 2.1 [General Specifications](#), page 12. 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<sup>®</sup> tape or equivalent water pipe sealant to plumb the ThermoJacket and water flow regulator.

An installation overview you can find in section 6 [Exemplary Installation](#), page 37.

*Note*

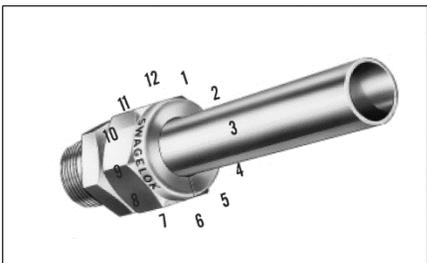
*Care should be taken to properly insulate coolant lines!*

#### 3.3.1 Installation of the Tube Fittings

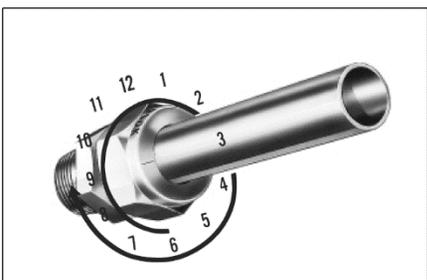
The following steps explain the installation of the tube fittings to the cooling tubes of the ThermoJacket.



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.



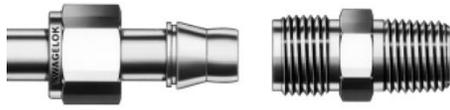
3. Scribe the nut at the 6 o'clock position.



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

### 3.3.2 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.

### 3.4 Air Cooling

The H<sub>2</sub>O ports are also designed to use air for cooling, for further information see section 3.3 [Water Cooling](#), page 17.

To control air flow, use the air flow regulator accessory, see section 4.9 [Air Flow Regulator \(A-TJ-AFR\)](#), page 33.

### 3.5 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 46 l / min (1.6 foot<sup>3</sup> / min) 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.

## 4 Accessories

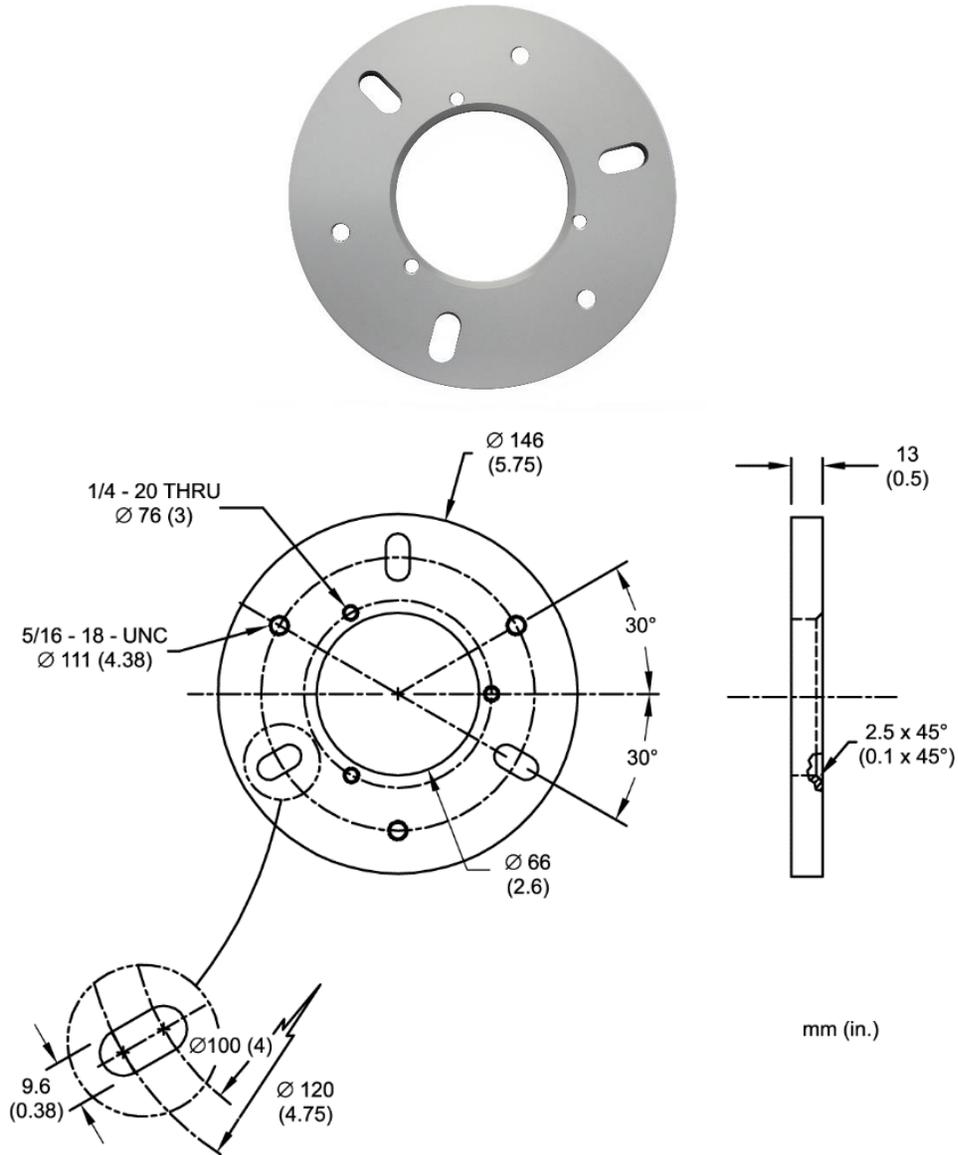
A full range of accessories for various applications and industrial environments are available. Accessories include items that may be ordered at any time and added on-site. These include the following:

- [Mounting Flange \(A-TJ-MF\)](#) (equivalent to previous E-MF)
- [Adjustable Mounting Base \(A-TJ-MB\)](#) (equivalent to previous E-MB)
- [Adjustable Pipe Adapter \(A-PA-A\)](#) (equivalent to previous E-APA)
- [Sighting Tube \(A-ST-xx\)](#) (equivalent to previous E-STxx and E-BEESIGHT)
- [Mounting Flange for Sighting Tube \(A-MF-ST\)](#) (equivalent to previous E-MST)
- [Extraction Tool for Endurance \(E-TJET\)](#)
- [Blast Gate \(A-TJ-GTx\)](#) (equivalent to previous E-GTQ)
- [Water Flow Regulator \(A-TJ-WFR\)](#) (equivalent to previous E-WR)
- [Air Flow Regulator \(A-TJ-AFR\)](#) (equivalent to previous E-CAFR)
- [Air Pressure Regulator \(A-TJ-APR\)](#) (equivalent to previous E-AR)
- Conversion Kit for Thermalert 4.0 (A-TJ-T40-CKIT), makes the Thermalert 4.0 suitable in an existing ThermoJacket, consists of nose adapter, spacer ring, rear adapter, O-ring, hex key

### 4.1 Mounting Flange (A-TJ-MF)

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.

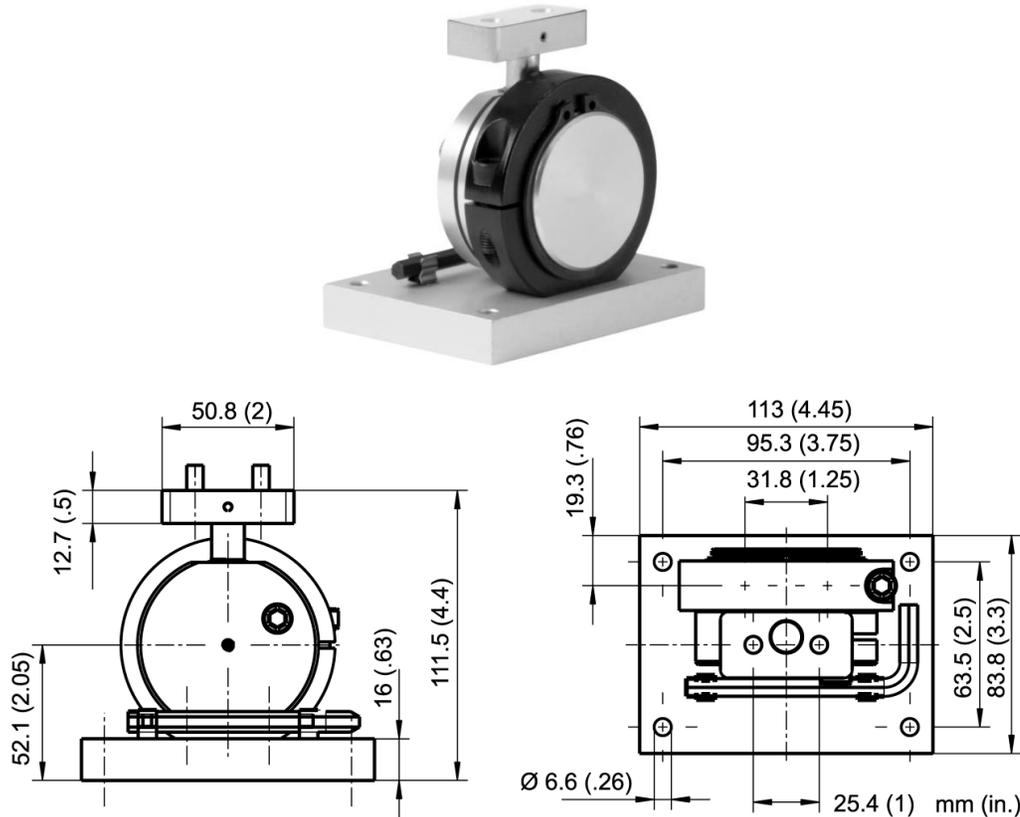
Figure 4-1: Mounting Flange



## 4.2 Adjustable Mounting Base (A-TJ-MB)

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

Figure 4-2: Adjustable Mounting Base



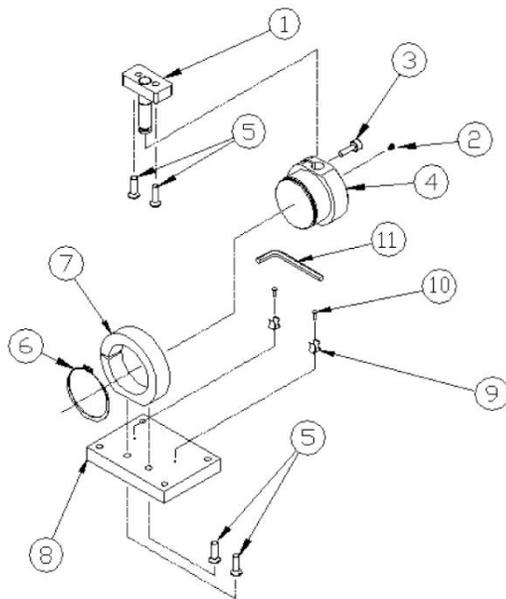
### Installing the Adjustable Mounting Base to the ThermoJacket:

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 cap screw (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 screws (1/4" 20 UNC or M6x1) (item 7).
6. Insert the ThermoJacket with adapter (item 1) attached back into the journal (item 4).
7. Tighten the 1/4" cap screw (item 3).

### Adjusting the Mounting Base:

8. Loosen the collar (item 5) and the cap screw (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 cap screw (item 3).

**Figure 4-3: Installation of the Adjustable Mounting Base**

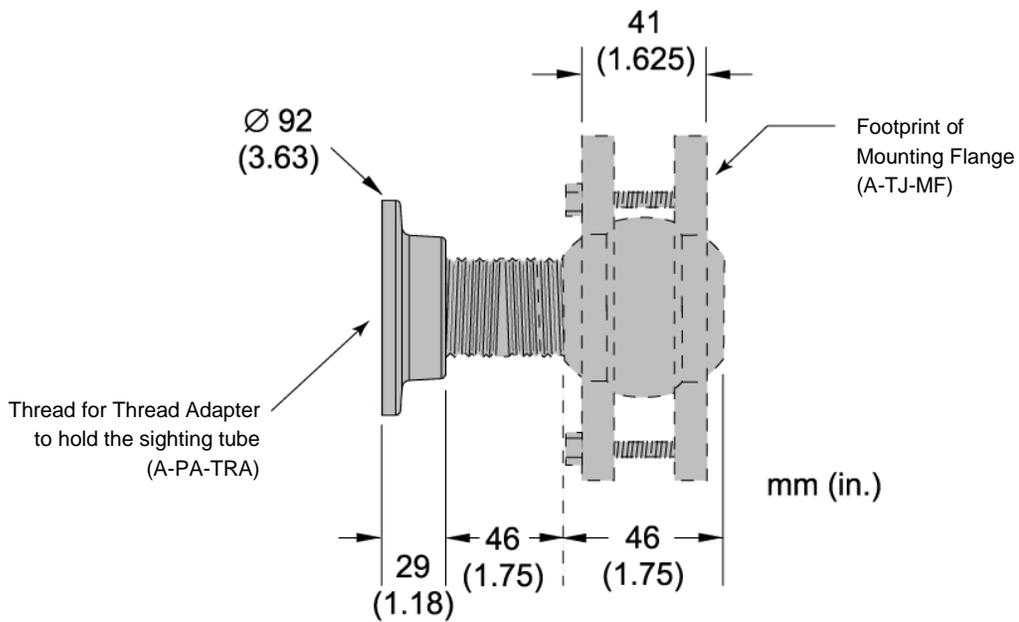


1. Adapter
2. Setscrew
3. Capscrew (for horizontal adjustment)
4. Journal
5. Flathead screw
6. Snapping
7. Collar (for vertical adjustment)
8. Base
9. Clip Holder

### 4.3 Adjustable Pipe Adapter (A-PA-A)

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.

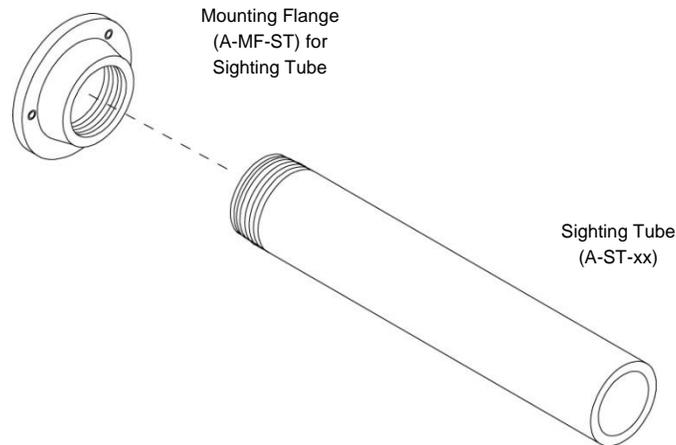
Figure 4-4: Adjustable Pipe Adapter



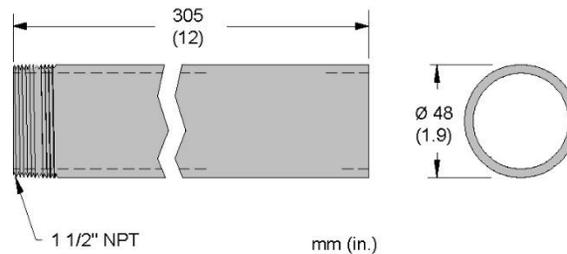
## 4.4 Sighting Tube (A-ST-xx)

The sighting tube is used in environmental conditions where reflected energy is a problem. The sighting tube is to install in conjunction with the mounting flange (A-MF-ST). Fix the mounting flange directly to the ThermoJacket face. Screw the desired sighting tube into the mounting flange.

**Figure 4-5: Installation of the Sighting Tube**



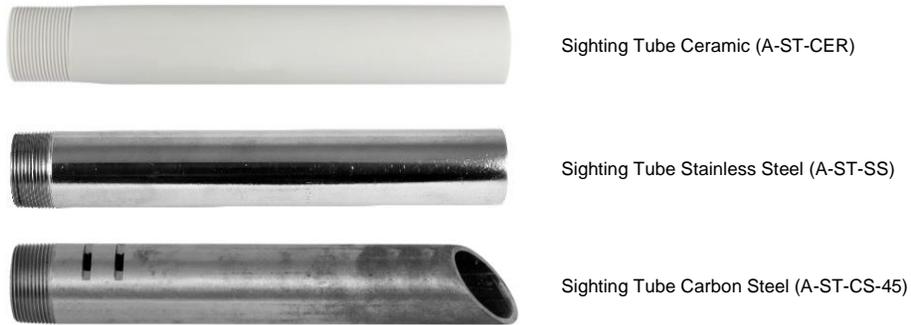
**Figure 4-6: Dimensions for the Sighting Tube**



Available sighting tubes:

- Sighting tube made of ceramic (A-ST-CER), resistible up to 1500°C (2732°F)
- Sighting tube made of stainless steel (A-ST-SS), resistible up to 800°C (1472°F)
- Sighting tube made of carbon steel (A-ST-CS-45), resistible up to 800°C (1472°F), with 45° cut and condensate outlet

Figure 4-7: Available Sighting Tubes



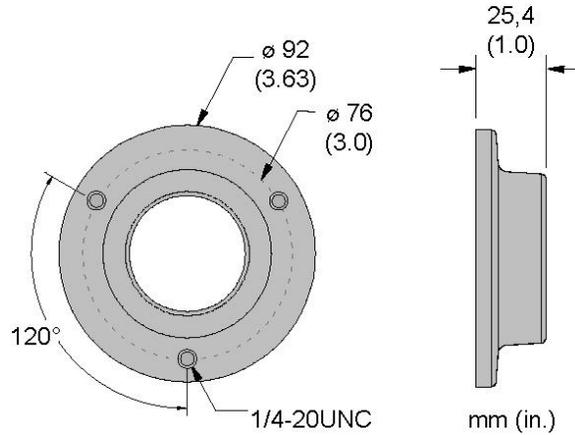
*Note*

*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!*

### 4.5 Mounting Flange for Sighting Tube (A-MF-ST)

The mounting flange is used to adapt different kind of sighting tubes to the ThermoJacket. The mounting flange has an inner thread to screw in and fix a selected sighting tube.

**Figure 4-8: Mounting Flange for Sighting Tube**



### 4.6 Extraction Tool for Endurance (E-TJET)

The extraction tool (E-TJET), made of stainless steel, eases the extraction/ejection of an Endurance® sensor out of the ThermoJacket cooling case.

**Figure 4-9: Extraction Tool for Endurance Sensors**

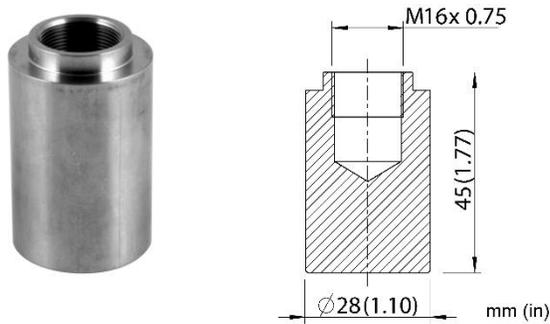
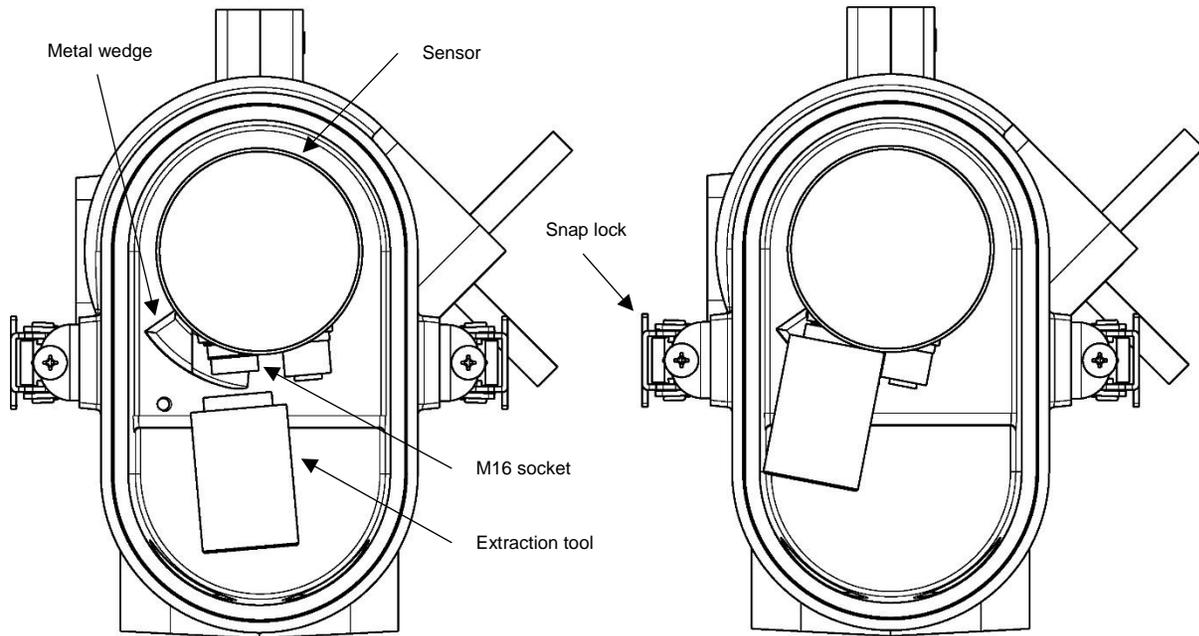


Figure 4-10: Extraction Tool and Endurance Sensor



Correctly positioned Endurance sensor to easily mount the extraction tool

Mounted extraction tool on the sensor's M16 socket to be forced left to extract the sensor

**Sequence to extract the sensor out of the ThermoJacket**

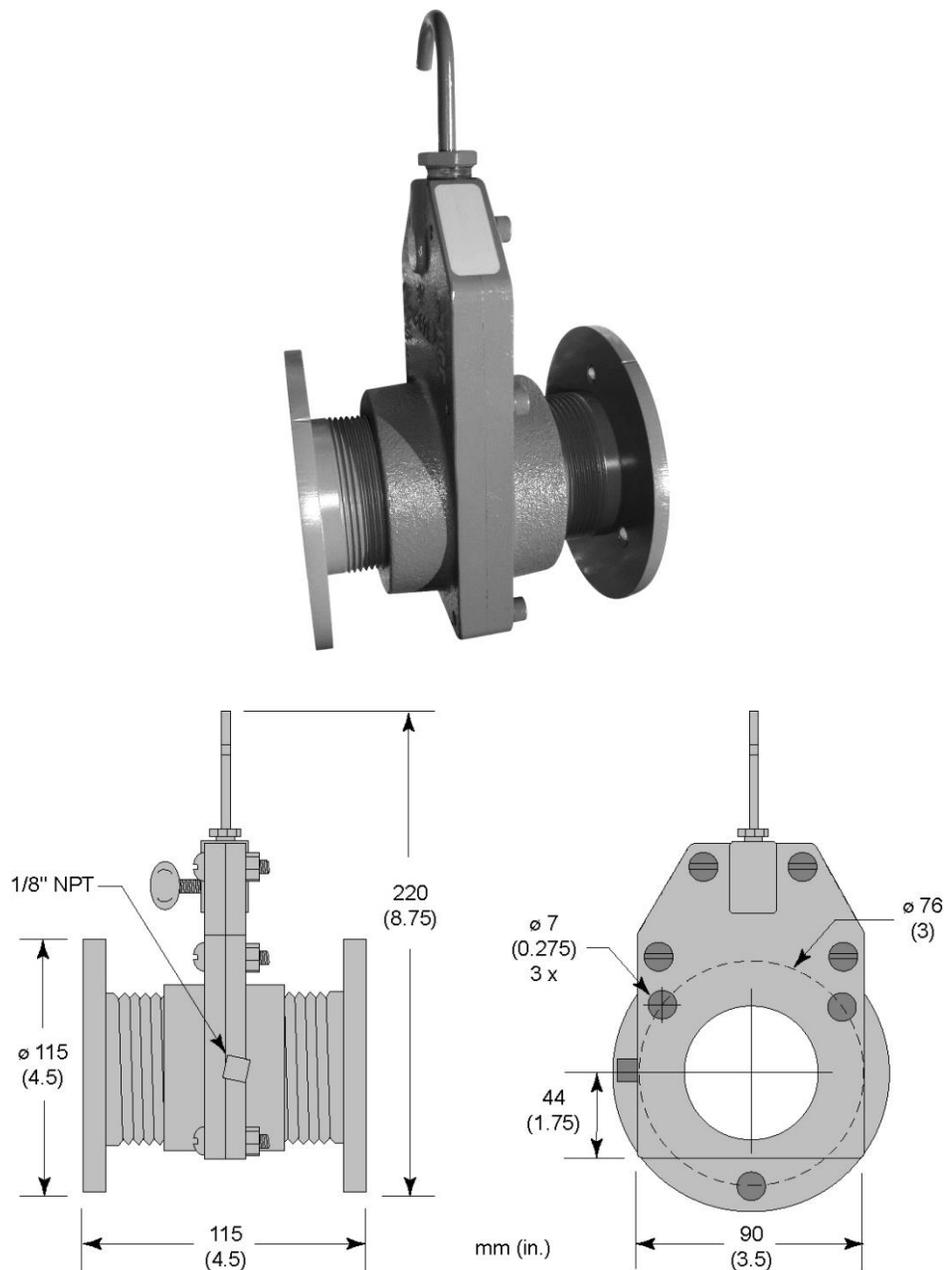
- Open the snap locks, release the rear ThermoJacket cover and leave the rear cover hang down, supported by flexible wire rope.
- Unscrew all top cable grommet compression seal nuts and push them downwards along the cables. Use a spanner with 30 mm (1.2 in) wrench size to release the sealed cables.
- Unscrew all cable connectors from the Endurance sensor by hand power and pull the cables completely out of the ThermoJacket grommet.
- Turn the Endurance sensor by hand power, induced to one of both cable sockets, some degrees anti-clockwise to give free space for the afterwards attached extraction tool.
- Press the flexible rear cover wire rope and the attached screw eye with your left-hand thumb to the left ThermoJacket inside.
- Screw the extraction tool by right hand power onto the left M16 Endurance sensor socket. Use the whole thread pitch to fix the tool on the socket.
- Keep the flexible wire rope and the screw eye in the outmost left position by your left-hand thumb.
- Force to turn the Endurance sensor via the installed extraction tool in clockwise rotating direction, to induce an ejection force over a die cast metal wedge.
- Pull the released Endurance sensor easily by hand power out of the ThermoJacket.

## 4.7 Blast Gate (A-TJ-GTx)

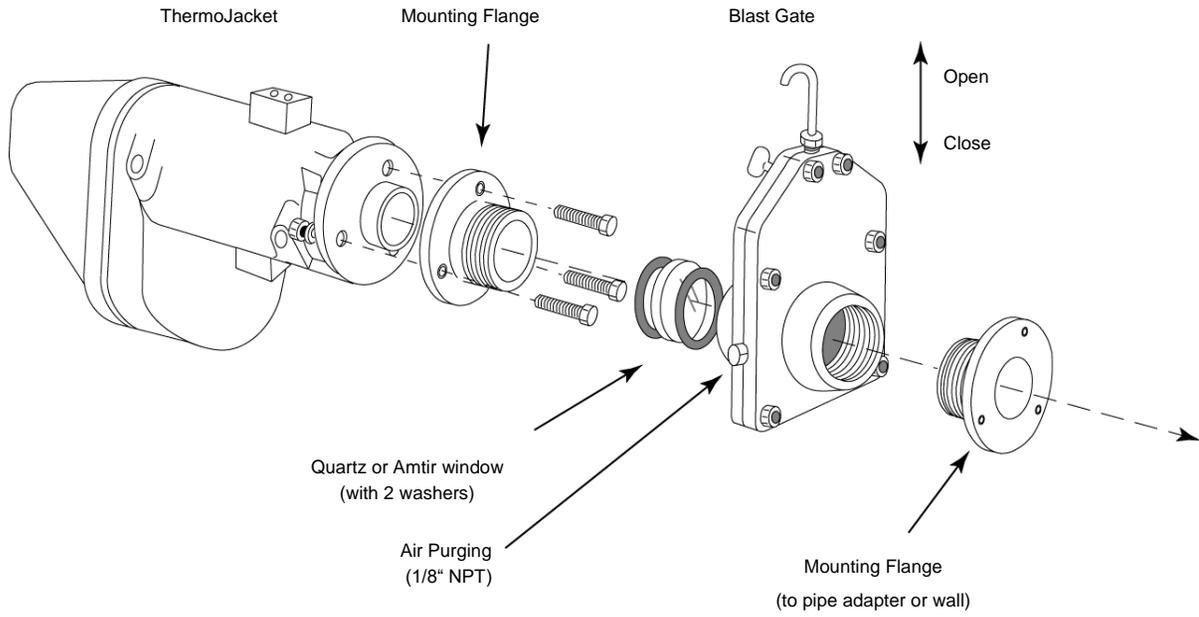
The blast gate is equipped with a window and a metal shutter. Use the blast gate accessory to protect the sensor, and perform tasks without exposure to hot or explosive target areas. Close the blast gate's metal shutter to perform maintenance, change the sensor or sensor settings, or remove the sensor and/or ThermoJacket. Two versions are available:

- Blast Gate with Quartz Window (A-TJ-GTQ), max. 870°C (1600°F) for 1 µm, 1.6 µm, 2.2 µm models
- Blast Gate with Amtir Window (A-TJ-GTA), max. 300°C (570°F) for 3.9 µm, 5 µm, 7.9 µm, 8 to 14 µm models

Figure 4-11: Blast Gate



**Figure 4-12: Mounting**



## 4.8 Water Flow Regulator (A-TJ-WFR)

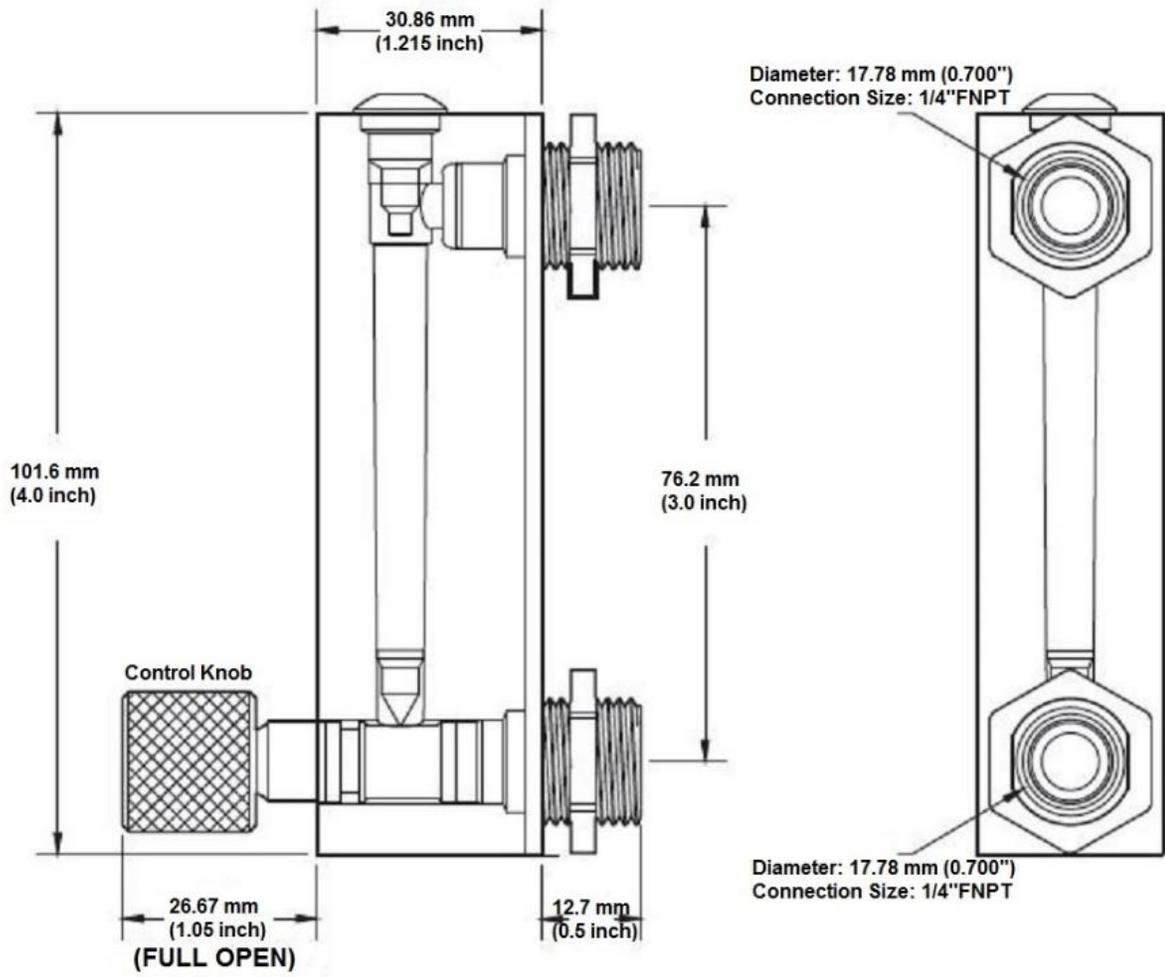
The water flow regulator is used to control the water cooling.

- Max. water pressure: 8.6 bar (125 psi)
- Max. water temperature: 54°C (130°F)
- Ambient temperature: 1 to 52°C (33 to 125°F)
- Flow control range: 0 to 2.8 l / min (0 to 44 GPH)

Figure 4-13: Water Flow Regulator (A-TJ-WFR)



**Figure 4-14: Dimensions**



## 4.9 Air Flow Regulator (A-TJ-AFR)

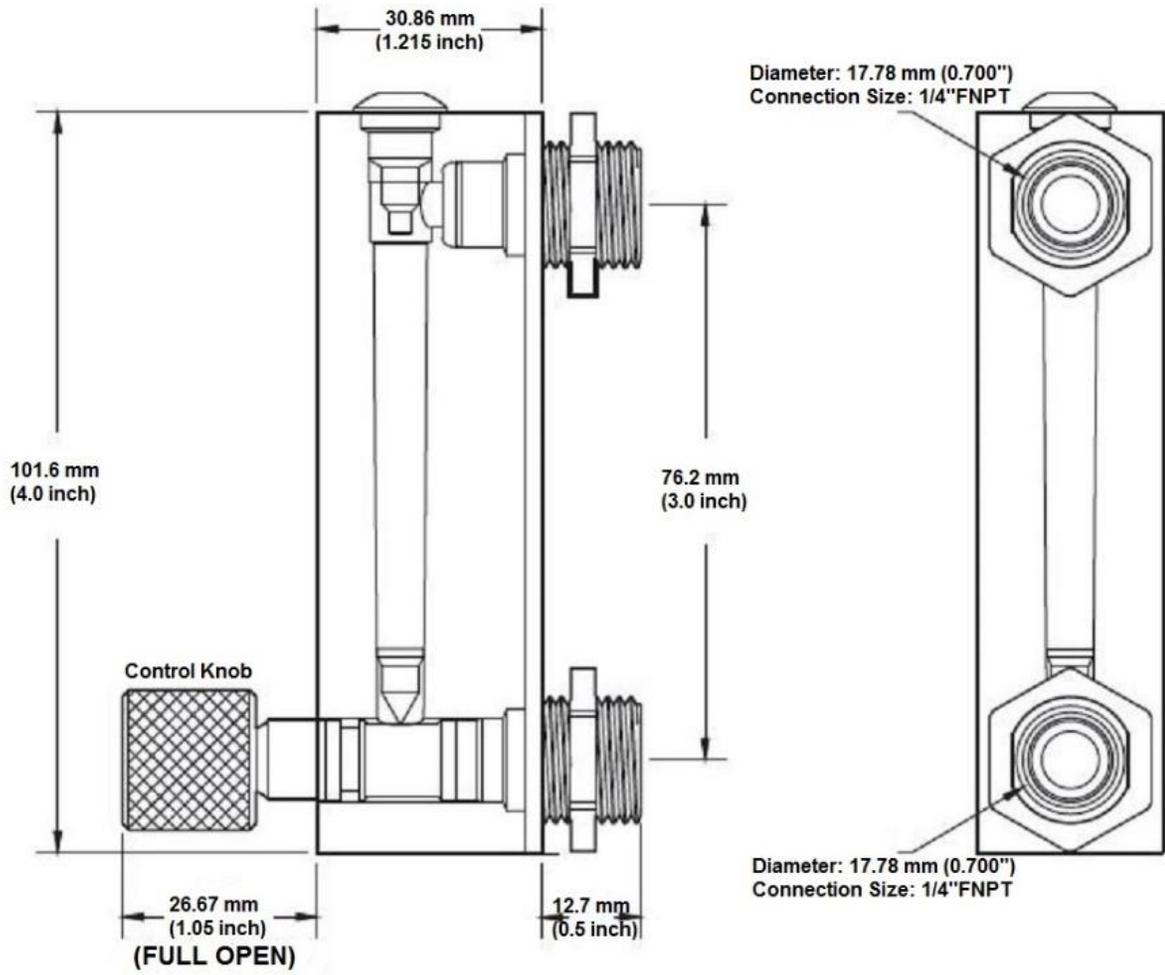
The high capacity cooling air flow regulator is used to control the cooled air flow.

- Max. air pressure: 6.9 bar (100 psi)
- Max. air temperature: 38°C (100°F)
- Ambient temperature: 1 to 52°C (33 to 125°F)
- Flow Control range: 0 to 113.3 l / min (0 to 4 SCFM)

Figure 4-15: Air Flow Regulator (A-TJ-AFR)



**Figure 4-16: Dimensions**

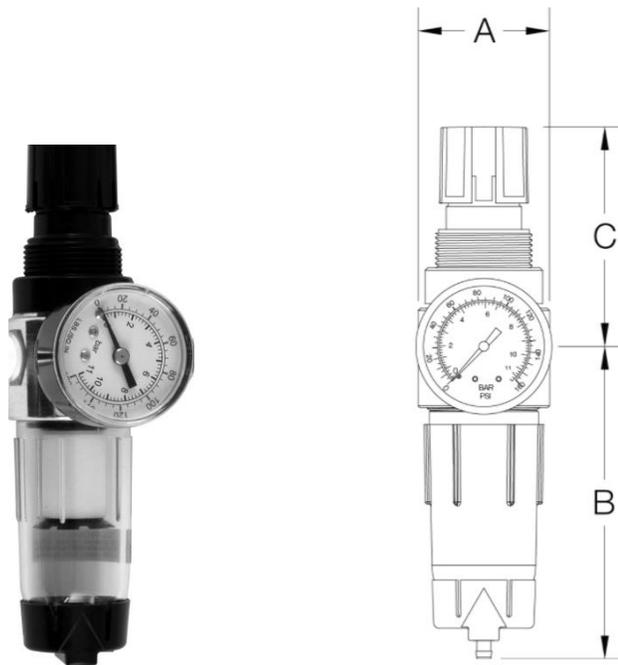


## 4.10 Air Pressure Regulator (A-TJ-APR)

The air pressure regulator is used to control the air purging.

- Max. air pressure: 10 bar (150 psi)
- Max. air temperature: 50°C (122°F)
- Ambient temperature: 4 to 52°C (40 to 125°F)
- Filter size: 5 µm

Figure 4-17: Air Pressure Regulator (A-TJ-APR)



A = 41 mm (1.6 in)

B = 99 mm (3.9 in)

C = 67 mm (2.6 in)

Depth = 41 mm (1.6 in)

## 5 Maintenance

### 5.1 Changing Sensing Heads

For routine sensing head change-overs, follow the steps outlined in section 3.2 [Disassembly](#), page 16.

### 5.2 Cleaning the Lens

Keep the lens always clean. 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.

### 5.3 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.

*Note*

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

## 6 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.

### 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!*

### 6.1 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.

### 6.2 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.

### Note

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

### 6.3 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 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 6-1: Installation of the ThermoJacket inside an Oven

