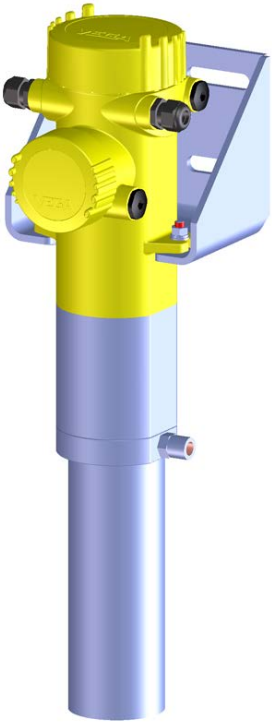
# Supplementary instructions

## Cooling system - FIBERTRAC 32 with Conduit tube connection

Active cooling system for radiometric sensors



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# Contents

**1 Product description ..... 3**
1.1 Configuration ..... 3
**2 Mounting ..... 4**
**3 Supplement ..... 14**
3.1 Technical data ..... 14
3.2 Dimensions ..... 15

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# 1 Product description

## 1.1 Configuration

The active cooling system is suitable for radiometric sensors of series FIBERTRAC 32.

**Scintillator cooling**

The cooling tube (provided by customer) for the sensor cools the active measuring part of the sensor (scintillator).

You can either use water or air cooling. The cooling tube must be suitable for the respective cooling medium.

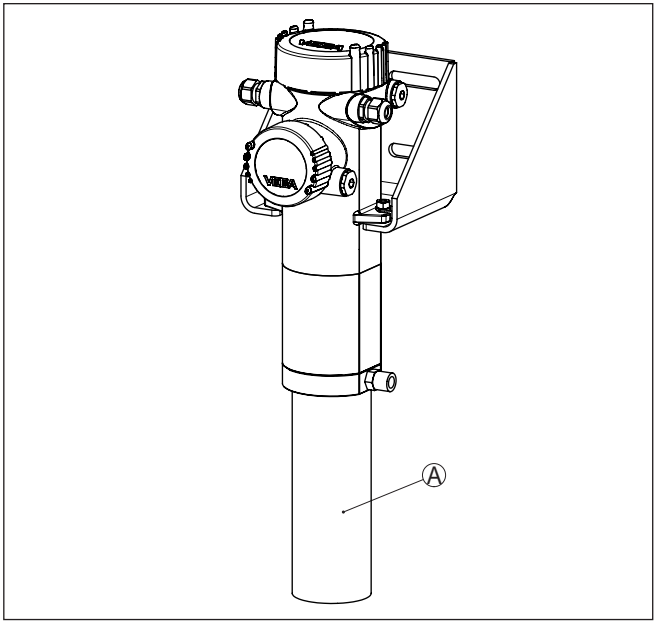


*Fig. 1: Active cooling system with fastening bracket*

*A Scintillator cooling tube (provided by customer)*

# 2 Mounting

## Mounting preparations

**Operating instructions**

Take note of the operating instructions manuals of the corresponding radiometric sensors and the source holder.

**Warning:**
During all mounting and dismounting work, the source container must be in switch position "OFF" and secured by a lock.

Carry out all work within the shortest possible time and at the largest possible distance. Provide suitable shielding.

Avoid risk to other persons by taking suitable measures (e.g. safety fence, etc.).

Mounting may only be carried out by authorized, qualified personnel who are monitored for radiation exposure according to local laws or the handling permit. Take note of the specifications in the handling permit. Also take the local conditions into account.

**Caution:**
The cooling system is used in areas with high temperatures. Therefore, use temperature-resistant cable and install it in such a way that contact with hot components is avoided.

## Mounting the scintillator cooling

Mount the scintillator cooling (customer-side) according to the following assembly drawing:

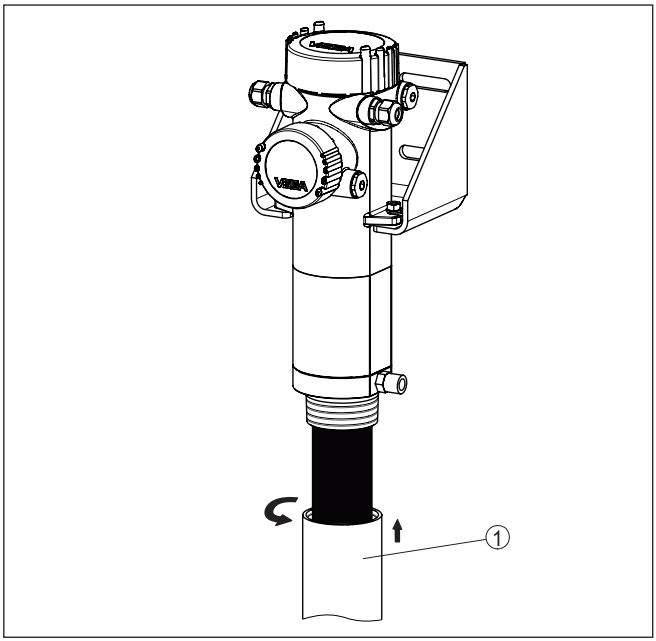


*Fig. 2: Mounting the scintillator cooling*

*1 Scintillator cooling tube with NPT connection thread 2½" (provided by customer)*

1. Prepare a cooling tube (1), matching the length of the sensor. The cooling tube (1) must have an NPT inner thread size of 2½" on the upper side.

   **Air cooling**

   The scintillator cooling tube (1) must remain open to the bottom so that the cooling air can escape freely.

   **Water cooling**

   The scintillator cooling tube (1) must remain closed to the bottom. Provide an entry for the cooling agent at the bottom for a cooling circuit.
2. Push the cooling tube (1) provided by the customer from below onto the black scintillator of the sensor.
3. Grease the upper thread of the scintillator cooling tube (1) with acid-free grease. This makes screwing the parts together easier.
4. Push the cooling tube (1) provided by the customer from below into the thread of the sensor and screw the thread into the sensor.
5. The air cooling tube must remain open to the bottom. Make sure that the cooling air can escape freely.

   Make sure when using the water cooling tube that the lateral connections for the cooling water lines are easily accessible.

   The scintillator cooling is now completely mounted.

6. The connection of the cooling is described in the following mounting process.

**Lifting the air cooling system**

**Information:**
The sensor together with the cooling system is very heavy. Use a suitable lifting device for mounting.

Use a hoisting sling with sufficient loading capacity. Take note of the sling marking. You can find the respective weight of the cooling system in chapter "*Technical data*".

Place the lifting sling around the cooling tube directly below the flange. The loop is a so-called lark's foot.

Fasten the hoisting sling according to the following illustration.

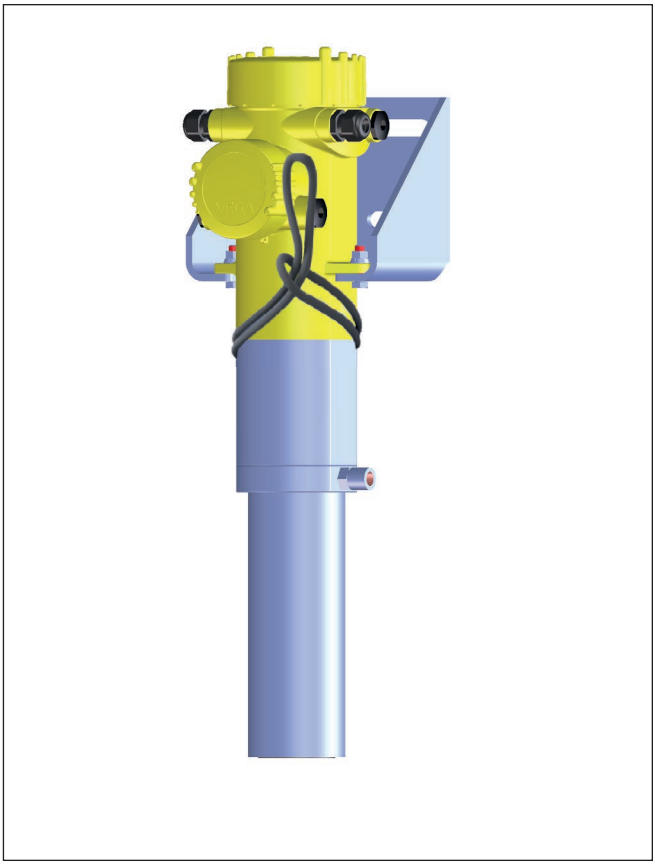

*Fig. 3: Attaching the sling*

## Mounting the sensor

As soon as the cooling system is mounted, you can install the sensor with the cooling system in your facility.

**Note:**
The cooling system does not come with components for fastening to the vessel. Use fastening elements that are appropriate to the situation in your plant.

→ Fasten the cooling tube (provided by customer) with suitable mounting clamps, brackets, etc.

Make sure that the tube is well secured against slippage.

You can find further information on sensor mounting in the operating instructions manual of the sensor.

## Connect cooling - Air cooling

**Connect cooling**

The scintillator cooling must be connected to the cooling system.

Two cooling methods are possible:

- Eddy current cooler (Vortex cooler)
- Compressed air (from the workshop compressed air system)

Combinations of the two cooling methods are also possible.

In this case we recommend using vortex coolers. The direct connection to the sensor as well as the defined, plannable cooling effect of vortex coolers allow effective cooling of the measuring point.

If compressed air from the workshop compressed air system is used, the flow rate as well as the temperature of the compressed air are undefined. Effective cooling is not ensured.

Please contact VEGA service before planning your system.

**Caution:**
Make sure that a sufficient cooling effect is achieved before putting the measuring point into operation with workshop compressed air. The max. permissible temperature around the scintillator is +50 °C (+122 °F); this temperature must not be exceeded.

**Cooling systems - vortex cooler**
So-called Vortex coolers are proven possibilities for cooling the sensor.

You can connect the cooling air output of the vortex cooler directly to the scintillator cooling.

Contact our sales staff to make sure the coolers fit perfectly to your air cooling system with respect to size, cooling capacity and throughput.

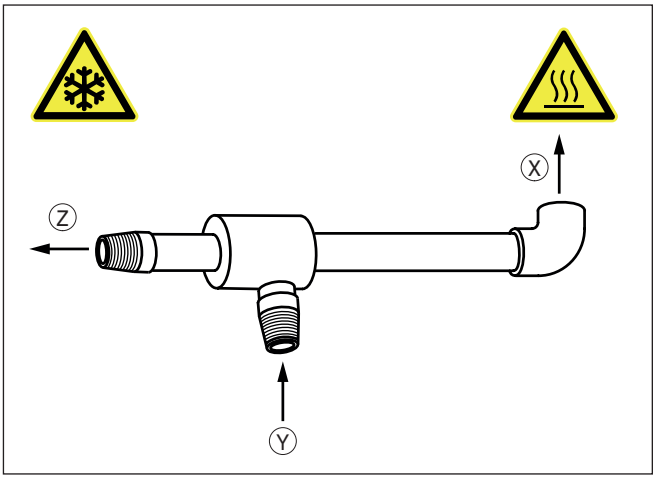


*Fig. 4: Eddy current cooler (Vortex cooler)*

*x Hot exhaust air*
*y Supply air*
*z Cooling air*

**Caution:**
The vortex cooler gets very hot during operation. Hot air at approx. 100 °C (212 °F) escapes from the exhaust opening. Furthermore, the cooler or sensor can be very cold on the cold air side. Wear suitable protective clothing and prevent people from touching the cooling system by installing barriers, etc.

Make sure that the exhaust airstream can escape safely into the open. Make sure that no heat-sensitive components or cables are in the exhaust airstream.

If you want to direct the exhaust airstream in another direction, you have to use standard, angled metal fittings with ¼" screw connection.

Connect the vortex coolers.

All threads for the cooling connection on the sensor are inner threads.

The vortex cooler type FOS 208SS 35 HVE BSP (optional) is connected to the scintillator cooling

Screw in the short cooling air output of the vortex cooler and tighten it with a torque of 25 Nm (18.43 lbf ft).

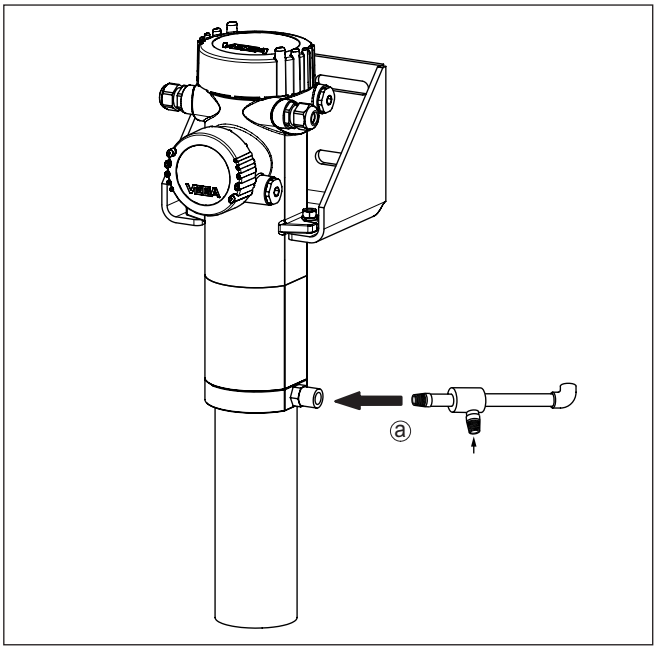


*Fig. 5: Cooling air inlet - scintillator cooling - vortex cooler type FOS 208SS 35 HVE BSP (optional)*

For cooling, use clean, water-free compressed air of class 3:3:2 acc. to ISO 8573-1:2010. Make sure that your compressor has enough supply capacity. You can find information on quality, pressure, throughput and temperature of the cooling air in chapter "*Technical data*".

Make sure that the cooling air inlets do not freeze, e.g. in case of a shutdown.

**Caution:**
Do not loosen any screws or connections during operation and make sure that the cooling air supply is reliable and interruption-free. Plan the necessary steps for a possible compressed air failure.

SIL If you want to use the air cooling in an SIL-qualified application, you have to assess the SIL failure rates of the complete air cooling system and the cooling air supply yourself.

**Cooling systems - compressed air (provided by customer)**
Compressed air from a workshop compressed air system is another possibility for cooling the sensor.

You can connect the air supply directly to the scintillator cooling.

Adapt the cooling capacity and the flow rate to the requirements of your application.

**Caution:**
Make sure that the exhaust airstream can escape safely into the open.

The air can heat up extremely during cooling. Make sure that no heat-sensitive components or cables are in the exhaust airstream.

→ Connect the workshop compressed air line. For this, use a ¼" fitting or a respective adapter.

All threads for the cooling connection on the sensor are inner threads.

Screw in the cooling air line and tighten it with a torque of 25 Nm (18.43 lbf ft).

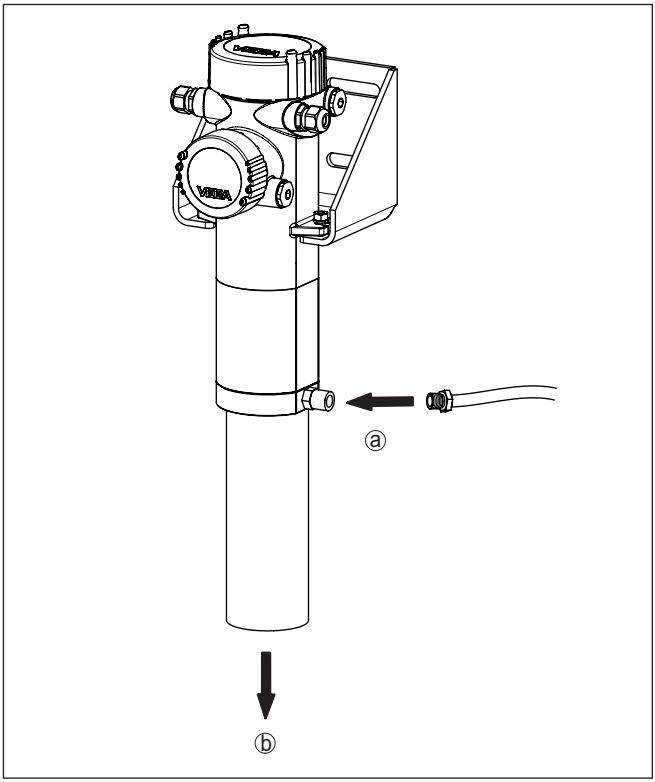


*Fig. 6: Connection of the cooling lines*

*a Cooling air inlet - scintillator cooling*
*b Cooling air outlet - scintillator cooling*

For cooling, use clean, water-free compressed air of class 3:3:2 acc. to ISO 8573-1:2010. Make sure that your compressor has enough supply capacity. You can find information on quality, pressure, throughput and temperature of the cooling air in chapter "*Technical data*".

**Caution:**
Do not loosen any screws or connections during operation and make sure that the cooling air supply is reliable and interruption-free. Plan the necessary steps for a possible compressed air failure.

SIL If you want to use the air cooling in an SIL-qualified application, you have to assess the SIL failure rates of the complete air cooling system and the cooling air supply yourself.

**Install a protective grid**

Take note of the operating instructions manuals of the corresponding radiometric sensors and the source holder.

When handling radioactive substances, unnecessary radiation exposure must be avoided.

If there are gaps or intervening spaces after mounting, provide protective fences or grids to keep hands away from the dangerous area. Such areas must be marked accordingly.

Install a safety barrier on both sides of the cooling system. A sheet metal cover or an appropriately shaped plastic sheet can also be used.

## Connect cooling - Water cooling

**Connect cooling**

Use clean tap water or distilled water for cooling. Oil or salt water are not suitable for the cooling system.

Make sure that the coolant cables do not freeze, e.g. in case of a shutdown.

You can find information on the throughput and the temperature of the cooling water in the technical data section.

**Coolant pump**
The water cooling may only be operated in an unpressurized state. Use an open cooling circuit that circulates the coolant through the system by means of a pump.

Plan the coolant pump and a possible re-cooling system according to the required inlet temperature, pumping height and water throughput.

If you want to integrate a gate valve into the system, then install it only in the feed line to avoid pressurization in the cooling system.

**Caution:**
Make sure that the cooling water supply is reliable und interruption-free. Plan the necessary steps for a possible pump failure, missing coolant, etc.

We recommend installing a temperature sensor (in the return flow) that triggers an alarm when a critical temperature is reached.

SIL If you want to use the water cooling in an application that is SIL qualified, you have to assess the SIL failure rates of the complete water cooling system and the cooling water supply yourself.

1. Install the coolant hoses in such a way that they do not get kinked or come into contact with hot components.

**Information:**
Note the flow direction of the coolant. The direction of flow should be from bottom to top so that no voids can arise.

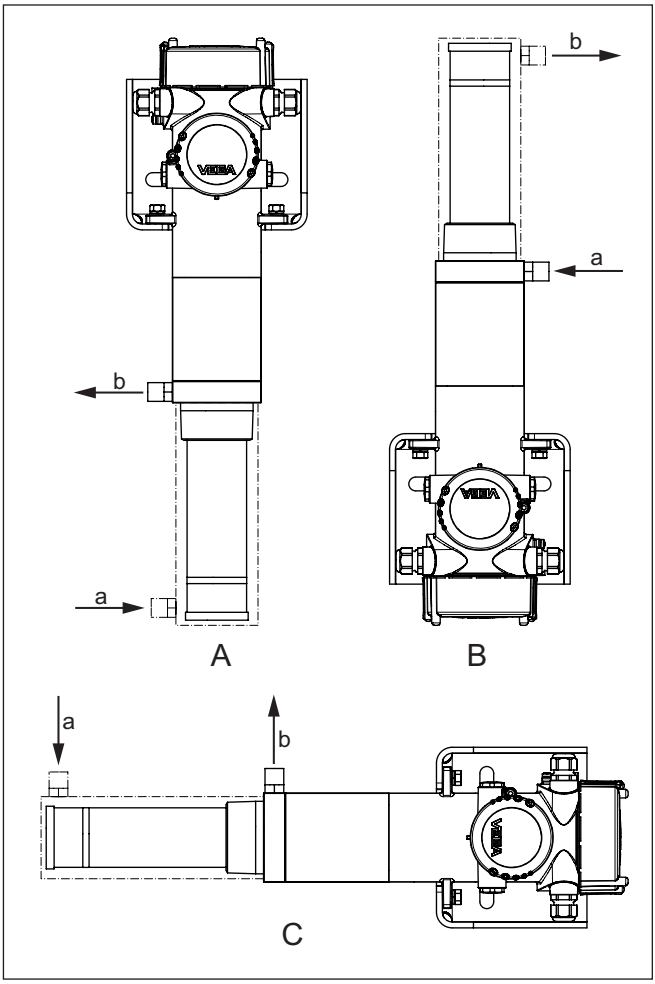


*Fig. 7: Mounting position of the cooling system - note flow direction of the coolant (a, b)*

*A Vertical mounting - housing head on top*
*B Vertical mounting - housing head on bottom*
*C Horizontal mounting*
*a Inlet*
*b Procedure*

2. Connect the lines for the cooling water.

   All threads for the cooling connection on the sensor are inner threads.

3. Fill the water cooling system.

   Check the tightness of the system and the hose fittings.

   The cooling system may only be operated in an unpressurized state.

**Caution:**
Do not loosen any screws or hose connections during operation and make sure that the coolant supply is reliable and interruption-free.

**Install a protective grid**

Take note of the operating instructions manuals of the corresponding radiometric sensors and the source holder.

When handling radioactive substances, unnecessary radiation exposure must be avoided.

If there are gaps or intervening spaces after mounting, provide protective fences or grids to keep hands away from the dangerous area. Such areas must be marked accordingly.

Install a safety barrier on both sides of the cooling system. A sheet metal cover or an appropriately shaped plastic sheet can also be used.

# 3 Supplement

## 3.1 Technical data

| General data | |
|---|---|
| Take note of the information in the operating instructions manual of the installed FIBERTRAC 32 level sensor and the source holder | |
| Material 316L corresponds to 1.4404 or 1.4435 | |
| Total length of the air cooling system | max. 7 m (22.97 ft) |
| Cooling tube provided by customer | |
| – Max. diameter - sensor hose | 64 mm (2.52 in) |
| – Thread[1] | 2½" NPSM - inner thread |
| Torques | |
| – Screws, Sensor mounting (M8) | 15 Nm (11.06 lbf ft) |
| – Threaded fittings, vortex cooler i.e. compressed air | 25 Nm (18.43 lbf ft) |
| Connection thread of the cooling air inputs | ¼" DIN ISO 228 outer thread |

| Flow rate - vortex coolers | |
|---|---|
| Quality of the compressed air | ISO 8573-1:2010 [3:3:2] |
| Supply capacity - Compressor[2] | |
| – Type FOS 208SS 25 HVE BSP[3] | 708 L/min (25 SCFM) |
| – Type FOS 208SS 35 HVE BSP[4] | 991 L/min (35 SCFM) |
| Air pressure of the supply air | 5 … 7.9 bar (72 … 114 psig) |
| Temperature of the supply air | +20 … +25 °C (+68 … +77 °F) |
| Ambient temperature | |
| – Sensor length 0.3 … 5 m (1 … 16.4 ft) | +80 °C (+176 °F) |
| – Sensor length 5 … 7 m (16.4 … 23 ft) | +70 °C (+158 °F) |

| Throughput - compressed air (provided by customer) | |
|---|---|
| Quality of the compressed air | ISO 8573-1:2010 [3:3:2] |
| Air pressure of the supply air | Adapt the cooling capacity and the throughput to the requirements of your measuring point. |
| Temperature around the scintillator | max. +50 °C (+122 °F) |

| Throughput - coolant water | |
|---|---|
| Cooling water pressure | The cooling system may only be operated in an unpressurized state. |

[1] For connection to the sensor
[2] at 6.9 bar (100 psig)
[3] optional
[4] optional

| | |
|---|---|
| Throughput - coolant water | Select the flow rate and the cooling water temperature according to the ambient and radiation temperature of your application.<br>Make sure that the temperature on the detector hose is max. +50 °C (+122 °F). |

**Approvals**

If you use an air cooling system in hazardous areas, make sure that the max. permissible temperatures in the Ex safety instructions are maintained around the sensor. If this is ensured, the sensor can also be used with an air cooling system in hazardous areas.

## 3.2 Dimensions

**Active air cooling system**

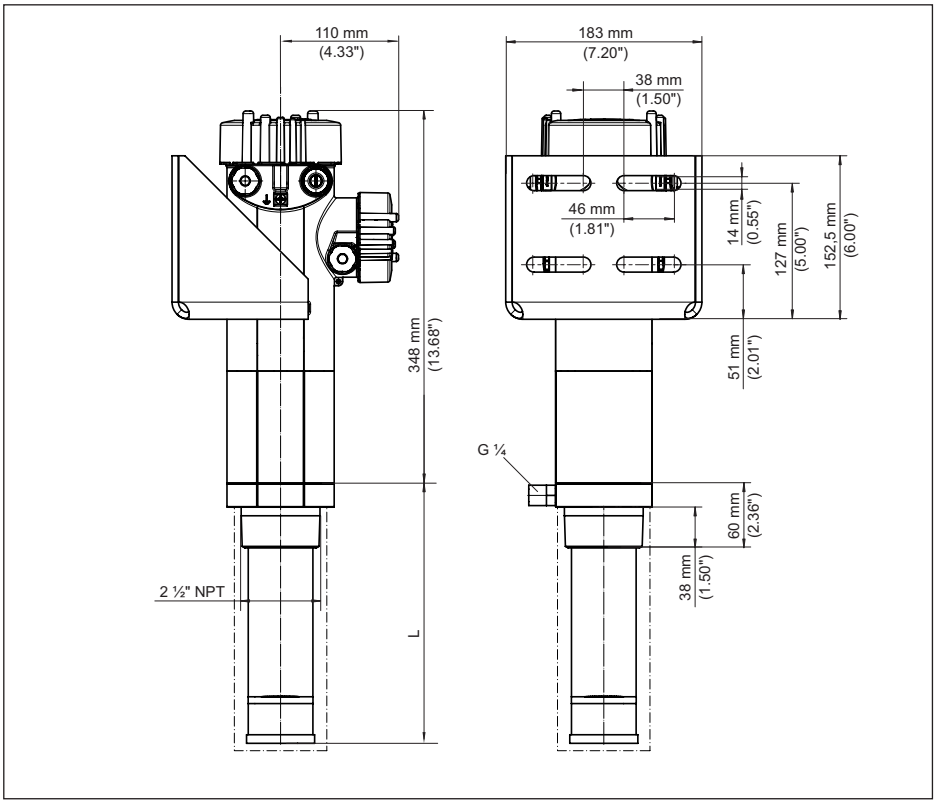


*Fig. 8: Active air cooling system with scintillator cooling*

*L Total length of the air cooling system*

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