# 6 Mechanical installation

## 6.1 Installation point

The installation point is crucial for a correct measurement. Sources of error can be: Imprecise installation, uneven flow profiles, swirls, rapid pressure or temperature swings, humidity variation, flow oscillations, sensor contamination and many others. To ensure the highest possible accuracy of flow measurement, installation and piping instructions must be followed. Read this paragraph carefully!

**Take into account:**
- Choose a location which is accessible, which allows access for wiring and maintenance activities
- Stay within specifications for the VPFlowScope M: when specifications are exceeded, for instance excessive pressure or temperature, inaccurate flow measurement and possible sensor damage are to be expected
- The VPFlowScope M is a precision instrument not designed for mechanical stress. Neither when in operation or during its installation

**Avoid:**
- Excessive heat; check the temperature specifications
- Corrosive atmosphere
- Electrical overloading (voltage spikes, EMF)
- Mechanical stress or vibrations (power tools, hammers, foot bridges, fork lift trucks)
- Harsh environmental influences


Stop: These devices are only for use with air, nitrogen and other non hazardous and non combustible gases. The maximum working pressure is 10 bar (145 psi)

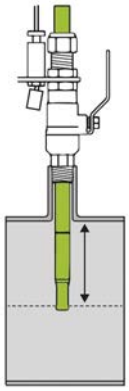
Arrêt: Ces dispositifs sont uniquement destinés à être utilisés avec de l'air, de l'azote et d'autres gaz non dangereux et non combustibles. La pression opérationnelle maximale est de 10 bar (145 psi)

**Prepare the installation**
The VPFlowScope M can be inserted through a tap with 1/2 inch female thread. For installation under pressurized conditions a hot tap saddle can be used.

Use a 1/2" full bore ball valve to enable inserting and retracting the VPFlowScope M VPSensorCartridge.

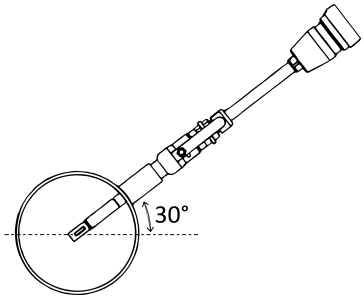
Warning: Make sure the hole is at least 16 mm (0.63 inch), and completely clear for insertion. Forcefully inserting the VPSensorCartridge will damage it and consequentially incorrect readings or no reading at all

**Installation procedure**
Insertion depth
Generally the insertion depth of the VPFlowScope M is 0.5 times the inner pipe diameter, where the bottom of the sensor tip must be in the middle of the pipe (see picture).



Position

Install the VPFlowScope M upwards in an angle between 1 and 2 o'clock (see picture). Never install the instruments upside down.

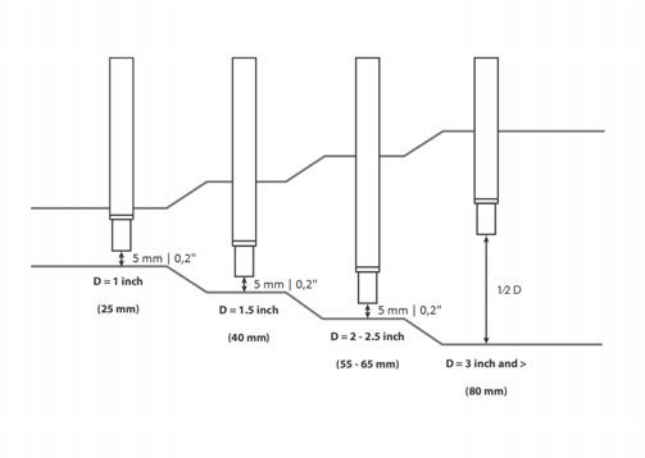



The VPSensorCartridge has a flow direction indicator, this also indicates the alignment of the instrument. A second indicator can be found on the safety system. Make sure it points in the right flow direction. Alignment “by the eye” is sufficient.

Info: A ruler can be used to align the instrument. It can be placed on the flat area where the direction indicator is located.

Exception

Between pipe sizes of 1” and 2”: be aware that the field accuracy is +/- 10%; installation errors are bigger. The insertion depth between DN25 and DN65 is also different. The VPFlowScope M probe has to be inserted almost completely to the bottom of the pipe or else the temperature sensor of the VPFlowScope M probe itself is outside the flow path. The sensor tip will not be in the middle of the pipe any more. The measurement value is automatically corrected for small diameters.



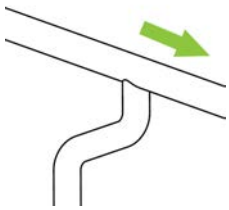
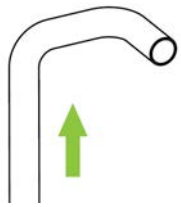
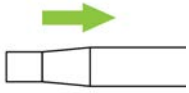
## 6.2 Piping table

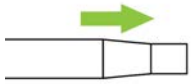
Check the piping table below and match it for your application. The table shows the amount of upstream and downstream length depending on the installation. If applicable in front of the meter, use given upstream length. If applicable in behind the meter, use given downstream length. Gas flow in pipes follows certain rules, which must be observed for optimal measurement results. In some cases the upstream length needs to be longer, in other cases it can be shorter.

If possible, you can always choose a longer upstream length, as these are minimum values. The up- and downstream lengths are used industry wide as guidelines, but will never be a guarantee for obtaining the “true value”.

### Piping table

The following table provides a guideline for proper distances between upstream or downstream objects and the VPFlowScope M. The upstream length is the length between the last non-straight object and the VPFlowScope M. If the upstream length is straight, and the distortion is downstream of the VPFlowScope M, you can use the column "downstream length" as a guideline. In very complex situations, with multiple up- and downstream objects, you should consider another location. This table is a practical guideline and is not exact science. Practical situations can have multiple sources of distortion, therefore VPInstruments does not take any responsibility for the correctness.

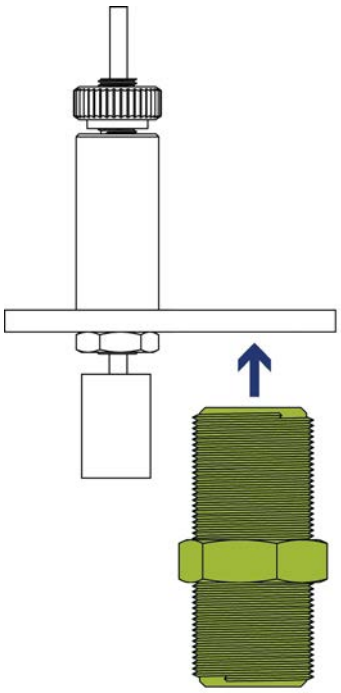
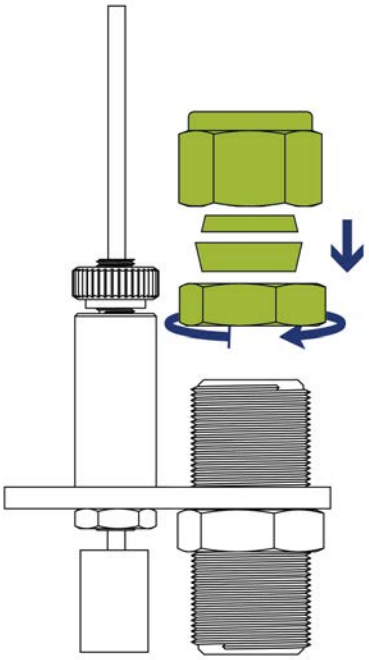
| Picture | Description | Upstream length[2] | Downstream length[2] | Effect |
|---|---|---|---|---|
|  | Single elbow | 30 * D[1] | 10 * D[1] | Distorted flow profile |
|  | Complex feed-in situation (header) | 40 * D[1] | 10 * D[1] | Flow profile will be distorted |
|  | Double elbow, multiple elbows following each other | 40 * D[1] | 10 * D[1] | Distorted profile + swirl |
|  | Diameter change from small to large (gradual or instant) | 40 * D[1] | 5 *D[1] | Jet shaped flow |

| | | | | |
|---|---|---|---|---|
|  | Diameter change from large to small (gradual change, between 7 and 15 degrees) | 10 * $D^1$ | 5 * $D^1$ | Flattened flow profile |

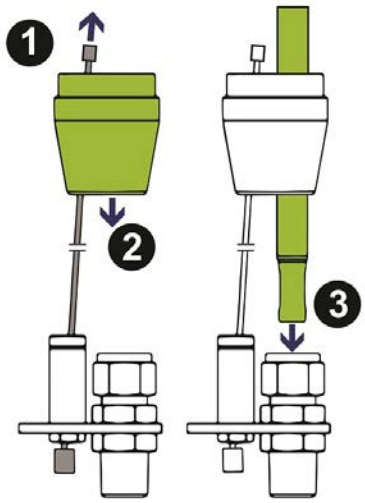
1 = inner diameter; 2 = minimum length

## 6.3 Safety system

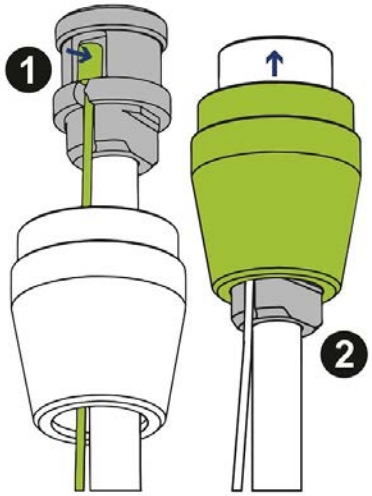
See chapter 3.3 safety system, for all safety system parts.

| | |
|---|---|
|  |  |
| **Step 1.**<br>1. Remove the compression fitting's parts on the long threaded end side<br>2. Place the safety plate over the compression fitting long threaded end | **Step 2.**<br>1. Mount the nut, and close tight. Then mount the compression fitting's teflon rings and nut |

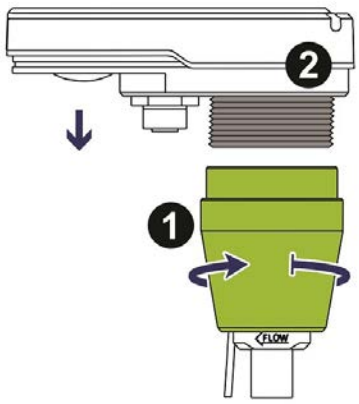
## 6.4 Assembling and installing the instrument



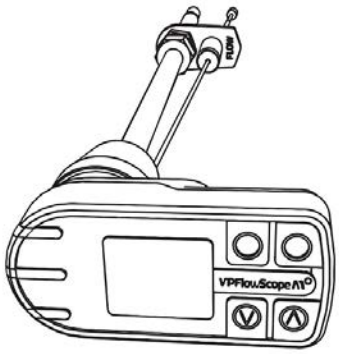

**Step 1**
1. Lift the safety cable
2. Slide the locking ring over the safety cable
3. Place the VPSensorCartridge through the locking ring into the compression fitting



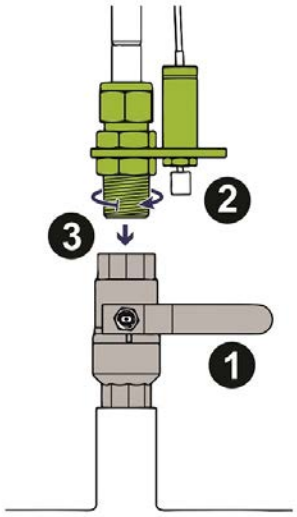

**Step 2**
1. Mount the safety line to the VPSensorCartridge, it should snap in completely
2. Move the locking ring upwards over the VPSensorCartridge and hold it in place




**Step 3**
1. Place the Transmitter on top of the assembly
2. Align the probe with the display (default position, arrow should point to the left as on the picture). Tighten the locking ring completely

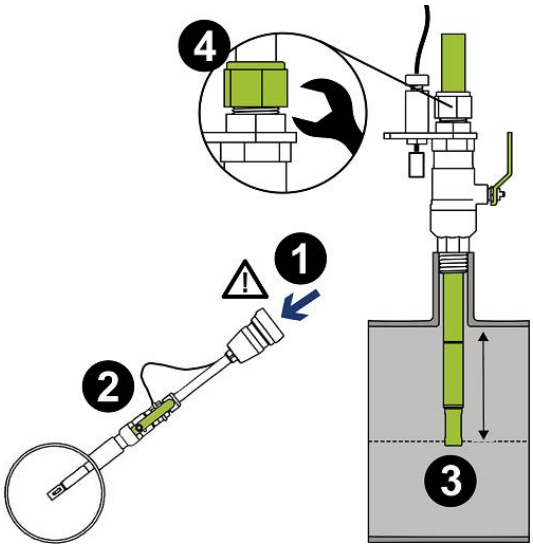



**Step 4**
The assembly should look like this. Check if the safety line is secured




**Step 5**

1. Keep the ball valve closed, the probe remains in the compression fitting
2. Check if the safety system is locked
3. Mount the VPFlowScope M including safety system on the ball valve

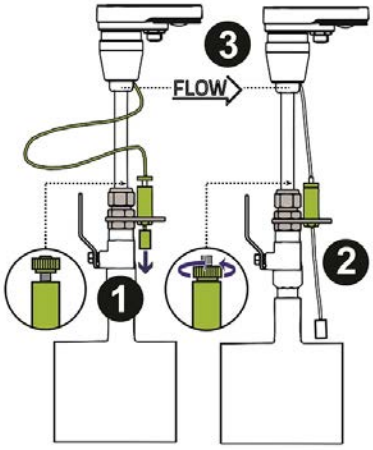



**Step 6**

1. Keep your hand on top of the Transmitter

⚠ When you install the VPFlowScope M assembly into a pressurized system you are about to experience temporary leakage around the compression fitting and force trying to push out the VPFlowScope M probe from the compression fitting. When the safety system is correctly installed this is part of the normal installation procedure.

2. Open the ball valve slowly and push the VPFlowScope M probe gently downwards.
3. The probe tip should be in the centre of the pipe
4. Tighten the compression fitting




**Step 7**

1. Unscrew the safety lock and pull the safety line tight
2. Tighten the safety lock
3. Align the flow direction. Alignment by the eye is sufficient