

# SDF-flow sensors high pressure steam version

## Operating and Mounting Instructions

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## **1. Incoming inspection**

Each delivery leaving S.K.I. GmbH is carefully inspected to the best knowledge. On the packing list included, the employee responsible for the delivery confirms with his signature that the delivery contains all the items specified in the delivery documents.

Nevertheless, it is necessary for the customer to carry out a crosscheck as soon as possible after receipt of the delivery. Only then can justified complaints be settled quickly and without further discussion.

For these special sensors the mounting parts are delivered separately from the sensor. The scope of delivery is clearly indicated on the package as **mounting parts** or **flow sensors**.

### **On receipt of the delivery please check:**

For mounting parts (pipe with end support):

- if the Tag-no. corresponds to that indicated on the delivery note
- if the version delivered corresponds to the version ordered especially with respect to length and material insofar as this is possible
- if the scope of delivery corresponds to the delivery list

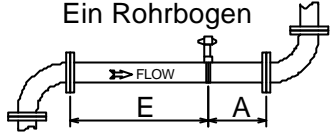
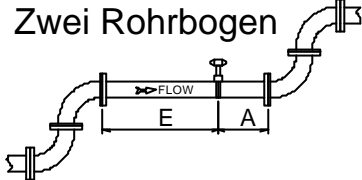
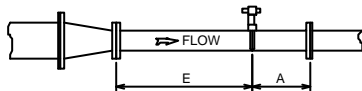
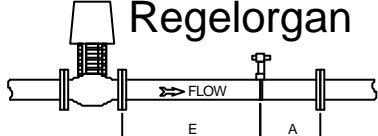
For flow sensors:

- if the rating plate corresponds to that indicated on the delivery note
- if the version delivered corresponds to the version ordered especially with respect to sensor length and sensor material insofar as this is possible
- if the scope of delivery corresponds to the delivery list

## 2. Mounting instructions for the mounting parts

### 2.1. Determination of the mounting location

Determine the longest straight section of the pipeline or channel and divide this into upstream and downstream distance respectively according to the table below.

Required steadying zones		
Pipe run	Upstream	Down-stream
<p>Ein Rohrbogen</p>  <p>One pipe bending</p>	<b>7*ID</b>	<b>3*ID</b>
<p>Zwei Rohrbogen</p>  <p>Two pipe bendings</p>	<b>10*ID</b>	<b>3*ID</b>
<p>Einschnürung</p>  <p>Diameter reduction</p>	<b>7*ID</b>	<b>3*ID</b>
<p>Regelorgan</p>  <p>Controlling organ</p>	<b>20*ID</b>	<b>5*ID</b>

Take into account obstructions existing in front of and behind the selected mounting location. Passive elements (e.g. bends) cause less interference than active elements (e.g. fans). Harmonic changes in the pipe run (bends with large radii, reductions according to DIN) are more favourable than sudden or less harmonic changes (corners, stops). Contact the manufacturer or responsible sales engineer if necessary!

Please ensure the application of the suitable welding material for connection of pipe material with the material of the mounting parts.

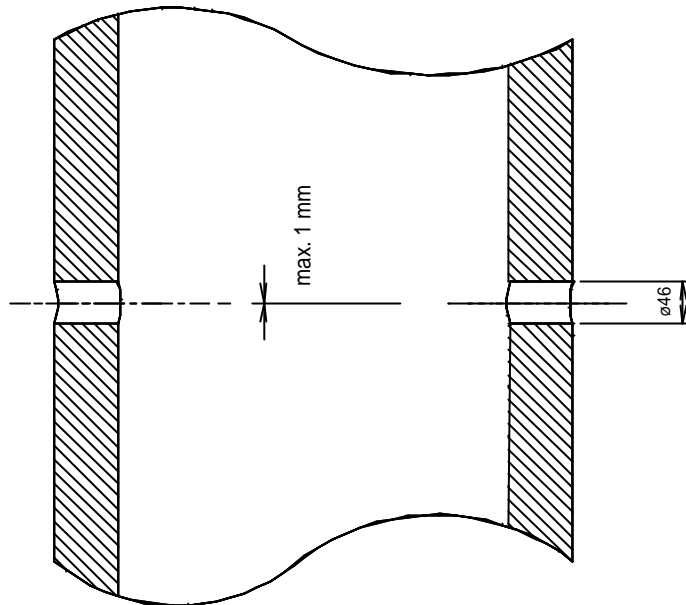
### 2.2. Recommended procedure for determining the opposite point

First mark the center of the main support to be installed on the pipeline. Then pass a tape of at least 30 mm width and appropriate length tightly around the pipeline, and align it so that after one rotation it exactly covers the first layer. Start by holding one end of the tape to the point marked on the pipeline. Mark the tape at the point which after one rotation is directly adjacent to the marked mounting part centre. The distance from the start of the tape to this point is equal to the outer diameter of the pipeline. Remove the tape, determine the centre between the start of the tape and the point marked on the tape, and mark the centre of the tape. Place the tape around the pipeline again as described above. The point marked last on the tape (centre) is the position exactly opposite the mounting part. Finally you only have to transfer this point to the pipeline. If there is no tape available you can also use a cord to determine the

diameter. In this case it is important to check the axial alignment of the cord by measuring the distance to the next flange or to the end of the pipe section.

### 2.3. Drilling the openings into the pipe

At the opposite point (see above) a 46 mm diameter hole size is subsequently bored or burned into the



pipe wall. For easier installation the end support is provided with a 44 mm diameter center border.

Please ensure the application of the suitable welding material for connection of pipe material

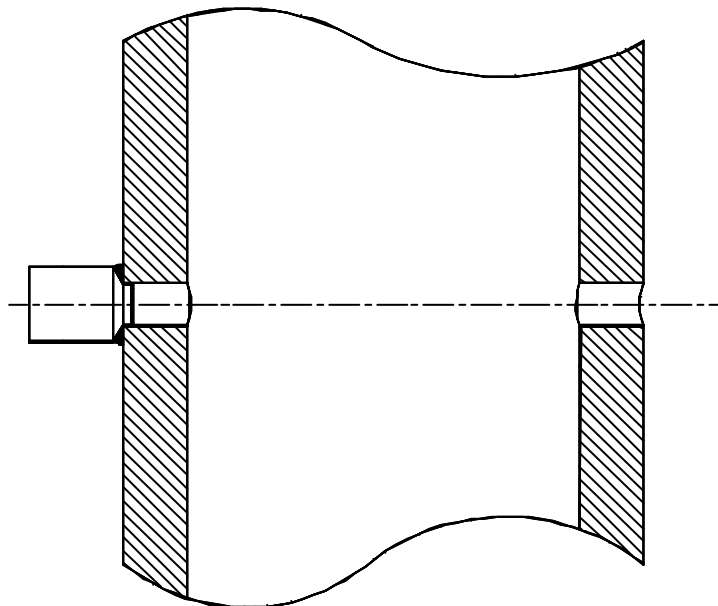
### 2.4. Welding the end support

First the mounting location of the end support is determined; it is positioned directly opposite the mounting part.

The end support is tack-welded to the pipeline and aligned with the mounting part previously welded to the pipeline. This ensures perfect insertion of the sensor without tilting.

Make sure that the bore hole in the pipeline remains completely unobstructed, and weld the end support to the pipeline according to the local standards.

The following sketch shows the pipe with the on-welded end support.



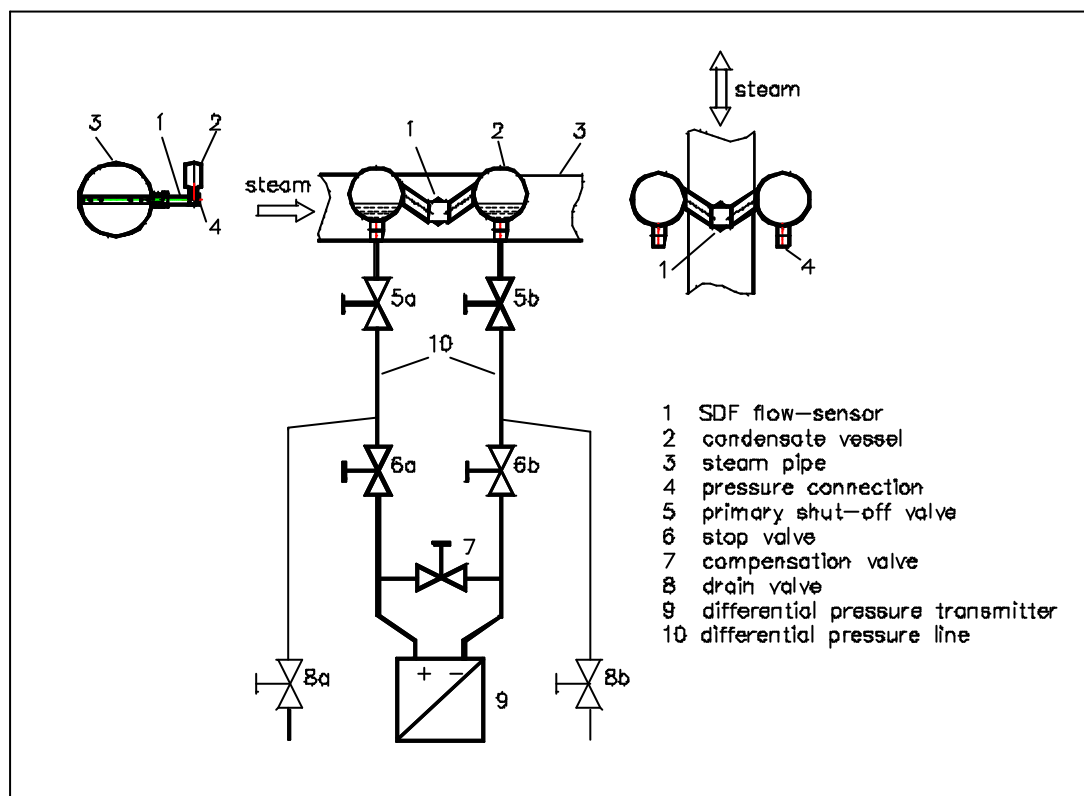
## 2.5. Welding the sensor into the pipe

The welding socket of the sensor must be tack-welded according to the generally applicable rules. Make sure that the bore hole in the pipeline remains completely unobstructed, and weld the socket to the pipeline (see item 3). The welding has to be executed according to the local standards.

Please ensure the application of the suitable welding material for connection of pipe material with the material of the mounting parts.

## 2.6. Fitting of the mounting parts

The delivery of SDF flow-sensors for steam applications fundamentally includes the condensate vessels (2) and as a rule the shut-off valves (5a, 5b) are already mounted. The sensor has **always** to be mounted **horizontally**. The alignment of the sensor for both horizontal pipe run and vertical pipe run is shown in the drawing below.



The illustration in the middle shows the typical pipework and the arrangement of the valves between the sensor and the differential pressure transmitter. In reality the valves 6, 7 and 8 are summarized in multi-way manifolds. Because of costs it is often done without the drain valves (8). In this case the combination of the valves 6a, 6b and 7 is summarized in a 3-way manifold. Otherwise a 5-way manifold will be used.

In order to protect the transmitter against thermal overloading it has to be secured that the hot steam cannot get direct contact with the transmitter cell. The use of condensate collection can guarantee that. For this the transmitter has to be mounted below the sensor in a sufficient distance. Sensor and transmitter are connected by pipes with  $\varnothing 12$  or  $\varnothing 14$  mm diameter. In these pipes the steam condensates and forms the a. m. condensate collections. Note that the originated water columns cause an additional pressure at the transmitter cell which initiate a falsification of the measuring of the differential pressure if the level of the condensate columns on both sides of the d/p transmitter are not exactly equal. To ensure this the SDF steam sensors are equipped with condensate pots which must be filled with condensate up to a defined level during normal operation. So pay unconditional attention to the alignment of the sensor when mounting it. Ensure that the condensate pots are located correctly and

aligned in such a way that the both vessels are exactly on the same level. Use a spirit level for the alignment of the sensor!

### **3. Mounting instructions**

#### **3.1. Orientation of the SDF flow sensor**

The construction of SDF flow sensors-profile is completely symmetrical. This is the reason why it is irrelevant which of the apertured sensor sides faces the flow. The only difference between sensors for horizontal and vertical pipes is the orientation of the condensate pots in relation to the measuring holes in the sensor profile. The sensor has to be mounted in a way, that both condensate pots are on the same level (as shown in the picture „front view“). At sensors for vertical pipes the measuring holes are located at the upper side and underside of the sensor profile, at sensors for horizontal pipes they are located at the left side and right side.

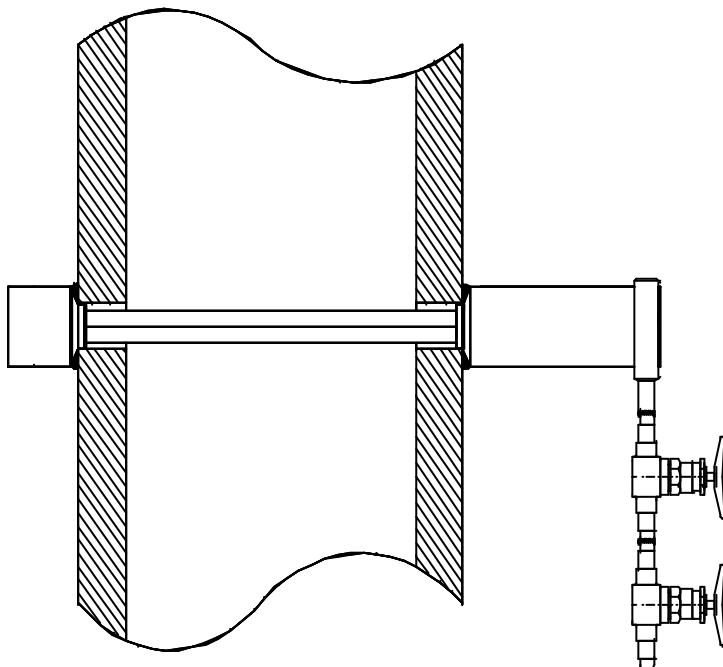
The following table shows the allocation of sensor chamber and transmitter connection depending on the pipe run and the direction of flow. The piping or mounting of the transmitter must be carried out accordingly.

<b>Pipe run and flow direction</b>	<b>+ side of transmitter</b>	<b>- side of transmitter</b>
Horizontal, from left to right →	left condensate pot	right condensate pot
Horizontal, from right to left ←	right condensate pot	left condensate pot
Vertical, from top to bottom ↓	right condensate pot	left condensate pot
Vertical, from bottom to top ↑	left condensate pot	right condensate pot

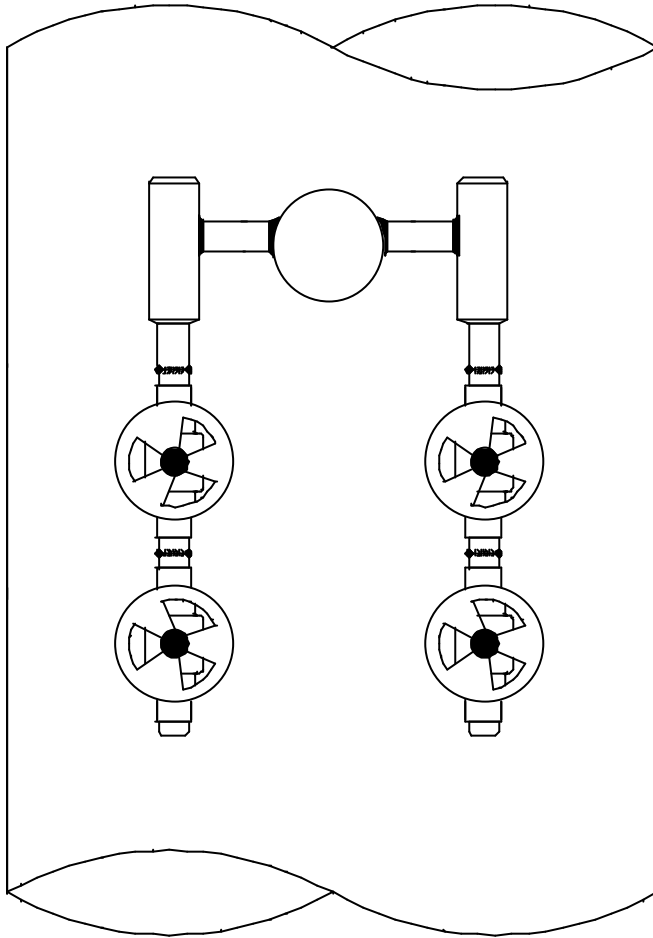
#### **3.2. Mounting and alignment of the SDF flow-sensor**

Insert the sensor into the pipe. The pressure connections of the condensate vessels must point to the bottom. Align the sensor so that the condensate pots are exactly on the same geodetic level.

**Side view**



front view



The welding of the sensor to the pipe has to be done according to the relevant rules.

Pay unconditional attention to the alignment of the sensor when mounting it. Ensure that the condensate pots are located correctly and aligned in such a way that the both vessels are exactly on the same level. Use a spirit level for the alignment of the sensor!

The transmitter and the sensor are connected via differential pressure lines. Using welded sensors it makes sense to weld these pressure lines to the valves. Thus it is recommended to use valves with welding sockets (for example  $\text{Ø}14 \times 2,5 \text{ mm}$ ).

It has to be ensured that the packings of the shutoff valves are provided from thermal overload during the welding procedure. Therefore the spindle should be removed (look at the instructions for the valves) before welding the valves to the pressure lines. After finishing the welding the spindles have to be reinstalled again.

Close the primary shut-off valves for safety until the measuring equipment will be put into operation.

#### **4. startup**

If the mounting and welding has been carried out according to the mounting instructions, it is only necessary to open the shutoff valves and to ensure that the pressure lines and the condensate pots are filled with water or condensate.