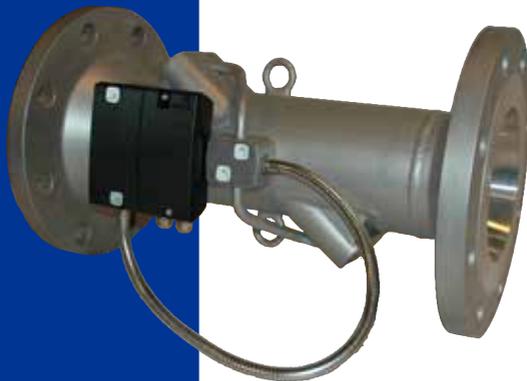


Installation Guide

ULTRAFLOW® 54 · DN150-300



Contents

1	Installation	3		
1.1	Installation angle of ULTRAFLOW® 54	4	2.2	Connection of power supply 11
1.1.1	Mounting ULTRAFLOW® 54 in lifting ring	4	2.2.1	Battery supply 11
1.2	Mounting of ULTRAFLOW® 54 electronics box	5	2.2.2	Mains supply modules 11
1.2.1	Orientation of flow sensor electronics box	7	2.2.3	Mains supply cable 12
1.3	Straight inlet	8	2.2.4	Cable connections 12
1.4	Operating pressure	8	2.2.5	Change of supply unit 13
2	Electrical connection	9	3	Example of connection of ULTRAFLOW® 54 to MULTICAL® 13
2.1	Connection to calculator	9	4	Calculator with two flow sensors 14
2.1.1	ULTRAFLOW® 54 and MULTICAL®, galvanically coupled	9	5	Operational check 14
2.1.2	ULTRAFLOW® 54 and MULTICAL®, galvanically separated	9	6	Accessories 14

1 Installation

Prior to installation of the flow sensor, the system should be flushed.

Correct flow sensor position (inlet or outlet) appears from the front label of MULTICAL®. The flow direction is indicated by an arrow on the side of the flow sensor.

Note: ULTRAFLOW® 54 may be lifted in the lifting rings only.

Pressure stage ULTRAFLOW® 54

PN16/PN25. See marking on label.

Temperature of medium, ULTRAFLOW® 54

2...150 °C/2...130 °C/2...50 °C. See marking on label.

Mechanical environment

M1 and M2 (fixed installation with minimum vibration and fixed installation with considerable or high vibration level respectively). See marking on label.

Electromagnetic environment

E1 and E2 (housing/light industry and industry respectively). See marking on label.

The meter's signal cables must be drawn at min. 25 cm distance to other installations.

Climatic environment

Must be installed in environments with non-condensing humidity as well as in closed locations (indoors).

The ambient temperature must be within 5...55 °C.

Maintenance and repair

The flow sensor is verified separately and can, therefore, be separated from the calculator. It is permitted to replace the supply and change the supply type. For battery supply a lithium battery with connector from Kamstrup A/S must be used. Lithium batteries must be correctly handled and disposed of [see Kamstrup document 5510-408, "Lithium batteries - Handling and disposal"]. Other repairs require subsequent reverification in an accredited laboratory.

If ULTRAFLOW® 54 is connected via a galvanically coupled output module, the flow sensor may be connected to a Kamstrup MULTICAL® calculator only.

If other calculator types are connected, ULTRAFLOW® 54 must be fitted with a galvanically separated output module and a power supply of its own.

Note: Make sure that meter factors of flow sensor and calculator are identical.

The steel tube between flow sensor housing and electronics box must not be disassembled.

At medium temperatures above 90 °C ($T_{med} > 90$ °C) or medium temperature more than 5 °C below ambient temperature ($T_{med} < T_{amb} - 5$ °C) the flow sensor's electronics box must be mounted via the enclosed distance piece. Alternatively, the electronics box can be wall mounted at a distance of minimum 170 mm from the sensor.

In order to prevent cavitation the back pressure (the pressure at the flow sensor outlet) at ULTRAFLOW® 54 must be min. 1.5 bar at q_p and min. 2.5 bar at q_s . This applies to temperatures up to approx. 80 °C.

When the installation has been completed, water flow can be turned on. Valves on the inlet side must be opened first.

1.1 Installation angle of ULTRAFLOW® 54

ULTRAFLOW® 54 can be installed horizontally, vertically, or at an angle.

ULTRAFLOW® 54 is normally installed horizontally, the lifting rings being vertically oriented. The ultra-sound paths in the flow sensor tube will thus be vertical, which is optimal in connection with possible stratification of the medium.

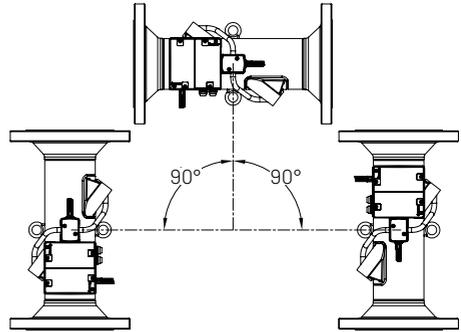


Figure 1

1.1.1 Mounting ULTRAFLOW® 54 in lifting ring

ULTRAFLOW® 54 can be mounted hanging from one of the two lifting rings depending on required flow direction. The enclosed distance piece can be used to secure optimal position of the electronics box [see paragraph 1.2 "Mounting of ULTRAFLOW® 54 electronics box", page 5]

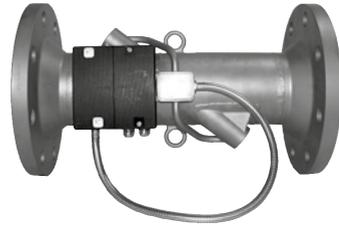


Figure 2

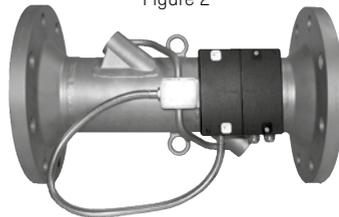


Figure 3

1.2 Mounting of ULTRAFLOW® 54 electronics box

At **medium temperature below 90 °C**

($T_{med} < 90\text{ °C}$) and at medium temperature less than 5 °C below ambient temperature ($T_{med} > T_{amb} - 5\text{ °C}$) the electronics box can be mounted directly on the flow sensor housing via the factory mounted fitting.

If the flow sensor is vertically mounted the cable connections of the electronics box will be horizontally oriented. This is permitted. If the cable connections should preferably point downwards, the electronics box can be mounted via the enclosed distance piece, which moves the box approx. 170 mm away from the flow sensor housing. Alternatively, a shorter distance piece, which only moves the box approx. 45 mm away from the flow sensor housing, can be used. The short distance piece must be ordered separately (6561-332).

At **medium temperature above 90 °C**

($T_{med} > 90\text{ °C}$) the temperature is too high for the electronics box to be mounted directly on the flow sensor housing.

Therefore, the electronics box must be mounted via the enclosed distance piece. The cable connections must always point downwards (see paragraph 1.2.1 "Orientation of flow sensor electronics box", page 7).

Alternatively, the electronics box can be wall mounted as long as the distance to flow sensor housing and pipe installation is minimum 170 mm.



Figure 4



Figure 5

It can also be an advantage to use the enclosed distance piece if the flow sensor housing is insulated and the electronics box must be removed from the insulation.

If the required position of the electronics box differs from standard position, the distance piece can be mounted with the enclosed collar band around the flow sensor housing. However, please note that the cable connections must always point downwards (see paragraph 1.2.1 "Orientation of flow sensor electronics box", page 7).



Figure 6

At **medium temperature more than 5 °C below ambient temperature ($T_{med} < T_{amb} - 5\text{ °C}$)** (typically in cooling installations) it is important to take action to avoid condensation in the electronics box.

Therefore, the electronics box must be mounted via the enclosed distance piece. The cable connections must always point downwards (see paragraph 1.2.1 "Orientation of flow sensor electronics box", page 7).

Alternatively, the electronics box can be wall mounted as long as the distance to flow sensor housing and pipe installation is minimum 170 mm.

Furthermore, when mounting the electronics box please make sure that the cable connections on the box are at a higher level than the cable connection on the flow sensor housing.

By vertical mounting of ULTRAFLOW® 54 in a riser this can be secured by mounting the distance piece by means of the collar band as shown in Figure 6.

If ULTRAFLOW® 54 is mounted horizontally the electronics box can be mounted on the distance piece by means of the collar band. The distance piece can then be turned upwards until the cable connections on the electronics box are in a higher position than the cable connection on the flow sensor housing. See Figure 7.

Alternatively, the electronics box can be wall mounted at a suitable distance to the installation (minimum 170 mm).

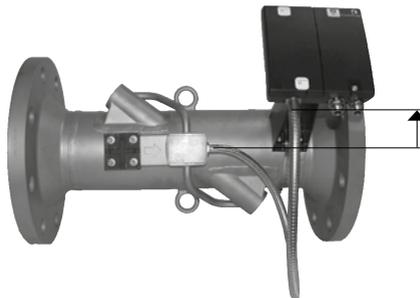


Figure 7

1.2.1 Orientation of flow sensor electronics box

Mounting the electronics box, the cable connections must always be horizontally or downwards oriented in order to avoid the risk of water and condensation being led into the electronics box via the cables.

This is especially important in humid environments, when ULTRAFLOW® 54 is used as cooling sensor, or if the medium temperature can become more than 5 °C lower than the ambient temperature ($T_{\text{med}} < T_{\text{amb}} - 5 \text{ °C}$).

Furthermore, the steel tube and wires must in general hang freely downwards after the cable connections to form a drip nose for drainage of water and condensation.

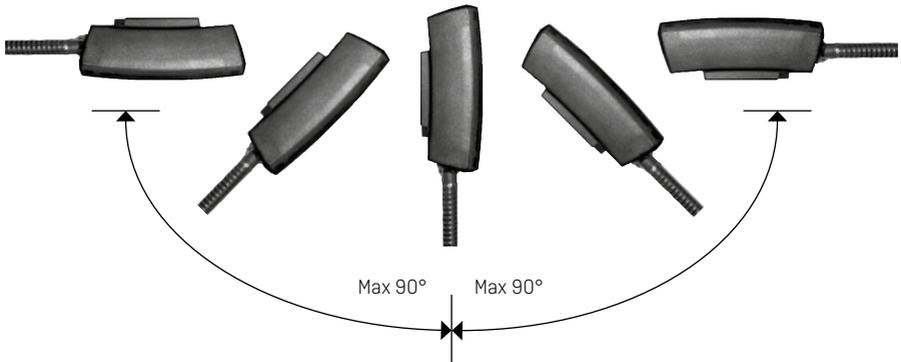


Figure 8

1.3 Straight inlet

ULTRAFLOW® 54 requires neither straight inlet nor outlet in order to fulfil the Measuring Instruments Directive (MID) 2004/22/ EC and EN 1434:2007. Only in case of heavy flow disturbances before the meter will a straight inlet section be necessary. We recommend following the guidelines in CEN CR 13582.

Optimal position can be obtained by taking the below-mentioned installation methods into consideration:

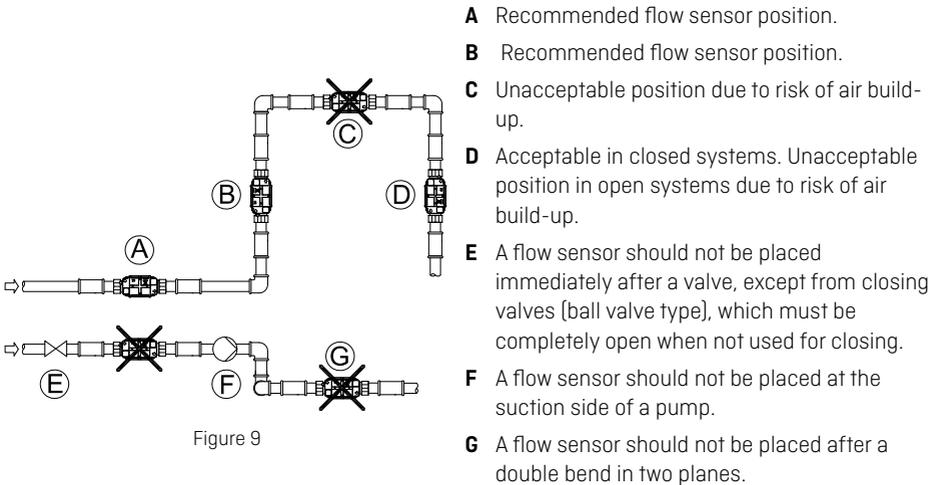


Figure 9

For general information concerning installation see CEN report *CEN CR 13582, Heat meter installation. Instructions in selection, installation and use of heat meters.*

1.4 Operating pressure

In order to prevent cavitation the back pressure (the pressure at the flow sensor outlet) at ULTRAFLOW® 54 must be min. 1.5 bar at q_p and min. 2.5 bar at q_s . This applies to temperatures up to approx. 80 °C.

2 Electrical connection

2.1 Connection to calculator

Signal cable length:

ULTRAFLOW® 54 DN150-300 output module	MULTICAL® 602/801	
	2-wire connection	3-wire connection
Y=1	N/A	< 10 m
Y=2	< 100 m *	< 25 m
Y=3	N/A	< 25 m

* MULTICAL® 602 must have sensor connection type D and external 24 VDC supply.

Table 1

2.1.1 ULTRAFLOW® 54 and MULTICAL®, galvanically coupled

If ULTRAFLOW® 54 and MULTICAL® are connected via output module (Y=1), ULTRAFLOW® 54 is galvanically coupled with the MULTICAL® calculator and is powered by the calculator via the three-wire signal cable (cable length up to 10 m).

Note: It is not permitted to mount a supply module or battery in ULTRAFLOW® 54.

ULTRAFLOW® 54	→	MULTICAL®		
11	→	11	GND	[Blue]
9	→	9	+3.6 V	[Red]
10	→	10		[Yellow]

Table 2

2.1.2 ULTRAFLOW® 54 and MULTICAL®, galvanically separated

If ULTRAFLOW® 54 and MULTICAL® are connected via output module (Y=2 or 3) ULTRAFLOW® 54 is galvanically separated from MULTICAL®.

Note: Flow info cannot be read.

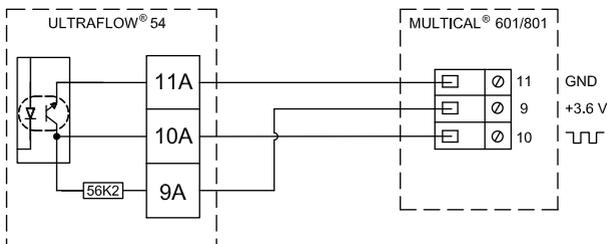


Diagram 1 - Three-wire connection, MULTICAL® 602/801 via output module (Y=2).
Cable length up to 25 metres.

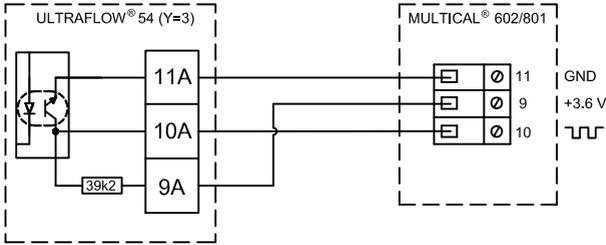


Diagram 2 - Three-wire connection, MULTICAL® 602/801 via output module (Y=3).
Cable length up to 25 metres.

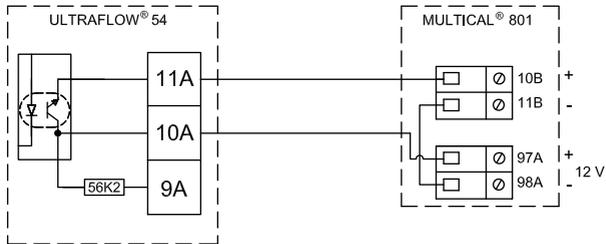


Diagram 3 - Two-wire connection, MULTICAL® 801 via output module (Y=2).
Cable length up to 100 metres.

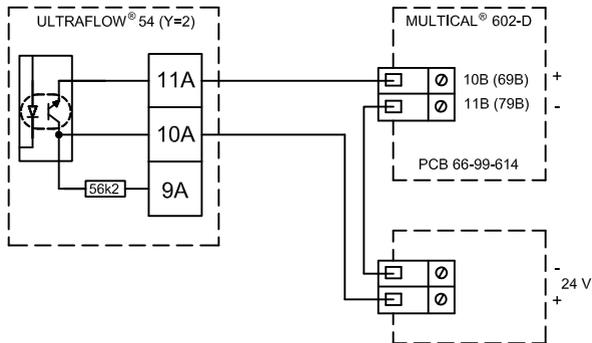


Diagram 4 - Two-wire connection, MULTICAL® 602-D via output module (Y=2) and external 24 VDC supply. Cable length up to 100 metres.

If long signal cables are used, installation requires careful consideration. Due to EMC there must be a distance of min. 25 cm between signal cables and all other cables.

2.2 Connection of power supply

If ULTRAFLOW® 54 is mounted with a galvanically coupled output module and connected to MULTICAL®, the flow sensor is supplied by the calculator. Therefore, the flow sensor must not be fitted with a supply of its own.

ULTRAFLOW® 54 may be connected to other calculators via the galvanically separated output module only, and the flow sensor must, therefore, be fitted with a supply module or battery. Supply module and battery are connected to the two-pole connector of the output module.

2.2.1 Battery supply

ULTRAFLOW® 54 is mounted with a D-cell lithium battery with connector. The battery plug is connected to the output module.

Optimal battery lifetime is obtained by keeping the battery temperature below 30 °C, e.g. by wall mounting the electronics box.

The voltage of a lithium battery is almost constant throughout the lifetime of the battery (approx. 3.65 V). Therefore, it is not possible to determine the remaining capacity of the battery by measuring the voltage.

The battery cannot and must not be charged and must not be short-circuited.

The battery supply may only be replaced by a corresponding lithium battery with connector from Kamstrup A/S. Used batteries must be handed in for approved destruction, f.inst. at Kamstrup A/S. (See Kamstrup document 5510-408, "Lithium batteries - Handling and disposal").

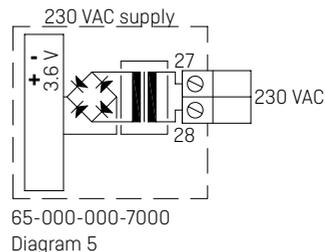
2.2.2 Mains supply modules

The mains supply modules are protection class II and are connected to the output module via a two-pole connector. The modules are powered via a two-wire supply cable (without earth connection) through the cable connector of the electronics box. Use supply cable with an outer diameter of 4.5-10 mm and ensure correct dismantling as well as correct tightening of cable connection (see paragraph 2.2.4 "Cable connections", page 12).

Max. permitted fuse: 6 A.

230 VAC

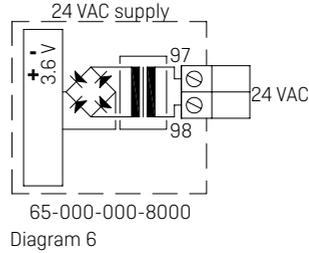
This PCB module is galvanically separated from the mains voltage and is suitable for direct 230 V mains installation. The module includes a double-chamber safety transformer, which fulfils double-isolation requirements when the cover is mounted on the electronics box. Power consumption is less than 1 VA or 1 W.



National regulations for electric installations must be observed. The 230 VAC module can be connected/disconnected by the district heating station's personnel, whereas the fixed 230 V installation in the main electrical panel must be carried out by an authorized electrician.

24 VAC

This PCB module is galvanically separated from the 24 VAC mains supply and is both suitable for industrial installations with joint 24 VAC supply and individual installations, which are supplied by a separate 230/24 V safety transformer in the main electrical panel. The module includes a double-chamber safety transformer, which fulfils double-isolation requirements when the cover is mounted on the electronics box. Power consumption is less than 1 VA or 1 W.



National regulations for electric installations must be observed. The 24 VAC module can be connected/disconnected by the district heating station's personnel, where-as the fixed 230/24 V installation in the main electrical panel must only be carried out by an authorized electrician.

Note: This module cannot be supplied by 24 VDC [direct current].

230/24 V, safety transformer

The 24 VAC module is specially suited for installation together with a 230/24 V safety transformer, e.g. type 66-99-403, which can be installed in the main electrical panel before the safety relay. When the transformer is used the total power consumption of the meter incl. the 230/24 V transformer will not exceed 1.7 W.



Figure 10

2.2.3 Mains supply cable

ULTRAFLOW® 54 is available with mains cable H05 VV-F for either 24 V or 230 V (l=1.5 m):

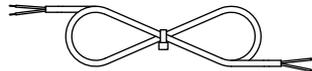


Figure 11. Mains cable [2 x 0.75 mm²], max. 6 A fuse.

"H05 VV-F" is the designation of a strong PVC mantle, which withstands max. 70 °C. Therefore, the mains cable must be installed with sufficient distance to hot pipes etc.

2.2.4 Cable connections

Cable dimension of connections: 4.5...10 mm.

Tightening torque: 4 Nm.

Note: If ULTRAFLOW® 54 is mounted with a galvanically coupled output module, or if a galvanically separated output module is used in combination with battery supply the unused cable connection must be sealed off as shown in Figure 12.

2.2.5 Change of supply unit

The supply unit of ULTRAFLOW® 54 can be changed from mains supply to battery or visa versa as the needs of the supply company change. Thus, it can be an advantage to change mains supplied meters to battery meters in buildings under construction where the mains supply can be unstable or periodically missing.

Please note that the supply type of some ULTRAFLOW® sensors appears from the label. If the original supply type is changed, it will no longer be in accordance with the label.

3 Example of connection of ULTRAFLOW® 54 to MULTICAL®

ULTRAFLOW® 54 with galvanically coupled output module (Y=1), powered by MULTICAL®.

Note: Installed plug in the unused rightmost connector of the electronics box.

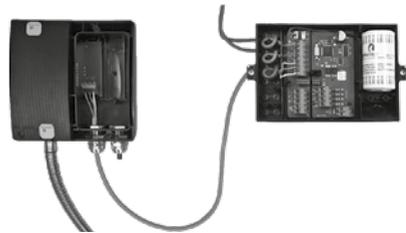


Figure 12

ULTRAFLOW® 54 with galvanically separated output module (Y=2) and 230 VAC supply of its own.

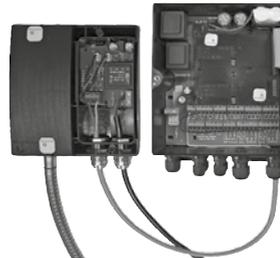


Figure 13

4 Calculator with two flow sensors

MULTICAL® 602/801 can be used in various applications with two flow sensors, e.g. leak surveillance or open systems. When two ULTRAFLOW® are direct connected to one MULTICAL® 602/801, a close electric coupling between the two pipes ought to be carried out as a main rule. If the two pipes are installed in a heat exchanger, close to the flow sensors, however, the heat exchanger will provide the necessary electric coupling.

- Forward and return pipes are closely electrically coupled
- No welded joints occur

In installations where the electric coupling cannot be carried out, or where welding in the pipe system can occur, one ULTRAFLOW® must be mounted with a galvanically separated output module and also a supply of its own.

- Forward and return pipes are not necessarily closely coupled
- Electric welding* can occur

* Electric welding must always be carried out with the earth pole closest to the welding point. Damage to meters due to welding is not comprised by Kamstrup's factory guarantee.

5 Operational check

Carry out an operational check when the complete meter (flow sensor and calculator) has been installed and connected. Open thermo regulators and valves to establish water flow through the installation. Activate the top key of the calculator and check that the displayed values for temperatures and water flow are credible values.

6 Accessories

Order number	Description
5000-333	2.5 m silicone cable (3-wire)
5000-259	5 m silicone cable (3-wire)
5000-270	10 m silicone cable (3-wire)
6561-332	Short distance piece

Table 3

