

Installation and User's Guide

MULTICAL® 801



www.kamstrup.com

MID designations

Rated operating conditions/measuring ranges:

Calculator θ : 2°C...180°C $\Delta\theta$: 3K...170K

Temperature sensor pair θ : 10°C...150°C $\Delta\theta$: 3K...140K

Flow sensor θ : 15°C...130°C

Mechanical environment: M1 (fixed installation with minimum vibration).

Electromagnetic environment: E1 and E2 (Domestic, light industrial and industrial). Signal cables from the meter must be separated by at least 25cm distance to other installations.

Climatic environment: The installation shall be made in non-condensing environments and in closed location (indoor). The ambient temperature must be within 5...55°C.

Maintenance and repair: The heat supplier is allowed to change communication module, back-up battery, temperature sensor pair and flow sensor. Sensor pair and flow sensor are separately verified and can, therefore, be separated from the calculator. All repairs require a following re-verification in an accredited laboratory.

MULTICAL® 801, type 67-G/L is suitable for temperature sensors type Pt500

MULTICAL® 801, type 67-F/K is suitable for temperature sensors type Pt100

Battery for replacement: Kamstrup type 66-99-619

MULTICAL® 801 can be connected to flow sensor type ULTRAFLOW®, electronic pick-up unit, flow sensor with reed switch output or a flow sensor with 24 V active pulse output.

Irrespective of flow sensor type, "pulses/litres" must be identical in flow sensor and calculator.

MULTICAL® 801 & ULTRAFLOW®

English




Kamstrup

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1. General information

⚠ Please read this guide before installing the energy meter. If the meter is installed incorrectly, Kamstrup's guarantee obligations will no longer apply.

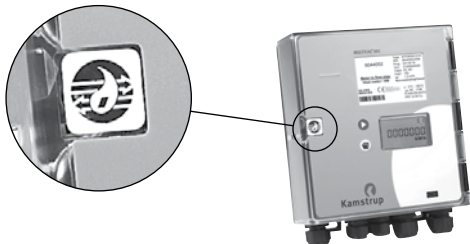
Please note that the following installation conditions must be obeyed:

- Pressure stage
ULTRAFLOW®: PN16/PN25/PN40, see marking.
Marking of flow part does not cover included accessories.
- Pressure stage Kamstrup
sensor set type DS: PN16
- Pressure stage Kamstrup
stainless steel pockets: PN25/PN40 - depending on type

If the medium temperature exceeds 90°C we recommend using flange meters.

Please make sure that MULTICAL® 801 is connected to correct voltage, either 230 VAC or 24 VAC, see the marking at terminals 27 and 28 at the bottom left.

MULTICAL® 801 must be sealed with seal and wire or a sealing label after mounting.



2. Mounting of temperature sensors

Temperature sensors used to measure flow and return temperatures make up a matched pair of sensors and must never be separated. According to EN 1434 or OIML R75 the cable length must not be changed.

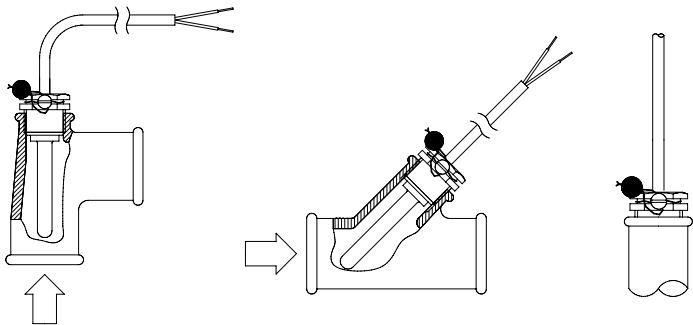
Replacement of sensors, if required, must always be made in pairs.

One sensor is marked with a red sign, and must be installed in the flow pipe.

The other sensor is marked with a blue sign, and must be installed in the return pipe.

2.1 Pocket sensor pair

Preferably, sensor pockets must be mounted in tee-pieces or in 45°C lateral Y-pieces. The tip of the sensor pocket must be placed pointing towards the flow direction and in the middle of the water flow.



Temperature sensors should be inserted to the bottom of the pockets. If a quick response time is required, “non-hardening” heat conducting paste can be used.

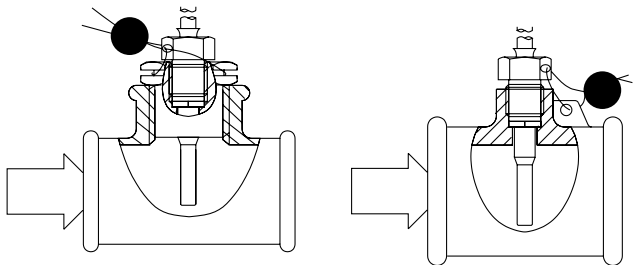
Push the plastic sleeve on the sensor cable into the sensor pocket and secure the cable with the supplied M4 sealing screw. Fasten the screw with your fingers only. Seal the pockets using seal and sealing wire.

2.2 Short direct temperature sensor set

The short direct sensor can be mounted in special ball valves or in special angle tee-pipes, both with threads up to R1 and built-in M10 union for the short direct sensor.

For mounting in existing heating installations with standard angle tees Kamstrup A/S can also supply R $\frac{1}{2}$ and R $\frac{3}{4}$ brass nipples which fit the short direct sensors.

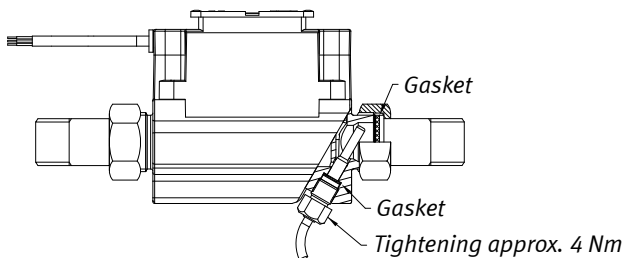
The short direct sensor can also be fitted directly into all ULTRAFLOW® variants from Kamstrup A/S with G $\frac{3}{4}$ and G1 thread on the meter case. Fasten the brass unions of the sensors lightly (approx. 4 Nm) by means of a 12 mm face wrench, and seal the sensors with seal and wire.



3. Mounting of flow sensor

Before mounting the flow sensor, flush the system thoroughly and remove protection plugs/plastic membranes from the flow sensor.

Correct flow sensor position (flow or return pipe) appears from the front label placed on the MULTICAL® 801. The flow direction is indicated by an arrow on the side of the flow sensor.



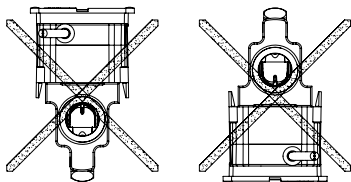
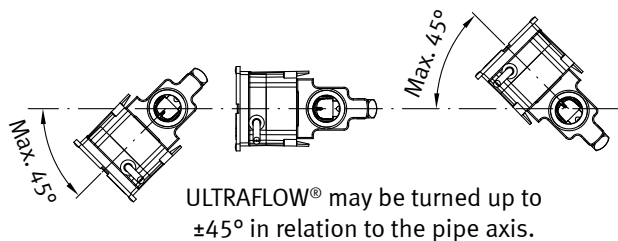
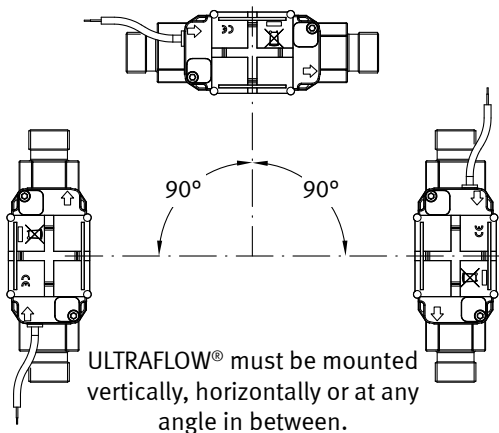
Glands and gaskets must be mounted as shown in the above drawing.

Straight inlet: ULTRAFLOW® requires neither straight inlet nor outlet to meet the Measuring Instruments Directive (MID) 2004/22/EEC, OIML R75:2002 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.

To prevent cavitation, the operating pressure at the ULTRAFLOW® must be min. 1.5 bar at q_p and min. 2.5 bar at q_s (4.5 bar for DN80). This applies to temperatures up to approx. 80°C.

ULTRAFLOW® must not be exposed to pressures below ambient pressure (vacuum).

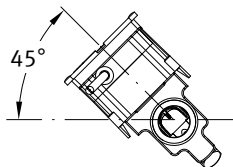
3.1 Mounting of ULTRAFLOW®



The ULTRAFLOW® housing must not be mounted facing upwards or downwards.

3.1.1 Humidity and condensation

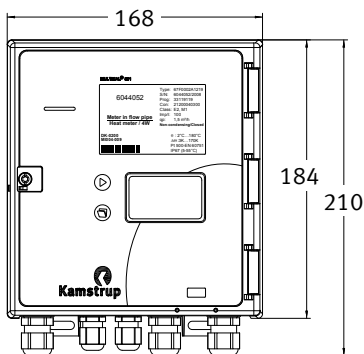
When installed in humid environments ULTRAFLOW® must be turned 45° in relation to the pipe axis as shown below.



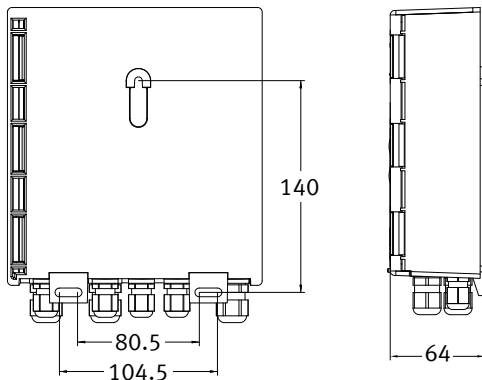
If condensation is likely, e.g. in cooling systems, an ULTRAFLOW® which is protected against condensation must be used.

4. Mounting of calculator

4.1 MULTICAL® 801 front measurements



4.2 MULTICAL® 801 installation measurements



5. Power supply

MULTICAL® 801 can be voltage supplied by means of 24 VAC or 230 VAC.

5.1 Backup battery

MULTICAL® 801 includes a backup battery, which ensures that all relevant measurements continue during power failure.

The battery ought to be replaced after 10 years' normal operation, or after 1 year without mains connection.

The type number of the backup battery is 66-99-619

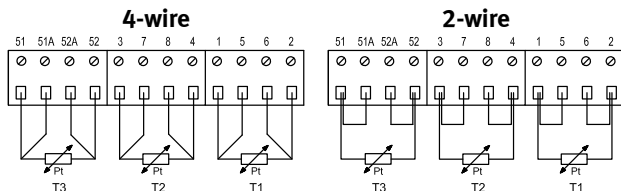
The voltage of a lithium battery is almost constant throughout the whole lifetime of the battery (approx. 3.65 V). Therefore, it is not possible to determine the remaining capacity by measuring the voltage.

The battery cannot and must not be charged and must not be short-circuited. Used batteries must be handed in for approved destruction, e.g. at Kamstrup.

6. Operational check

Carry out an operational check when the energy meter has been fully mounted. Open the thermo-regulators and cocks in order to establish a water flow through the heating system. Activate the upper push button on the MULTICAL® 801 and check that the display values for temperature and water flow are reliable.

7. Electrical connection



The temperature sensors are mounted in the terminals of the calculator as shown above. Jumpers are used when mounting 2-wire sensors.

In connection with flow sensors V1 and V2, the below-mentioned colours are used for connection of ULTRAFLOW® and electronic pick-up units.

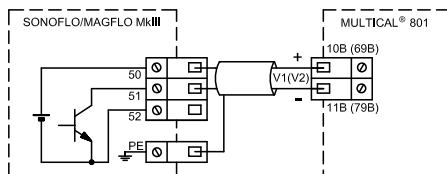
Flow sensors with Reed switch output must be connected to terminals 11-10 and 11-69, respectively.

	V1	V2	
-	11	11	Blue
+	9	9	Red
SIG	10	69	Yellow

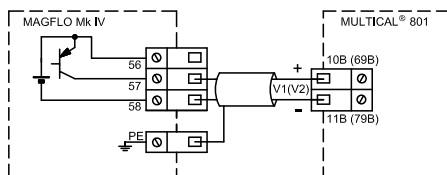
	Terminal No.	Standard measurement of heat and cooling	Heat measurement and leak surveillance	Energy measurement in open systems
T1	1-5-6-2	Sensor in flow pipe (red)	Sensor in flow pipe (red)	Sensor in flow pipe (red)
T2	3-7-8-4	Sensor in return pipe (blue)	Sensor in return pipe (blue)	Sensor in return pipe (blue)
V1	11-9-10	Flow sensor in flow or return pipe	Flow sensor in flow pipe	Flow sensor in flow pipe
V2	11-9-69	-	Flow sensor in return flow pipe	Flow sensor in return pipe
T3	51-51A-52A-52	-	Tank/heat exchanger temperature	Reference sensor (grey)

Other makes of flow sensors are usually connected to terminals 10B and 11B.

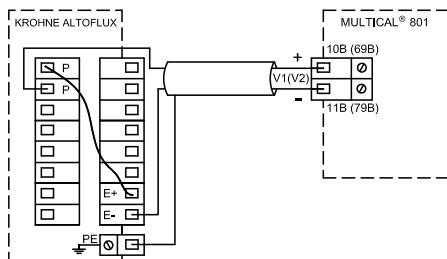
7.1 Examples of connections



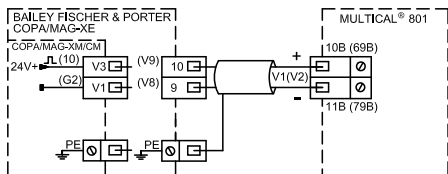
The active pulse output of the flow sensor is connected to the galvanically separated flow sensor input directly. This permits a cable length of up to 100 m between flow sensor and calculator.



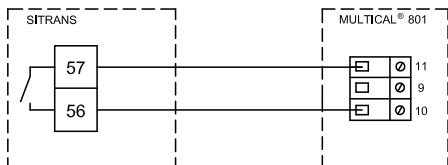
The active pulse output of the flow sensor is connected to the galvanically separated flow sensor input directly. This permits a cable length of up to 100 m between flow sensor and calculator.



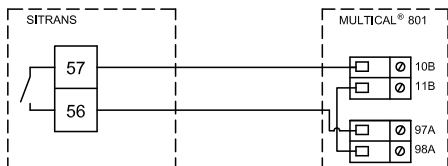
Auxiliary voltage from E+ and E- is added to the passive contact output P of the flow sensor before the signal is connected to the galvanically separated flow sensor input. This permits a cable length of up to 100 m between flow sensor and calculator.



The active pulse output of the flow sensor is connected to the galvanically separated flow sensor input directly. This permits a cable length of up to 100 m between flow sensor and calculator.



The passive contact output of the flow sensor on terminals 56 and 57 is connected directly to the flow sensor input which is not galvanically separated. This permits a cable length of max. 10-20 m between flow meter and calculator.

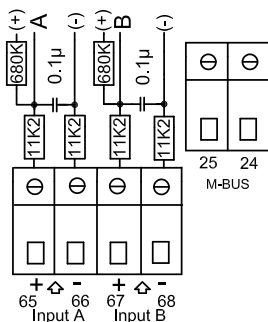


Auxiliary voltage from terminals 97A and 98A is added to the passive contact output of the flow sensor on terminals 56 and 57 before the signal is connected to the galvanically separated flow sensor input. This permits a cable length of up to 100 m between flow sensor and calculator.

8. Data modules

8.1 M-Bus, type 67-00-20/27

M-Bus can be mounted in star, ring or bus topology. Depending on the power supply of the M-Bus Master as well as the total cable resistance, up to 250 meters can be connected.



Cable resistance < 29 Ohm

Cable capacity < 180 nF

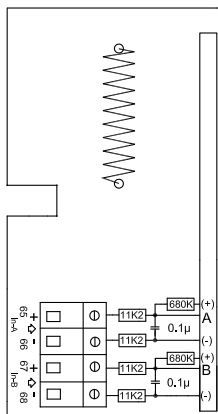
The M-Bus network is to be connected to terminals 24 and 25. The polarity is unimportant. M-Bus is supplied with pulse inputs (at module 1 only which is located nearest the terminals).

8.2 Radio + pulse inputs, type 67-00-21

The radio module is used for wireless communication via a license-free radio frequency and is available for internal or external antenna.

For further information on radio please refer to *Technical Description for Radio (5512-013)*.

The pulse inputs in this module are identical with the ones described earlier.

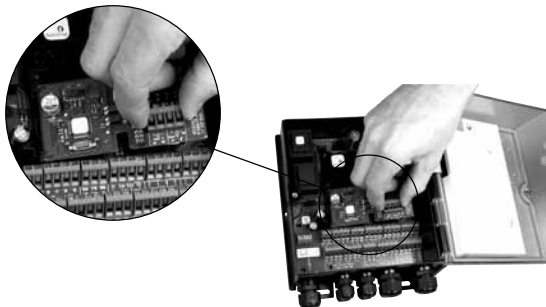


8.3 Lon Works

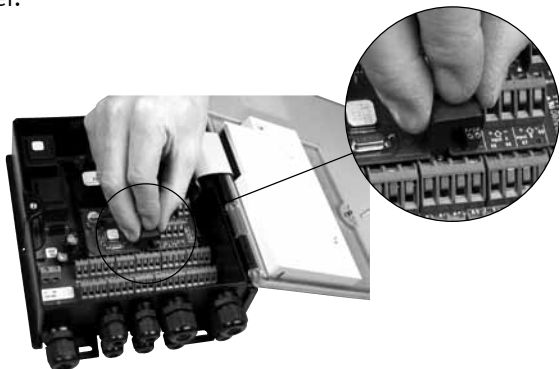
Re mounting of Lon Works type 67-00-24, see installation guide 5512-396 (DK) or 5512-403 (GB).

8.4 Insertion of modules

Data modules are retrofitted by placing the module in the PCB holder in the left side of the meter and "clicking" on the module.



Module and meter are electrically connected using a 6-pole jumper.

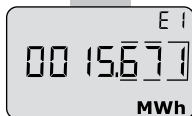


9. Information codes “E”

MULTICAL® 801 constantly monitors a series of important functions. If a serious error occurs in the measuring system or in the installation, “Info” appears in the display and an info code can be read by activating the upper front plate button until the measuring unit shows “Info” in the display. The info code is only visible while the error exists.

Info code	Description	Response time
0	No irregularities	-
1	Supply voltage has been cut off	-
8	Temperature sensor T1 outside measuring range	1...10 min.
4	Temperature sensor T2 outside measuring range	1...10 min.
32	Temperature sensor T3 outside measuring range	1...10 min.
64	Leak in the cold-water system	24 hours
256	Leak in the heating system	24 hours
512	Burst in the heating system	120 sec.
ULTRAFLow® 54 info (if activated CCC=4XX)		
16	Flow sensor V1, Datacomm error, signal too low or wrong flow direction	After reset and 1 day (00:00)
1024	Flow sensor V2, Datacomm error, signal too low or wrong flow direction	After reset and 1 day (00:00)
2048	Flow sensor V1, Wrong meter factor	After reset and 1 day (00:00)
128	Flow sensor V2, Wrong meter factor	After reset and 1 day (00:00)
4096	Flow sensor V1, Signal too low (Air)	After reset and 1 day (00:00)
8192	Flow sensor V2, Signal too low (Air)	After reset and 1 day (00:00)
16384	Flow sensor V1, Wrong flow direction	After reset and 1 day (00:00)
32768	Flow sensor V2, Wrong flow direction	After reset and 1 day (00:00)

Consumed energy in
kWh, MWh or GJ



Consumed district
heating water



Number of operating
hours



Current flow pipe
temperature
(*) Press  to see
yearly and monthly
average values



Current return pipe
temperature
(*) Press  to see
yearly and monthly
average values



Latest yearly
target date



Energy consumption
count on latest yearly
target date, followed by
previous yearly target
date

(*) followed by monthly
target date data



Date of latest yearly
target date

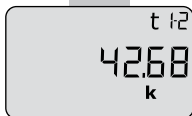


District heating water
volume count on latest
yearly target date,
followed by previous
yearly target date

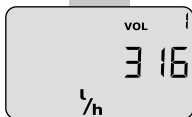
(*) followed by monthly
target date data



Current temperature difference



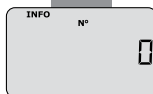
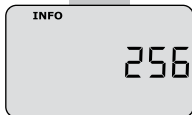
Current water flow
(*) Press  to see the peak value of the current year and historic yearly and monthly values



Current heat power
(*) Press  to see the peak value of the current year and historic yearly and monthly values



Current information code
(contact the utility if the figure differs from "000")



Indication of the number of current and corrected error conditions



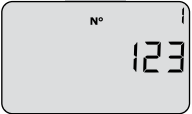
Data logger indicates the date ...



... and the INFO code of the latest 36 changes

5512603_A3_GB_04.2009

The first max. 8
digits of the
customer number



The latest 8 digits of the
customer number. This
example displays
customer number
12345678912



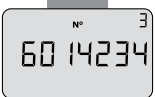
Current date



Current time



The target date appears
in the order of month
and day. In this
example 1 June



The counter's
serial number



The counter's program
number. In this
example: Installed in
return flow, MWh and
100 imp/l.



Display segment test

MULTICAL[®] 801

Energy metering

MULTICAL[®] 801 functions in the following way:

The flow sensor registrates how many m³ (cubic metres) of district heating water are circulating through the heating system.

The temperature sensors, placed in flow and return flow pipes, register cooling, i.e. the difference between the input and output temperatures.

MULTICAL[®] 801 calculates the consumed amount of energy based on the district heating water volume and cooling.

Readings in the display

When the upper front key  is activated, a new reading appears.

The lower front key is used to show historical readings and average values.

4 minutes after the front key has been activated reading of consumed energy will automatically appear.




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