

MULTICAL® 602 & ULTRAFLOW® 14/54

Heating/Cooling Meter



MULTICAL® 602 and ULTRAFLOW® 14/54 are used for measurement of cooling or combined heat/cooling in all water based plants with flow temperatures from 2°C to 50°C/ 90°C and with ULTRAFLOW® 14/54 between qp 1.5 m³/h and qp 400 m³/h.

The meter is simple to install, read and test. MULTICAL® 602 and ULTRAFLOW® 14/54 contributes to keeping the annual operating costs at a minimum with its unique combination of high measuring accuracy and long lifetime.

MULTICAL® 602 receives volume pulses from the connected ULTRAFLOW® 14/54 and calculates the energy for every predetermined water volume. The energy calculation includes temperature measurements in flow and return as well as correction for density and heat content according to EN 1434. MULTICAL® 602 and ULTRAFLOW® 14/54 can be supplied by either 24 VAC, 230 VAC or battery.

MULTICAL® 602 can be extended with two internal modules – a top module with pulse outputs, M-Bus or valve control and a base module with M-Bus, radio, LonWorks or 0/4...20 mA outputs. Furthermore, the base module includes two additional pulse inputs for connection of water and electricity meters, making it possible to collect all consumption data with one single automatic data reading.

ULTRAFLOW® 14/54 is a static flow sensor based on the ultrasonic measuring principle for use in cooling installations where water is used as the energy conveying medium.

ULTRAFLOW® 14/54 is not suitable for use with other media than water and should therefore not be used with e.g. anti-freeze additives like glycol. The flow is measured using bidirectional ultrasonic technique based on the transit time method, with proven long-term stability and accuracy. Two ultrasonic transducers are used to send the sound signal both against and with the flow direction. The ultrasonic signal travelling with the flow direction reaches the opposite transducer first.

FEATURES

- Moisture resistant flowpart
- Ultrasonic flow sensor
- Large dynamic range
- Exceptionally accurate
- Longevity
- 24 VAC, 230 VAC or 10 years' battery supply
- Data logging for 1392 hours, 460 days, 36 months and 15 years
- Room for two extra plug-in modules
- Top module: CE+CV outputs, PQ-limiter and M-Bus
- Built in Real Time Clock
- Base module: M-Bus, LonWorks, 0/4...20 mA outputs and pulse inputs for electricity and water meters

Contents

1	CALCULATOR FUNCTIONS	p. 3
1.1	Energy calculation	p. 3
1.2	Application	p. 3
1.3	Min. and max. flow and power	p. 3
1.4	Set/reset function	p. 4
1.5	Data loggers	p. 5
1.6	Pulse inputs VA and VB	p. 5
1.7	Voltage supply	p. 5
1.8	Plug-in modules	p. 5
1.9	Programming and testing	p. 5
1.10	Tariff functions	p. 5
2	ELECTRICAL DATA	p. 6
3	FLOW DATA HEAT COOLING	p. 7
4	PRESSURE LOSS	p. 7
5	PRESSURE LOSS CHART	p. 8
6	MECHANICAL DATA	p. 9
7	MATERIALS	p. 9
8	ORDER SPECIFICATIONS	p. 10
9	SCHNEIDER PART NO DESCRIPTION	p. 11
10	MULTICAL® 602	p. 12
11	TEMPERATURE SENSORS DIMENSIONS	p. 12
12	FLOW SENSORS	p. 13
13	INSTALLATION OF CALCULATORS	p. 16
14	INSTALLATION OF TEMPERATURE SENSORS	p. 16
15	MOUNTING OF FLOW SENSORS	p. 17
16	MOUNTING OF ULTRAFLOW® 14/54	p. 17

1 CALCULATOR FUNCTIONS

1.1 Energy calculation

MULTICAL® 602 calculates energy based on the formula in EN 1434-1:2004, in which the international temperature scale from 1990 (ITS-90) and the pressure definition of 16 bar is used.

The energy calculation can in a simplified way be expressed as:

$$\text{Energy} = V \times \Delta\Theta \times k$$

V is the supplied water volume

$\Delta\Theta$ is the temperature difference measured

k is the thermal coefficient of water

The calculator always calculates energy in [Wh], and then it is converted into the selected measuring unit.

1.2 Application

MULTICAL® 602 operates with 9 different energy formulas, E1...E9, that are all calculated in parallel in connection with each integration no matter how the meter is configured.

When MULTICAL® 602 is configured and used as a combined heat/cooling meter, heat energy (E1) is measured at positive temperature difference ($T_1 > T_2$) whereas cooling energy (E3) is measured at negative temperature difference ($T_2 > T_1$). Temperature sensor T1 (with a red type sign) must be installed in the hydraulic inlet line whereas T2 is installed in the outlet line. Both calculations are based on the same volume flow meter (V1)

In connection with heating and/or cooling the following energy calculations are used:

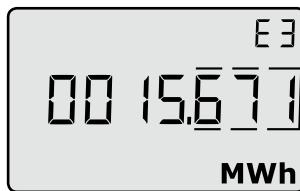
$$E1=V1(T1-T2) \quad \text{Heating energy}$$

$$E3=V1(T2-T1) \quad \text{Cooling energy}$$

(V1 in flow or return)

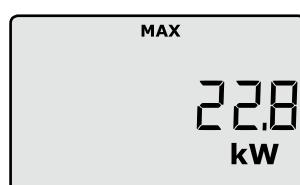
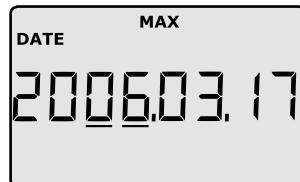
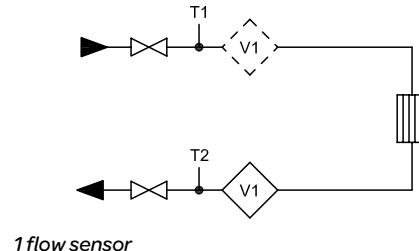
$$E8=m^3 \times T_1 \quad (\text{Flow pipe})$$

$$E9=m^3 \times T_2 \quad (\text{Return pipe})$$



E [Wh] =	$V \times \Delta\Theta \times k \times 1,000$
E [kWh] =	E [Wh] / 1,000
E [MWh] =	E [Wh] / 1,000,000
E [GJ] =	E [Wh] / 277,780
E [Gcal] =	E [Wh] / 1,163,100

CLOSED THERMAL SYSTEM



1.3 Min. and max. flow and power

MULTICAL® 602 registers minimum and maximum flow and power on a monthly as well as on a yearly basis. The registrations which appear from the display or can be read via data communication include max. and min. flow and power values, all with date indication.

All max. and min. values are calculated as largest and smallest average respectively of a number of current flow or power measurements.

The average period used for all calculations is selected in the interval 1...1440 min.

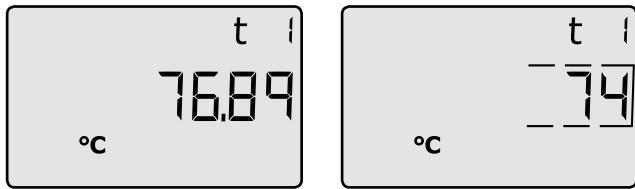
1.4 Set/reset function

The set/reset function of MULTICAL® 602 makes it possible to change a number of parameters by means of the two buttons on the meter's front.

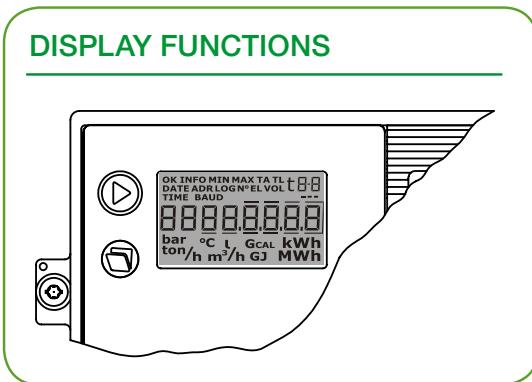
The following parameters can be changed:

- Date
- Hour
- Input A (preset of register)
- Input B (preset of register)
- Meter no. of Input A
- Meter no. of Input B
- Pulse value for Input A
- Pulse value for Input B
- Primary M-Bus address
- Operating hour counter (reset)
- Info-event counter (reset)

As the installation seal is broken, the change can only be made by the energy supplier.

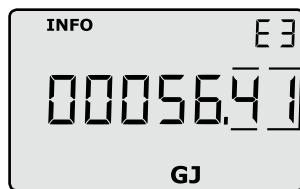


DISPLAY FUNCTIONS



The upper push button is used to switch between the primary readings. The consumers typically use the first primary readings in connection with self-reading for billing purposes.

The lower push button is used to show secondary information on the selected primary reading.



Info code	Description
0	No irregularities
1	Supply voltage connected after cut off
4	T2 sensor outside range, short-circuited or cut off
8	T1 sensor outside range, short-circuited or cut off
16	Flow sensor V1, datacomm error, signal too low or wrong flow direction
2048	Flow sensor V1, wrong meter factor
4096	Flow sensor V1, signal too low (Air)
16384	Flow sensor V1, wrong flow direction

[Meters] MULTICAL® 602 & ULTRAFLOW® Heating/Cooling Meter

1.5 Data loggers

MULTICAL® 602 contains a permanent memory (EEPROM), where the results of a number of various data loggers are stored. The meter contains the following data loggers which can be read on the display or via serial data. Availability of log data in display depends on selected display settings.

Data logging interval	Data logging depth	Logged value
Yearly logger	15 years	Counter registers (as seen on the display)
Monthly logger	36 months	Counter registers (as seen on the display)
Daily logger	460 days	Consumption (increase)/day
Hourly logger	1392 hours	Consumption (increase)/hour
Programmable data logger (option)	1080 loggings (e.g. 45 days' hour loggings or 11 days' 15 min. loggings)	Up to 40 optional registers and values
Info logger	50 events	Date, Info code, E1, E3, Time

1.6 Pulse inputs VA and VB

MULTICAL® 602 has two extra pulse inputs, VA and VB, to collect and accumulate pulses remotely, e.g from cold-water meters and electricity meters. The pulse inputs are physically placed on the "base modules". The pulse inputs VA and VB function independently of the other inputs/outputs.



1.7 Voltage supply

MULTICAL® 602 is available with 24 VAC mains module as default, Optional 230 V or Battery. The supply modules are exchangeable without breaking the verification seal.

1.8 Plug-in modules

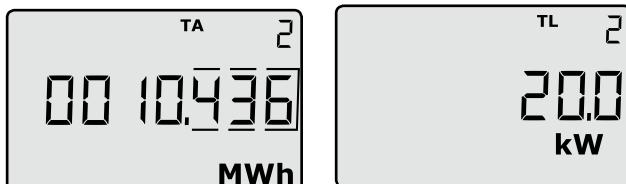
Plug-in modules can be added to MULTICAL® 602 both in the calculator top (top modules) and in the base unit (base modules), in this way the meter can adapt to various applications and data reading methods.

1.9 Programming and testing

METERTOOL for MULTICAL® 602 is a Windows® -based software which includes all facilities for calculator programming. If the software is used together with VERIFICATION EQUIPMENT for MULTICAL® 601/602, the calculator can be tested.

1.10 Tariff functions

MULTICAL® 602 has 2 extra registers TA2 and TA3 to accumulate energy parallelly to the main register based on a programmed tariff condition. No matter which tariff type you select the tariff registers will be displayed as TA2 and TA3. The main register is always accumulated, irrespective of the selected tariff function, as it is considered the legal billing register. Tariff conditions TL2 and TL3 are monitored before each integration. If the tariff conditions are fulfilled, the consumed cooling energy is accumulated in either TA2 or TA3, as well as the main register.



[Meters] MULTICAL® 602 & ULTRAFLOW® Heating/Cooling Meter

2 ELECTRICAL DATA

Typical accuracy

Supply voltage 3.6 VDC ± 0.1 V
Battery 3.65 VDC, D-cell lithium
Stand-by current. < 85 µA

Replacement interval

Mounted on wall	12 years @ $t_{BAT} < 35^\circ\text{C}$
The replacement interval is reduced when using data modules, frequent data communication or high ambient temperature	
Mains supply	24 VAC $\pm 50\%$, 50/60 Hz
Insulation voltage	4 kV
Power supply	< 1 W

Backup supply Integral super-cap
eliminates operational stop-down due to short-term
power cuts

EMC data. Domestic and light industrial

Pulse inputs VA and VB	Water meter connection	Electricity meter connection
VA: 65-66 and VB: 67-68	FF(VA) and GG(VB) = 71...90	FF(VA) and GG(VB) = 50...60
Pulse input	680 kΩ pull-up to 3.6 V	680 kΩ pull-up to 3.6 V
Pulse ON	< 0.4 V for > 30 msec.	< 0.4 V for > 30 msec.
Pulse OFF	> 2.5 V for > 100 msec.	> 2.5 V for > 100 msec.
Pulse frequency	< 1 Hz	< 3 Hz
Electrical isolation	No	No
Max. cable length	25 m	25 m
	FF(VA) and GG(VB) = 01...40	
Pulse input	680 kΩ pull-up to 3.6 V	
Pulse ON	< 0.4 V for > 200 msec.	
Pulse OFF	> 2.5 V for > 500 msec	
Pulse frequency	< 1 Hz	
Electrical isolation	No	
Max. cable length	25 m	
Requirements to external contact	Leakage current at function open < 1uA	

Calculator data

Calculator data	
Display	LCD – 7 (8) digits with a digit height of 7.6 mm
Resolution	9999.999 – 999999.99 – 999999.9 – 9999999
Energy units	MWh
Temperature range	θ: 2...180°C
Differential range	Δθ: 3...170 K

Data logger (Eeprom)

Standard 1392 hours, 460 days, 36 months,
15 years, 50 info codes
Option Data loggers with
Programmable interval

Clock/calendar

Standard Clock calendar, leap-year compensation, target date

Data communication

Standard KMP protocol with CRC16 used for optical communication and for top and base modules
Power in temperature sensors < 10 μ W RMS

Temperature measurement

Sensor inputs T1, T2
Measuring range. 0.00...185.00°C
Max. cable lengths
Pt500, 2-wire 2 x 0.25 mm²: 10 m

Pulse outputs CE and CV – via top module 67-08	
Type	Open collector (OB)
Pulse length	32 msec. or 100 msec. (32 msec. for 67-06)
External voltage	5...30 VDC
Current	1...10 mA
Residual voltage	$U_{CE} \approx 1 \text{ V}$ at 10 mA
Electrical isolation	2 kV
Max. cable length	25 m

[Meters] MULTICAL® 602 & ULTRAFLOW® Heating/Cooling Meter

3 FLOW DATA HEAT COOLING

Nom. Flow qp [m³/h]	Nom. Diameter	Meter factor *) [imp./l]	Dynamic range q _s :qp	q _s :qp	Flow @125 Hz **) [m³/h]	Δp@qp [bar]	Min. cut off [l/h]	Type
1.5	DN15 & DN20	100	1:100	2:1	4.5	0.22	3	ULTRAFLOW 14
2.5	DN20	60	1:100	2:1	7.5	0.03	5	ULTRAFLOW 14
3.5	DN25	50	1:100	2:1	9	0.07	7	ULTRAFLOW 14
6	DN25	25	1:100	2:1	18	0.2	12	ULTRAFLOW 14
10	DN40	15	1:100	2:1	30	0.06	20	ULTRAFLOW 14
15	DN50	10	1:100	2:1	45	0.14	30	ULTRAFLOW 14
25	DN65	6	1:100	2:1	75	0.06	50	ULTRAFLOW 14
40	DN80	5	1:100	2:1	90	0.05	80	ULTRAFLOW 14
60	DN100	2.5	1:100	2:1	180	0.03	120	ULTRAFLOW 14
100	DN100	1.5	1:100	2:1	300	0.07	200	ULTRAFLOW 14
150	DN150	1	1:100	2:1	450	0.02	300	ULTRAFLOW 54
250	DN150	0.6	1:100	2:1	750	0.055	500	ULTRAFLOW 54
400	DN150	0.4	1:100	2:1	1125	0.04	800	ULTRAFLOW 54
400	DN200	0.4	1:100	2:1	1125	0.01	800	ULTRAFLOW 54
400	DN250	0.4	1:100	2:1	1125	0.01	800	ULTRAFLOW 54

*) The meter factor can be seen on the label on the side of the meter.

**) Saturation flow. Max. pulse frequency 128 Hz is maintained at higher flow rates.

4 PRESSURE LOSS

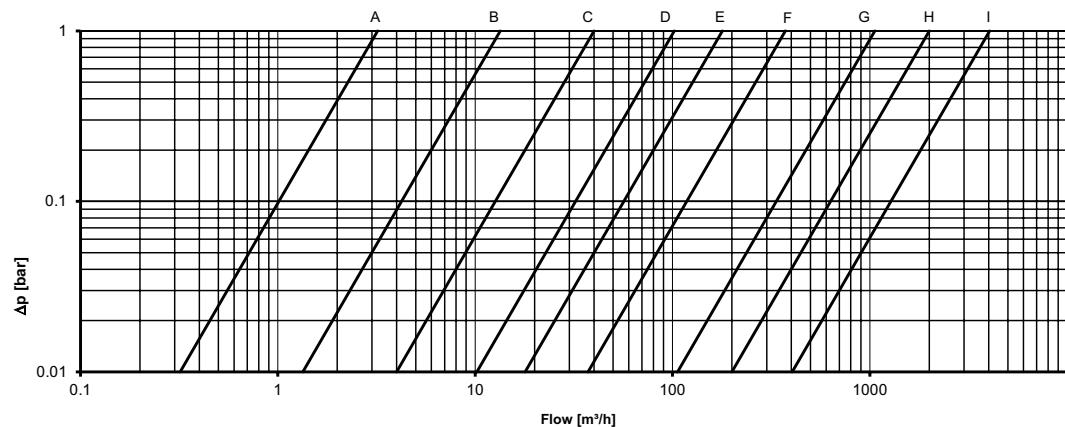
Graph	qp [m³/h]	Nom. diameter	Kv *)	Q@0.25 bar [m³/h]
A	1.5	DN15 & DN20	3.2	1.6
B	2.5 & 3.5 & 6	DN20 & DN25	13.4	6.7
C	10 & 15	DN40 & DN50	40	20
D	25	DN65	102	51
E	40	DN80	179	90
F	60 & 100	DN100	373	187
G	150 & 250	DN150	1060	530
H	400	DN150	2000	1000
I	400	DN200 & DN250	4040	2020

$$q = k_v \cdot x \cdot \Delta p$$

5 PRESSURE LOSS CHART

Δp ULTRAFLOW® 14/54

Δp ULTRAFLOW® 54



6 MECHANICAL DATA

Environmental class Meets EN 1434
Class A & B
Ambient temperature 5...55°C non condensing, closed location (indoor installation)
Protection class IP67
Calculator IP54
Flow sensor qp 1.5 to 100 IP65
Flow sensor qp 130 to 400 IP67
Storage temperature -20...60°C
(drained flow meter)

Weight
MULTICAL® 602 0.4 kg
excluding sensors and flow sensor
ULTRAFLOW® 14/54 See Dimension sketches on page 12-13
Flow sensor cable
(between flowpart and calculator) 2.5 m
Removable
Connection cables Ø3.5...6 mm
Supply cable Ø5...10 mm

Additional sizes

Ultraflow 54	qp 150 to 400
Housing	stainless steel w.no. 1.4308
Transducer holder	stainless steel w.no. 1.4308
Transducer	Titanium
Gasket	Fiber

Electronic housing

Base	Thermoplastic, PBT 30% GF
Lid	Thermoplastic, PC 10% GF

7 MATERIALS

MULTICAL® 602

Top cover Thermoplastic, PC
Base unit ABS with T PE gaskets (Thermoplastic elastomer) elastomer TPE gaskets
Print box Thermoplastic, ABS
Wall bracket Thermoplastic, PC 30% GF

ULTRAFLOW® 14/54

Wetted parts

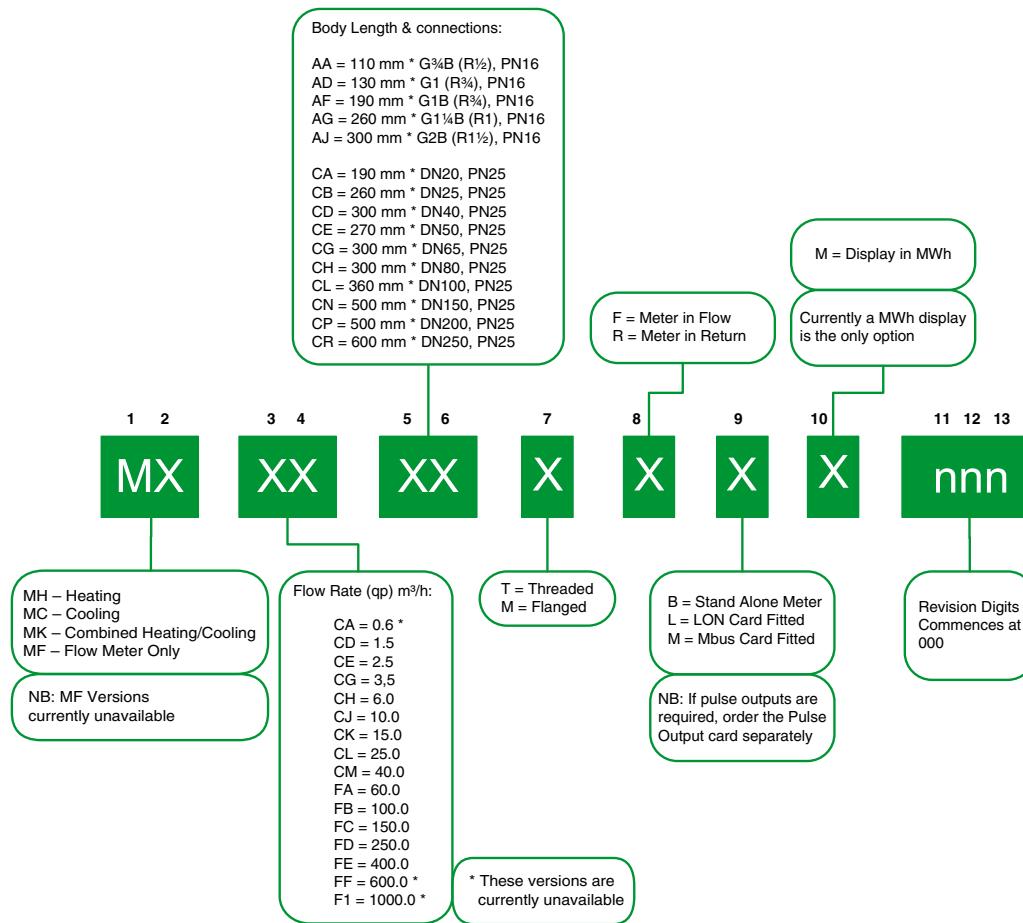
ULTRAFLOW® 14/54, qp 1.5 m³/h

Housing, gland Dezincification resistant brass
Transducers Stainless steel, W.no. 1.4401
Gaskets EPDM
Reflectors Thermoplastic, PES 30% GF and stainless steel, W.no. 1.4301
Measuring pipe Thermoplastic, PES 30% GF

ULTRAFLOW® 14/54, qp 2.5 to 100 m³/h

Housing, gland Dezincification resistant brass
Housing, flange Red brass, RG5 or stainless steel W.no. 1.4308
(see Order specification)
Transducers Stainless steel, W.no. 1.4401
Gaskets EPDM
Measuring pipe Thermoplastic, PES 30% GF
Reflectors Stainless steel, W.no. 1.4301

8 ORDER SPECIFICATIONS



Type number	qp [m ³ /h]	q _i [m ³ /h]	q _s [m ³ /h]	Connection	Length [mm]	Meter factor [pulses/l]	Material
MX-CDAA-TXXM	1.5	0.015	3.0	G $\frac{3}{4}$ B (R $\frac{1}{2}$)	110	100	Brass
MX-CEAF-TXXM	2.5	0.025	5.0	G1B (R $\frac{3}{4}$)	190	60	Brass
MX-CGAG-TXXM	3.5	0.035	7.0	G5/4B (R1)	260	50	Brass
MX-CHAG-TXXM	6.0	0.06	12	G5/4B (R1)	260	25	Brass
MX-CHCB-MXXM	6.0	0.06	12	DN25	260	25	Stainless steel
MX-CJAJ-TXXM	10	0.1	20	G2B (R $\frac{1}{2}$)	300	15	Brass
MX-CJCD-MXXM	10	0.1	20	DN40	300	15	Stainless steel
MX-CKCE-MXXM	15	0.15	30	DN50	270	10	Stainless steel
MX-CLCG-MXXM	25	0.25	50	DN65	300	6	Stainless steel
MX-CMCH-MXXM	40	0.4	80	DN80	300	5	Stainless steel
MX-FACL-MXXM	60	0.6	120	DN100	360	2.5	Stainless steel
MX-FBCL-MXXM	100	1.0	200	DN100	360	1.5	Stainless steel
MX-FCCN-MXXM	150	1.5	300	DN150	500	1	Stainless steel
MX-FDCN-MXXM	250	2.5	500	DN150	500	0.6	Stainless steel
MX-FECN-MXXM	400	4	800	DN150	500	0.4	Stainless steel
MX-FECP-MXXM	400	4	800	DN200	500	0.4	Stainless steel
MX-FECR-MXXM	400	4	800	DN250	600	0.4	Stainless steel

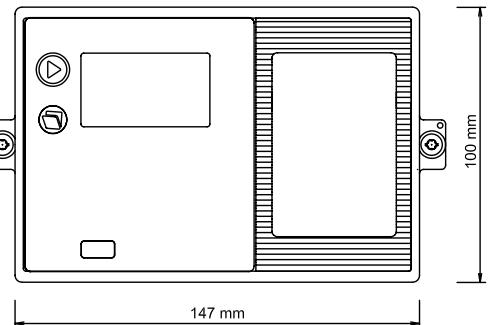
9 SCHNEIDER PART NO DESCRIPTION

MASENSORA	Set of Pocket Sensors 1.5 m Cable
MASENSORB	Set of Pocket Sensors 3.0 m Cable
MASENSORC	Set of Pocket Sensors 5.0 m Cable
MASENSORD	Set of Pocket Sensors 10.0 m Cable
MASENSORF	Set of Direct Sensors 1.5 m Cable
MASENSORG	Set of Direct Sensors 3.0 m Cable
MABATTDCELL	D-Cell Battery
MA230VSUPPLY	230 Vac Supply
MA24VSUPPLY	Replacement 24 Vac Supply
MAPT500NIPL 1/2	1/2 R1/2 nipple for Pt500 Direct Probe
MAPT500NIPL 3/4	3/4 R3/4 nipple for Pt500 Direct Probe
MAPOCKET 65MM	Replacement Sensor Pocket 65 mm
MAPOCKET 90MM	Replacement Sensor Pocket 90 mm
MAPOCKET 140MM	Replacement Sensor Pocket 140 mm
MAMTR BRACKET	Replacement Mounting Bracket
MAPULSEOPTOPC	RTC+ Hourly Data Logger+ 2 Pulse O/Ps +Scheduler
MAPULSEOPTOPD	RTC+ 2 Pulse O/Ps+ Prog Data Logger
MAMBUSTOP	MBus Top Module
MAMBUSBASE	Replacement Mbus Base Module
MALON BASE	Replacement LON Base Module
MAOPTICUSB	Optical USB Coupler
MAEXTKIT14	HM Flow Meter Extension Kit UF14
MASECLABELA	Sealing Labels for Calculator (Roll of 1000)
MASECLABELB	Sealing wire (400 m Length)
MASECLABELC	Plastic Seals (1000 pcs)
MA4-20BASE	Analogue Output Base Module 4-20 mA
MAEXTKIT14+	Flow Meter Extension Kit+ UF14
MAEXTKIT_SPLIT	Flow Meter Extension Kit SPLIT
MASWHWTOOL	HM Programming WH for Multical
MAPULSEOTOP-5	HM Pulse output top module
MASERIALTOP-C	HM Serial output top module
MAEXTCOMBOX	HM External Comms Box MC602

[Meters] MULTICAL® 602 & ULTRAFLOW® Heating/Cooling Meter

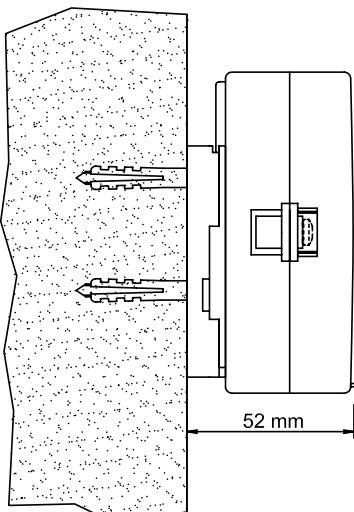
10 MULTICAL® 602

DIMENSIONS (mm)



Front view

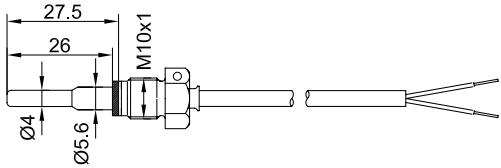
WALL MOUNTED



Side view

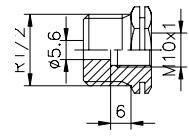
11 TEMPERATURE SENSORS DIMENSIONS

DIRECT SHORT SENSOR

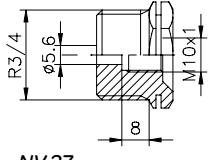


NV12

Change-over nipples



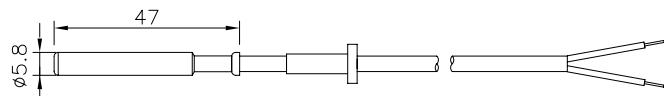
NV22



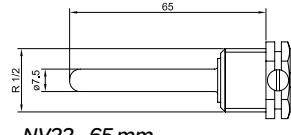
NV27

R $\frac{1}{2}$ and R $\frac{3}{4}$ thread according to ISO 7.1.

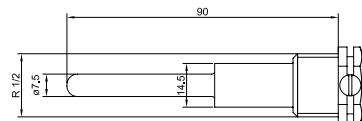
POCKET SENSOR



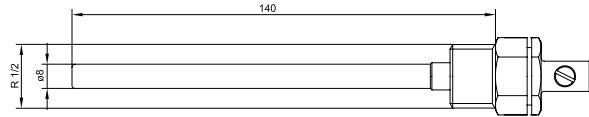
NV12



NV22 - 65 mm



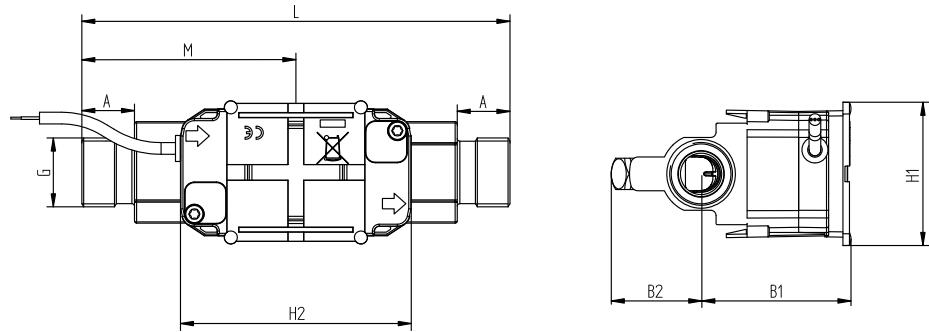
NV22 - 90 mm



NV22 - 140 mm

12 FLOW SENSORS

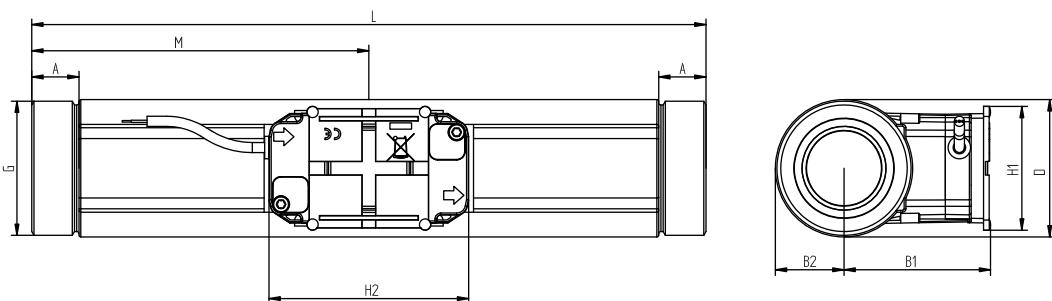
ULTRAFLOW® 14/54, G3/4 AND G1



Thread ISO 228-1

Thread	L	M	H2	A	B1	B2	H1	App. weight [kg]
G3/4	110	L/2	89	10.5	58	35	55	0.8
G1	130	L/2	89	20.5	58	35	55	0.9
G1(qp 1.5)	190	L/2	89	20.5	58	35	55	1.4
G1(qp 2.5)	190	L/2	89	20.5	58	36	55	1.3

ULTRAFLOW® 14/54, G5/4 AND G2

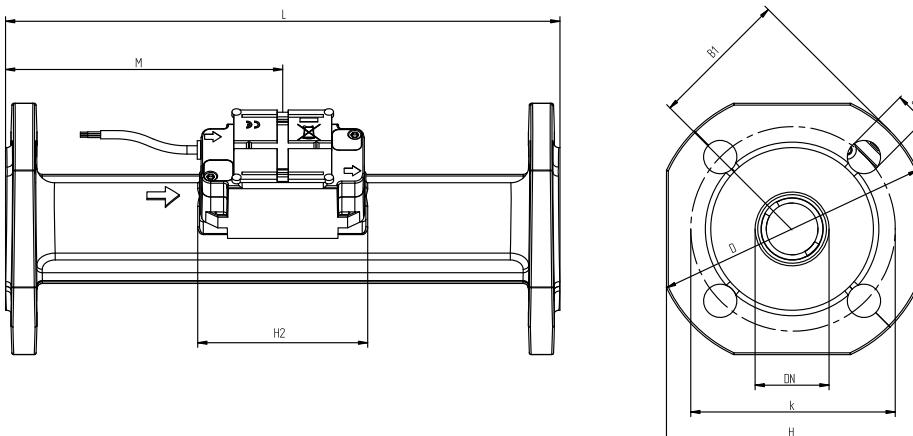


Thread ISO 228-1

Thread	L	M	H2	A	B1	B2	H1	App. weight [kg]
G5/4	260	L/2	89	17	58	22	55	2.3
G2	300	L/2	89	21	65	31	55	4.5

[Meters] MULTICAL® 602 & ULTRAFLOW® Heating/Cooling Meter

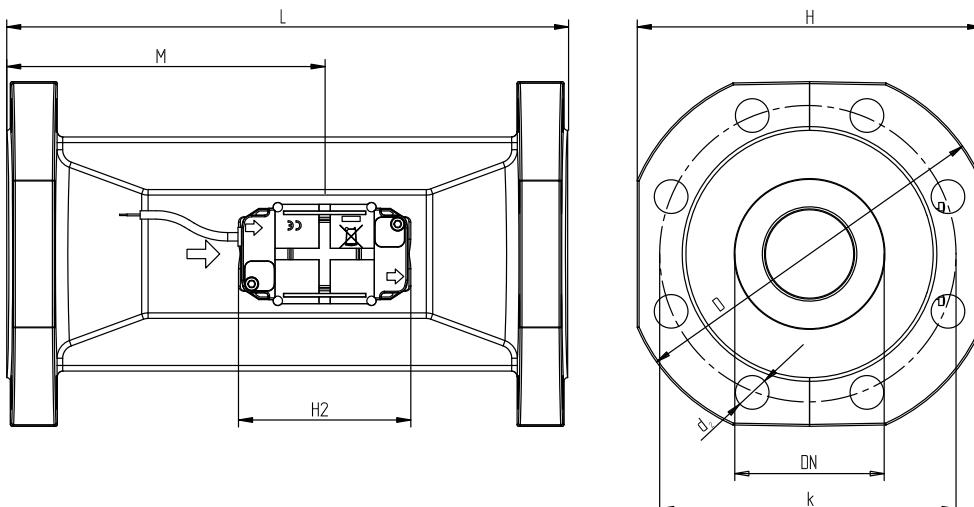
ULTRAFLOW® 14/54, DN20 TO DN50



Flange EN 1092-3, type B, PN25

Nom. dia.	L	M	H2	B1	D	H	k	Bolts			App. weight [kg]
								No.	Thread	d ₂	
DN25	260	L/2	89	58	115	106	85	4	M12	14	5.0
DN40	300	L/2	89	<D/2	150	136	110	4	M16	18	8.3
DN50	270	155	89	<D/2	165	145	125	4	M16	18	10.1

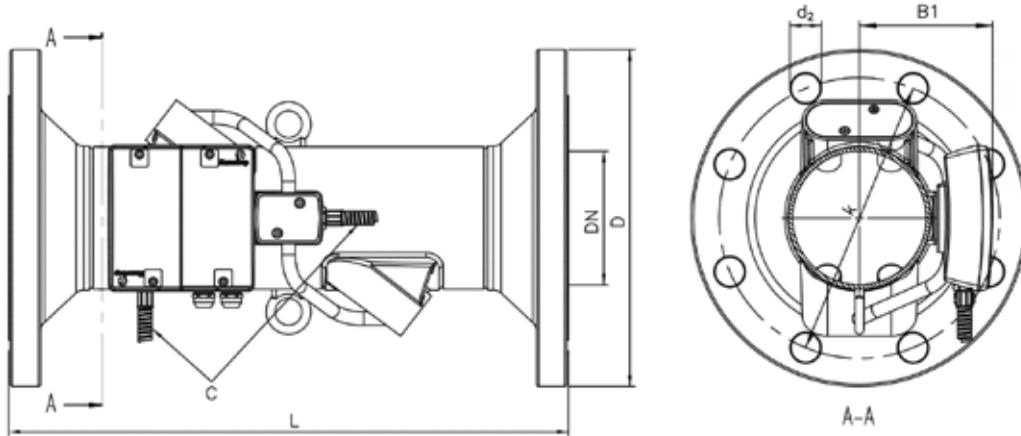
ULTRAFLOW® 14/54, DN65 TO DN100



Flange EN 1092-3, type B, PN25

Nom. dia.	L	M	H2	B1	D	H	k	Bolts			App. weight [kg]
								No.	Thread	d ₂	
DN65	300	170	89	<H/2	185	168	145	8	M16	18	13.2
DN80	300	170	89	<H/2	200	184	160	8	M16	18	16.8
DN100	360	210	89	<H/2	235	220	190	8	M20	22	21.7

ULTRAFLOW® 14/54, DN150 TO DN250

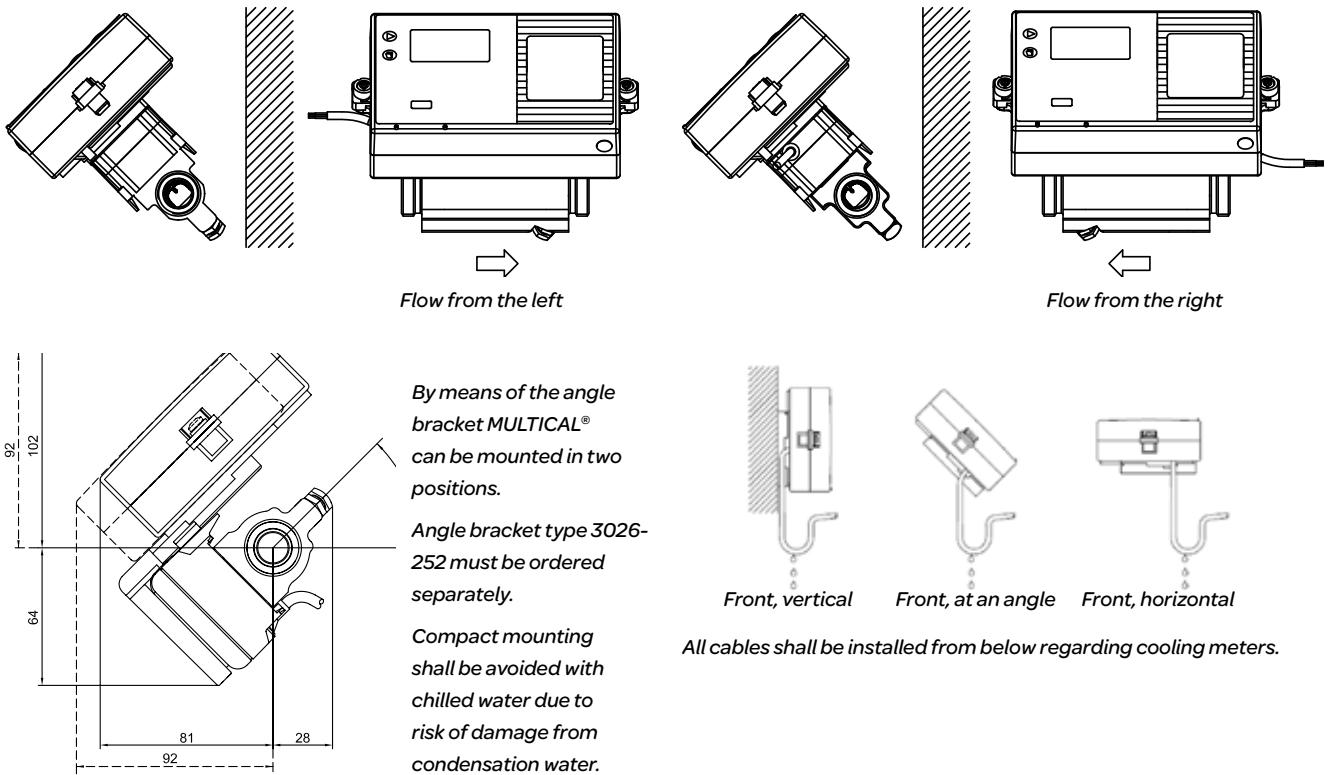


Flange EN 1092-1, type B, PN25

Nom. dia.	Nom. flow qp [m³/h]	L	D	k	B1	Bolts			Steel tube length C	App. weight [kg]
						No.	Thread	d ₂		
DN150	150 & 250	500	300	250	119	8	M24	26	650	37
DN150	400	500	300	250	140	8	M24	26	625	36
DN200	400 & 600	500	360	310	166	12	M24	26	570	49
DN250	400 & 600	600	425	370	166	12	M27	30	570	79
DN250	1000	600	425	370	190	12	M27	30	500	75

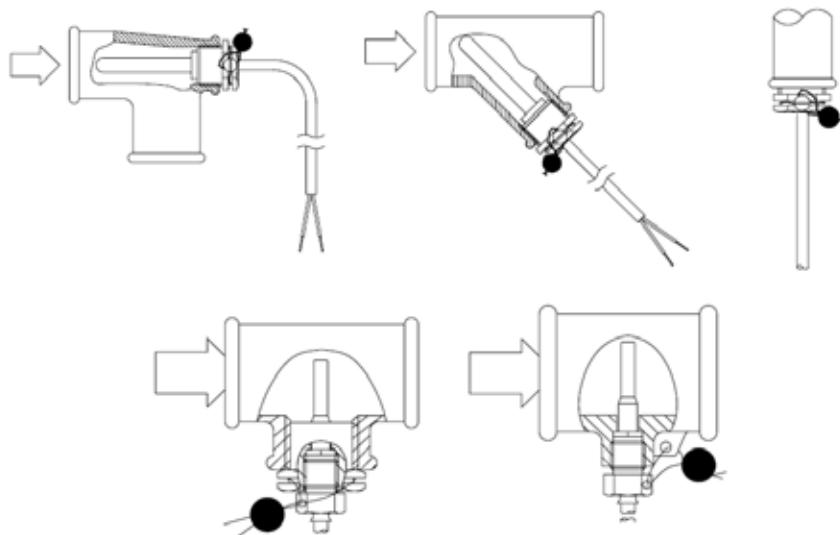
13 INSTALLATION OF CALCULATORS

INSTALLATION



14 INSTALLATION OF TEMPERATURE SENSORS

INSTALLATION



15 MOUNTING OF FLOW SENSORS

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® 602. The flow direction is indicated by an arrow on the side of the flow sensor.

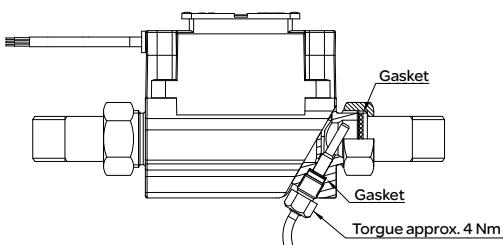
Glands and gaskets must be mounted as shown on the drawing below.

Straight inlet: ULTRAFLOW® 14/54 requires neither straight inlet nor outlet to meet the Measuring Instruments Directive (MID) 2004/22/EC, 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 to follow the guidelines in CEN CR 13582.

To prevent cavitation, the operating pressure at the ULTRAFLOW® 14/54 must be min. 1.5 bar at q_p and min. 2.5 bar at q_s .

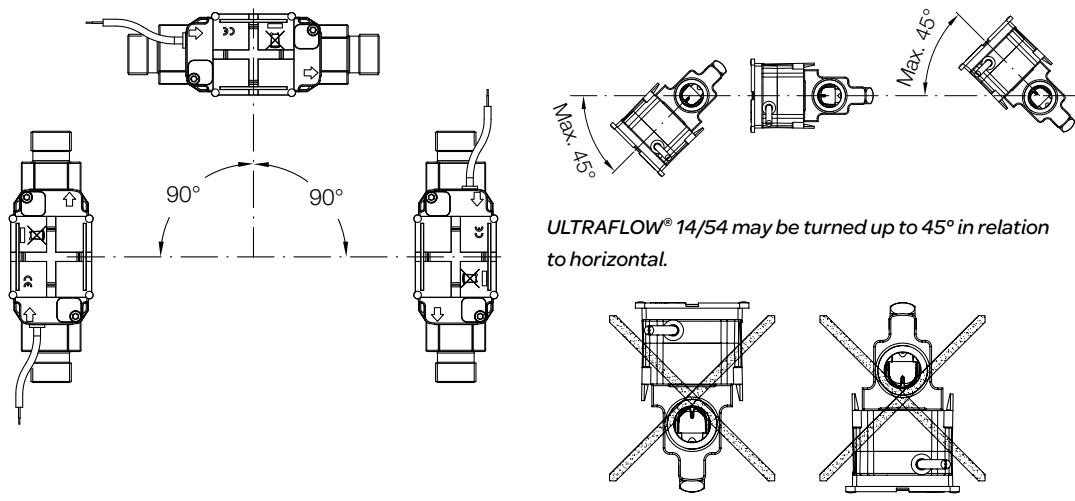
ULTRAFLOW® 14/54 must not be exposed to pressures below ambient pressure (vacuum).

MOUNTING



16 MOUNTING OF ULTRAFLOW® 14/54

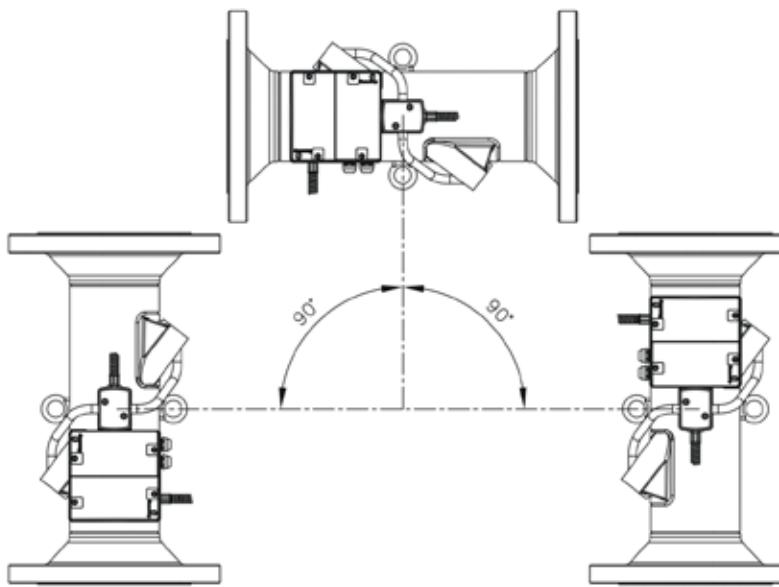
MOUNTING, DN15 TO DN100



The ULTRAFLOW® 14/54 housing must vertically, horizontally or any angle in between.

The ULTRAFLOW® 14/54 housing must not be mounted facing upwards or downwards.

MOUNTING, DN150 TO DN250



The ULTRAFLOW® 14/54 can be installed horizontally, vertically, or at an angle. It is normally installed horizontally, with the lifting rings oriented vertically. The ultrasound paths in the flow sensor tube will thus be vertical, which is optimal in connection with possible stratification of the medium.