MULTICAL® 603

Calculator

Your benefits

- Ultrasonic technology:
  Long-term stable energy measurement with maximum measurement accuracy
- Highly flexible modular design:
  Expandable base unit, reduced inventory requirements
- Auto detect function of ULTRAFLOW®:
  One calculator for all flow sensor sizes
- Comprehensive data logger:
  Instant access to information for analysis and optimization purposes
- One-time programming of metrological parameters on site without breaking the MID seal:
  Flexibility and time savings during commissioning
- Option cards for various functions:
  - Affordable base unit
  - Additional functions can be added later
- CH refrigeration certification (METAS) incl. initial calibration:
  Approved for use in commercial transactions

Applications

- Particularly suitable for district heating/cooling applications (main meters, transfer stations, etc.) in billing transactions
- Heat and/or cooling consumption measurement in building services engineering
- Calculator for local or remote reading
- Leakage and pipe break monitoring in district heating systems

Properties

- Large LCD display, resolution 7 or 8 digits
- Mains power supply 230 V AC, power supply 24 V AC / V DC or with 16-year battery for wall mounting
- Supported, integrated real-time clock (RTC) and data logger, mains power supply 230 V AC
- Pt 500 temperature sensor, 2-/4-wire technology (603-M 2-wire)
- Storage of the last 36 monthly and 20 annual values
- Can be combined with the following volume measuring parts:
  - ULTRAFLOW®
  - Impeller meter with reed pulse generator
  - Magnetic-inductive meter
- Type testing/approval:
  - Heat: CE Conformity according to European Measuring Instruments Directive (MID)
  - Cold: CH approval (METAS) incl. initial calibration

Options

- Mixed fluid on version (603-M) on request
- Option cards for
  - M-Bus / 2 water meter inputs
  - M-Bus / 2 pulse outputs energy + volume
  - Radio OMS T1, 868 MHz (battery life 11 years)
  - 2 active analog outputs 0/4...20 mA (mains power supply required)
  - LonWorks, TP/FT-10 / 2 water meter inputs (high-power power supply required)
  - BACnet MS/TP (RS485) / 2 water meter inputs (mains power supply required)
  - Modbus RTU (RS485) / 2 water meter inputs (mains power supply required)
  - Modbus TCP-IP / 2 water meter inputs (high-power power supply required)
  - BACnet IP / 2 water meter inputs (high-power power supply required)
  - LoRaWAN int./ext. antenna

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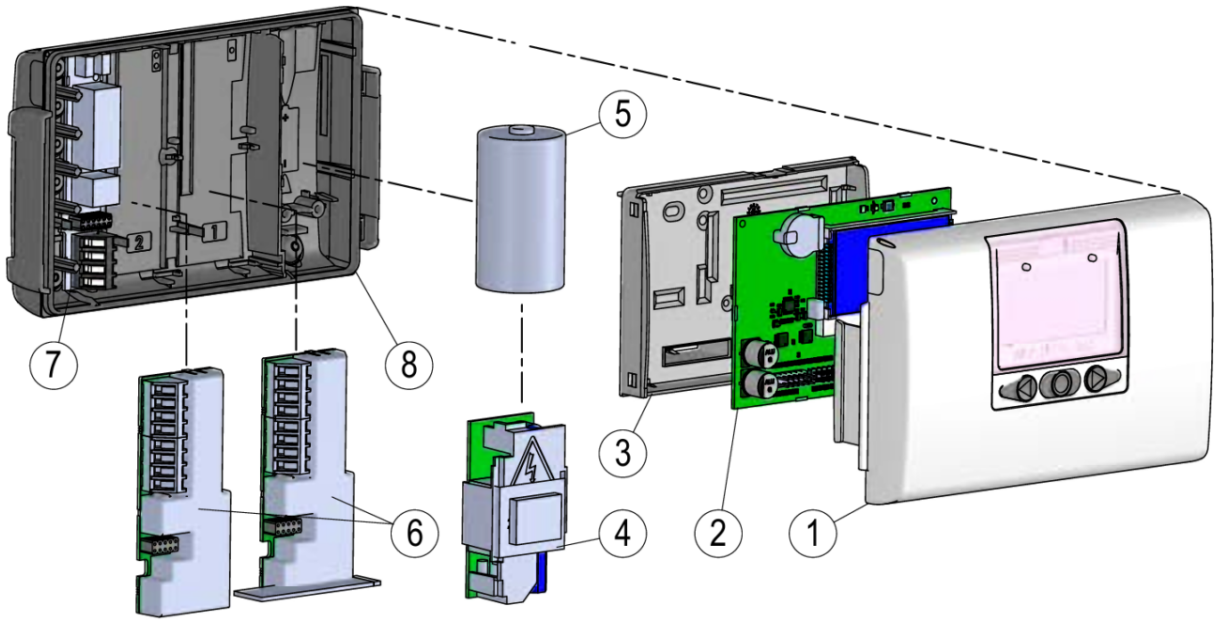
Mechanical design MULTICAL® 603



1. Upper part of the calculator unit with front buttons and laser engraving
2. Circuit board with microcontroller, display, etc.
3. Calibration cover (Note: May only be opened by authorized testing laboratories)
4. Either a power supply module can be installed...
5. ...or a battery can be installed
6. 1 or 2 communication modules
7. Connections for temperature sensors and flow sensors
8. Lower part of the calculator unit

Mechanical data

MULTICAL® 603	
Weight	450 g
Ambient temperature	5...55 °C, non-condensing, closed location (indoor installation)
Protection class	IP65
Media temperatures in ULTRAFLOW®	2...130 °C For media temperatures below ambient temperature or above 90 °C, wall mounting of the calculator is recommended.
Media in ULTRAFLOW®	Water (district heating water as described in CEN TR 16911 and AGFW FW510) MULTICAL® 603 is not approved for use with drinking water
Storage temperature	-25...60 °C (drained meter)
Connection cable	ø 3,5...6 mm
Supply cable	ø 5...8 mm

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Materials	
Housing top and bottom	Thermoplastic, PC 10 % GF with TPE (thermoplastic elastomer)
Verification cover	ABS
Cables	Silicone cable with internal Teflon insulation
Gasket	TPE (thermoplastic elastomer)
Push buttons	TPE (thermoplastic elastomer)

Approved meter data

MULTICAL® 603	
Heat meter	**DK-0200-MI004-040**
Cooling meter	**TS 27.02 012**
Bifunctional heat/cooling meter	**Labeled with DK-0200-MI004-040 and TS 27.02 012 as well as year mark as MID**
Temperature range	θ: 2 °C...180 °C
Differential range	Δθ: 3 K...178 K
Total temperature range	The specified minimum temperatures are only related to the type approval. The meter has no cut-off for low temperature and thus measures down to 0,01 °C and 0,01 K.
Mixed fluid meter	**EN 1434 without MID approval**
Temperature range	θ: -40 °C...140 °C
Differential range	Δθ: 3 K...180 K
Total temperature range	The temperature range -40 °C...140 °C indicates the technical operating range in which the calculator calculates energy. The temperature range for any installation depends on the design of the installation and the type of fluid and solution used.
Standards and norms	EN 1434:2007/AC:2007 EN 1434:2015+A1:2018 EN 1434:2022
EU directives	Measuring Instruments Directive (MID) Low Voltage Directive (LVD) Electromagnetic Compatibility Directive (EMC) Radio Equipment Directive (RED) Restriction of Hazardous Substances Directive (RoHS) Pressure Equipment Directive (PED)
EN 1434 designation	Environmental Class A and C
MID Mechanical environment	Class M1 and M2
MID Electromagnetic environment	Class E1 and E2
Temperature sensor	Pt 500 – EN 60751 (2-wire or 4-wire)

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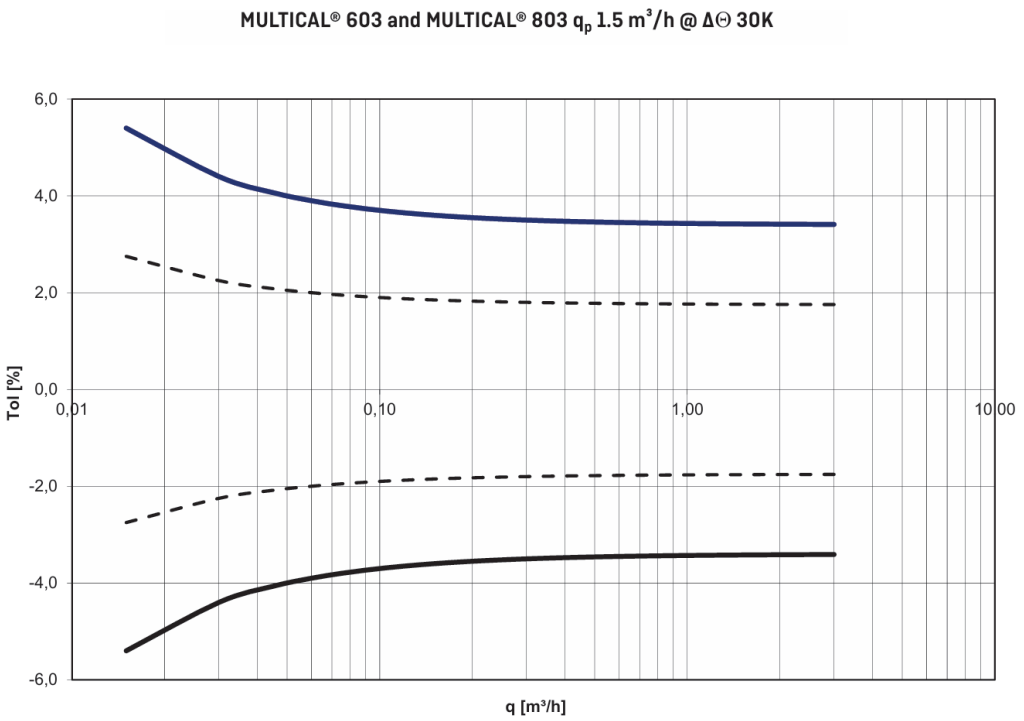
Accuracy

Meter components	MPE according to EN 1434-1	Typical accuracy
Calculator	Ec = ± (0,5 + ΔΘ min/ΔΘ) %	Ec = ± (0,15 + 2/ΔΘ) %
ULTRAFLOW®	Ef = ± (2 + 0,02 q_p/q), but not over ± 5 %	Ef = ± (1 + 0,01 q_p/q) %
Sensor set	Et = ± (0,5 + 3 ΔΘ min/ΔΘ) %	Et = ± (0,4 + 4/ΔΘ) %

Total typical accuracy of MULTICAL® 603 compared to EN 1434-1 qp 1,5



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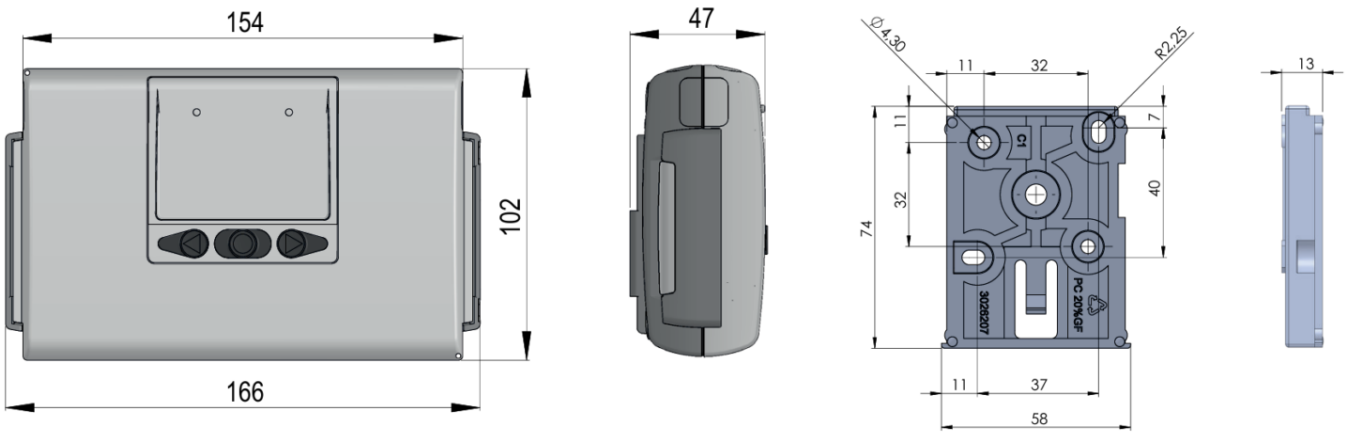
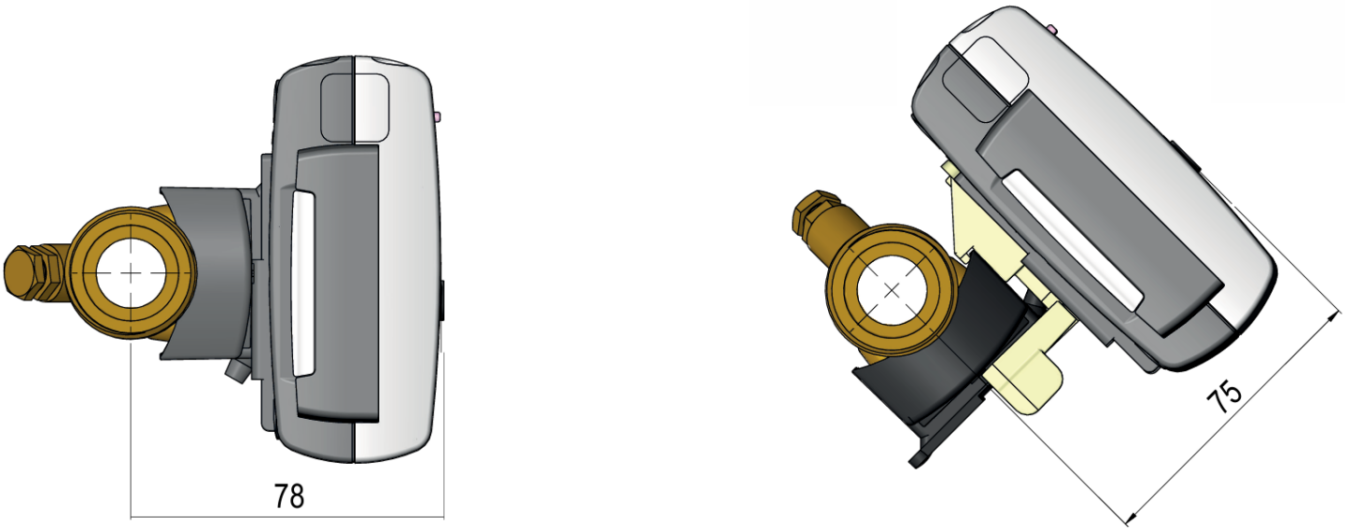
Dimensions MULTICAL® 603

Calculator and wall mount bracket



Calculator base separate and mounted on ULTRAFLOW®

MULTICAL® 603 mounted on ULTRAFLOW® with G¾ threaded connection



All dimensions in [mm]

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Electrical data

MULTICAL® 603	
Display	LCD – 7 or 8 digits with a digit height of 8,2 mm
Resolutions	9999,999 – 99999,99 – 999999,9 – 9999999 99999,999 – 999999,99 – 9999999,9 – 99999999
Energy units	MWh – kWh – GJ (Standard kWh up to q_p 15, MWh from q_p 25)
Data logger contents	Programmable - all registers can be selected
Data logging interval	Programmable - from 1 minute to 1 year
Data Logging depth	Programmable - standard: 20 years, 36 months, 460 days, 72 hours
Info logger (EEPROM)	50 info codes (50 latest are shown in the display)
Clock/calendar (with backup battery)	Clock, calendar, leap year compensation, target date
Daylight saving time/wintertime (DST)	Programmable The function can be disabled so that "technical normal time" is used
Clock accuracy	Without external adjustments: Less than 15 minutes/year With external adjustment every 48 hours: Less than 7 s from legal time
Power in temperature sensors	<10 µW RMS
Supply voltage	3,6 V DC ± 0,1 V DC
Battery type	3,65 V DC 1 x D-cell
Battery life	Up to 16 years at t_{BAT} 30 °C (wall mounting) Up to 14 years at t_{BAT} 40 °C (mounting on the flow sensor) Battery life depends on the communication and configuration parameters of the measuring device, as well as on the transmission interval, the transmission power and the content of the datagrams.
Lithium contents	2 x app. 0,9 g
Backup battery (for real-time clock)	3,0 V DC, BR-Zellen Lithium
Network supply	**230 V AC +15/-30 %, 50/60 Hz** **24 V AC ±50 %, 50/60 Hz** **24 V DC +75/-25 % (24 V DC only High-Power-SMPS)**
Insulation voltage	3,75 kV
Electricity consumption	<1 W
Backup supply	An integrated supercapacitor bridges interruptions caused by short-term network outages (only power supply modules type).
Max. cable lengths (max. 6 mm diameter cable)	2 x 0,25 mm^2: 10 m (2-wire) 4 x 0,25 mm^2: 100 m (4-wire)

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Flow measurement	ULTRAFLOW®	Reed contacts	FET contacts	24 V active pulses
CCC code	1xx-2xx-4xx-5xx-8xx	0xx	9xx	2xx og 9xx
EN 1434 pulse class	IC	IB	IB	(IA)
Pulse input	680 kΩ pull-up to 3,6 V	680 kΩ pull-up to 3,6 V	680 kΩ pull-up to 3,6 V	12 mA at 24 V
Pulse ON	<0,4 V in > 1 ms	<0,4 V in > 300 ms	<0,4 V in > 30 ms	<4 V in > 3 ms
Pulse OFF	> 2,5 V in > 4 ms	> 2,5 V in > 100 ms	> 2,5 V in > 70 ms	> 12 V in > 4 ms
Pulse frequency	<128 Hz	<1 Hz	<8 Hz	<128 Hz
Integration frequency	<1 Hz	<1 Hz	<1 Hz	<1 Hz
Electrical isolation	No	No	No	2 kV
Max. cable length	10 m	10 m	10 m	100 m
Max. cable length with cable extender box	30 m	30 m	30 m	-

Pulse inputs In-A/In-B	Electronic contact	Reed contact
Pulse input	680 kΩ pull-up to 3,6 V	680 kΩ pull-up to 3,6 V
Pulse ON	<0,4 V in > 30 ms	<0,4 V in > 500 ms
Pulse OFF	> 2,5 V in > 30 ms	> 2,5 V in > 500 ms
Pulse frequency	<3 Hz	<1 Hz
Electrical isolation	No	
Max. cable length	25 m	
Requirements for external contact	Leakage current when open <1 µA	

Pulse outputs Out-C/Out-D	Opto FET
External voltage	1...48 V DC / V AC
Current	<50 mA
Residual voltage	Ron ⩽ 40 Ω
Electrical isolation	2 kV
Max. cable length	25 m

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