

MULTICAL® 41

Water Meter

”Long-life” ultrasonic meter

Wide dynamic range

12 years’ battery operation
24 VAC or 230 VAC

Calendar and data logger

Optical data reading

RS232, M-Bus, modem and radio

2 pulse inputs for water meters

OIML R 49 type tested



MID-2004/22/EC

CE M10 0200

Application

MULTICAL® 41 measures the water consumption (0.1-30°C) in single-family houses as well as in blocks of flats. The meter is very simple to install, read and verify. In addition, MULTICAL® 41 contributes to keeping the annual operating costs at a minimum with its unique combination of very accurate measurement and long lifetime.

Flow is measured with ultrasound according to the transit time method, and all measurements, references, display readings, calculations and data communication are controlled by a microprocessor and an ASIC.

Furthermore, MULTICAL® 41 totalizes the consumptions of two water meters with pulse output.

Via an internal module MULTICAL® 41 can be remotely read by means of RS232, M-Bus, modem or Kamstrup's radio system.



Kamstrup

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Description

MULTICAL® 41 is a static water meter which is based on the ultrasonic principle. The design is based on Kamstrup's experience with the development and production of static ultrasonic meters since 1991.

The meter which is intended for measurement of water consumption in „utility environment“ has been thoroughly OIML R 49 type tested with a view to securing long-term stability, accuracy and reliability of the meter. One of the water meter's many advantages is the fact that it has no wearing parts, which improves its lifetime considerably. Furthermore, the meter's starting flow is as low as 3 l/h which gives accurate measurement also at low flows.

According to OIML R 49 MULTICAL® 41 can be designated a "complete water meter". In practice this means that flow part and calculator must not be separated.

If flow part and calculator have been separated and the seals are broken, the meter will no longer be valid for billing purposes. Furthermore, the factory guarantee no longer applies.

Ultrasonic measurement and microprocessor technology are the foundation of MULTICAL® 41. All circuits for calculation of flow measurement are combined in a single board construction, which not only gives a compact and rational design but also ensures excellent measuring quality and reliability.

Bidirectional, ultrasonic technique is used to measure the volume on the basis of the transit time method, a long-term stable and accurate measuring principle.

Two ultrasonic transducers send sound signals against and with the flow respectively. The ultrasonic signal traveling with the flow reaches the opposite transducer first. The time difference between the two signals is subsequently converted into a flow speed and thereby also a volume.

The accumulated water consumption is displayed in m³ incl. seven significant digits and the measuring unit. The display has been specially designed with a view to longevity and optimal contrast in a wide temperature range.

Other values displayed include hour counter and current flow. MULTICAL® 41 can also be configured to display peak flow, Information code, customer number and segment test etc.

To maximize safety all registers are stored at hourly intervals in an EEPROM, which also stores monthly data for the previous two-year period.

MULTICAL® 41 is voltage supplied by an internal lithium battery with up to twelve years' lifetime. Alternatively, the meter can be mains supplied by either 24 VAC or 230 VAC.

In addition to the water meter's own data, MULTICAL® 41 can display the accumulated consumption of two extra meters, which deliver a contact signal to MULTICAL® 41 via a reed switch. The contact signals of the extra meters are connected via communication modules.

MULTICAL® 41 has two data communication ports. The optical eye on the front panel complies with EN 61107 standard facilitating reading of consumption data, data logger and on-line serial PC-connection when configuring the water meter.

A split multiplug is placed beneath the top cover. The top part of this plug is used to verify the meter. The lower part is used when connecting communication modules with M-Bus, modem, RS232 interface or radio.

Approved meter data

MID designation

Mechanical environment Class M1
Electromagnetic environment Class E1

Climatic class 5...55°C, non condensing, closed location (indoor installation)

OIML R 49 designation Accuracy class 2

Environment class Fulfils OIML R 49 class B

Temperature of medium 0.1...30C

Flow meter type Q3: 1.6 m³/h

Type No.	Nom. flow [m ³ /h]	Max. flow [m ³ /h]	Min. flow [l/h]	Min. Cut off [l/h]	Pressure loss Δp @ Q3 [bar]	Connection on meter	Length [mm]
66-Zx-xx5-xxx	Q3 = 1.6	Q4 = 2.0	Q1 = 16	3	0.28	G¾B	165
66-Zx-xx9-xxx	Q3 = 1.6	Q4 = 2.0	Q1 = 16	3	0.28	G1B	190

Technical data

Electrical data

Supply voltage	3.6 V 5%
Battery	3.65 VDC, D-celle Lithium
Replacement interval	12 years @ t_{BAT} 30°C
Net supply	230 VAC + 15/30%, 50 Hz 24 VAC 50%
Power consumption mains supply	1W
Backup mains supply	Integral SuperCap eliminates operation stops due to power failure
EMC data	Fulfil OIML R 49 class E1

Mechanical data

Metrological class	2
Environmental class	Fulfil OIML R 49 class B
Electromagnetic environmental class	Fulfil OIML R 49 class E1
Ambient temperature	0...55°C
Protection class	IP54
Temperature of medium	0.1...30°C
Storage temperature empty meter	÷ 25...60°C
Pressure stage (with thread)	PN16
Flow sensor cable	1.4 m

Accuracy

MPE (maximum permissible error range)

MPE according to OIML R 49

± 5% in the range $Q_1 \leq Q \leq Q_2$

± 2% in the range $Q_2 \leq Q \leq Q_4$

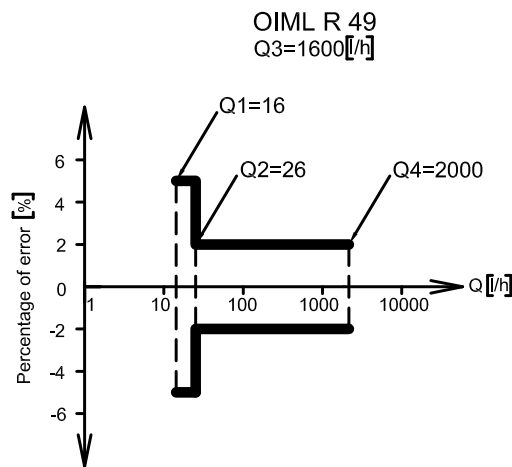


Diagram 1: OIML R 49 Requirements to water meters

Material characteristics

Wetted parts

– Case, screw-joint	Enkotal (alpha brass)
– Transducer	AISI 316
– Gaskets	EPDM
– Measuring tube	PES 30% GF
– Reflectors	AISI 304

Flow sensor case

– Wall bracket	PC + 20% glass
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Calculator case

– Top	PC
– Base	ABS with TPE gaskets (thermoplastic elastomer)
– Internal cover	PP

Flow sensor cable

Silicone cable with internal teflon insulation

Order specifications

MULTICAL 41	66-Z-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Modules										
No module									0	
M-Bus/pulse inputs (secondary addressing)									P	
Data/pulse inputs									R	
M-Bus/pulse inputs (primary addressing)									S	
Radio/pulse output/internal antenna/leakage surveillance									L	
Radio/pulse output/external antenna connection/leakage surveillance									M	
Radio/pulse input/internal antenna									U	
Radio/pulse input/external antenna connection									W	
Supply										
No module									0	
Battery, D-cell									2	
230 VAC supply module									7	
24 VAC supply module									8	
Flow sensor										
Q3 [m³/h]	Connection	Length [mm]								
1.6	G ³ / ₄ B (R ¹ / ₂)	165								5
1.6	G1B (R ³ / ₄)	190								9
Country code									7XX	

The country code is used for:

- Language and approval on type label
- Flow sensor dynamic range (1:100)
- Marking of PN class
- Special verification, if necessary

Customer labels (2001-XXX) are integrated in the front label

Prog. number	A	B	CCC
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flow sensor position	Internal value		
Measuring unit	Internal value		
Flow sensor programming			CCC

Standard CCC-codes

CCC-table for MULTICAL® 41

CCC No.	Number of decimals on display					Q3 [m³/h]	Type 66-Zx-xxX-xxx
			m³	l/h			
119			2	0		1.6	5-9

Configuration

>DD< Configuration of display – DD-codes >primary<

Level 1	81	82		
Volume	1	1		
Hour counter	2	2		
Current flow	3	3		
Peak flow (months)	*4	*4		
Yearly peak flow				
All info				
All info but (-2)	5	5		

>DD< Configuration of display – DD-codes >secondary<

Level A	81	82		
VA		A		
VB		B		
Reading date 1				
Volume 1				
Yearly peak flow 1				
Reading date 2				
Volume 2				
Yearly peak flow 2				
Monthly data 1-12	A	C		
Volume	B	D		
Monthly peak flow	C	E		
Prog. No.				
Customer No.	D	F		
Current date				
Software version	E	G		
Segment test	F	H		

* Selection of peak flow for monthly data (/#5)

NB: Info code 128 is automatically controlled by the factory/METER TOOL configuration:

Type 66-Zx-2xx-xxx Info code 128 **active**. In connection with other supply modules Info code 128 **enabled**

NBB: Remember that possible rebuilding from battery to mains supply requires reconfiguration of type number.

Yearly peak values are updated at the turn of the month.

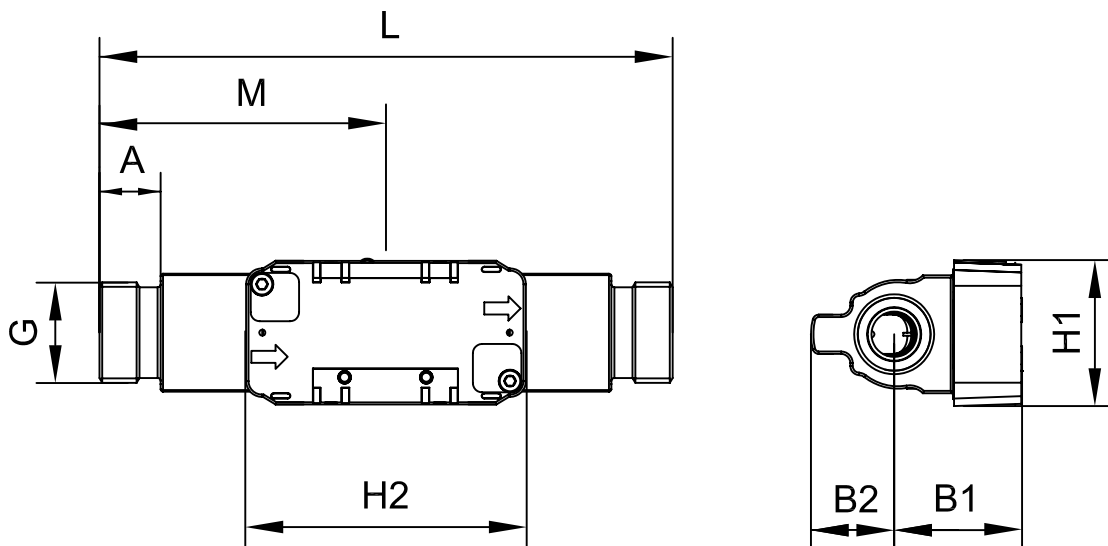
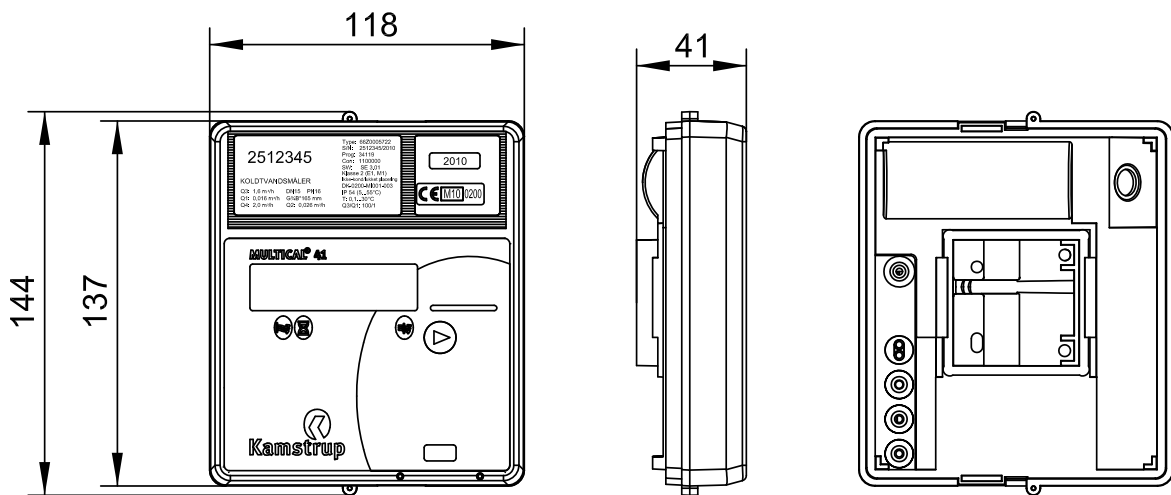
Configuration

>FF< Input a, >GG< Input b, Pulse separation ($f \leq 0.5$ Hz)

Input a, Terminals 65-66		Input b, Terminals 67-68					
FF	Max. input	GG	Max. input	Pre-counter	l/pulse	Measuring unit and decimal point	
00	OFF	00	OFF	-	-	-	-
01	50 m ³ /h	01	50 m ³ /h	1	100	m ³ a - m ³ b	000000.0
02	25 m ³ /h	02	25 m ³ /h	2	50	m ³ a - m ³ b	000000.0
03	12 m ³ /h	03	12 m ³ /h	4	25	m ³ a - m ³ b	000000.0
04	5 m ³ /h	04	5 m ³ /h	10	10	m ³ a - m ³ b	000000.0
05	2.5 m ³ /h	05	2.5 m ³ /h	20	5.0	m ³ a - m ³ b	000000.0
06	1 m ³ /h	06	1 m ³ /h	40	2.5	m ³ a - m ³ b	000000.0
07	0.5 m ³ /h	07	0.5 m ³ /h	100	1.0	m ³ a - m ³ b	000000.0
24	5 m ³ /h	24	5 m ³ /h	1	10	m ³ a - m ³ b	00000.00
25	2.5 m ³ /h	25	2.5 m ³ /h	2	5.0	m ³ a - m ³ b	00000.00
26	1 m ³ /h	26	1 m ³ /h	4	2.5	m ³ a - m ³ b	00000.00
27	0.5 m ³ /h	27	0.5 m ³ /h	10	1.0	m ³ a - m ³ b	00000.00
40	500 m ³ /h	40	500 m ³ /h	1	1000	m ³ a - m ³ b	0000000

NB: Electricity meters cannot be connected as minimum 1 sec.'s pulse and interval time is required.

Dimensional drawings



Thread	L	M	H2	A	B1	B2	H1	Approx. Weight [kg]
G ³ / ₄ (Q3=1.6)	165	L/2	92.5	20.5	42	28	47.5	1.7
G1 (Q3=1.6)	190	L/2	92.5	20.5	42	28	47.5	2.0

Total weight excl. packing

Pressure loss graphs

According to OIML R 49 the maximum pressure loss must not exceed 1.0 bar within the range Q1 to Q4.

The pressure loss of a meter increases with the square on the flow and can be expressed as follows:

$$Q = kv \times \sqrt{\Delta p}$$

Q = volume flow rate [m³/h]

kv = volume flow at a pressure loss of 1 bar [m³/h]

Δp = pressure loss [bar]

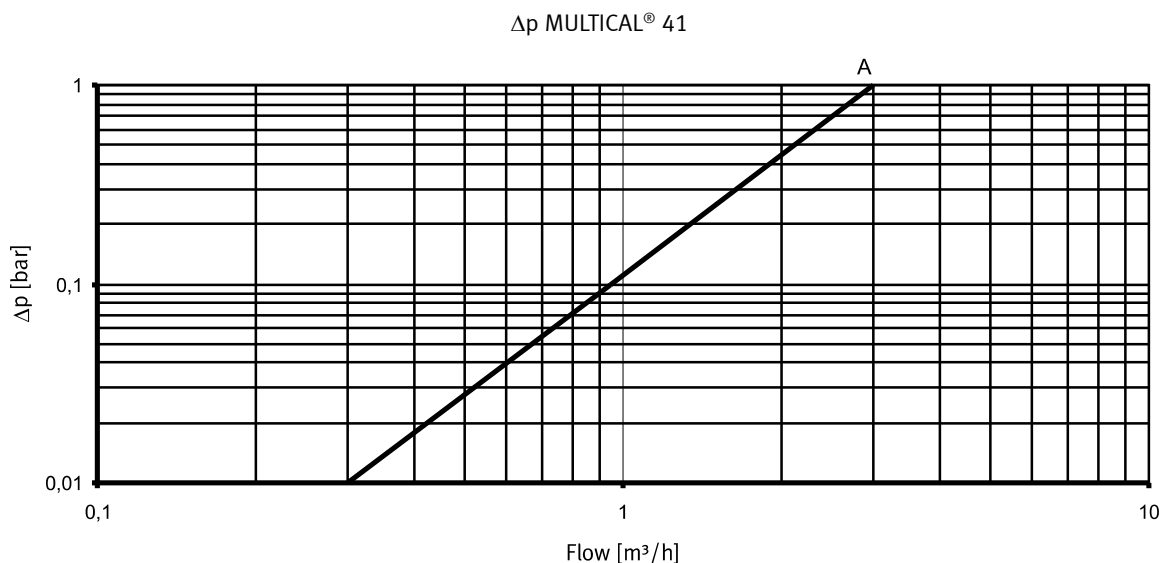


Diagram	Q3 [m ³ /h]	Nom. diameter [mm]	kv	Q@Δp 0.28 bar [m ³ /h]
A	1.6	DN15 & DN20	3	1.6

Accessories

Strainer for inlet in the flow sensor

Flow sensor Q3 [m ³ /h]	Connection	Length [mm]	Type no.
1.6	G ³ / ₄ B (R ¹ / ₂)	165	22 10 182
1.6	G1B (R ³ / ₄)	190	22 10 183

METERTOOL LogView

66-99-703

The meter is prepared for common nonreturn valves (NF EN 13959).