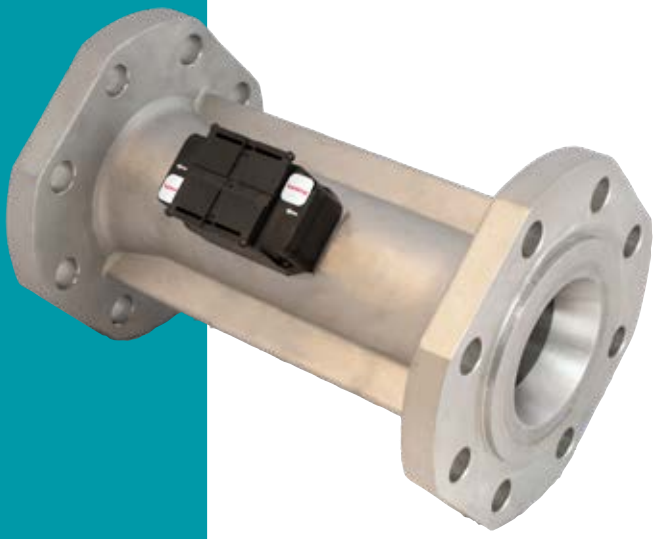
kamstrup

Data sheet

ULTRAFLOW® 54
DN25-65, PN40, PS32

- Ultrasonic flow sensor
- For flow rates from 3.5 m^3/h to 25 m^3/h
- Static sensor, no moving parts and no wear
- Compact design
- Small pressure loss
- Large dynamic range
- Exceptionally accurate
- Durable



MID 2014/32/EU

CE M23 0200

EN 1434

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Description

ULTRAFLOW® 54 is a static flow sensor based on the ultrasonic measuring principle. It is used primarily as a subassembly of a thermal energy meter in combination with the separate calculators MULTICAL® 603 or MULTICAL® 803 and a set of TemperatureSensor 63. ULTRAFLOW® 54 has been designed for use in heat installations where water is used as the heat-bearing medium.

ULTRAFLOW® 54 employs microprocessor technology. The flow is measured using bidirectional ultrasonic technique based on the transit time method. All circuits for calculation and measurement are collected on a single board, providing a compact and rational design in addition to an exceptionally high level of measuring accuracy and proven longterm stability.

A three-wire pulse cable is used to connect ULTRAFLOW® 54 to separate MULTICAL® calculators. This cable is used to supply the flow sensor from the calculator and also to send the volume-proportional pulses to the calculator.

If ULTRAFLOW® 54 is used as a flow sensor for other equipment, it must be connected through a Pulse Transmitter. If ULTRAFLOW® is connected to another calculator with a different meter factor than the one supplied by ULTRAFLOW®, a Pulse Divider is used instead. Pulse Transmitter and Pulse Divider have a galvanically separated pulse output and a built-in supply for ULTRAFLOW® 54.

If the distance between MULTICAL® and ULTRAFLOW® 54 is more than 10 m, a Pulse Transmitter allows prolongation of the connecting cable (up to 100 m). Alternatively, a Cable Extender Box can be used for this purpose for distances up to 30 m between MULTICAL® and ULTRAFLOW® 54.

Compliance

Type approval

ULTRAFLOW® 54 is approved as a heat meter in accordance with MID-2014/32/EU:

EU-Type Examination Certificates	DK-0200-MI004-008
MID-certified according to Module D	DK-0200-MID-D-001

CE M23 0200

Please contact Kamstrup A/S for further information relating to type approval and verification.

Standards and documents

- EN 1434:2007/AC2007
- EN 1434:2015+A1:2015
- EN 1434:2022
- WELMEC 7.2:2022

CE-marking

ULTRAFLOW® 54 is marked in accordance with:

– EMC-directive	2014/30/EU
– LV-directive	2014/35/EU (together with Pulse Transmitter or Pulse Divider)
– PE-directive	2014/68/EU (DN40...DN65 category I)

Approved meter data

MID designation	
– Mechanical environment	M1 (vibrations and shocks of low significance) M2 (significant or high levels of vibrations and shocks)
– Electromagnetic environment	E1 (residential, commercial and light industrial buildings) E2 (other industrial buildings)
– Climatic environment	5...55 °C, condensing, closed location (indoors)
– Accuracy class	2 and 3
EN 1434 designation	
– Environmental class	C (high electrical and electromagnetic conditions)
Fast response meter	Volume sampling interval ≤ 2 s (sub-assembly flow sensor)

Technical data

Electrical data

Internal supply voltage	3.6 VDC ± 0.1 VDC
Battery (MULTICAL® or Pulse Transmitter/ Pulse Divider)	3.65 VDC, D-cell lithium
Battery lifetime (replacement interval)	
– ULTRAFLOW® 54 and MULTICAL®	Up to 16 years @ t_{BAT} < 30 °C
– Pulse Transmitter/Pulse Divider	6 years @ t_{BAT} < 30 °C (Y=3)
Mains supply (MULTICAL® or Pulse Transmitter/Pulse Divider)	230 VAC +15/-30 %, 50 Hz or 60 Hz 24 VAC ± 50 %, 50 Hz or 60 Hz
Backup supply	Integral supercap eliminates operational disturbances due to short-term power cuts
Cable length	
– Flow sensor	Max 10 m
– Pulse Transmitter/Pulse Divider	Depends on calculator – max 100 m when connected to MULTICAL® (Y=2)
– Cable Extender Box	Depends on calculator – max 30 m when connected to MULTICAL® (does not provide galvanic separation, but supports extended info codes)
Electromagnetic environment	Fulfils EN 1434 class C, MID E1 and E2
Pulse output	Galvanically connected (ULTRAFLOW®)
– Type	Push-Pull
– Output impedance	10 kΩ
– Pulse duration	2...6 ms
– Pause time	Depending on current pulse frequency

Technical data

Mechanical data

Accuracy class	2 and 3
Electromagnetic environment	Fulfils EN 1434 class C, MID E1 and E2
Mechanical environment	MID M1 and M2
Ambient conditions	5…55 °C, closed location (installation indoors)
Protection class	
– Flow sensor	IP65
– Pulse Transmitter/Pulse Divider	IP67
– Cable Extender Box	IP65
Medium in flow sensor	Water – recommended water quality as in CEN TR 16911 and AGFW FW510
Medium temperature*	15…130 °C or narrower range
Storage temperature (empty sensor)	-25…60 °C
Pressure stage	PN40, PS32
Straight inlet requirement	0D (according to EN 1434)
Installation angle	Horizontally, vertically and at an angle

* At medium temperatures above 90°C, the use of flange meters is recommended.
At medium temperatures above 90 °C or below the ambient temperature, the calculator and Pulse Transmitter/Pulse Divider must not be mounted on the flow sensor. Instead wall mounting is recommended.

Flow data

Nom. flow q_p [m³/h]	Nom. diameter [mm]	Meter factor * [p/l]	Dynamic range q_p:q_i	q_s:q_p	Flow @ 125 Hz ** [m³/h]	$\Delta p@q_p$ [bar]	Min. cut-off [l/h]
3.5	DN25	50	100:1	2:1	9	0.07	7
10	DN40	15	100:1	2:1	30	0.06	20
15	DN50	10	100:1	2:1	45	0.14	30
25	DN65	6	100:1	2:1	75	0.06	50

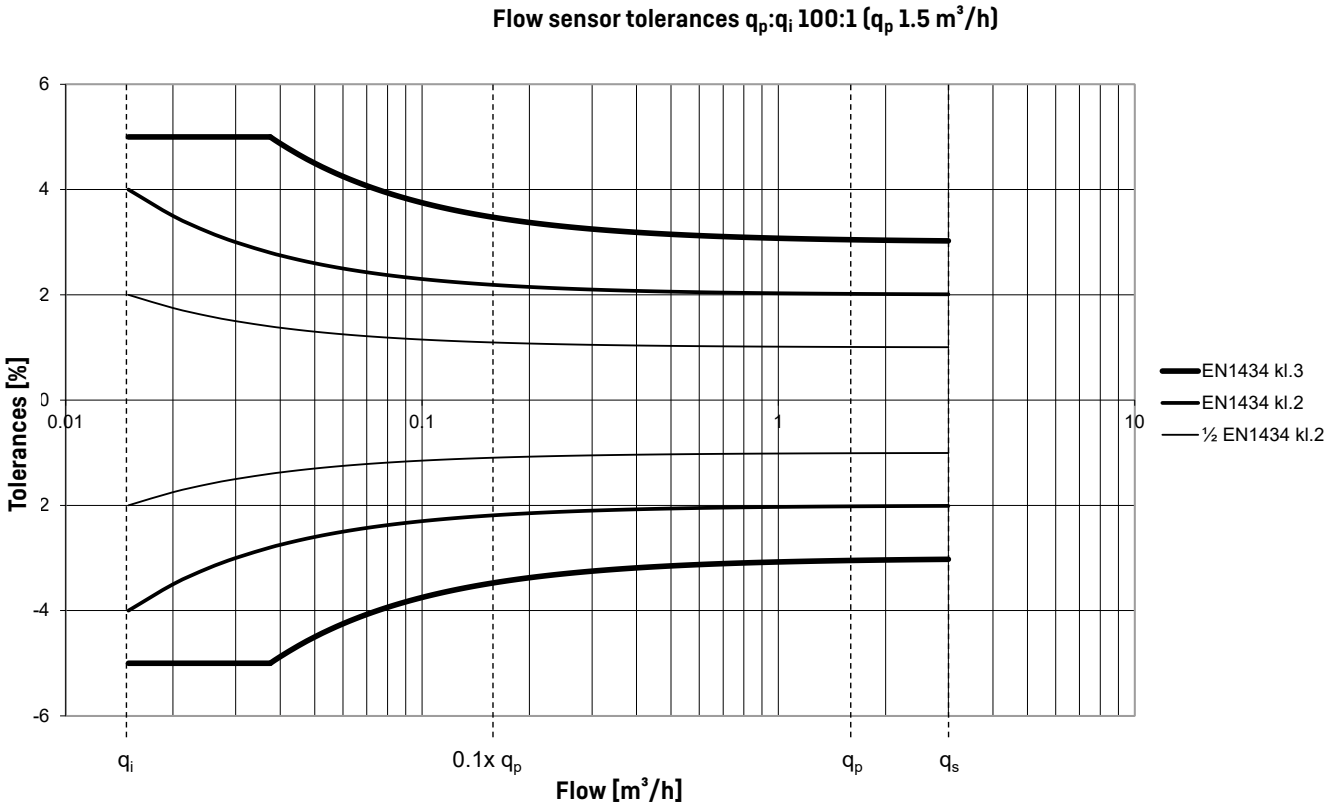
* The meter factor appears from the type label.

** Saturation flow 125 Hz. Max pulse frequency is maintained at higher flow rates.

Measurement accuracy

Class 3	Ef = ±(3 + 0.05 qp/q), but not above ±5%
Class 2	Ef = ±(2 + 0.02 qp/q), but not above ±5%
Typical *	Ef = ±(1 + 0.01 qp/q)

* Documented with DANAK-accredited certificate at flow qi, 0.1 qp and qp.



Materials

Wetted parts

Housing	Stainless steel, W.no. 1.4308
Transducer (membrane)	Stainless steel, W.no. 1.4404
O-ring	Ethylene propylene (EPDM)
Reflector	Stainless steel, similar to AISI 304 or AISI 316
Measuring tube	Thermoplastic, PPS 30% GF

Electronic housing

– Base	Thermoplastic, PC 10% GF
– Cover	Thermoplastic, PC 20% GF

Connection cable

Silicone cable (3 x 0.25 mm^2)

Housing, Cable Extender Box

Base, cover	Thermoplastic, acrylonitrile butadiene styrene (ABS)

Housing, Pulse Transmitter/Pulse Divider

Base, cover	Thermoplastic, PC 10% GF

Type summary

Nom. flow q_p [m^3/h]	Installation dimensions	
3.5	DN25 x 220 mm	
10	DN40 x 256 mm	DN40 x 300 mm
15	DN50 x 250 mm	DN50 x 270 mm
25	DN65 x 300 mm	

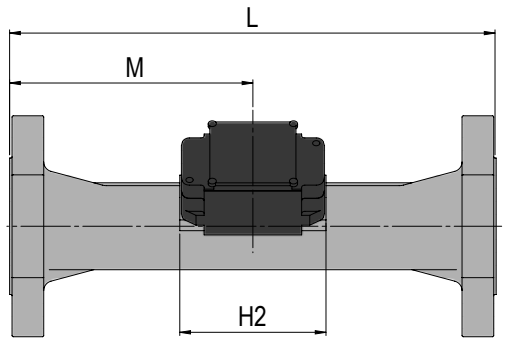
Flange facing type E, spigot according to EN 1092-1, PN40

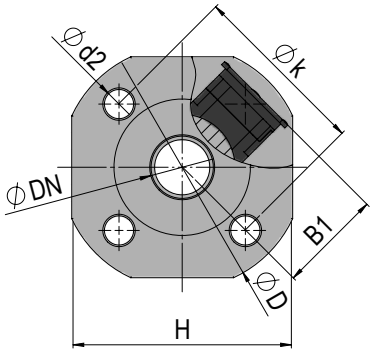
(Please note, flange facing type E, spigot requires a counter flange type F, recess.
Type E is not compatible with flange facing type B, raised face.)

Dimensional sketches

ULTRAFLOW® 54, DN25 to DN50

All measurements are in mm, unless otherwise stated.



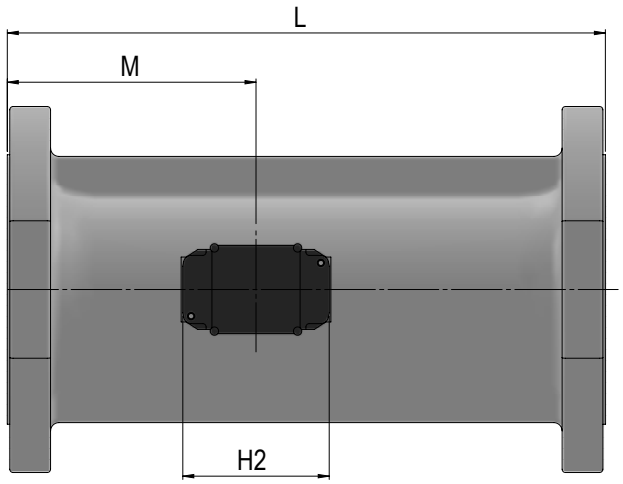


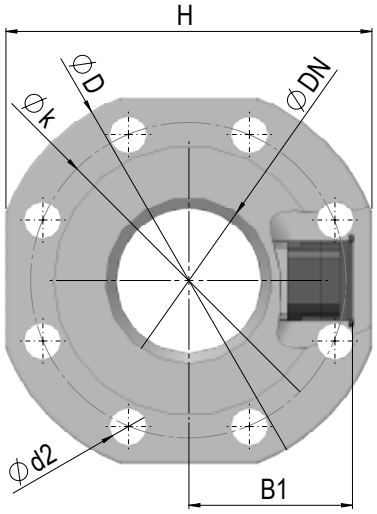
Flange facing type E, spigot according to EN 1092-1, PN40

Nom. diameter	L	M	H2	B1	D	H	k	Bolts			Approx. weight
								No.	Thread	d_2	[kg]
DN25	220	L/2	89	58	115	106	85	4	M12	14	4,5
DN40	256	138	89	<D/2	150	136	110	4	M16	18	7,9
DN40	300	L/2	89	<D/2	150	136	110	4	M16	18	7,6
DN50	250	135	89	<D/2	165	145	125	4	M16	18	9,5
DN50	270	155	89	<D/2	165	145	125	4	M16	18	9,8

Dimensional sketches

ULTRAFLOW® 54, DN65



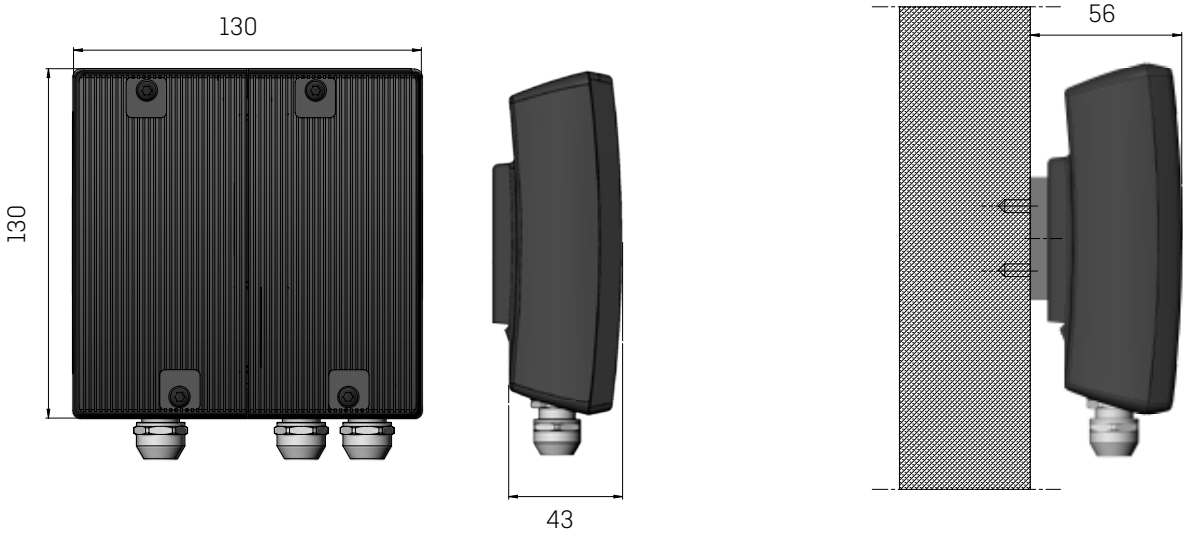


Flange facing type E, spigot according to EN 1092-1, PN40

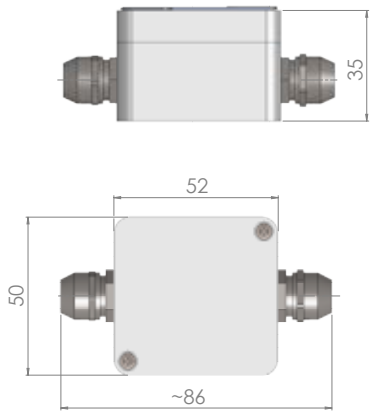
Nom. diameter	L	M	H2	B1	D	H	k	Bolts			Approx. weight
								No.	Thread	d_2	[kg]
DN65	300	170	89	<H/2	185	168	145	8	M16	18	12,7

Dimensional sketches

Pulse Transmitter



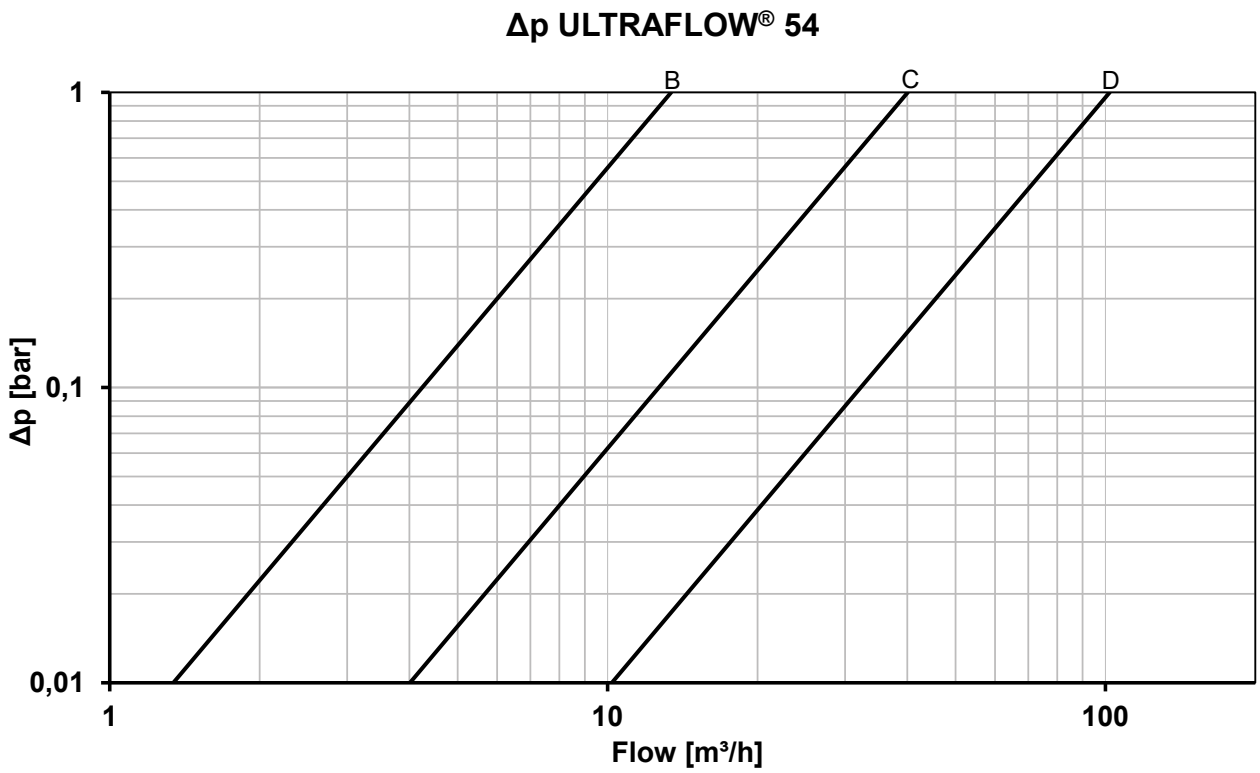
Cable Extender Box



Pressure loss

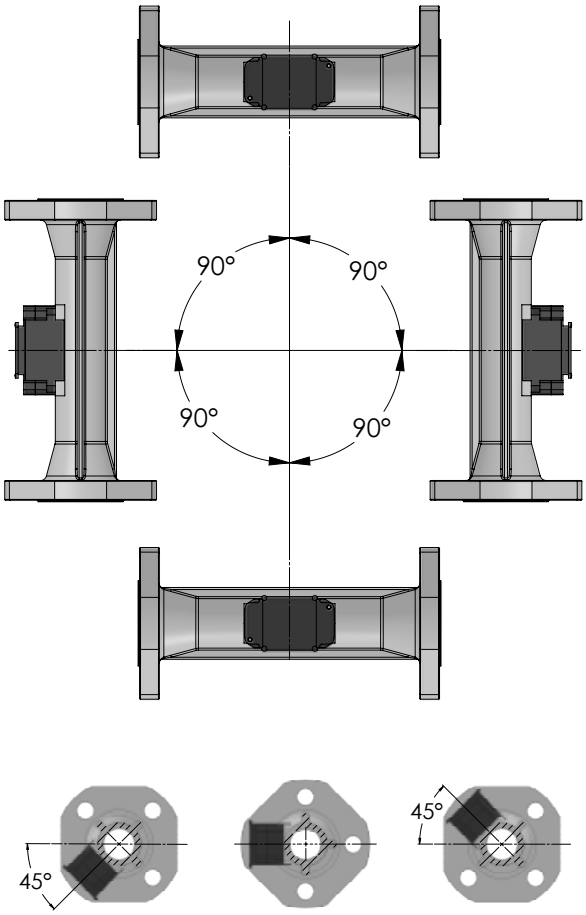
Graph	Nom. flow q_p [m³/h]	Nom. diameter [mm]	k_v *	q@0.25 bar [m³/h]
B	3,5	DN25	13,4	6,7
C	10 & 15	DN40 & DN50	40	20
D	25	DN65	102	51

* $q=k_v \times \sqrt{\Delta p}$



Installation

Orientation of Kamstrup flow sensors (mounted separately)



Kamstrup flow sensors can be installed horizontally, vertically or at an angle. For vertical mounting, Kamstrup flow sensors can be turned ±360° around the pipe axis.

⚠ The plastic box on the flow sensor must be turned to the side (when installed horizontally).

The flow sensor may always be turned up to 45° downwards in relation to the pipe axis.

Only in case that the district heating water is clean and does not contain any kind of dirt, the flow sensor may also be turned up to 90° downwards.

In case that the district heating water is free of air, the flow sensor may in addition also be turned 45° upwards.

For further recommendations for the orientation of Kamstrup flow sensors, see the technical description for ULTRAFLOW® 54 DN15-125, 5512-2464-GB, which can be downloaded from www.kamstrup.com.

Straight inlet

ULTRAFLOW® requires neither straight inlet nor outlet to meet the Measuring Instruments Directive (MID) 2014/32/EU, OIML R75:2002 and EN 1434. Only in case of heavy flow disturbances before the meter, a straight inlet section will be necessary. It is recommended to follow the guidelines in CEN CR 13582.

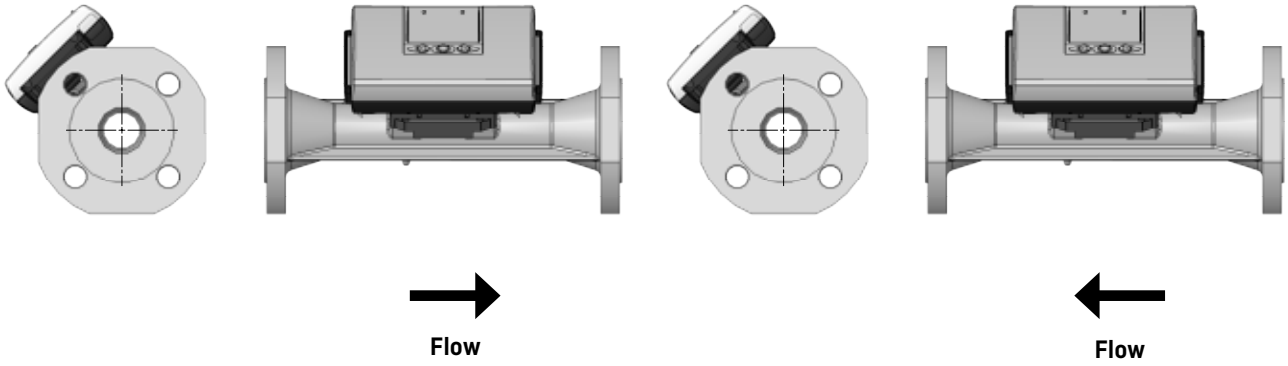
Operating pressure

To minimise the risk of measuring errors as a result of cavitation or air in the water, it is recommended to keep a sufficient static pressure at the flow sensor outlet of min. 1.5 bar up to qp and min. 2.5 bar at qs. This applies to temperatures up to approx. 80 °C. It is particularly recommended to follow this advice during meter calibration. In absence of cavitation, the flow sensor is typically functioning at lower operating pressure. ULTRAFLOW® must not be exposed to pressure lower than the ambient pressure (vacuum). This minimises the risk of transducer damage.

Examples of installation

MULTICAL® mounted directly on ULTRAFLOW® 54

The orientation of the flow sensors follows the general installation recommendations of Kamstrup.



⚠ At a medium temperature above 90 °C, calculator and Pulse Transmitter must not be mounted on the flow sensor. Instead wall mounting is recommended.

Insulation

For information about insulation of ULTRAFLOW® 54, see the Technical description 5512-2464-GB, which can be downloaded from www.kamstrup.com.

Electrical connection

Connecting MULTICAL® and ULTRAFLOW® 54

ULTRAFLOW® 54	->	MULTICAL®
Blue (GND)	->	11
Red (supply)	->	9
Yellow (signal)	->	10

Connecting via Pulse Transmitter/Pulse Divider/Cable Extender Box

ULTRAFLOW® 54	->	Pulse Transmitter/Pulse Divider/ Cable Extender Box		->	MULTICAL®
		Input	Output		
Blue (GND)	->	11	11A/11	->	11
Red (supply)	->	9	9A/9	->	9
Yellow (signal)	->	10	10A/10	->	10

Pulse Transmitter/Pulse Divider provides galvanic separation, but does not support extended info codes.

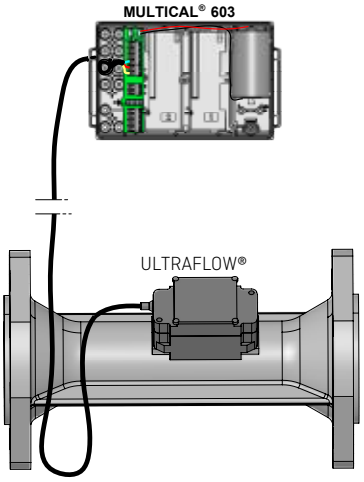
Cable Extender Box does not provide galvanic separation, but supports extended info codes.

If long signal cables are used, please consider the installation carefully. There must be **at least 25 cm** between the signal cable and all other cables due to EMC.

For further information about Pulse Transmitter/Pulse Divider and Cable Extender Box, see the Technical description 5512-2464, which can be downloaded from www.kamstrup.com.

Example of connecting ULTRAFLOW® 54 and MULTICAL®

ULTRAFLOW® 54 and MULTICAL® 603



Order specification

Type number *	q_p [m^3/h]	q_i [m^3/h]	q_s [m^3/h]	Connection	Length [mm]	PN, PS [bar]	Meter factor [p/l]	Material (housing)
65-5-CGE1-XXX	3,5	0.035	7	DN25	220	PN40, PS32	50	Stainless steel
65-5-CJE3-XXX	10	0.1	20	DN40	256	PN40, PS32	15	Stainless steel
65-5-CJED-XXX	10	0.1	20	DN40	300	PN40, PS32	15	Stainless steel
65-5-CKE4-XXX	15	0.15	30	DN50	250	PN40, PS32	10	Stainless steel
65-5-CKEE-XXX	15	0.15	30	DN50	270	PN40, PS32	10	Stainless steel
65-5-CLEG-XXX	25	0.25	50	DN65	300	PN40, PS32	6	Stainless steel

* The XXX-code pertaining to final assembly, approvals, etc. is determined by Kamstrup A/S. Some variants may not be available in national approvals.

By default, ULTRAFLOW® 54 is delivered with 2.5 m cable, but can also be delivered with 5 or 10 m cable.

Pulse Transmitter/Pulse Divider – type no. 6699-903/6699-907

Pulse Transmitter/Pulse Divider is delivered with built-in supply for ULTRAFLOW® 54. Battery, 24 VAC and 230 VAC supply are available. Please state the required supply type when ordering.

Cable Extender Box - type no. 6699-036

If ULTRAFLOW® must be connected to MULTICAL® with a cable length between 10 m and 30 m and galvanic separation is not necessary, a Cable Extender Box can be utilized. See document no. 5512-2008 (DK-GB-DE-RO) for further information.

Pulse Transmitter provides galvanic separation, but does not support extended info codes.

Cable Extender Box does not provide galvanic separation, but supports extended info codes.

For further information about Pulse Transmitter/Pulse Divider and Cable Extender Box, see the Technical description 5512-2464, which can be downloaded from www.kamstrup.com.

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