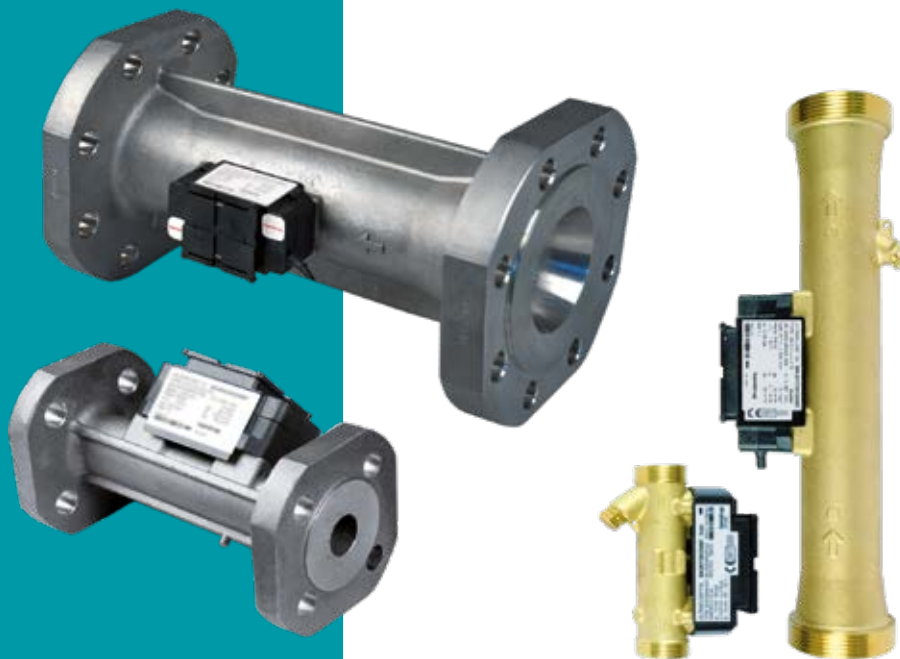


Data sheet

ULTRAFLOW® 54 DN15-125

- Ultrasonic flow sensor (q_v 0.6...100 m³/h)
- Static sensor, no moving parts and no wear
- Compact design
- Enables direct mounting of a temperature sensor in threaded meters (q_v 0.6...10 m³/h)
- 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 sub-assembly 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.

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 @ $t_{BAT} < 30\text{ °C}$
- Pulse Transmitter/Pulse Divider	6 years @ $t_{BAT} < 30\text{ °C}$ (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 1434:2015 class C, MID E1 and E2
Pulse output	Galvanically connected (ULTRAFLOW®)
- Type	Push-Pull
- Output impedance	10 k Ω
- 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	PN16, PS16 or PN25, PS25 or PN16/PN25, PS25 (see marking)
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 [m ³ /h]	Meter factor * [p/l]	Dynamic range $q_p:q_i$	$q_s:q_p$	Flow @125 Hz ** [m ³ /h]	Min. cut-off [l/h]
0.6	300	100:1	2:1	1.5	2
1.5	100	100:1	2:1	4.5	3
2.5	60	100:1	2:1	7.5	5
3.5	50	100:1	2:1	9	7
6	25	100:1	2:1	18	12
10	15	100:1	2:1	30	20
15	10	100:1	2:1	45	30
25	6	100:1	2:1	75	50
40	5	100:1	2:1	90	80
60	2.5	100:1	2:1	180	120
100	1.5	100:1	2:1	300	200

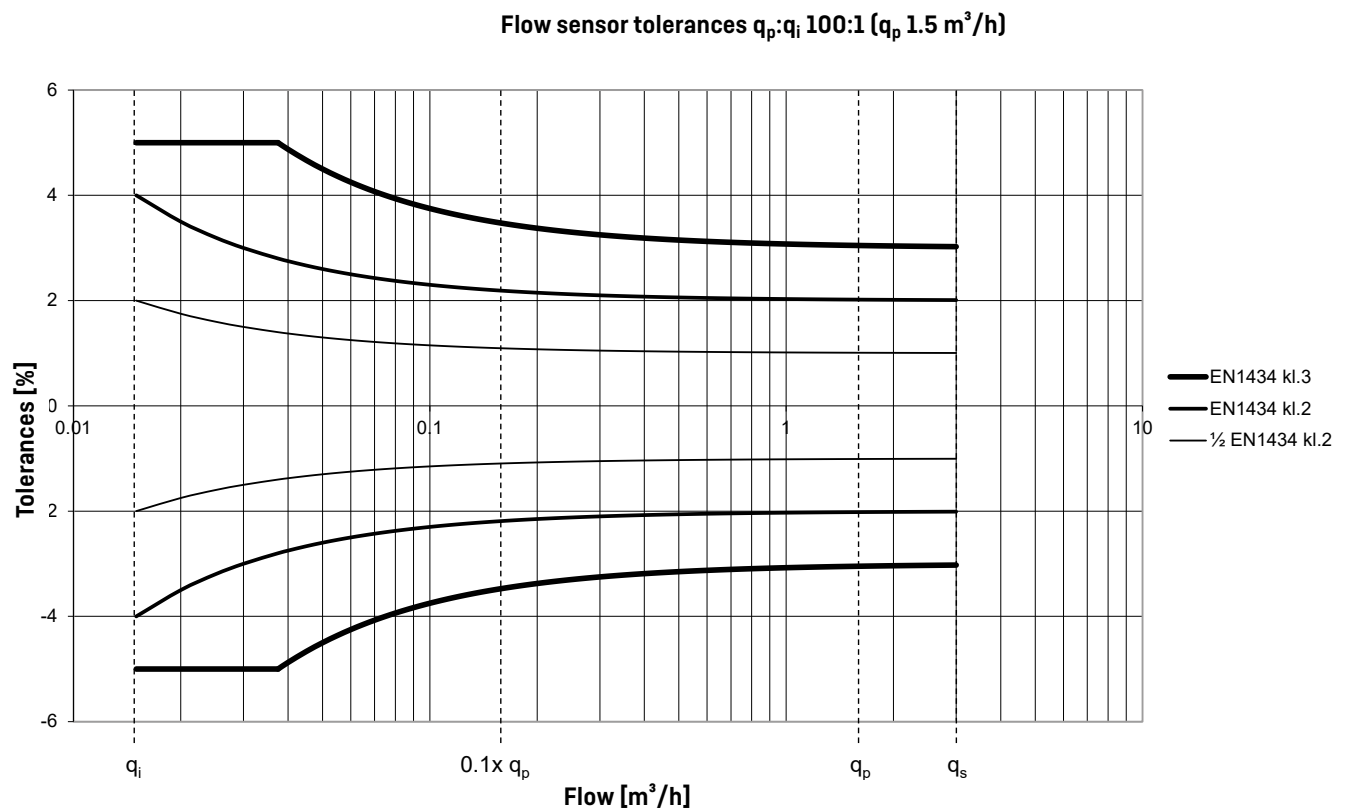
* The meter factor appears from the type label.

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

Measurement accuracy

Class 3	$E_f = \pm[3 + 0.05 q_p/q]$, but not above $\pm 5\%$
Class 2	$E_f = \pm[2 + 0.02 q_p/q]$, but not above $\pm 5\%$
Typical *	$E_f = \pm[1 + 0.01 q_p/q]$

* Documented with DANAK-accredited certificate at flow q_i , $0.1 q_p$ and q_p .



Materials

Wetted parts

Housing, thread	DZR brass (dezincification-resistant brass), CW602N
Housing, flange	Stainless steel, W.no. 1.4308
Transducer (membrane)	Stainless steel, W.no. 1.4404
O-ring	Ethylene propylene (EPDM)
Reflector base/reflector	Thermoplastic, PESU 30% GF and stainless steel, similar to AISI 304 or AISI 316/ Stainless steel, similar to AISI 304 or AISI 316
Measuring tube	Thermoplastic, PESU – only flow sensor type 65-5-XXHX-XXX/ Thermoplastic, PESU 30% GF

Electronic housing

65-5-XXHX-XXX

– Base	Thermoplastic, PESU 30% GF
– Cover	Thermoplastic, PC 10% GF

65-5-XXCX-XXX and 65-5-XXJX-XXX

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

Connection cable

Silicone cable (3 x 0.25 mm²)

Housing, Cable Extender Box

Base, cover	Thermoplastic, acrylonitrile butadiene styrene (ABS)
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Housing, Pulse Transmitter/Pulse Divider

Base, cover	Thermoplastic, PC 10% GF
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Type summary

Nom. flow q_p [m ³ /h]	Installation dimensions			
0.6	G¾B x 110 mm	G1B x 130 mm		
1.5	G¾B x 110 mm	G¾B x 165 mm	G1B x 130 mm	G1B x 190 mm
2.5	G1B x 190 mm	DN20 x 190 mm		
3.5	G1¼B x 260 mm	DN25 x 260 mm		
6	G1¼B x 260 mm	G1½B x 260 mm	DN25 x 260 mm	DN32 x 260 mm
10	G2B x 300 mm	DN40 x 300 mm		
15	DN50 x 270 mm			
25	DN65 x 300 mm			
40	DN80 x 300 mm			
60	DN100 x 360 mm			
100	DN100 x 360 mm	DN125 x 350 mm		

Thread EN ISO 228-1

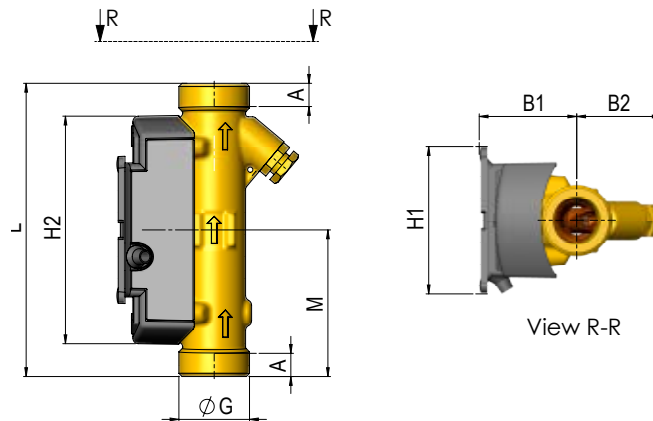
Flange facing type B, raised face according to EN 1092-1, PN25

Dimensional sketches

ULTRAFLOW® 54 flow sensors have a compact design and can be ordered with 2.5, 5 and 10 m signal cable to the calculator. Flow sensors of size qp 0.6...10 m³/h with threaded meter housings have the provision for built-in temperature sensors (M10x1 connection).

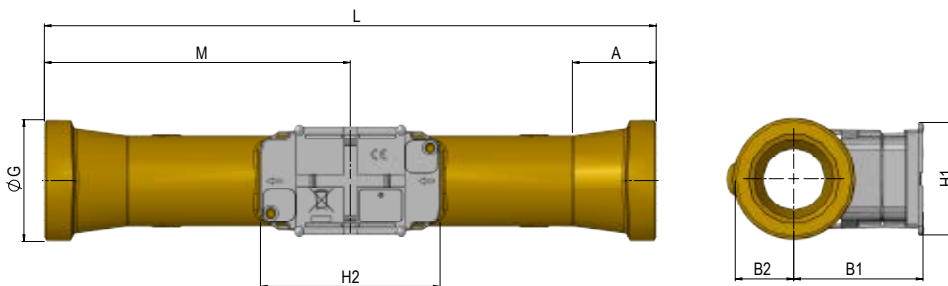
ULTRAFLOW® 54 type 65-5-XXHX-XXX, G¾B and G1B

All measurements are in mm, unless otherwise stated.



Thread EN ISO 228-1	L	M	H2	A	B1	B2	H1	Approx. weight [kg]
G¾B (qp 0.6;1.5)	110	L/2	86	8	37	32	55	0.41
G1B (qp 0.6;1.5)	130	L/2	86	12	37	32	55	0.51
G¾B (qp 1.5)	165	L/2	86	8	37	32	55	0.51
G1B (qp 1.5)	190	L/2	86	12	37	32	55	0.61
G1B (qp 2.5)	190	L/2	86	12	40	35	55	0.67

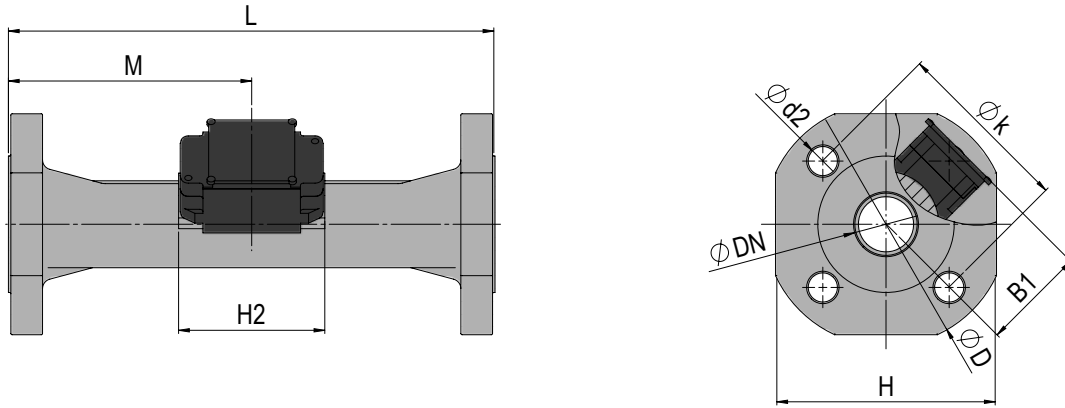
ULTRAFLOW® 54 type 65-5-XXJX-XXX, G5/4B, G1½B and G2B



Thread EN ISO 228-1	L	M	H2	A	B1	B2	H1	Approx. weight [kg]
G1¼B (qp 3.5)	260	L/2	89	16	58	20	55	1.5
G1¼B (qp 6.0)	260	L/2	89	16	60	20	55	1.6
G1½B	260	L/2	89	31	60	24	55	1.7
G2B	300	L/2	89	40,2	63	29	55	2.5

Dimensional sketches

ULTRAFLOW® 54, DN20 to DN50

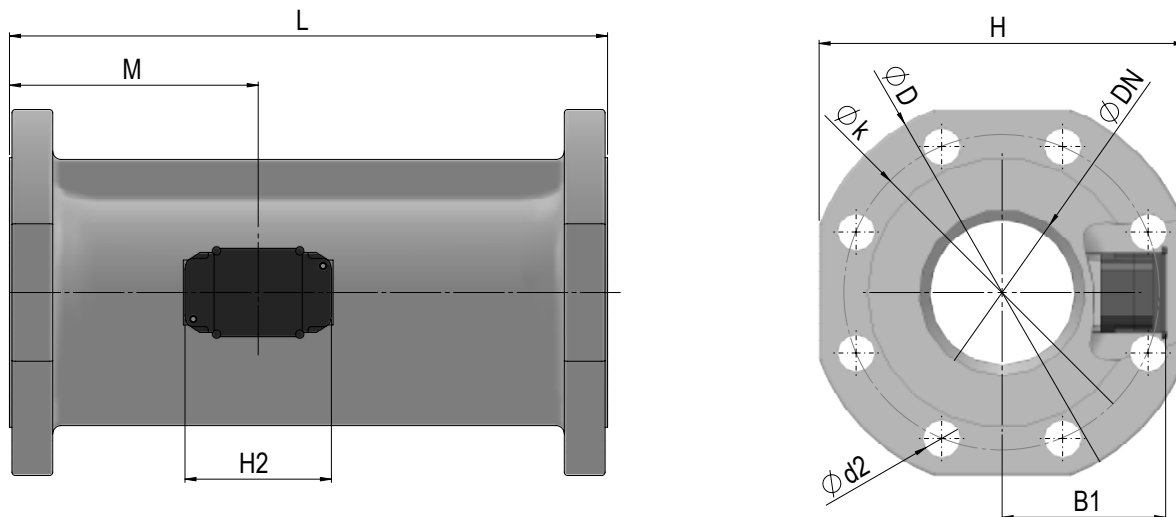


Flange facing type B, raised face according to EN 1092-1, PN25

Nom. diameter	L	M	H2	B1	D	H	k	Bolts			Approx. weight [kg]
								No.	Thread	d ₂	
DN20	190	L/2	89	58	105	95	75	4	M12	14	2.9
DN25	260	L/2	89	58	115	106	85	4	M12	14	5.0
DN32	260	L/2	89	<D/2	140	128	100	4	M16	18	5.2
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

Dimensional sketches

ULTRAFLOW® 54, DN65 to DN125

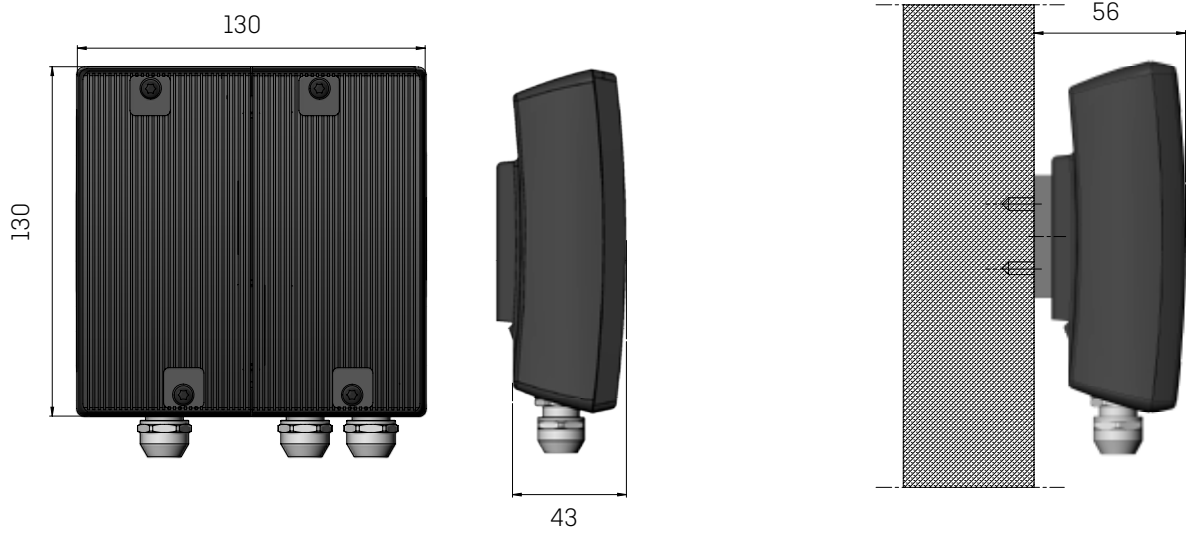


Flange facing type B, raised face according to EN 1092-1, PN25

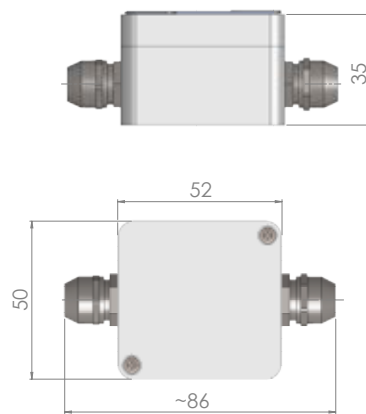
Nom. diameter	L	M	H2	B1	D	H	k	Bolts			Approx. weight [kg]
								No.	Thread	d ₂	
DN65	300	170	89	<H/2	185	168	145	8	M16	18	13.2
DN80	300	170	89	<H/2	200	184	160	8	M16	18	16.8
DN100	360	210	89	<H/2	235	220	190	8	M20	22	21.7
DN125	350	212	89	<H/2	270	260	220	8	M24	26	28.2

Dimensional sketches

Pulse Transmitter



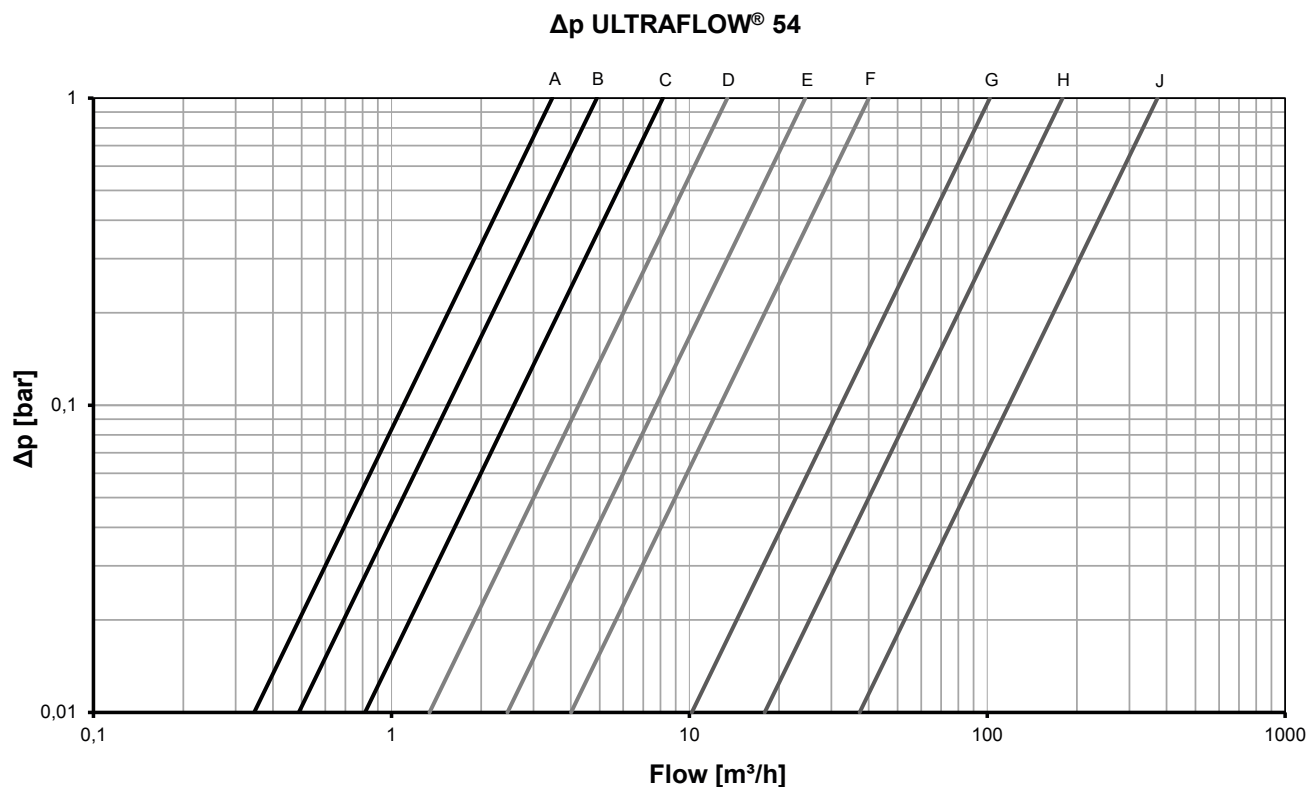
Cable Extender Box



Pressure loss

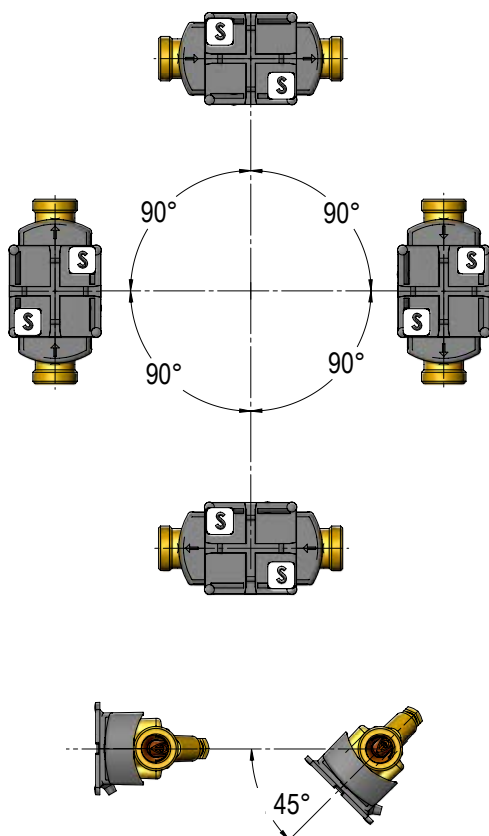
Graph	Nom. flow q_p [m³/h]	Nom. diameter [mm]	$\Delta p@q_p$ [bar]	k_v^*	$q@0.25 \text{ bar}$ [m³/h]
A	0.6	DN15/DN20	0.03	3.5	1.7
B	1.5	DN15/DN20	0.09	4.9	2.4
C	2.5	DN20	0.09	8.2	4.1
D	2.5	DN20 (Flange)	0.03	13.4	6.8
D	3.5	DN25	0.07	13.4	6.8
D	6	DN25/DN32 (Flange)	0.20	13.4	6.8
E	6	DN25/DN32	0.06	24.5	12.3
F	10	DN40	0.06	40.8	20
F	15	DN50	0.14	40.1	20
G	25	DN65	0.06	102	51
H	40	DN80	0.05	179	90
J	60	DN100	0.03	373	187
J	100	DN100/DN125	0.07	373	187

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



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 $\pm 360^\circ$ 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 types 65-5-XXCX-XXX and 65-5-XXJX-XXX 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.

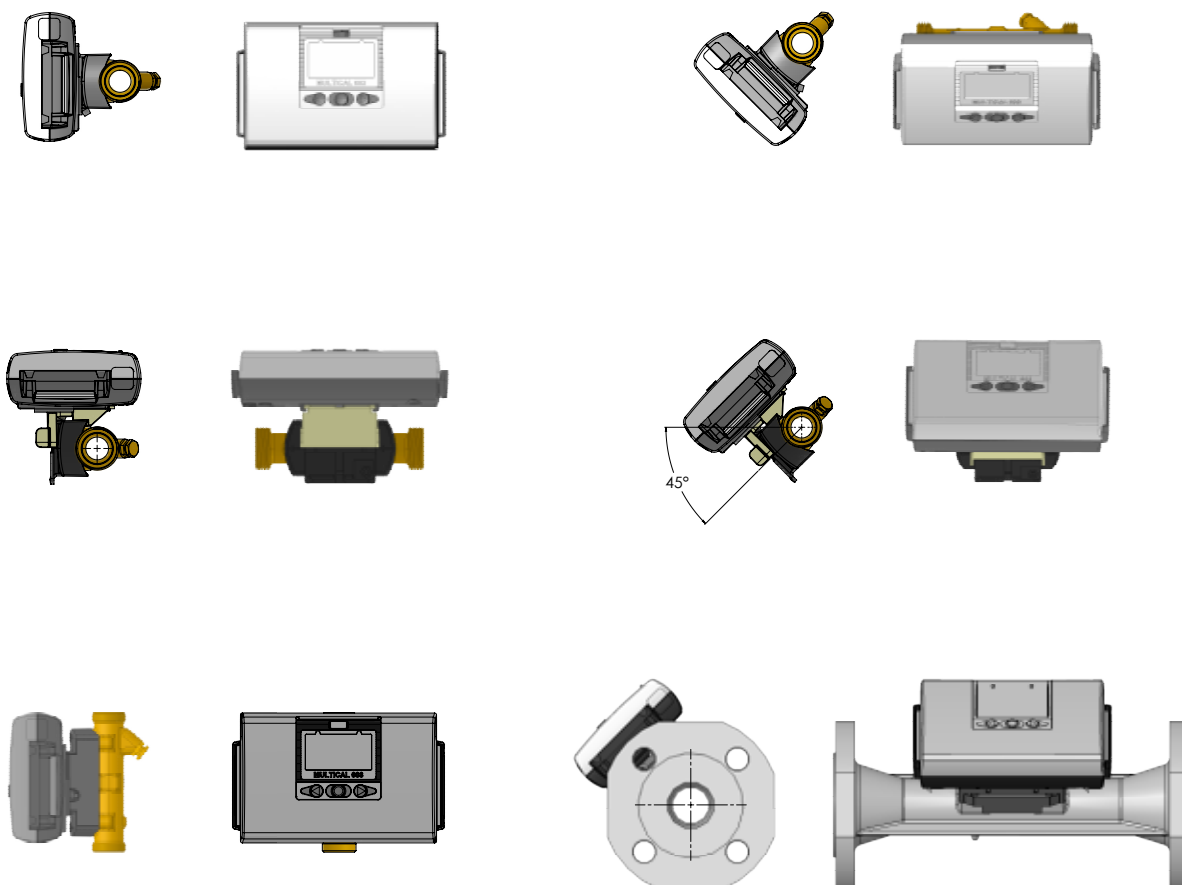
Operating pressure

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 (1.0 bar for ULTRAFLOW® 54 type 65-5-XXHX-XXX) up to q_p and min. 2.5 bar (2.0 bar for ULTRAFLOW® 54 type 65-5-XXHX-XXX) at q_s . 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

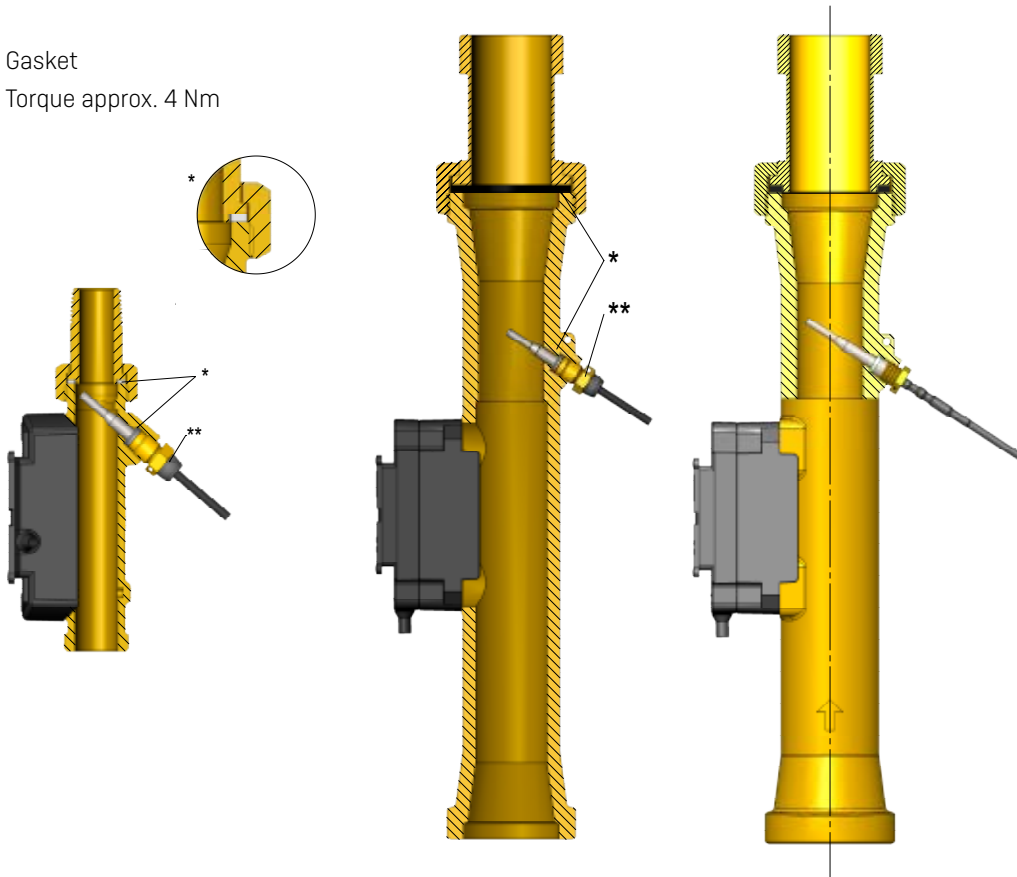
For information about insulation of ULTRAFLOW® 54, see the Technical description 5512-2464-GB, which can be downloaded from www.kamstrup.com.

Coupling and direct short sensor mounted in ULTRAFLOW® 54

A temperature sensor can be directly mounted (M10x1 connection) in the outlet of all flow sensors with threaded meter housings (q_p 0.6...10 m³/h).

* Gasket

** Torque approx. 4 Nm



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.

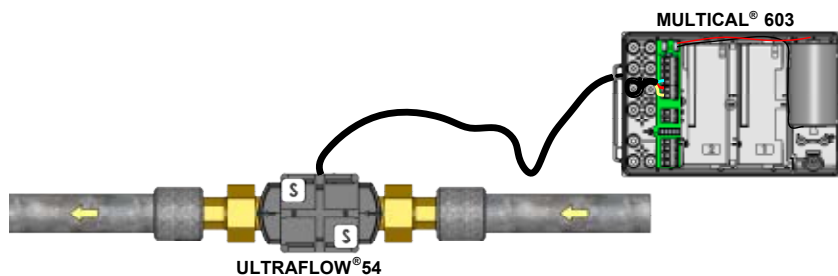
Cable Extender Box does not provide galvanic separation, but supports extended info codes.

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 [bar]	Meter factor [p/l]	Material (housing)
65-5- CAHA -XXX	0.6	0.006	1,2	G¾B (R¾)	110	16/25	300	Brass
65-5- CAHD -XXX	0.6	0.006	1,2	G1B (R¾)	130	16/25	300	Brass
65-5- CDHA -XXX	1.5	0.015	3	G¾B (R¾)	110	16/25	100	Brass
65-5- CDHC -XXX	1.5	0.015	3	G¾B (R¾)	165	16/25	100	Brass
65-5- CDHD -XXX	1.5	0.015	3	G1B (R¾)	130	16/25	100	Brass
65-5- CDHF -XXX	1.5	0.015	3	G1B (R¾)	190	16/25	100	Brass
65-5- CEHF -XXX	2.5	0.025	5	G1B (R¾)	190	16/25	60	Brass
65-5- CECA -XXX	2.5	0.025	5	DN20	190	16/25	60	Stainless steel
65-5- CGJG -XXX	3.5	0.035	7	G1¼B (R1)	260	16/25	50	Brass
65-5- CGCB -XXX	3.5	0.035	7	DN25	260	16/25	50	Stainless steel
65-5- CHJG -XXX	6	0.06	12	G1¼B (R1)	260	16/25	25	Brass
65-5- CHJH -XXX	6	0.06	12	G1¼B (R1¼)	260	16/25	25	Brass
65-5- CHCB -XXX	6	0.06	12	DN25	260	16/25	25	Stainless steel
65-5- CHCC -XXX	6	0.06	12	DN32	260	16/25	25	Stainless steel
65-5- CJJJ -XXX	10	0.1	20	G2B (R1½)	300	16/25	15	Brass
65-5- CJCD -XXX	10	0.1	20	DN40	300	16/25	15	Stainless steel
65-5- CKCE -XXX	15	0.15	30	DN50	270	16/25	10	Stainless steel
65-5- CLCG -XXX	25	0.25	50	DN65	300	16/25	6	Stainless steel
65-5- CMCH -XXX	40	0.4	80	DN80	300	16/25	5	Stainless steel
65-5- FACL -XXX	60	0.6	120	DN100	360	25	2.5	Stainless steel
65-5- FBCL -XXX	100	1	200	DN100	360	25	1.5	Stainless steel
65-5- FBCM -XXX	100	1	200	DN125	350	25	1.5	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.

Accessories

Couplings including gaskets (PN16 and PN25)

Size	Nipple	Union	Type no. (1 pc)	Type no. (2 pcs)
DN15	R½	G¾	-	6561-323
DN20	R¾	G1	-	6561-324
DN25	R1	G1¼	6561-325	-
DN32	R1¼	G1½	6561-314	-
DN40	R1½	G2	6561-315	-

Gaskets for couplings (PN16 and PN25)

Size (union)	Type no. (1 pc)
G¾	2210-061
G1	2210-062
G1¼	2210-063
G1½	2210-064
G2	2210-065

Gaskets for flanged meters (PN16 and PN25)

Size	Type no. (1 pc)
DN20	2210-147
DN25	2210-133
DN32	2210-217
DN40	2210-132
DN50	2210-099
DN65	2210-141
DN80	2210-140

Gaskets for flanged meters (PN25)

Size	Type no. (1 pc)
DN100	1150-142
DN125	1150-153

For further information about ULTRAFLOW® 54 DN15-125, see the Technical description 5512-2464, which can be downloaded from www.kamstrup.com.

Kamstrup A/S

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