kamstrup

Data sheet

ULTRAFLOW® 85
DN150-300

- Ultrasonic flow sensor (q_p 150...1000 m^3/h)
- MID approved for heat and BEK 1178 for cooling metering
- MID approved measurement of forward and reverse flow (bi-directional flow)
- Fast response for process control
- Static sensor, no moving parts and no wear
- Compact design
- Small pressure loss
- Large dynamic range
- Exceptionally accurate
- Durable

MID 2014/32/EU

CE M25 0200

EN 1434

DK-BEK 1178 – 06/11/2014

DK 268 25

EN 1434

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Description

ULTRAFLOW® 85 is a static flow sensor based on the ultrasonic measuring principle and has been designed for use in heat and cooling installations where water is used as the heat-bearing medium. It is used primarily as a subassembly of a thermal energy meter in combination with a set of TemperatureSensor 63 & 83 and the separate calculators MULTICAL® 603-S/603-U and 803-A. These types of MULTICAL® support legal measurement of bi-directional flow (forward and reverse flow) with ULTRAFLOW® 85 which can be of benefit e.g. when in some periods thermal energy is consumed and in other periods surplus thermal energy is supplied to the distribution net. In addition, it enables even shorter volume sampling intervals of down to 0.5 s which makes this fast response flow sensor particularly suitable for regulation of industrial processes. ULTRAFLOW® 85 is equipped with a display indicating the actual flow and different status messages.

Forward and reverse flow is measured using bidirectional ultrasonic technique based on the transit time method. ULTRAFLOW® 85 employs microprocessor technology. All circuits for calculating and measuring are collected on a single board, providing a compact and rational design in addition to an exceptionally high level of measuring accuracy and proven long-term stability.

A three-wire signal cable is used to connect ULTRAFLOW® 85 to a separate MULTICAL® calculator or other equipment. This cable is used to supply the flow sensor. When connected to MULTICAL® 603-S/603-U/803-A serial communication is facilitated via this cable, which enables measurement of forward and reverse flow in the field. For a correct energy calculation in the calculator, when ULTRAFLOW® 85 is measuring reverse flow, the flow sensor must be mounted in outlet next to t2 (or t3, depending on the used energy register). When connected to other equipment than MULTICAL® 603-S/603-U/803-A, volume-proportional pulses are emitted from ULTRAFLOW® 85. Measurement of reverse flow in the field is not supported in that case.

If ULTRAFLOW® 85 is used as a flow sensor for equipment different from Kamstrup MULTICAL® calculators, it must be connected through a Pulse Transmitter. If ULTRAFLOW® 85 is connected to another calculator with a different meter factor than the one supplied by ULTRAFLOW® 85, a Pulse Divider is used instead. Pulse Transmitter and Pulse Divider have a galvanically separated pulse output, a built-in supply for ULTRAFLOW® and do not support measurement of reverse flow in the field. If the distance between MULTICAL® and ULTRAFLOW® 85 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® 85. The Cable extender box does not prohibit measurement of forward and reverse flow in the field.

Compliance

Type approval

ULTRAFLOW® 85 is approved as a heat meter in accordance with MID 2014/32/EU:

EU-Type Examination certificate	DK-0200-MI004-048
MID-certified according to Module D	DK-0200-MID-D-001

CE M25 0200

ULTRAFLOW® 85 is approved as a cooling meter in accordance with DK-BEK 1178 – 06/11/2014:

System designation	TS 27.02 019
Verification	DANAK accreditation 268

DK 268 25

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

Standards and documents

EN 1434:2022
OIML R75:2002
WELMEC 7.2:2023 (May 2024)

CE-marking

ULTRAFLOW® 85 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 (category I or II)

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 installation)
– Accuracy class	2 and 3

EN 1434 designation

– Environmental class	C (high electrical and electromagnetic conditions)
– Fast response meter	Volume sampling interval (sub-assembly flow sensor) depends on connected calculator. Down to 0.5 s with MULTICAL® 603-S/603-U/803-A. Requires mains supply. Otherwise 1 s.

Technical data

Electrical data

Internal supply voltage	3.6 VDC ± 0.1 VDC
Battery Display backlight OFF (MULTICAL® or Pulse Transmitter/Pulse Divider)	3.65 VDC, D-cell lithium
Battery lifetime (replacement interval)	
– ULTRAFLOW® 85 and MULTICAL® serial mode pulse mode	 Up to 16 years @ t_{BAT} < 30 °C Up to 13 years @ t_{BAT} < 30 °C
– Pulse Transmitter/Pulse Divider	6 years @ t_{BAT} < 30 °C (Y=3)
Mains supply Display backlight ON	
– (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 capacitor 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 measurement of forward and reverse flow as well as 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 - Cable extender box - Pulse Transmitter/Pulse Divider	 IP68 IP68 IP67
Medium in flow sensor	Water – recommended water quality as in CEN TR 16911 and AGFW FW510
Medium temperature	2...150 °C or narrower range
Storage temperature (empty sensor)	-25...60 °C
Pressure stage	PN16, PS16 (DN300) PN25, PS25 or PN16, PS16 (DN150-250); see marking
Straight inlet requirement	0D (according to EN 1434:2022 and OIML R75:2002)
Installation angle	Horizontally, vertically and at an angle

At medium temperature above 120 °C ULTRAFLOW® 85 must be insulated. Do not cover the hole of the extension tube, when insulating ULTRAFLOW® 85.

Flow data

Nom. flow q_p [m³/h]	Meter factor * [p/l]	Dynamic range q_p:q_i	q_s:q_p	Flow@125 Hz [m³/h] **	Min. cut off [l/h]
150	1	100:1	2:1	450	750
250	0.6	100:1	2:1	750	1250
400	0.4	100:1	2:1	1125	2000
600	0.25	100:1	2:1	1800	3000
1000	0.15	100:1	2:1	3000	5000

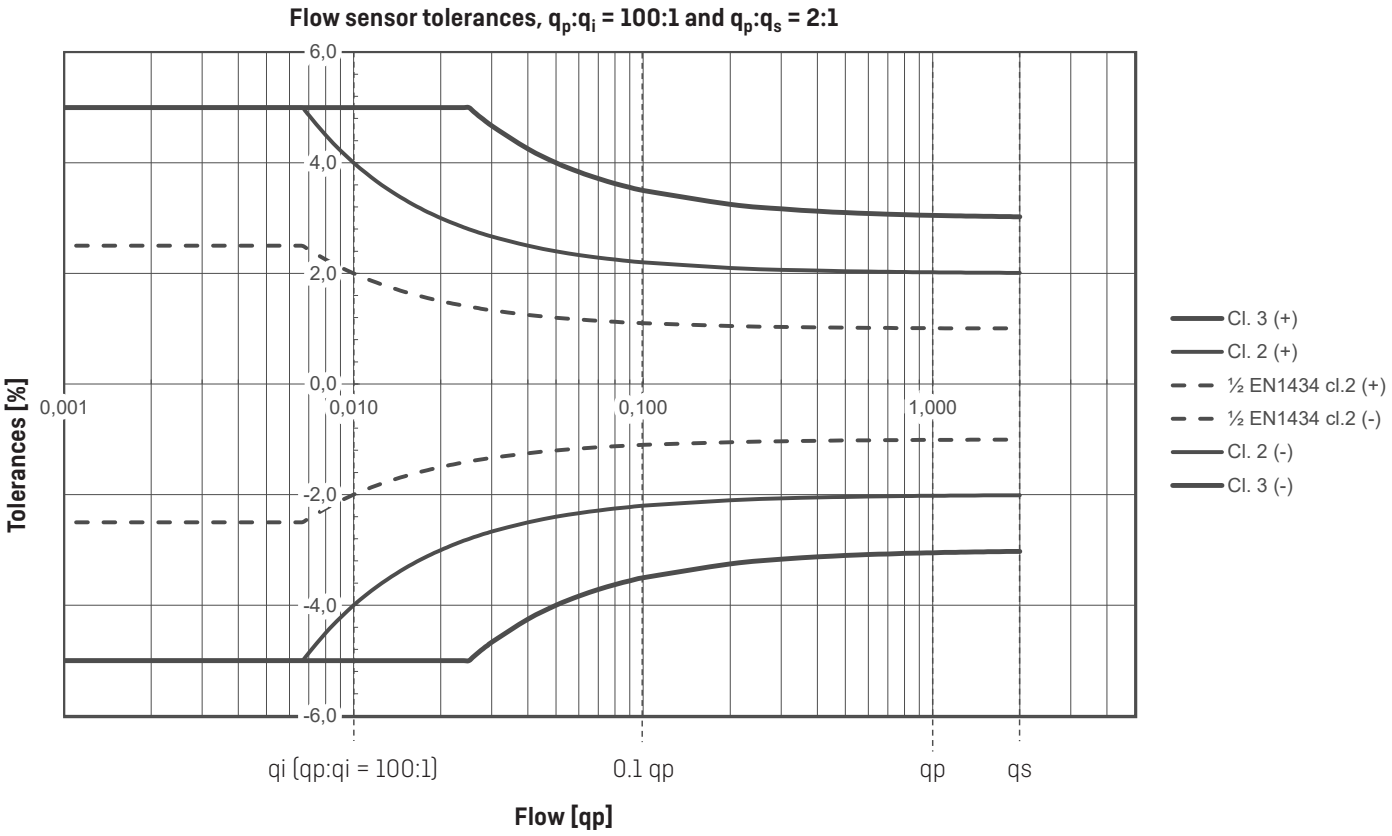
* *The meter factor appears from the type label.*

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

Measurement accuracy

Class 3	Ef = ±(3 + 0.05 q_p/q), but not above ±5 %
Class 2	Ef = ±(2 + 0.02 q_p/q), but not above ±5 %
Typical *	Ef = ±(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	Stainless steel, W.no. 1.4308
Flanges	Stainless steel, W.no. 1.4301
Transducer	Titanium
Gaskets	Fibre

Electronics box

Extension tube	Thermoplastic, 40 % glass-reinforced Polyphenylenesulfide (PPS)
Base part	Thermoplastic, 10 % glass-reinforced polycarbonate (PC)
Transparent lid	Thermoplastic, Polycarbonate (PC)
Top cover	Thermoplastic, 10 % glass-reinforced polycarbonate (PC)
Calculator mount bracket	Thermoplastic, 10 % glass-reinforced polycarbonate (PC)
Signal cable (optional)	Silicone cable (3 x 0.5 mm^2)
Power supply cable 24/230 VAC (optional for Pulse Transmitter/Pulse Divider)	Cable with PVC mantle (2 x 0.75 mm^2)

Housing, Cable Extender Box

Base, cover	Thermoplastic, acrylonitrile butadiene styrene (ABS)

Housing, Pulse Transmitter/Pulse Divider

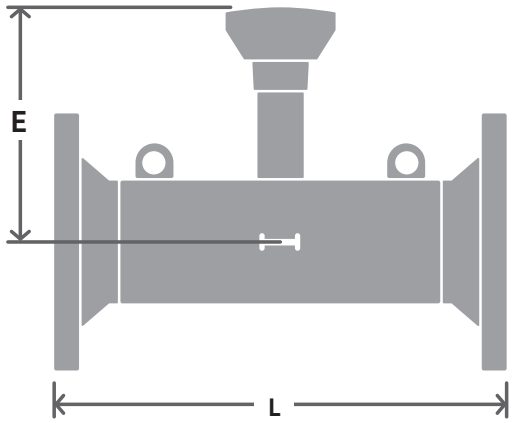
Base, cover	Thermoplastic, 10 % glass-reinforced polycarbonate (PC)

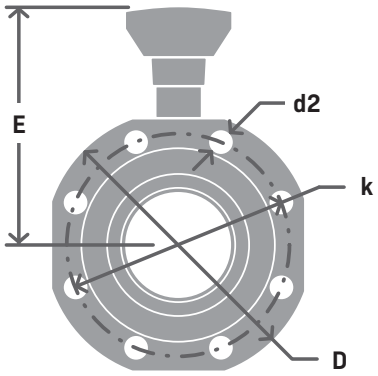
Type summary

Nom. flow q_p [m^3/h]	Installation dimensions	
150	DN150x500 mm	
250	DN150x500 mm	DN200x500 mm
400	DN200x500 mm	DN250x600 mm
600	DN250x600 mm	DN300x500 mm *
1000	DN300x500 mm *	

* *PN16 only.*

Dimensional sketches





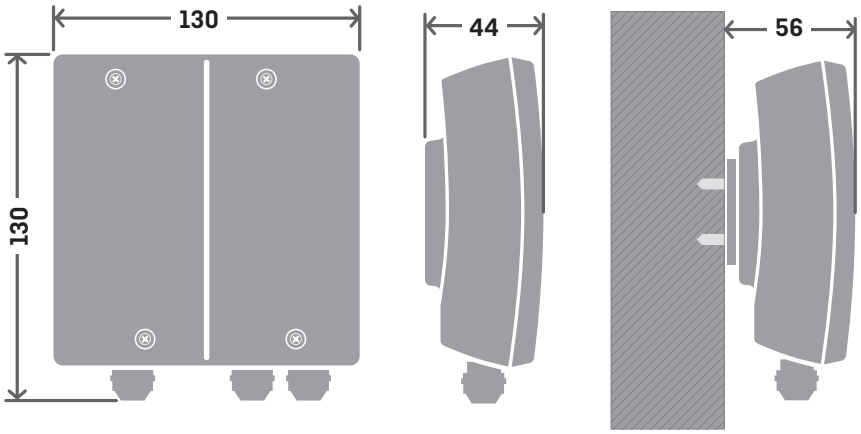
Flange facing type B, raised face according to EN 1092-1

Nom. Diameter [mm]	PN, PS	Nom. Flow qp [m³/h]	L [mm]	D [mm]	k [mm]	Bolts			E [mm]	Approx. weight [kg]
						Quantity	Thread	d2 [mm]		
DN150	16, 16	150 & 250	500	285	240	8	M20	22	264	27
DN200	16, 16	250 & 400	500	340	295	12	M20	22	281	41
DN250	16, 16	400 & 600	600	405	355	12	M24	26	341	67
DN300	16, 16	600 &1000	500	460	410	12	M24	26	370	80

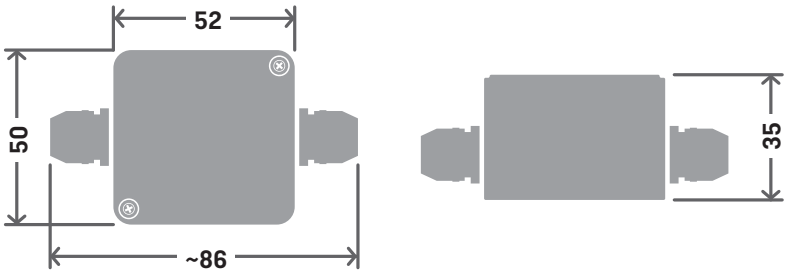
Nom. Diameter [mm]	PN, PS	Nom. Flow qp [m³/h]	L [mm]	D [mm]	k [mm]	Bolts			E [mm]	Approx. weight [kg]
						Quantity	Thread	d2 [mm]		
DN150	25, 25	150 & 250	500	300	250	8	M24	26	264	33
DN200	25, 25	250 & 400	500	360	310	12	M24	26	281	53
DN250	25, 25	400 & 600	600	425	370	12	M27	31	341	83

Dimensional sketches

Pulse Transmitter/Pulse Divider



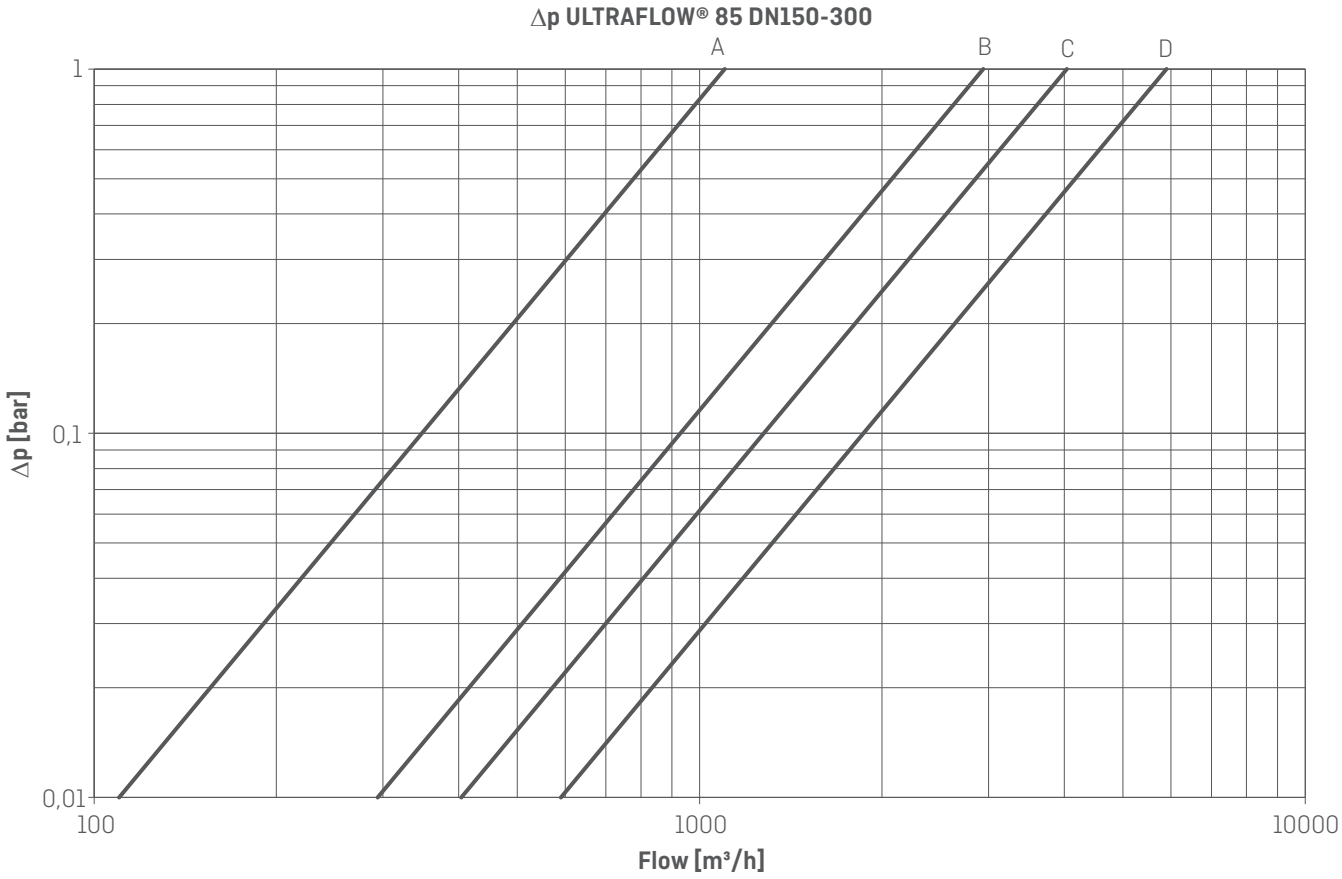
Cable Extender Box



Pressure loss

Graph	Nom. flow qp [m³/h]	Type number *	Nom. diameter [mm]	Length [mm]	Δp@qp [bar]	kv	q@0.25 bar [m³/h]
A	150 250	65-85-FCxN-XXX 65-85-FDxN-XXX	DN150	500	0.02 0.06	1100	550
B	250 400	65-85-FDxP-XXX 65-85-FExP-XXX	DN200	500	0.02 0.04	1945	973
C	400 600	65-85-FExR-XXX 65-85-FFxR-XXX	DN250	600	0.02 0.04	2940	1470
D	600 1000	65-85-FFDS-XXX 65-85-FGDS-XXX	DN300	500	0.01 0.03	5900	2950

* *XXX - code for final assembly, approvals etc. - determined by Kamstrup. A few variants may not be available in national approvals. x = C (PN25) or x = D (PN16).*



Installation

⚠ Please read this chapter carefully before installing the meter.

In case of incorrect mounting, Kamstrup's guarantee obligations no longer apply.

By connecting to 230 V supply, there is a risk of electric shock.

When working on the flow sensor in the installation, there is a risk of outflow of (hot) water under pressure.

At a media temperature higher than 60 °C, the flow sensor should be shielded from unintended contact.

Prior to installation of the flow sensor, the system should be flushed.

Correct flow sensor position (inlet or outlet) appears from the front marking of MULTICAL®. The forward flow direction is indicated by an arrow on the flow sensor.

⚠ ULTRAFLOW® 85 may be lifted in the lifting rings only.

Pressure stage: PN16, PS16 or PN25, PS25. See marking on flange or label

Temperature of medium: 2...150 °C or narrower range. See marking on label.

Mechanical environment: M1 and M2 (fixed installation with minimum vibration and fixed installation with considerable or high vibration level respectively).

Electromagnetic environment: E1 and E2 (housing/light industry and industry respectively).

The meter's signal cables must be drawn at min. 25 cm distance to other installations.

Ambient conditions: The ambient temperature must be within 5...55 °C. Installation must be in closed locations (indoors).

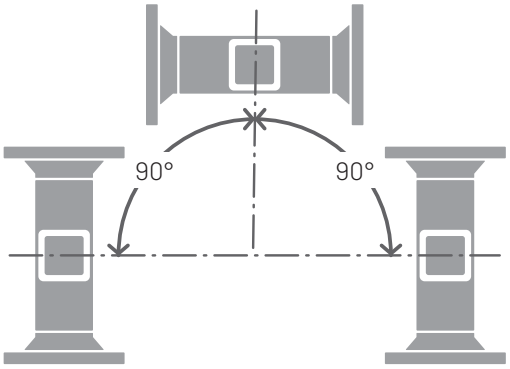
Protection class: IP68 – The flow sensor is durable, even in permanently wet conditions.

Insulation: ULTRAFLOW® 85 can be insulated. At medium temperature above 120 °C ULTRAFLOW® 85 must be insulated. For details see Insulation manual FILE100005249, which can be downloaded from www.kamstrup.com.

Maintenance and repair: The flow sensor is verified separately and can, therefore, be separated from the calculator. It is permitted to replace the transparent lid and the 3-wire cable from ULTRAFLOW® 85 on-site. Other repairs must be performed in a workshop and requires subsequent reverification in an accredited laboratory.

Installation angle of ULTRAFLOW® 85

ULTRAFLOW® 85 can be installed horizontally, vertically, or at an angle.



ULTRAFLOW® 85 is typically oriented horizontally. In that case, the electronics box should also be oriented horizontally, i. e. pointing to the side, to achieve optimum metrological performance.

The ultrasound paths in the flow sensor tube will thus be vertical, which is optimal in connection with possible stratification of the medium. To minimize possible stratification at minimum flow, insulation of ULTRAFLOW® 85 and in particular of the pipes around (before and after the flow sensor) is recommended.

When the installation has been completed, water flow can be turned on. The valve on the inlet side must be opened first.

Straight inlet ULTRAFLOW® 85

ULTRAFLOW® 85 requires neither straight inlet nor outlet in order to fulfil the Measuring Instruments Directive (MID) 2014/32/EU and EN 1434. Only in case of heavy flow disturbances before the meter will a straight inlet section be necessary. We recommend following the guidelines in CEN TR 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 at q_p and min. 2.5 bar at q_s. This applies to temperatures up to approx. 80 °C.

Electrical connection

Connecting via Pulse Transmitter/Pulse Divider/Cable Extender Box

ULTRAFLOW® 85	->	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 and bi-directional flow measurement.

Cable Extender Box does not provide galvanic separation, but supports extended info codes and does not prohibit bi-directional flow measurement.

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 e.g. the Technical description UF54 DN15-125 (FILE100001282), which can be downloaded from www.kamstrup.com.

ULTRAFLOW® 85 is preferentially mains supplied e.g. via MULTICAL® 603-S/-U to achieve e.g. the highest volume sampling frequency.

In case of battery supply the battery lifetime depends on many parameters like e.g. data communication, integration mode and environmental temperature. For further information, see the technical documentation of the connected MULTICAL® calculator.

ULTRAFLOW® 85	→	MULTICAL®		
11	→	11	GND	(Blue)
9	→	9	+ 3.6 V	(Red)
10	→	10	⎍⎍⎍	(Yellow)

Connection to calculator

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.

Type numbers of ULTRAFLOW® 85

Type number*	qp [m³/h]	qi [m³/h]	qs [m³/h]	Dynamic range q_p:q_i	Connection [mm]	PN, PS [bar]	Length [mm]
65-85-FCCN-XXX	150	1.5	300	100:1	DN150	25, 25	500
65-85-FDCN-XXX	250	2.5	500	100:1	DN150	25, 25	500
65-85-FDCP-XXX	250	2.5	500	100:1	DN200	25, 25	500
65-85-FECP-XXX	400	4	800	100:1	DN200	25, 25	500
65-85-FECR-XXX	400	4	800	100:1	DN250	25, 25	600
65-85-FFCR-XXX	600	6	1200	100:1	DN250	25, 25	600
65-85-FCDN-XXX	150	1.5	300	100:1	DN150	16, 16	500
65-85-FDDN-XXX	250	2.5	500	100:1	DN150	16, 16	500
65-85-FDDP-XXX	250	2.5	500	100:1	DN200	16, 16	500
65-85-FEDP-XXX	400	4	800	100:1	DN200	16, 16	500
65-85-FEDR-XXX	400	4	800	100:1	DN250	16, 16	600
65-85-FFDR-XXX	600	6	1200	100:1	DN250	16, 16	600
65-85-FFDS-XXX	600	6	1200	100:1	DN300	16, 16	500
65-85-FGDS-XXX	1000	10	2000	100:1	DN300	16, 16	500

* *XXX - code for final assembly, approvals etc. - determined by Kamstrup.*

Accessories

Description	Type number
Gasket, DN150 PN16 (1 pc.)	1150-214
Gasket, DN200 PN16 (1 pc.)	1150-215
Gasket, DN250 PN16 (1 pc.)	1150-216
Gasket, DN300 PN16 (1 pc.)	1150-164
Gasket, DN150 PN25 (1 pc.)	1150-140
Gasket, DN200 PN25 (1 pc.)	1150-139
Gasket, DN250 PN25 (1 pc)	1150-141
2.5 m silicone cable (3-wire)	5000-333
5 m silicone cable (3-wire)	5000-259
10 m silicone cable (3-wire)	5000-270
Bracket for MULTICAL® 603	3026-1392
Cable Extender Box	66-99-036
Pulse Transmitter	66-99-903-YZ-XXX
Pulse Divider	66-99-907-YZ-XXX

Cables

ULTRAFLOW® 85 DN150-300, when ordered with MULTICAL® 603, is delivered with 2.5 m signal cable, optionally 5 or 10 m. The cable is mounted in the ULTRAFLOW® 85 electronics box and in MULTICAL® 603.

When ULTRAFLOW® 85 is ordered with MULTICAL® 803, the calculator is delivered in a separate box. Hence the cable is only mounted in the ULTRAFLOW® 85 electronics box.

ULTRAFLOW® 85 DN150-300, when ordered as a separate flow sensor, is also optionally available with signal cable in lengths of 2.5, 5 or 10 m. If selected, the cable is mounted in the flow sensor's electronics box.

If ULTRAFLOW® 85 is ordered together with Pulse Transmitter or Pulse Divider, the cable with length of 2.5 m, 5 m or 10 m is mounted between flow sensor and Pulse Transmitter/ Pulse Divider.

If Pulse Transmitter or Pulse Divider are ordered separately, a cable with length of 2.5 m, 5 m or 10 m can be mounted on demand by factory in the output of Pulse Transmitter/ Pulse Divider.

Cable extender box is delivered in all cases in a separate packaging without cable.

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