
Ultrasonic flow sensor
ULTRAHEAT® T150 (2WR7...)
For connecting external calculators

Landis+Gyr+
manage energy better

ULTRAHEAT® T150 (2WR7...)



Technical description

32 15 101 001 e
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Landis+Gyr GmbH

Outstanding Features

The flow sensor is used with a calculator for measurement of heat or cooling consumption in systems with water.

Important properties are:

- Non-wearing due to non-moving parts
 - Measuring range of 1:100 according EN1434:2007, 1:1.000 total range
 - No settling sections or flow straighteners
 - Battery operated for 5 or 9 years
 - Optical interface according EN 61107
 - Pulse output, adjustable
 - Automatic data storage on yearly set day and for 36 months
 - Self-diagnosis
-

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1 General notes

The flow sensor is used with a calculator for measurement of heat or cooling consumption in systems with water.

The flow sensor consists of a metal measurement unit and an associated electronic unit. These two components are affixed with each other by cable.

Other available documentations

- Operating and Installation Instructions T150 (2WR7...)
- Illustrated catalogue

Additional information is available on request.

2 Safety information



The flow sensor may only be used in building service engineering systems and only for the applications described.



The local regulations (installation etc.) must be adhered to.



Adhere to the operating conditions according to the dial plate during use. Non-adherence can cause hazards and the warranty will expire.



Adhere to the requirements regarding circulating water (CEN / TR 16911:2016).



The flow sensor is only suitable for circulating water in heating systems.



The flow sensor is not suitable for drinking water.



Do not lift the flow sensor by the electronic unit.



Be aware of sharp points on the thread, flange and measuring tube.



Only personnel, trained in the installation and operation of meters in heat and cooling systems, may install and remove the flow sensor.



Only install or remove the flow sensor when the pipes are pressure-less.



After installing the flow sensor, check the leak-tightness of the system.



Warranty and calibration validity will lapse if the calibration relevant security seal is broken.



Only clean the flow sensor from outside with a soft, lightly wetted cloth. Do not use any spirit or cleaning solvent.



As far as disposal is concerned, the flow sensor is a waste electronic appliance in the sense of European Directive 2012/19/EU and it must not be disposed of as domestic waste. The relevant national, legal regulations must be observed as the appliance must be disposed of via the channels provided for this purpose. The local and currently valid legislation must be observed.



The flow sensor contains lithium batteries. Do not dispose of the flow sensor and the batteries with domestic waste. Observe the local stipulations and laws on disposal.



You can return the lithium batteries to the manufacturer for appropriate disposal following use. When shipping please observe legal regulations, in particular, those governing the labelling and packaging of hazardous goods.



Do not open the batteries. Do not bring batteries into contact with water or expose to temperatures above 80 °C.



The flow sensor does not have any lightning protection. Ensure lightning protection via the in-house installation.

3 Technical data

General

Measuring accuracy	Class 2 or 3 (EN 1434)
Environment class	A (EN 1434) for indoor installation
Mechanical class	M1 *)
Electromagnetic class	E1 *)
*) according to 2014/32/EU Directive on Measuring Instruments	
Ambient humidity	< 93 % rel. humidity at 25 °C, without condensation
Maximal height	2000 m above sea level
Storage temperature	-20 ... 60 °C

Electronic unit

Ambient temperature	5 ... 55 °C
Housing protection rating	IP 54 according to EN 60529
Power supply	Battery for 5 or 9 years
Optical interface	Standard, EN 62056-21
Separability	Always, optional cable length

Pulse output

Type	Open drain
Dielectric strength	500 V _{eff} against ground, galvanic insulated
Pulse significance	Optional
Pulse length	Optional
Pulse sequence	In packages every 0.5 s (not equally spaced)
Cable length	2 m
Voltage	Maximum 30 V
Current	Maximum 30 mA
Voltage drop	< 0.3 V at 10 mA
Polarity	bipolar
Maximum pulse output frequency	10 Hz

Volume measurement unit

Protection class	IP 54 / IP 65 / IP 68 according to EN 60529
Installation position	Any
Flow straightening	None
Measuring range	1:100 or 1:50
Temperature range	5 ... 130 °C
Recommended...	National type approvals may be different.
...heat application	10 ... 130 °C
...cooling application	5 ... 50 °C
Maximum temperature	150 °C for 2000 h
Maximum overload	2.8 × qp
Nominal pressure	PN16 (PS16), PN25 (PS25)

Nominal flowrate q_p	Overall length	Connection	Maximum flowrate q_s	Minimum flowrate q_i	Response threshold (variable)	Pressure loss at q_p	Kv flowrate at Δp 1 bar	Kv flowrate at Δp 100 mbar	Weight
m ³ /h	mm	G/DN	m ³ /h	l/h	l/h	mbar	m ³ /h	m ³ /h	kg
0.6	110	G 3/4	1.2	6	2.4	150	1.5	0.5	1
0.6	190	G1	1.2	6	2.4	150	1.5	0.5	1.5
0.6	190	DN20	1.2	6	2.4	150	1.5	0.5	3
1.5	110	G 3/4	3	15	6	150	3.9	1.2	1
1.5	130	G1	3	15	6	160	3.8	1.2	1.5
1.5	190	G1	3	15	6	160	3.8	1.2	1.5
1.5	190	DN20	3	15	6	160	3.8	1.2	3
2.5	130	G1	5	25	10	200	5.6	1.8	1.5
2.5	190	G1	5	25	10	210	5.3	1.7	1.5
2.5	190	DN20	5	25	10	210	5.3	1.7	3
3.5	260	G 1 1/4	7	35	14	60	14	4.5	3
3.5	260	DN25	7	35	14	60	14	4.5	5
6	150	G 1 1/4	12	60	24	240	12	3.9	3
6	260	G 1 1/4	12	60	24	180	14	4.5	3
6	260	DN25	12	60	24	180	14	4.5	5
10	200	G2	20	100	40	130	28	8.8	2.6
10	300	G2	20	100	40	110	30	9.5	4
10	300	DN40	20	100	40	130	28	8.8	7
15	200	DN50	30	150	60	95	49	15.4	5
15	270	DN50	30	150	60	110	45	14.3	8
25	300	DN65	50	250	100	105	77	24.4	11
40	300	DN80	80	400	160	160	100	31.6	13
60	360	DN100	120	600	240	115	177	56.0	22
150	500	DN150	300	1500	600	120	433	136.9	50*)

*) Measurement insert 4 kg

Tolerance of pressure loss: +/- 5%

Small flow sensors

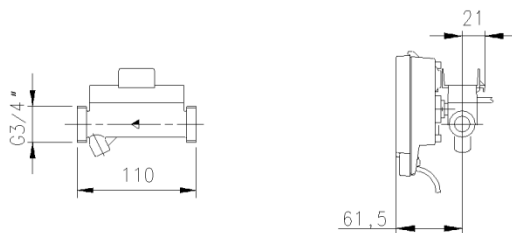


Fig. 1

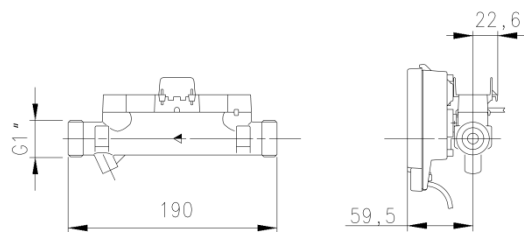


Fig. 2

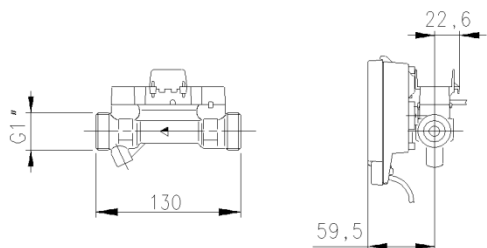


Fig. 3

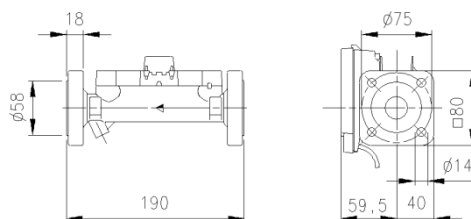


Fig. 4

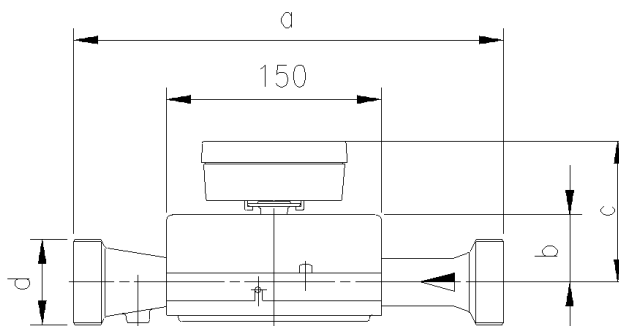


Fig. 5

Order-No.	qp	PN	a	b	c	d
	m ³ /h					
2WR7 45	3.5	16	260	59	96	G 1¼ B
2WR7 50	6	16	260	59	96	G 1¼ B
2WR7 55	6	16	150	59	63	G 1¼ B
2WR7 63	10	16	200	59	93	G 2 B
2WR7 60	10	16	300	59	93	G 2 B

Large flow sensors with flange

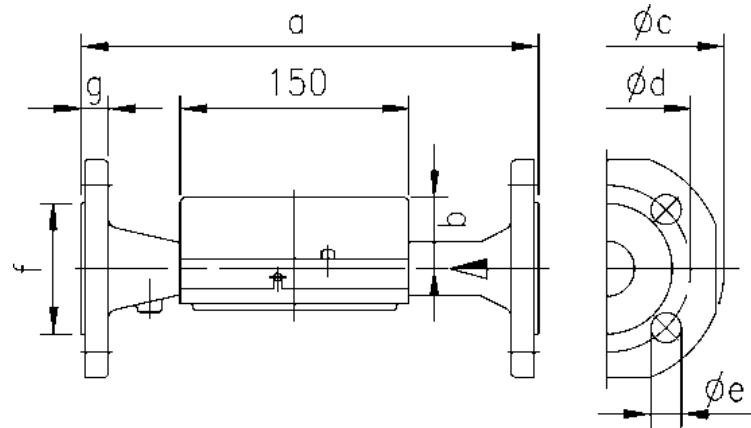


Fig. 6: Overview dimensions of large flow sensors with flange

Order-No.	qp	PN	DN	a	b	Øc	Ød	Øe	No. of holes	f	g
	m ³ /h										
2WR7 46	3.5	25	25	260	59	112	85	14	4	60	19
2WR7 52	6	25	25	260	59	112	85	14	4	60	19
2WR7 61	10	25	40	300	59	140	110	18	4	90	19
2WR7 65	15	25	50	270	59	155	125	18	4	102	20
2WR7 69	15	25	50	200	59	155	125	18	4	102	20
2WR7 70	25	25	65	300	52	185	145	18	8	122	22
2WR7 74	40	25	80	300	56	200	160	18	8	138	24
2WR7 82	60	16	100	360	68	235	180	18	8	158	24
2WR7 83	60	25	100	360	68	235	190	22	8	158	24

Large flow sensors qp 150

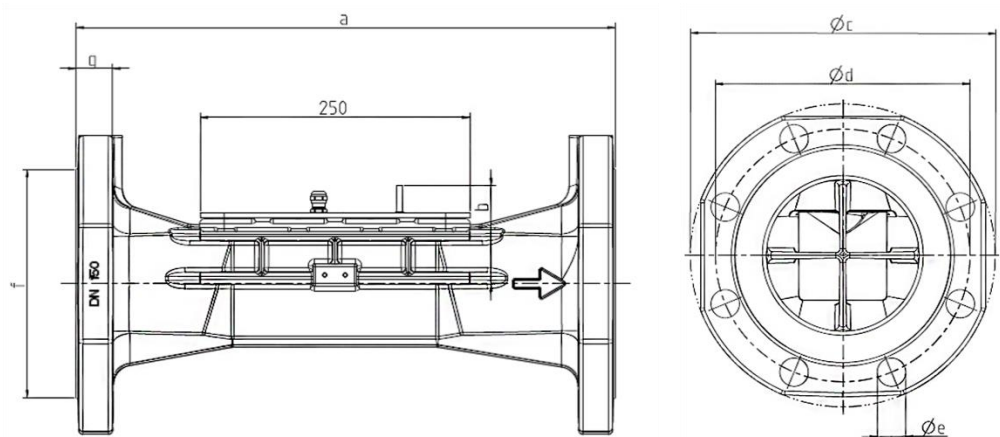


Fig. 7: Overview all dimensions of large flow sensor qp 150

Order-No.	qp	PN	DN	a	b	Øc	Ød	Øe	No. of holes	f	g
	m ³ /h										
2WR7 A1	150	16	150	500	91	300	240	23	8	211	31
2WR7 A2	150	25	150	500	91	300	250	28	8	211	31

4 Installation

To install the flow sensor proceed as follows:

- Observe the dimensions of the flow sensor and check whether there is sufficient space available.
- Rinse the system thoroughly before installing the flow sensor.
- Fit the flow sensor vertically or horizontally between two slide valves so that the arrow on the housing and the flow direction match. Also observe the installation situations and the following examples of installation.
- Seal the fittings to protect against manipulation.
- Loosen the elastic band or the cable tie, provided for the transport, from the volume measurement unit. In operation, the control cable should not depend directly on the volume measurement unit.
- If you install the flow sensor for cooling metering, follow the appropriate notes.

Recommendation: If you are installing more flow sensors in one unit, make sure that all the flow sensors operate under the same mounting conditions.

Installation Notes



Note: When installing the flow sensor the locally applicable installation regulation for flow sensor must be observed.

Inlet or outlet sections are not necessary. If you install the flow sensor in the common return of two circuits, determine a place of installation with a minimum distance of $10 \times \text{DN}$ from the T-piece. This distance ensures a good thorough mixing of the different water temperatures.

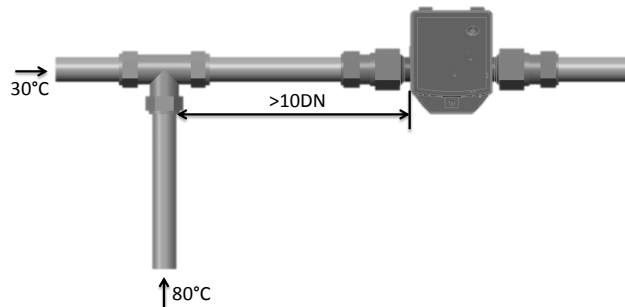


Fig. 8: Mixture of different return temperatures

Examples of installation

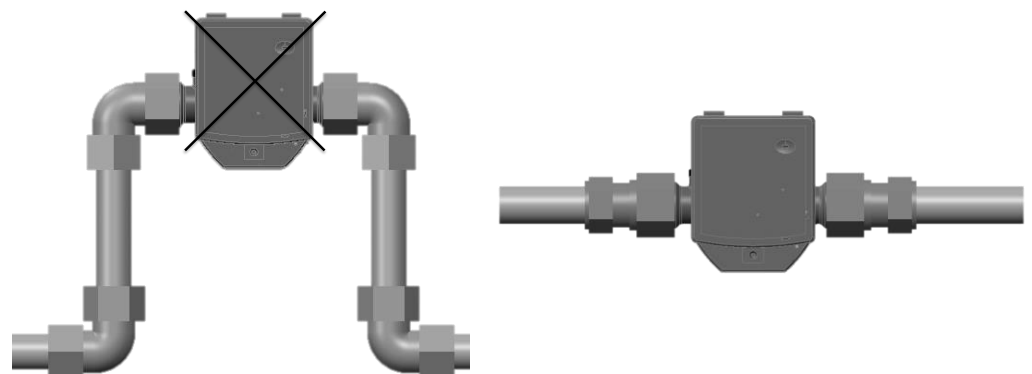


Fig. 9: Avoid accumulation of air

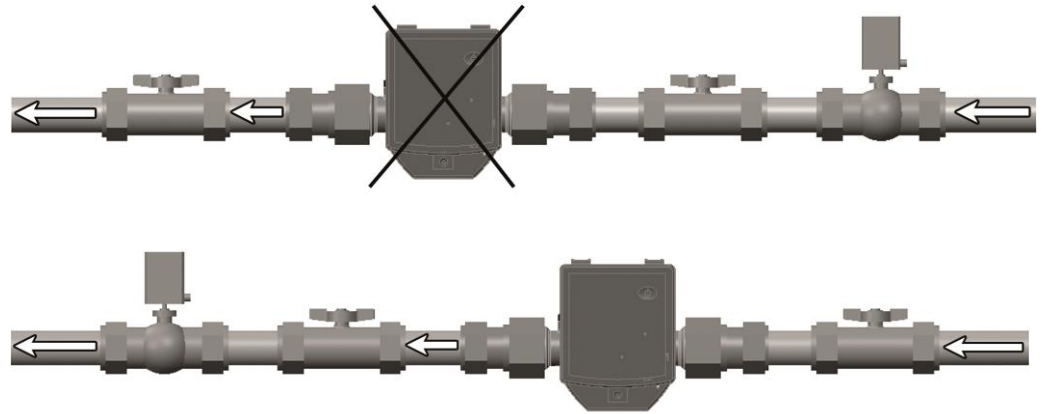


Fig. 10: Mount a valve or a regulator after the flow sensor



Note: During installation it must be ensured that no water can enter the electronic unit during operation.

Installation for cooling metering



Note: It is recommended that the flow sensor installed on the hot side.

When installing as a cooling meter it is essential that the black cover on the measuring tube is pointed to the side or downwards in order to avoid problems with condensation forming.

Fit the electronic unit separate to the volume measurement tube, e.g. on the wall. Make a loop downwards in order to prevent condensation running along the connected lines into the electronic unit.

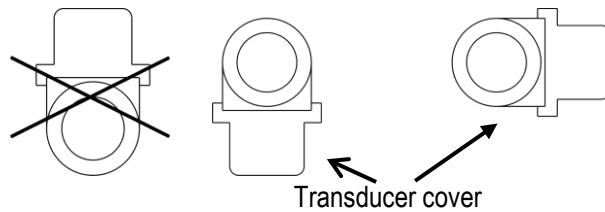


Fig. 11: Recommended installation position for cooling metering

Installation of qp 150



Note: Use flange bolts with a length of at least 100 mm to install the flanged body in the pipeline.

As an assembly aid two M10 threads are mounted on the flange. The threads allow the use of stainless steel eye bolts, for example, for a lifting device.



Note: The measurement insert in the flanged body should be positioned on the top.

5 Dimension of electronic unit

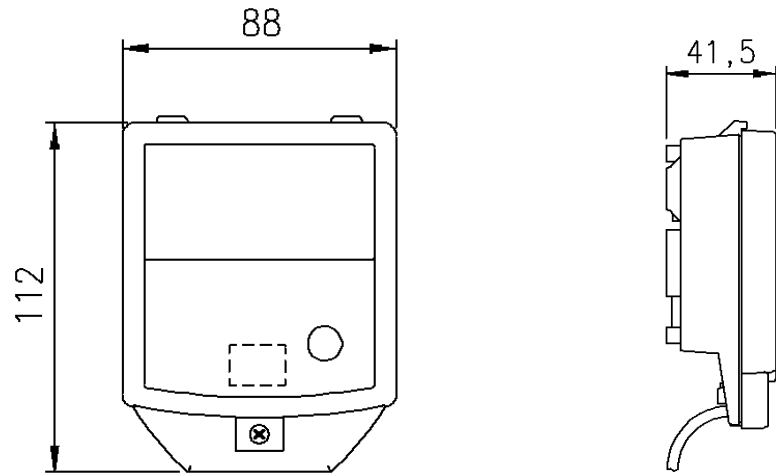


Fig. 12: Dimensions of electronic unit

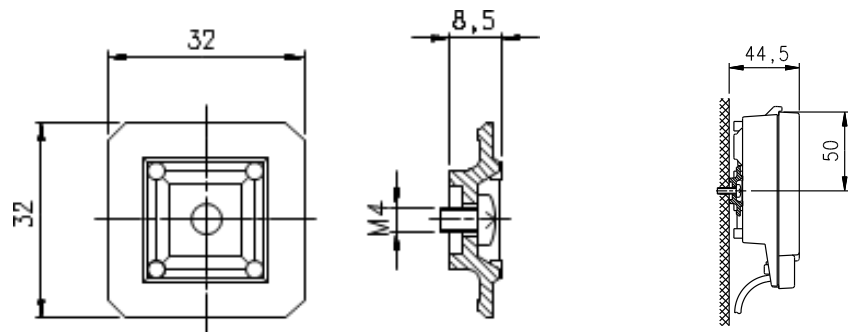


Fig. 13: Plan view and cross section of adapter plate

6 Functional details

The flow sensor is equipped with an optical interface in accordance with EN 62056-21 as standard.

Volume readings, maximum flow rates and missing hours are stored monthly for 36 months.

The operating hours are counted from the first connection of the power supply.

Missing hours are summated if there is an error and the flow sensor is thus unable to take a measurement.

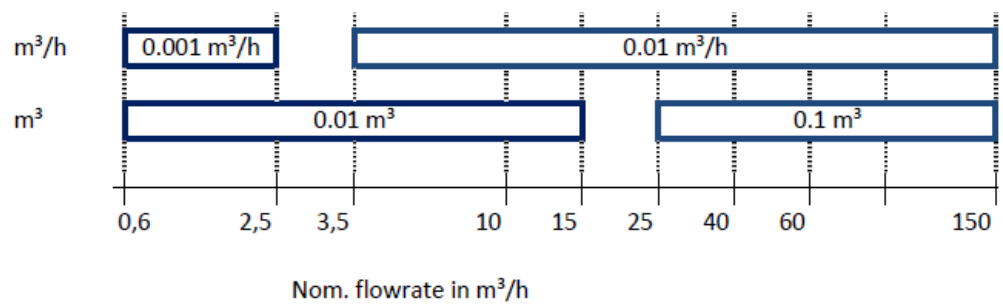
Operating hours and missing hours can be reset through the service software.



Note: Detailed information's on resetting operating hours and missing hours with the service software you will find in the UltraAssist user manual.

The device number and the firmware version number are issued by the manufacturer.

7 Resolution of stored values



Note: The number of place after the decimal point of a value is based on the nominal flow rate qp.

8 Power supply

The flow sensor can be supplied with a 5 or 9 years battery. Battery is replaceable at any time.

Options:

- 5 years battery
- 9 years battery



Note: The lifetime of battery depends on the type of battery and on the requirements.



Note: Only batteries approved by the manufacturer may be installed.

9 Pulse output

Pulse output	
Type	Open drain
Dielectric strength	500 V _{eff} against ground, galvanic insulated
Pulse significance	Optional
Pulse length	Optional
Pulse sequence	In packages every 0.5 s (not equally spaced)
Cable length	2 m
Voltage	Maximum 30 V
Current	Maximum 30 mA
Voltage drop	< 0.3 V at 10 mA
Polarity	bipolar
Maximum pulse output frequent	10 Hz

Table of standard settings for pulses dependent on the nominal flow rate

qp m³/h	Significance liter/pulse	pulse length ms
0.6	0.1	10
1.5	0.1	10
2.5	1	10
3.5	1	10
6	1	10
10	1	10
15	1	10
25	10	10
40	10	10
60	10	10
150	10	10



Note: These standard settings for pulses can be changed with the service software UltraAssist at the service level. This level is accessible below a service seal after removal of the cover.



Note: If pulse parameters have been changed the dial plate has to be amended, too!

Pulse cable length

The maximum length of the pulse cable depends on

- the pulse length,
- the electrical properties of the cable used (capacity)
- of the attached calculator input circuit (Ri).

Example:

Two wire cable (2 x 0.75 mm²) and Ri = 1000 kOhm, pulse duration of 10 ms
 → L_{max} = ca. 100 m, for Ri = 1 MOhm: L_{max} = ca. 10 m



Note: Additional restrictions on the part of the calculator need to be observed!

10 Additional options

Options:

- Flow sensor for cooling application
 - Length of the control cable between measurement tube and electronic unit up to 3 m
 - Flow measurement part is available also in IP 65
-

11 Order codes (type number key)

Type code:	2	W	R	7	5	6	7	-	8	9	10	11	12	-	13	14	15	16
Nominal flowrate																		
Integration																		
Sensor type																		
Control cable / type / electronic unit																		
Power supply																		
Communication interface																		
Manufacturer's label																		
Country / where used																		
Data output																		
Calibration / conformity																		

Order codes for label plate data	
Nominal flowrate	Code
Nominal flowrate 0.6 m ³ /h, length 110 mm, nominal pressure PN16, connection G ¾ B	05
Nominal flowrate 0.6 m ³ /h, length 110 mm, nominal pressure PN25, connection G ¾ B	06
Nominal flowrate 0.6 m ³ /h, length 190 mm, nominal pressure PN16, connection G 1 B	07
Nominal flowrate 0.6 m ³ /h, length 190 mm, nominal pressure PN25, connection flanged DN 20	08
Nominal flowrate 0.6 m ³ /h, length 190 mm, nominal pressure PN25, connection G 1 B	09
Nominal flowrate 1.5 m ³ /h, length 110 mm, nominal pressure PN16, connection G ¾ B	21
Nominal flowrate 1.5 m ³ /h, length 110 mm, nominal pressure PN25, connection G ¾ B	22
Nominal flowrate 1.5 m ³ /h, length 190 mm, nominal pressure PN16, connection G 1 B	23
Nominal flowrate 1.5 m ³ /h, length 190 mm, nominal pressure PN25, connection flanged DN 20	24
Nominal flowrate 1.5 m ³ /h, length 190 mm, nominal pressure PN25, connection G 1 B	25
Nominal flowrate 1.5 m ³ /h, length 130 mm, nominal pressure PN16, connection G 1	26
Nominal flowrate 1.5 m ³ /h, length 130 mm, nominal pressure PN25, connection G 1	27
Nominal flowrate 2.5 m ³ /h, length 130 mm, nominal pressure PN16, connection G 1 B	36
Nominal flowrate 2.5 m ³ /h, length 130 mm, nominal pressure PN25, connection G 1 B	37
Nominal flowrate 2.5 m ³ /h, length 190 mm, nominal pressure PN16, connection G 1 B	38
Nominal flowrate 2.5 m ³ /h, length 190 mm, nominal pressure PN25, connection flanged DN 20	39
Nominal flowrate 2.5 m ³ /h, length 190 mm, nominal pressure PN25, connection G 1 B	40
Nominal flowrate 3.5 m ³ /h, length 260 mm, nominal pressure PN16, connection G 1 ¼ B	45
Nominal flowrate 3.5 m ³ /h, length 260 mm, nominal pressure PN25, connection flanged DN 25	46
Nominal flowrate 3.5 m ³ /h, length 260 mm, nominal pressure PN25, connection G 1 ¼ B	47
Nominal flowrate 6.0 m ³ /h, length 260 mm, nominal pressure PN16, connection G 1 ¼ B	50
Nominal flowrate 6.0 m ³ /h, length 260 mm, nominal pressure PN25, connection flanged DN 25	52
Nominal flowrate 6.0 m ³ /h, length 150 mm, nominal pressure PN16, connection G 1 ¼ B	55

Nominal flowrate 10 m ³ /h, length 300 mm, nominal pressure PN16, connection G 2 B	60
Nominal flowrate 10 m ³ /h, length 300 mm, nominal pressure PN25, connection flanged DN 40	61
Nominal flowrate 10 m ³ /h, length 200 mm, nominal pressure PN16, connection G 2 B	63
Nominal flowrate 15 m ³ /h, length 270 mm, nominal pressure PN25, connection flanged DN 50	65
Nominal flowrate 15 m ³ /h, length 200 mm, nominal pressure PN25, connection flanged DN 50	69
Nominal flowrate 25 m ³ /h, length 300 mm, nominal pressure PN25, connection flanged DN 65	70
Nominal flowrate 40 m ³ /h, length 300 mm, nominal pressure PN25, connection flanged DN 80	74
Nominal flowrate 60 m ³ /h, length 360 mm, nominal pressure PN16, connection flanged DN 100	82
Nominal flowrate 60 m ³ /h, length 360 mm, nominal pressure PN25, connection flanged DN 100	83
Nominal flowrate 150 m ³ /h, length 500 mm, nominal pressure PN16, connection DN 150	A1
Nominal flowrate 150 m ³ /h, length 500 mm, nominal pressure PN25, connection DN 150	A2
Measurement insert: Nominal flowrate 150 m ³ /h, length 500 mm, nominal pressure PN16, connection DN 150	A3
Measurement insert: Nominal flowrate 150 m ³ /h, length 500 mm, nominal pressure PN25, connection DN 150	A4
Integration	Code
As a flow sensor with removable housing	D
Sensor type	Code
Without temperature sensors	8 F
Control cable / type / electronic unit	Code
Compact version (until 90 °C, with 0.3 m control cable)	A
Split version with 1.5 m control cable	C
Split version with 3.0 m control cable	D
Power supply	Code
Without power supply	0
Battery for 9 years (C-cell)	2
Battery for 5 years (2 AA-cells)	B
Battery for 5 years (C-cell)	C
Battery for 7 years (C-cell)	D
Communication interface	Code
With bipolar pulse output, especially for battery driven calculators / collectors, 2m cable;	C

Manufacturer's label	Code
Logo Landis+Gyr	0
Logo neutral	C
Other labels on request	xx
Country / language	Code
Dial plate for Germany (German)	A
Dial plate for Sweden (Swedish)	C
Dial plate for Austria (German)	D
Dial plate for Denmark (Danish)	F
Dial plate for Czech Republic (Czech)	G
Dial plate for Ukraine (Ukrainian)	N
Dial plate for Romania (Romanian)	R
Dial plate English neutral	T
Dial plate for Slovak Republic (Slovakian)	U
Dial plate for Belgium (French/Flemish)	Z*
Dial plate for Kazakhstan (Russian)	Z*
Dial plate for Belarus (Russian)	Z*
Dial plate for Lithuania (Lithuanian)	Z*
Dial plate for Armenia (Armenian)	Z*
Dial plate for Russia (Russian)	Z*
Dial plate for Uzbekistan (Russian)	Z*
Data output	Code
Pulse parameters according to default table	M
Other parameters on request	xx
Calibration / conformity	Code

Tested according to CEN 1434 class 3, with lock mark	2
Certified according to CEN 1434 class 3 **)	3
Tested according to CEN 1434 class 2, with lock mark	4
Certified according to CEN 1434 class 2	5
Tested according to national regulations (not CEN), without lock mark	6
Tested according to CEN 1434 class 3, without lock mark	7
Tested according to CEN 1434 class 2, without lock mark	8
Conform according to MID class 2	S
Conform according to MID class 3	R

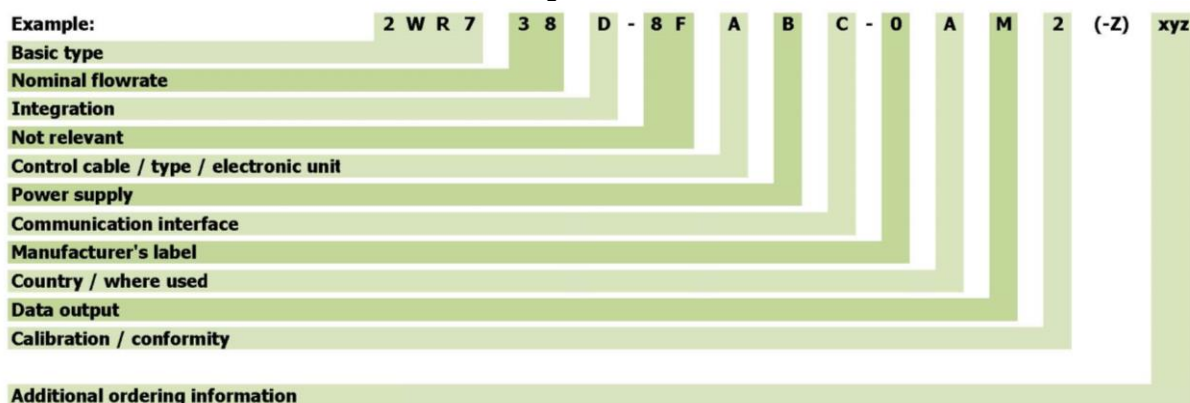
*) Additional ordering information needed (see page 21)

***) Certified acc. to CEN applies only to Germany and Russia

12 Additional ordering information

For the exact definition of special sensor versions additional ordering information may be necessary.

The structure of the ordering code is then as follows:



Example for a special dial plate (Russia)

2WR7XXY-XXYXY-XYXY **P7B**

Variants of the sensor via special sensor versions

Condition in the type code	Description	Code
14th digit is Z	Dial plate for Kazakhstan (Russian)	P3A
14th digit is Z	Dial plate for Belarus (Russian)	P4A
14th digit is Z	Dial plate for Lithuania (Lithuanian)	P7A
14th digit is Z	Dial plate for Armenia (Armenian)	P5B
14th digit is Z	Dial plate for Russia (Russian)	P7B
14th digit is Z	Dial plate for Uzbekistan (Russian)	P8B
16th digit is 9	Tested according to CEN 1434 class 3, lock mark, with test report	R2P
16th digit is 9	Certified according to CEN 1434 class 3 with test report	R3P
16th digit is 9	Tested according to CEN 1434 class 2, lock mark, with test report	R4P
16th digit is 9	Certified according to CEN 1434 class 2 with test report	R5P
16th digit is 9	Tested according to national regulations with test report	R6P
16th digit is 9	Tested according to CEN 1434 class 3 with test report	R7P
16th digit is 9	Tested according to CEN 1434 class 2 with test report	R8P
16th digit is 9	Tested according to MID class 2 with test report	RSP
16th digit is 9	Tested according to MID class 3 with test report	RRP

Variants of the sensor via additional ordering information

Variants of the sensor	Suppl. text with (-Z...)
Flow measurement part in IP65	W02
For cooling metering, flow measurement part in IP65	K00

13 Pressure loss

Nominal flowrate qp	Overall length	Connection	Pressure loss at qp	Kv-Factor at Δp 1 bar	Graph in diagram
m ³ /h	mm		mbar	m ³ /h	
0,6	110, 190	G 3/4, G 1, DN20	150	1,5	A
1,5	130, 190	G 1, DN20	160	3,8	B
1,5	110	G 3/4	150	3,9	C
2,5	190	G 1, DN20	210	5,3	D
2,5	130	G 1	200	5,6	E
3,5	260	G 1 1/4, DN25	55	15	G
6	150	G 1 1/4	190	14	F
6	260	G 1 1/4, DN25	140	16	H
10	200, 300	G 2, DN40	130	28	I
10	300	G 2	110	30	J
15	270	DN50	110	45	K
15	200	DN50	95	49	L
25	300	DN65	105	77	M
40	300	DN80	160	100	N
60	360	DN100	115	177	O
150	500	DN150	120	433	P

The indicated pressure loss of a flow sensor is at the nominal flowrate qp. Using the Kv-Factor, which defines the flow rate at a pressure loss of 1 bar, the pressure loss at any given flow rate can be calculated:

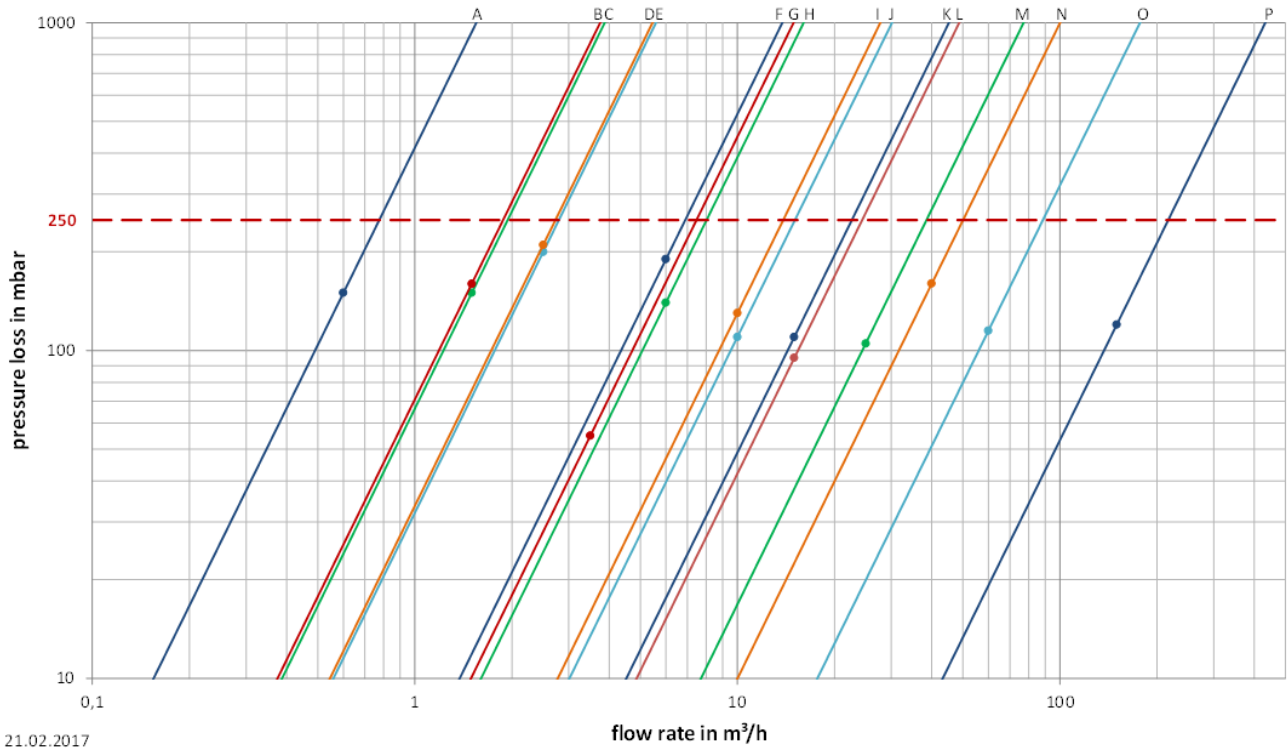
$$\Delta p = 1 \text{ bar} \times \left(\frac{Q}{K_v} \right)^2$$

$\Delta p =$ pressure loss in bar

$Q =$ flowrate in m³/h

$K_v =$ Kv – Factor at Δp = 1 bar

Alternatively, the value can be taken from the diagram.



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