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Harmonized standards applied: LST EN 1434-1:2016, LST EN 1434-2:2016, LST EN 1434-4:2016, LST EN 1434-5:2016.

Additionally documents applied:
WELMEC 7.2 – Software guide (Issue 6).

The measuring instrument shall meet the following specifications:

1 Design of the instrument

1.1 Construction

Ultrasonic flow sensor for heat meter QALCOSONIC F2 designed for measuring of volume of the heat-conveying liquid in heating system and conversion it into electrical pulse signal. It is used in conjunction with the type approved heating energy calculator.

The flow sensor consists of the brass measuring section with built-in ultrasonic transducers and electronic unit, which can be mounted either directly on the measuring section or separately. For flow sensors having relative diameters from DN65 to DN100 measuring section can be made from either brass (cast) or steel (welded construction). The measuring section is inseparably connected with the electronic unit via 1,2 m length screened cable (2,5 m or 5 m – optional). For welded construction measuring sections two cables are used.

The flow sensor is powered by 3,6 V DC lithium battery either remote 12 V to 42 V DC or 12 V to 36 V AC power source.



Fig.1. Flow sensor QALCOSONIC F2 (measuring section and electronic unit)



Fig.2. Electronic unit of the flow sensor

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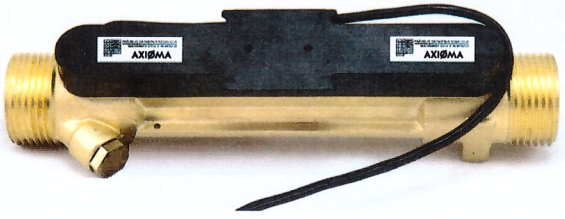
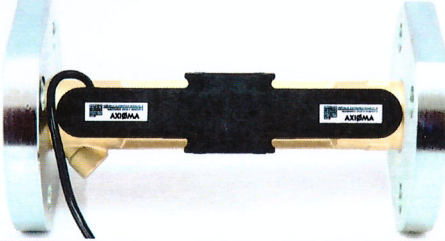

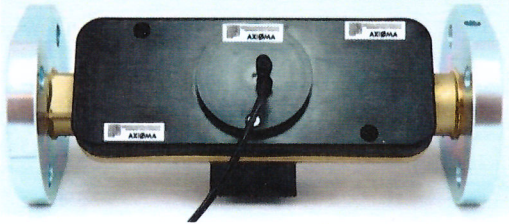
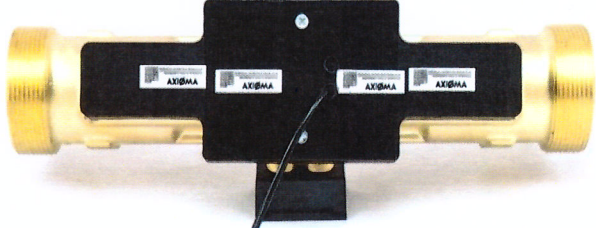
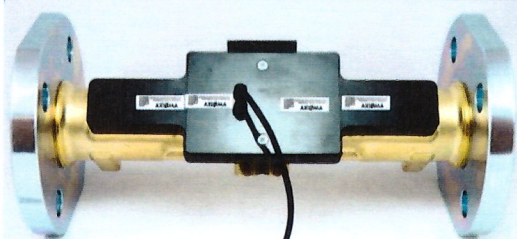
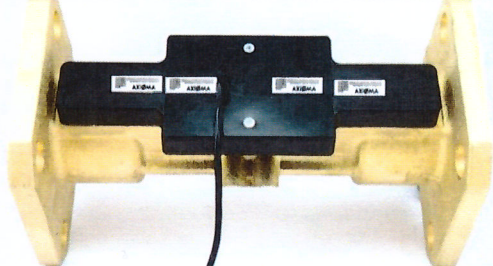
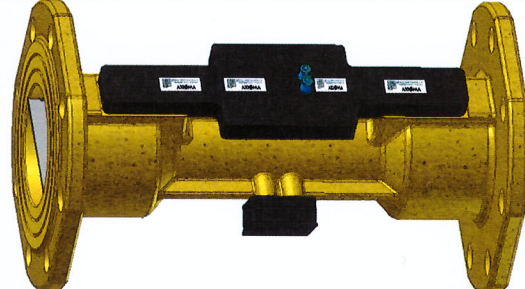

	
a) Measuring section of the flow sensor QALCOSONIC F2 $q_p = 0,6/1,0/1,5/2,5 \text{ m}^3/\text{h}$ with threaded end connections G $\frac{3}{4}$ B or G 1 B	b) Measuring section of the flow sensor QALCOSONIC F2 $q_p = 0,6/1,0/1,5/2,5 \text{ m}^3/\text{h}$ with flanged end connections DN20
	
c) Measuring section of the flow sensor QALCOSONIC F2 $q_p = 3,5/6 \text{ m}^3/\text{h}$ with threaded end connections G $1\frac{1}{4}$ B	d) Measuring section of the flow sensor QALCOSONIC F2 $q_p = 3,5/6 \text{ m}^3/\text{h}$ with flanged end connections DN25 or DN32
	
e) Measuring section of the flow sensor QALCOSONIC F2 $q_p = 10 \text{ m}^3/\text{h}$ with threaded end connections G 2 B	f) Measuring section of the flow sensor QALCOSONIC F2 $q_p = 10 \text{ m}^3/\text{h}$ with flanged end connections DN40
	
g) Measuring section of the flow sensor QALCOSONIC F2 $q_p = 15 \text{ m}^3/\text{h}$ with flanged end connections DN50	h) Measuring section of the flow sensor QALCOSONIC F2 $q_p = 25/40/60 \text{ m}^3/\text{h}$ with flanged end connections (DN65/DN80/DN100), brass body
	
i) Measuring section of the flow sensor QALCOSONIC F2 $q_p = 25/40/60 \text{ m}^3/\text{h}$ with flanged end connections (DN65/DN80/DN100), steel body	

Fig.3. Measuring section of the flow sensor QALCOSONIC F2

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Structure of type number combination of the flow sensor QALCASONIC F2

QALCASONIC F2 - 1 1 1 - NM - 1

Type

Ratio of the flow rates q_p/q_i :

	Code
100	1
250 (with the exceptions of sensors $q_p = 0,6 \text{ m}^3/\text{h}$; $1,0 \text{ m}^3/\text{h}$; $3,5 \text{ m}^3/\text{h}$)	2

Technical data of the flow sensor:

Permanent flow-rate $q_p, \text{m}^3/\text{h}$	Overall length, mm	End connections	Code
0,6	110	G 3/4	1
1,0	110	G 3/4	2
1,5	110	G 3/4	3
1,5	165	G 3/4	N
1,5	130	G1	M
2,5	130	G1	4
3,5	260	G 1 1/4	5
6,0	260	G 1 1/4	6
10,0	300	G 2	7
10,0	300	DN40	8
15,0	270	DN50	9
3,5	260	DN25	A
6,0	260	DN25	B
0,6	190	G 1	C
1,0	190	G 1	D
1,5	190	G 1	E
2,5	190	G 1	F
0,6	190	DN20	G
1,0	190	DN20	H
1,5	190	DN20	K
2,5	190	DN20	L
3,5	260	DN32	O
6,0	260	DN32	P
25	300	DN65	R
40	350	DN80	S
40	300	DN80	U
60	350	DN100	T
60	360	DN100	V

Length of the connection cable between measuring section and electronic unit:

Cable length	Code
1,2 m	1
2,5 m	2
5 m	3

Pulse value of the flow sensor $N \times 10^{-M}, \text{m}^3/\text{pulse}$

- where N- possible number 1 to 9, M – possible number 1 to 6.

Power supply:

	Code
Internal battery	1
24 V AC/DC remote power supply	2

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1.2 Measurand sensor

Ultrasonic flow sensor.

1.3 Measurand processing

Volume measurement is made by means of bi-directional ultrasonic technique according to the transit time method. Measured volume of heat-conveying liquid is converted into the pulses quantity (litre/pulse) that is transferred in output pulse terminal.

1.4 Indication of the measurement results

None.

Output signal (litre/pulse) is transferred to the connected heat meter calculator.

1.5 Optional equipment and functions subject to MID requirements

None.

1.6 Technical documentation

Ultrasonic flow sensor QALCOSONIC F2 – Technical description, user manual, passport: PLF2V02, 20-11-2017.

Other reference documents on which basis this certificate is issued, are stored in a file Nr.LEI-12-MP-070.17.

1.7 Integrated equipment and functions not subject to MID

The flow sensor can be used also as a sub-assembly for cooling meter under rated operating conditions, listed in section 2.1.

2 Technical data

2.1 Rated operating conditions

2.1.1 Measurand

Quantity of a heat-conveying liquid, which has passed through the flow sensor, is transferred in the form of pulse volume (litre/pulse).

2.1.2 Measurement range

The technical data of the flow sensor are presented in table 1:

Table 1

End connections	Flow-rate, m ³ /h			Overall length, mm
	Permanent q_p	Maximum q_s	Minimum q_i	
1	2	3	4	5
G 3/4	0,6	1,2	0,006	110
G 1 or DN20	0,6	1,2	0,006	190
G 3/4	1,0	2,0	0,010	110
G 1 or DN20	1,0	2,0	0,01	190
G 3/4	1,5	3,0	0,006	110; 165

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End connections	Flow-rate, m ³ /h			Overall length, mm
	Permanent q_p	Maximum q_s	Minimum q_i	
1	2	3	4	5
G 1 or DN20	1,5	3,0	0,006	190
G ¾	1,5	3,0	0,015	110; 165
G 1 or DN20	1,5	3,0	0,015	190
G 1	1,5	3,0	0,015	130
G 1	2,5	5,0	0,01	130
G 1 or DN20	2,5	5,0	0,01	190
G 1	2,5	5,0	0,025	130
G 1 or DN20	2,5	5,0	0,025	190
G 1¼ or DN25 or DN32	3,5	7,0	0,035	260
G 1¼ or DN25 or DN32	6,0	12,0	0,024	260
G 1¼ or DN25 or DN32	6,0	12,0	0,06	260
G 2 or DN40	10,0	20,0	0,04	300
G 2 or DN40	10,0	20,0	0,10	300
DN50	15,0	30,0	0,06	270
DN50	15,0	30,0	0,15	270
DN65	25,0	50,0	0,10	300
DN65	25,0	50,0	0,25	300
DN80	40,0	80,0	0,16	300; 350
DN80	40,0	80,0	0,40	300; 350
DN100	60,0	120,0	0,24	350; 360
DN100	60,0	120,0	0,60	350; 360

Temperature limits of heat conveying liquid :

- when electronic unit is mounted directly on the measuring section : Θ_q : 5 °C to 90 °C;
- when electronic unit is mounted separately : Θ_q : 5 °C to 130 °C.

2.1.3 Accuracy class

Accuracy class : 2 according to LST EN 1434-1.

2.1.4 Environmental conditions / Influence quantities

Ambient temperature : 5 °C to 55 °C;
Humidity level : condensing;
Installations : indoor;
Mechanical environment : class M1;
Electromagnetic environment : class E2.

2.1.5 Maximum admissible working pressure

The maximum admissible working pressure/nominal pressure (PS/PN) of flow sensor is 16 bar or 25 bar.

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2.1.6 Mounting position of the flow sensor

Flow sensor can be mounted either horizontally or vertically.

3 Interfaces and compatibility conditions

Pulse output. Class of pulse output device - OD according to LST EN 1434-2.

The minimum admissible pulse values on pulse output device are specified in table 2:

Table 2

Permanent flow-rate q_p , m ³ /h	0,6/1,0/1,5	2,5	3,5	6/10/15	25	40	60
Pulse value, litre/pulse	0,01	0,02	0,05	0,1	0,2	0,5	1

4 Requirements on production, putting into use and utilization

4.1 Requirements on production

At the end of the manufacturing and adjustment process the flow sensors shall be tested according to the requirements of the LST EN 1434-5. Errors of indication of the flow sensors shall not exceed the maximum permissible errors, , described in Annex VI (MI-004) of Directive 2014/32/EU.

The flow sensors can be tested with cold water (25 ± 5) °C.

4.2 Requirements on putting into use

The flow sensor must be installed and used in accordance with the requirements of document listed in section 1.6.

For flow sensors with nominal diameter DN65 to DN100 necessary straight pipelines lengths are: upstream $\geq 5 \times DN$, downstream $\geq 3 \times DN$. For flow sensors of other sizes the straight pipelines installation in upstream and downstream the sensor are not necessary.

4.3 Requirements for utilization

No special requirements identified.

5 Control of the measuring process after tasks of the instrument in use

5.1 Documentation of the procedure

None.

5.2 Special equipment or software

No special requirements identified.

5.3 Identification of hardware and software

Identification of hardware:

- see Fig.1, Fig.2, Fig.3 and Fig. 4 of this appendix.

Identification of software: version number of the software is **1.00**. This number shall be marked on the label of flow sensor (SW:1.00).

5.4 Calibration-adjustment procedure

Flow sensor errors determination test shall be carried out when TEST mode is activated as described in section 7 of the document noted in section 1.6 of the present appendix. Two middle contacts in the terminal block under cover of the electronic unit have to be closed using the jumper (Fig. 4).

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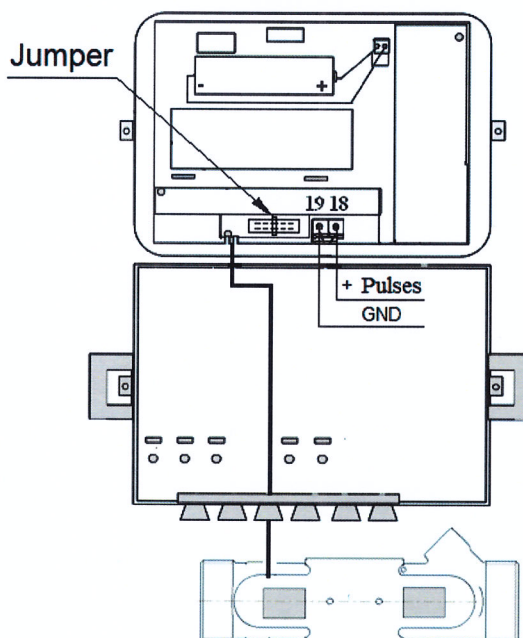


Fig. 4. Activation of the TEST mode

The flow sensor measurement error should be evaluated at the controls flow rates specified in the section 6.2 of the LST EN 1434-5. Pulse output of the flow sensor is used (terminals 18 and 19). The volume pulse value in TEST mode is presented in table 3.

Table 3

Permanent flow-rate q_p , of the flow sensor , m ³ /h	Volume pulse value in TEST mode, litre/pulse
0,6/1,0	0,002
1,5	0,004
2,5	0,005
3,5/6	0,02
10/15/25	0,05
40/60	0,2

6 Security measures

6.1 Sealing

The following sealing of the electronic unit is provided:

- manufacturer adhesive seal - sticker on the access to the adjustment activation jumper (Fig.5, pos.1) and on the fixer of the cover protecting electronics wiring plate (Fig.5, pos.2);
- after installation the case and cover of the electronic unit (Fig.5, pos.3) are sealed with two hanged seals of heat supplier.

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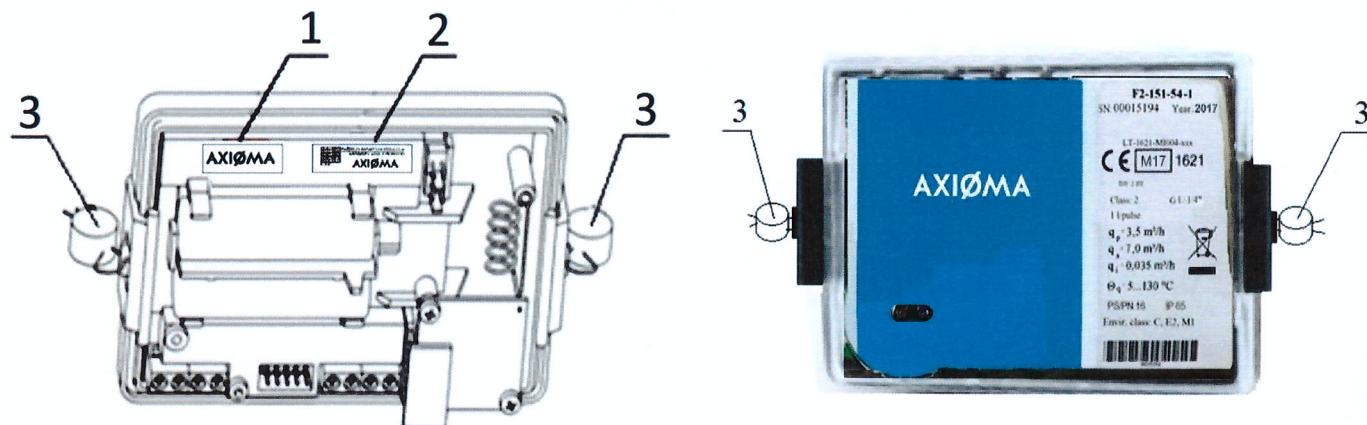


Fig.5. Sealing of the electronic unit of the flow sensor

The following measuring section sealing is provided:

- manufacturer's adhesive seal - sticker on the bolts of the cover (Fig.6, Fig.7, Fig.8);
- manufacturer's hanged seals on ultrasonic transducers for flow sensors with steel body (Fig. 9).

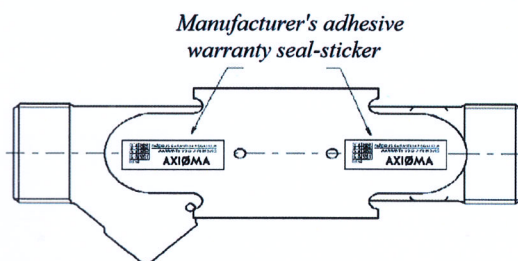


Fig. 6. Sealing of measuring section of the flow sensor
 $q_p = 0,6/1,0/1,5/2,5 \text{ m}^3/\text{h}$

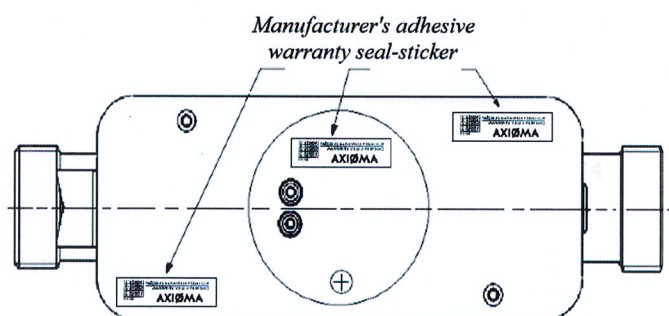


Fig. 7. Sealing of measuring section of the flow sensor
 $q_p = 3,5/6 \text{ m}^3/\text{h}$

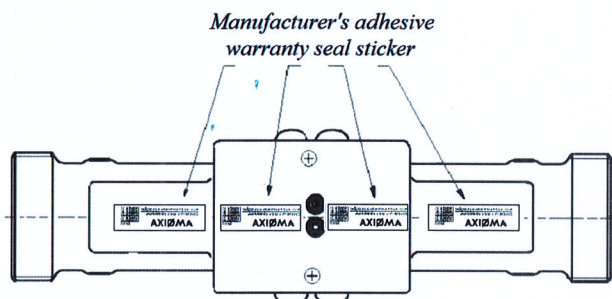


Fig. 8. Sealing of measuring section of the flow sensor
 $q_p = 10/15/25/40/60 \text{ m}^3/\text{h}$ (brass body)

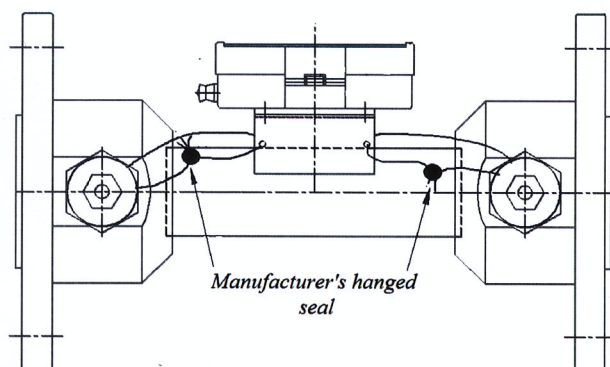
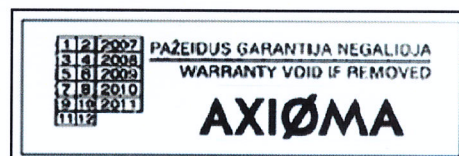


Fig. 9. Sealing of measuring section of the flow sensor
 $q_p = 25/40/60 \text{ m}^3/\text{h}$ (steel body)

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a) Manufacturer's adhesive
seal-sticker



b) Manufacturer's adhesive
warranty seal-sticker



c) Manufacturer's hanged seal

Fig.10. Examples of the manufacturer's adhesive seal-stickers

6.2 Data logger

Not applicable.

7 Marking and inscriptions

7.1 Information to be borne by and to accompany the measuring instrument

At least the following information shall appear on the casing of the electronic unit and his label:

- EU-type examination certificate number (LT-1621-MI004-021 rev. 1);
- manufacturer's mark or name;
- type designation and type number;
- year of manufacture and serial number;
- limits of heat conveying liquid temperature;
- meter factor (pulse value of volume);
- limits of flow-rate: maximum q_s , permanent q_p and minimum q_i ;
- the maximum admissible working pressure/nominal pressure (PS/PN);
- accuracy class;
- voltage level for external power supply;
- climatic class;
- electromagnetic class;
- mechanical class.
- version number of the software.

Additional metal label is attached to the flow sensor DN65/DN80/DN10 steel measuring section.
On the label is the following information:

- nominal diameter DN of the measuring section;
- serial number;
- year of manufacture;
- manufacturer's mark or name;
- arrow to indicate the direction of the flow.

Arrow to indicate the direction of the flow shall appear on flow sensor brass body.

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7.2 Conformity marking

In addition, the label of electronic unit of the flow sensor should contain the following marking:

- „CE” marking;
- metrology marking, consisting of the capital letter „M” and the last two digits of the year of its affixing, surrounded by a rectangle;
- identification number of the notified body, which carried out the conformity assessment.

8 List of the drawings attached to the certificate.

Drawings are not added.

9 Certificate history

Issue	Date and reference No.	Description																												
LT-1621-MI004-021	24-02-2016, No. LEI-12-MP-038.15	Type examination certificate first issued																												
LT-1621-MI004-021 Revision 1	14-02-2018, No. LEI-12-MP-070.17	<p>1. Manufacturer's name AB „Axis Industries” changed by name UAB „Axioma LEZ”.</p> <p>2. The name of the flow sensor type from QALCASONIC FLOW 2 changed by QALCASONIC F2.</p> <p>3. On the sensor electronic unit, type designation QALCASONIC F2 changed by manufacturer's brand AXIOMA.</p> <p>4. Measuring section of the flow sensor has been supplemented with the following modifications:</p> <table><tr><th rowspan="2">End connections</th><th colspan="3">Fow-rate, m³/h</th><th rowspan="2">Overall length, mm</th></tr><tr><th>Permanent q_p</th><th>Maximum q_s</th><th>Minimum q_i</th></tr><tr><td>DN80</td><td>40</td><td>80</td><td>0,16</td><td>300</td></tr><tr><td>DN80</td><td>40</td><td>80</td><td>0,40</td><td>300</td></tr><tr><td>DN100</td><td>60</td><td>120</td><td>0,24</td><td>360</td></tr><tr><td>DN100</td><td>60</td><td>120</td><td>0,60</td><td>360</td></tr></table> <p>5. The document PLSF2V01, issued 01-2016, has been replaced by the document PLF2V02, issued 20-11-2017.</p>	End connections	Fow-rate, m³/h			Overall length, mm	Permanent q_p	Maximum q_s	Minimum q_i	DN80	40	80	0,16	300	DN80	40	80	0,40	300	DN100	60	120	0,24	360	DN100	60	120	0,60	360
End connections	Fow-rate, m³/h			Overall length, mm																										
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DN100	60	120	0,24	360																										
DN100	60	120	0,60	360																										

