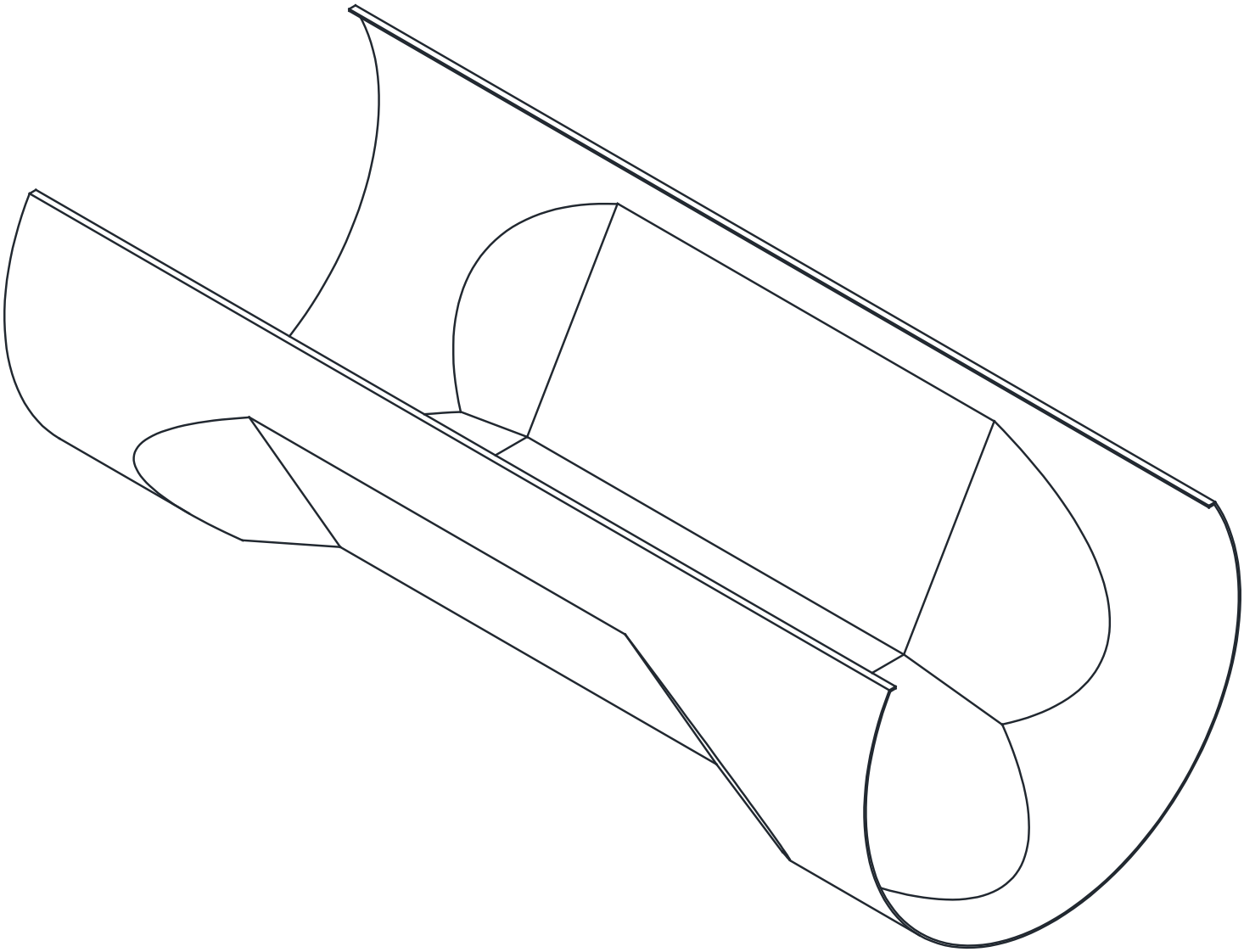
PALMER-BOWLUS

Open Channel Primary Devices



technical documentation GB Rev. of 14/02/2023

sgm lektra

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1-WARRANTY

Products supplied by SGM LEKTRA are guaranteed for a period of 12 (twelve) months from delivery date according to the conditions specified in our sale conditions doc ument.
SGM LEKTRA can choose to repair or replace the Product.
If the Product is repaired it will maintain the original warranty terms, whereas if the Product is replaced it will have 12 (twelve) months of warranty.
The warranty will be null if the Client modifies, repairs or uses the Products for other purposes than the normal conditions foreseen by instructions or Contract.
In no circumstances shall SGM LEKTRA be liable for direct, indirect or consequential or other loss or damage whether caused by negligence on the part of the company or its employees or otherwise howsoever arising out of defective goods.

2- PRODUCT

The Palmer-Bowlus is essentially a primary devices designed to increase, upstream of the restriction, the fluid head during its outflow.
Upstream of the Palmer-Bowlus, the fluid head increases or decreases in relation to the fluid volume flowing on it.
The head measured by a level transmitter is then used to calculate the instantaneous flow rate value.
Its main use is in pipes or ducts accessible through the inspection shaft.
The easy installation and the low cost of implementation, are the reason for the increasing number of applications for this flow rate measure system.

3-TECHNICAL FEATURES

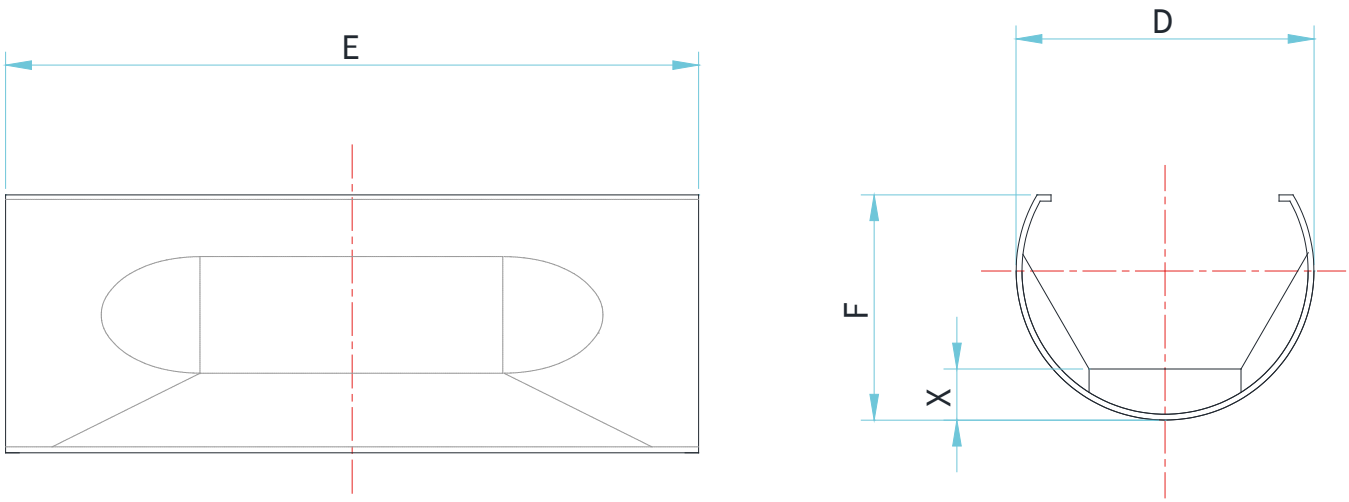
Material
glass fiber

Range di misura		
	Inst. in tubi	**Inst. in pozzetto**
DN100 (4”)	0,45 ÷ 6m3/h	0,45 ÷ 8m3/h
DN150 (6”)	0,68 ÷ 15m3/h	0,68 ÷ 19m3/h
DN200 (8”)	1,12 ÷ 48m3/h	1,12 ÷ 56m3/h
DN250 (10”)	1.29 ÷ 68m3/h	1.29 ÷ 76m3/h
DN300 (12”)	2,27 ÷ 136m3/h	2,27 ÷ 150m3/h
DN350 (14”)	3 ÷ 161m3/h	3 ÷ 192m3/h
DN400 (16”)	2,23 ÷ 213m3/h	2,23 ÷ 240m3/h
DN450 (16”)	3,8 ÷ 330m3/h	3,8 ÷ 365m3/h
DN500 (20”)	5.34 ÷ 468m3/h	5.34 ÷ 532m3/h
DN600 (24”)	10 ÷ 560m3/h	10 ÷ 623m3/h
DN700 (28”)	15 ÷ 1019m3/h	15 ÷ 1115m3/h
DN800 (32”)	18 ÷ 1672m3/h	18 ÷ 1806m3/h

Range dei diametri interni di installazione	
DN100 (4”)	95 ÷ 105mm
DN150 (6”)	149 ÷ 160mm
DN200 (8”)	180 ÷ 200mm
DN250 (10”)	249 ÷ 260mm
DN300 (12”)	280 ÷ 310mm
DN350 (14”)	330 ÷ 370mm
DN400 (16”)	399 ÷ 420mm
DN450 (18”)	430 ÷ 470mm
DN500 (20”)	480 ÷ 505mm
DN600 (24”)	600 ÷ 630mm
DN700 (28”)	670 ÷ 730mm
DN800 (32”)	770 ÷ 802mm

4-DIMENSIONS

4.1 MECHANICAL DIMENSIONS



	D	F	X	E
DN100 (4”)	105	75	16,6	250
DN150 (6”)	175	130	29	400
DN200 (8”)	175	130	29	400
DN250 (10”)	275	205	46	600
DN300 (12”)	275	205	46	600
DN350 (14”)	350	262,5	58,5	600
DN400 (16”)	450	335	75	950
DN450 (18”)	450	335	75	950
DN500 (20”)	450	335	75	950
DN600 (24”)	700	525	116,5	1450
DN700 (28”)	700	525	116,5	1450
DN800 (32”)	700	525	116,5	1450

5-APPLICATIONS

The Palmer-Bowlus channel is usually used in underground ducts with inspection manholes (fig.2), even if its size made it interesting for flow monitoring in many channels kinds.
It's ideal for runoff studies and monitoring in permanent and temporary installations.
The Palmer-Bowlus channels have a low cost of installation, which makes them a valid alternative to the Parshall channels, more complex and expensive to install.
The Palmer-Bowlus channels can be installed in two different modes:

1) by opening the pipe upper part and positioning the Palmer-Bowlus channel directly into the created aperture. (see eg. in figure 1)

2) by opening the pipe upper part and and inserting the Palmer-Bowlus channel in the pipe (see eg. in figures 2)

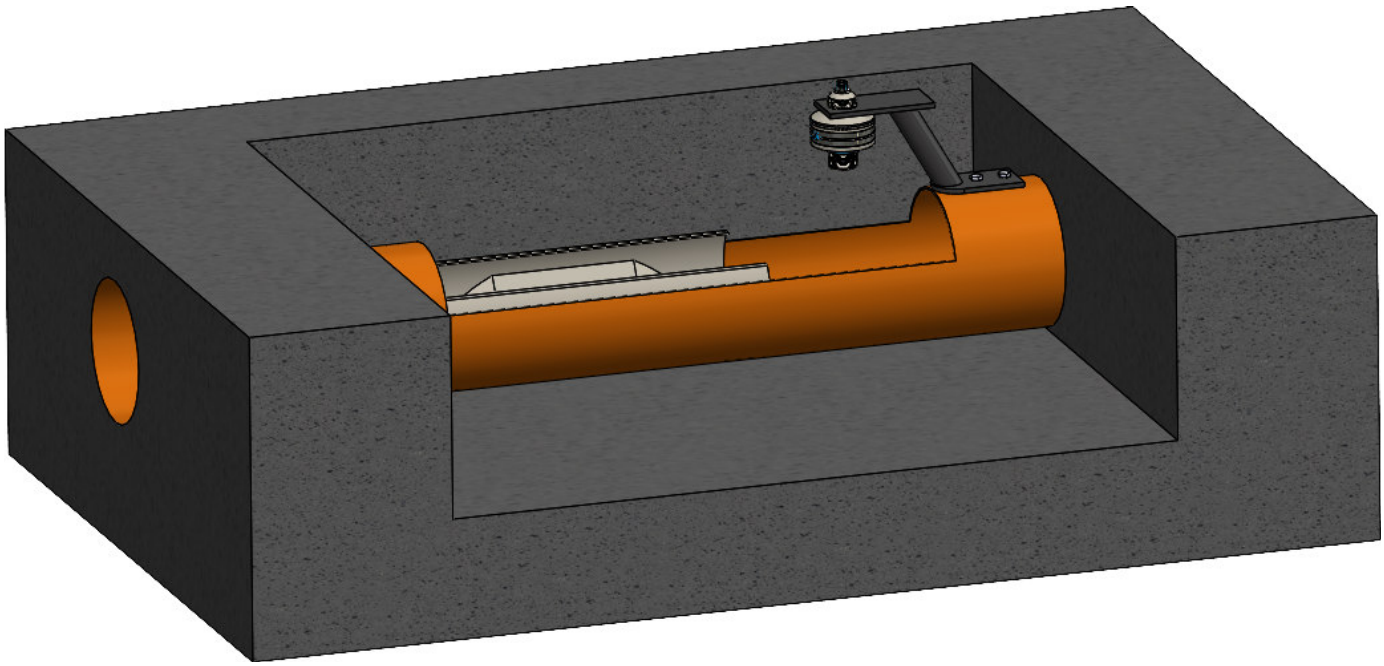


Fig. 1

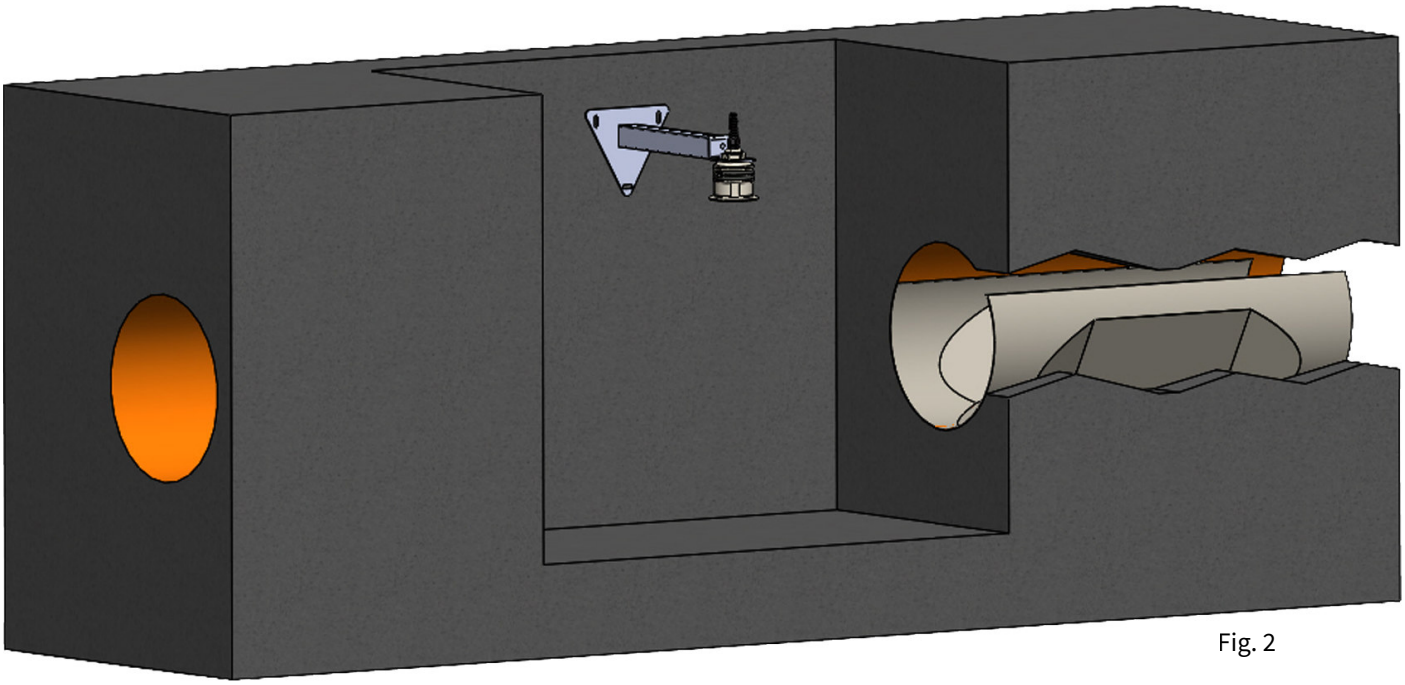


Fig. 2

5.1 ACCURACY

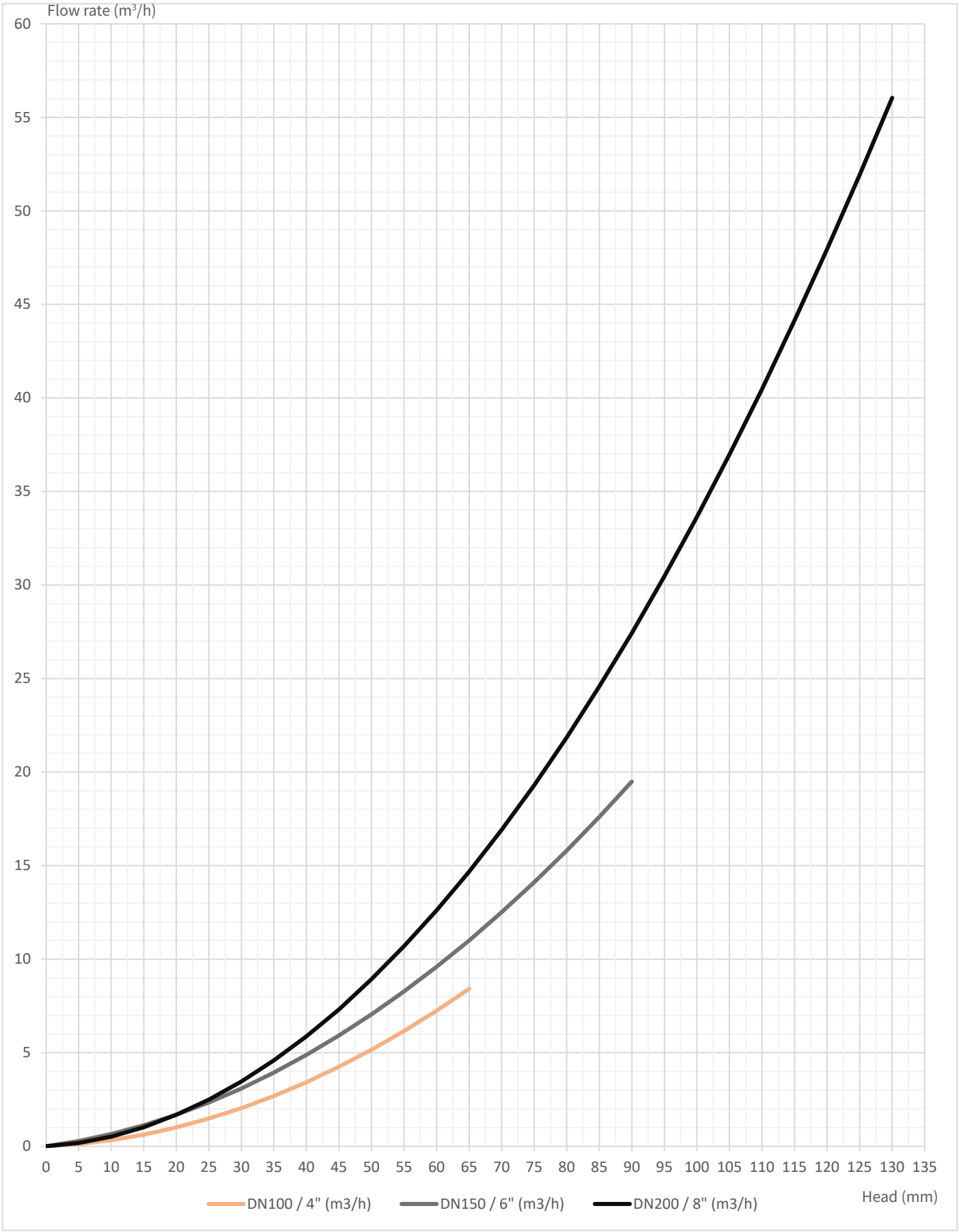
Under optimal flow conditions, the Palmer-Bowlus channel has a measurement accuracy comparable to that of Venturi channel.
However, an instantaneous flow rate variation produces a minor level variation, upstream of the restriction, to what would result with a properly sized Venturi channel.
Therefore, the instantaneous flow rate variations are often less distinguishable, even if the accuracy is anyway comparable.

5.2 OPERATIVITY

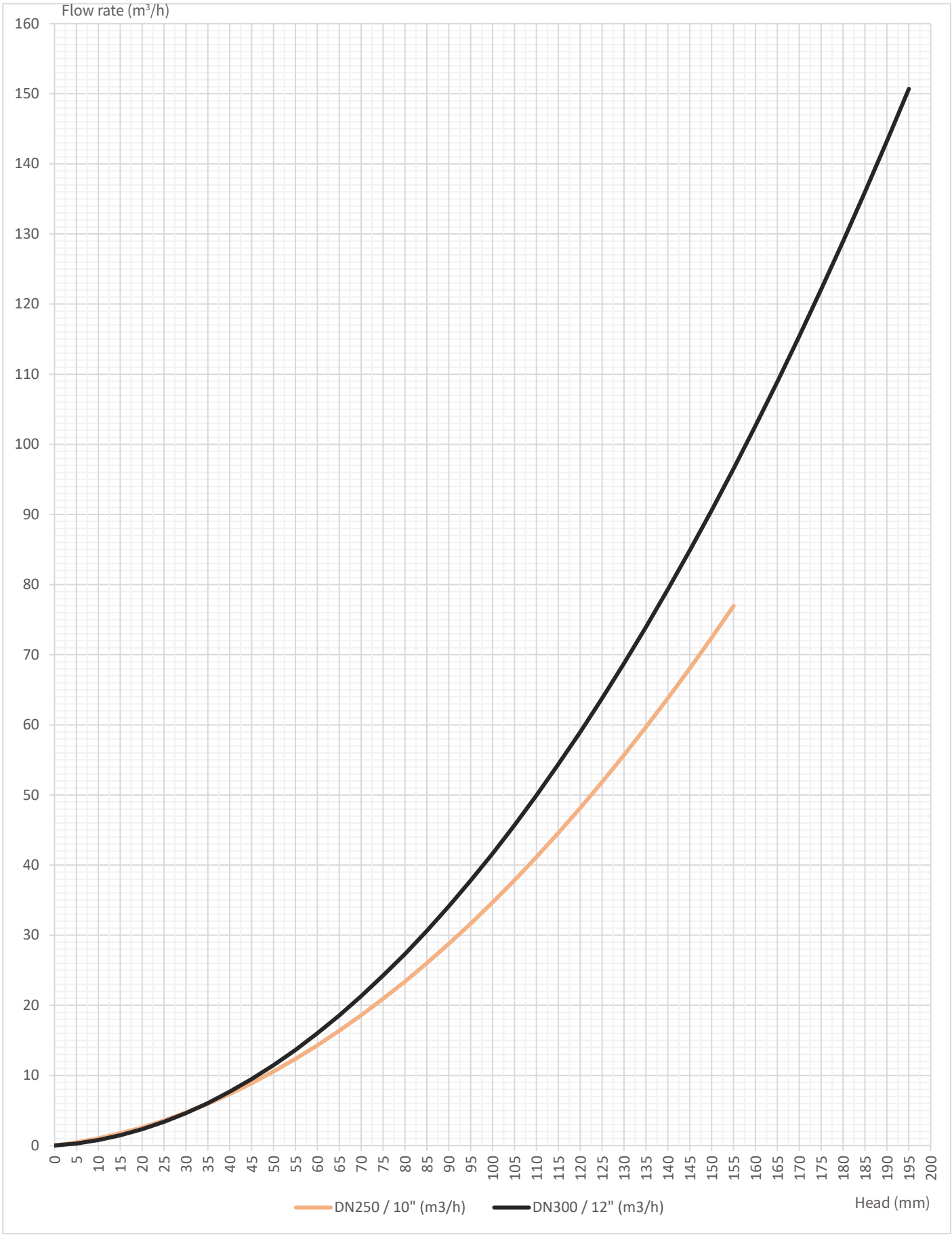
The Palmer-Bowlus channel does increase or decrease the fluid head, upstream of the restriction, in function of the instantaneous flow rate value.
The channel slope must be less than 1%.

6-FLOW CURVES

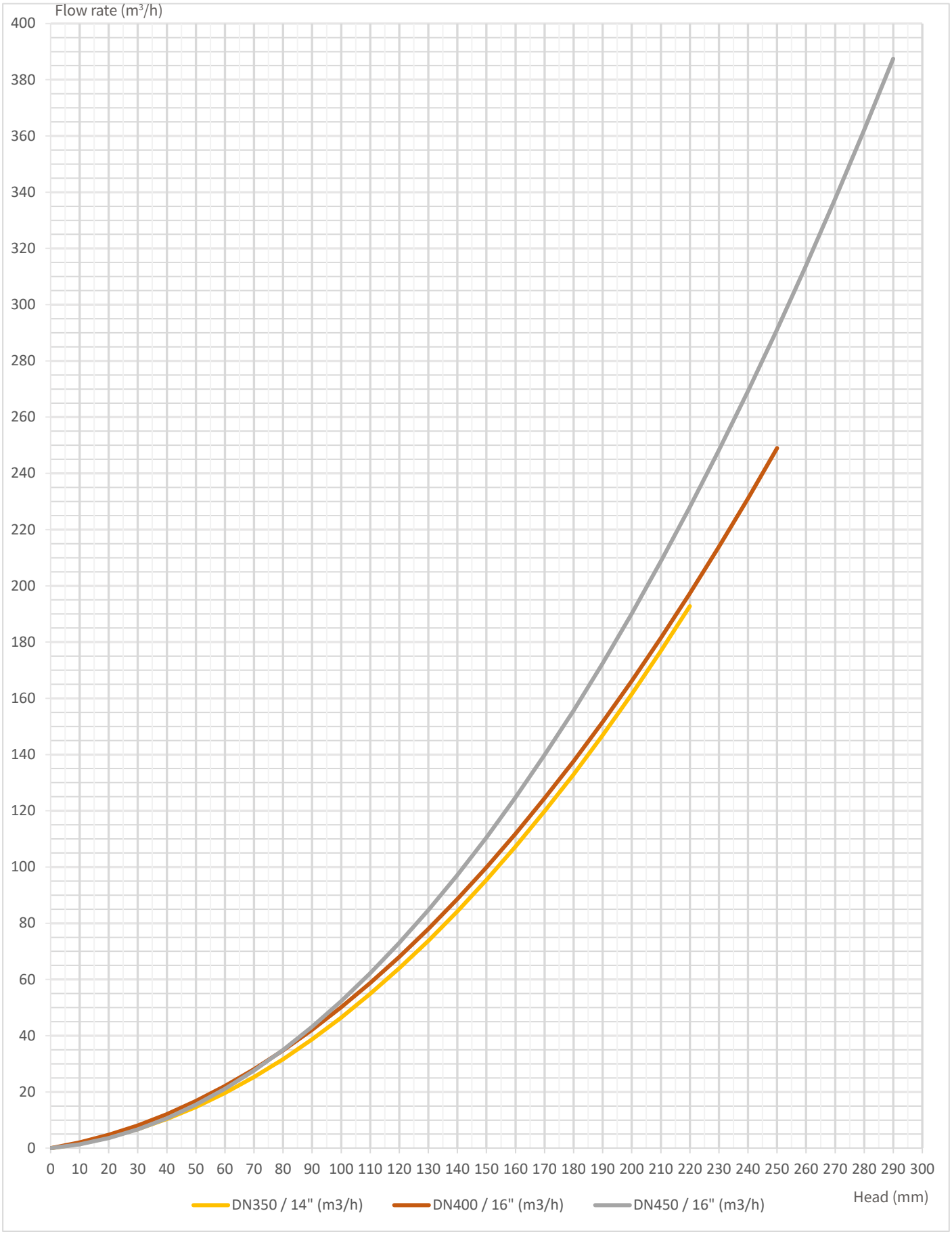
6.1 Flow curves DN100 - DN150 - DN200



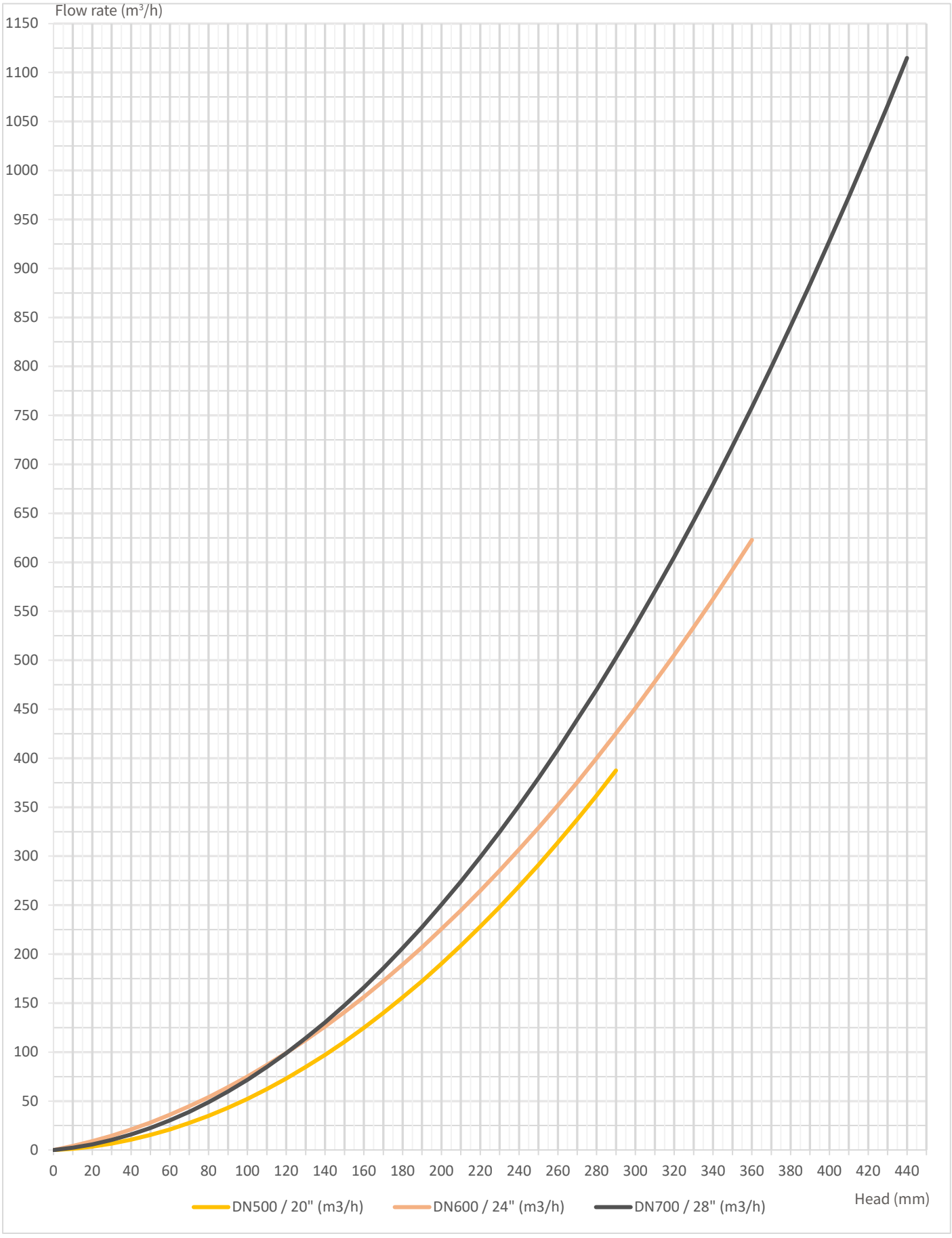
6.2 Flow curves DN250 - DN300



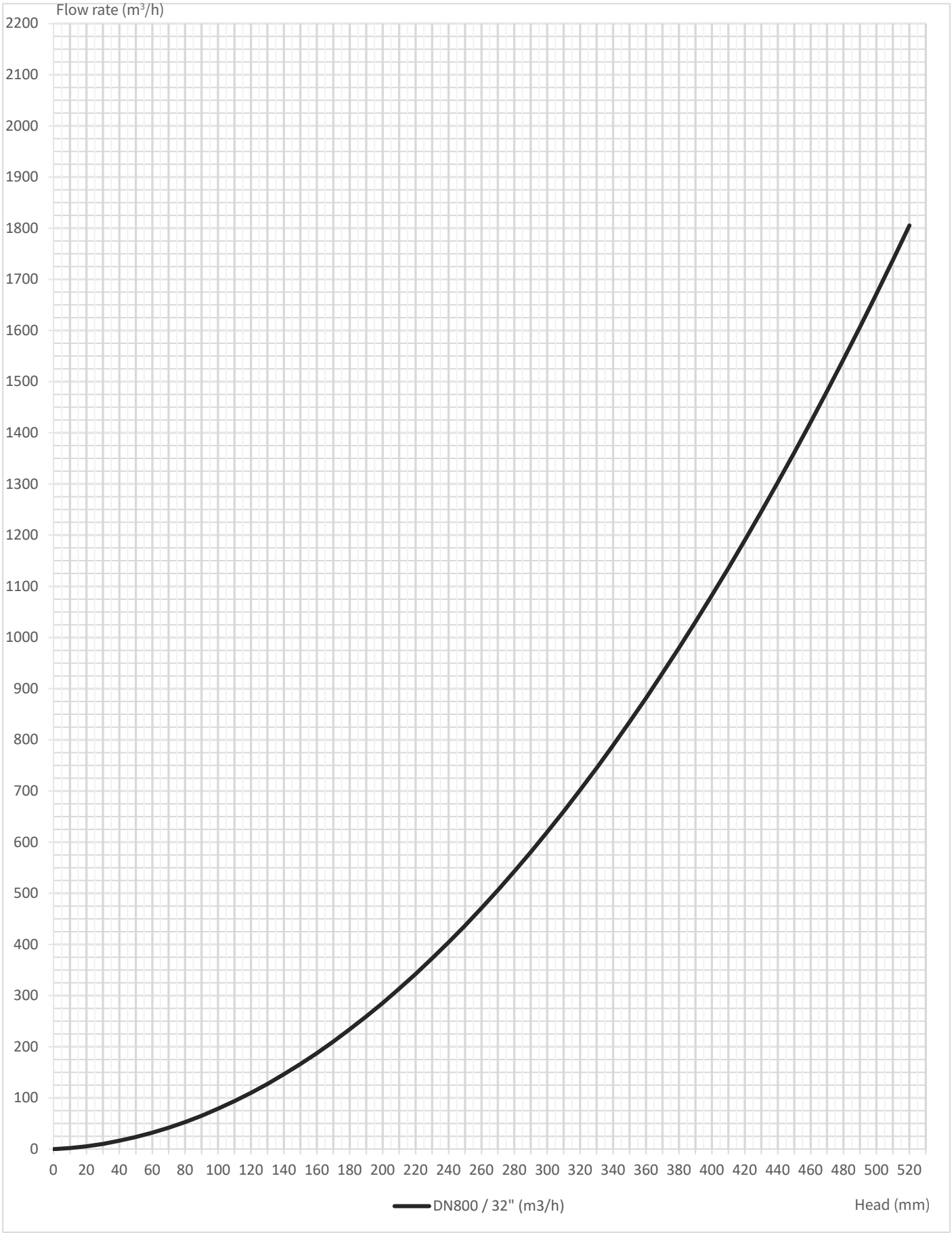
6.3 Flow curves DN400 - DN500



6.4 Flow curves DN600 - DN700



6.5 Flow curves DN800



7-INSTALLATION

7.1 PIPE WINDOW

For the mechanical installation is necessary to create an opening in the upper part of the pipe, which we will call pipe window, for the Palmer Bowlus mounting.
The following paragraphs explain how to determine the the pipe window dimensions.

7.1.1 Minimum pipe window length (L)

To determine the "L" length minimum value (See next page), have to consider the following quote:

a) "E" dimension of the channel Palmer Bowlus.
b) "D/2" distance (Pipe Ø / 2) there must be between the measuring sensor level and the Palmer Bowlus beginning (See next page).
c) "M" dimension of the sensor mounting bracket (See next page).
d) L=E+D/2+M

Calculation example for a pipe DN400 with a PTU50 or PTU51 sensor:
a) "E" dimension = 960mm
b) "D/2" dimension = 200mm (Pipe Ø 400mm / 2 = 200mm)
c) "M" dimension = 143mm (See next page the accessory 835A027R for PTU50 or PTU51)

The minimum value of "L" will be: 950mm+200mm+143mm = 1293mm

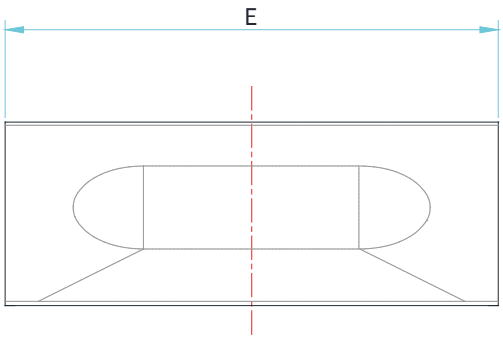
Calculation example for a pipe DN400 with a FLOWMETER sensor:
a) "E" dimension = 960mm (see fig.10)
b) "D/2" dimension = 200mm (Pipe Ø 400mm / 2 = 200mm)
c) "M" dimension = 258mm (See next page the accessory 835B027R for FLOWMETER)

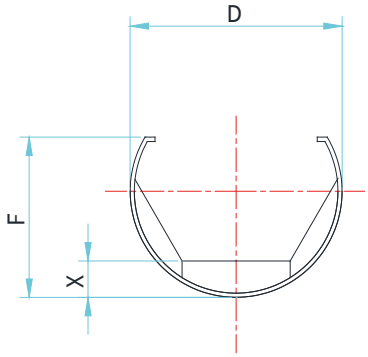
The minimum value of "L" will be: 950mm+200mm+258mm = 1408mm

7.1.2 Pipe side wall height (H)

The "H" height value is shown in the table.
NB - The "H" height base should be the inside bottom of the pipe (See next page)

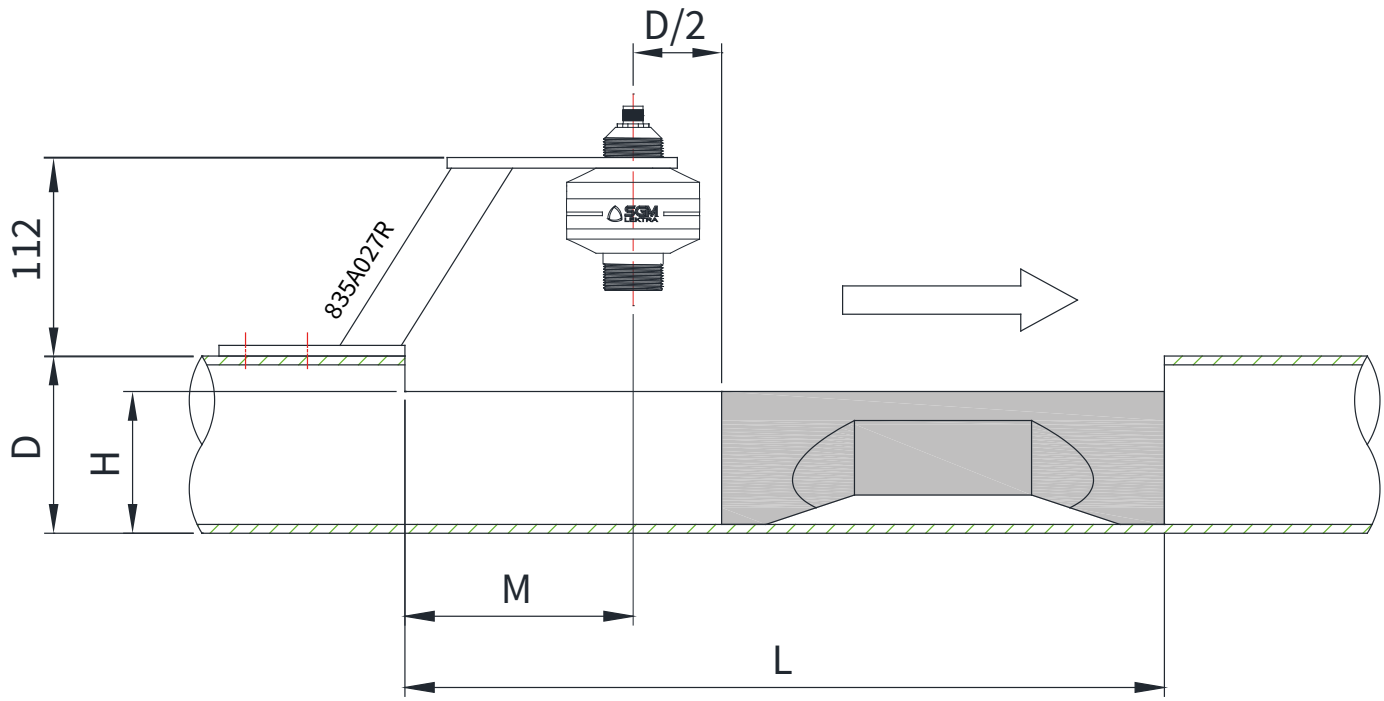
	H
DN100 (4")	80
DN150 (6")	120
DN200 (8")	160
DN250 (10")	200
DN300 (12")	240
DN350 (14")	280
DN400 (16")	320
DN450 (18")	360
DN500 (20")	400
DN600 (24")	480
DN700 (28")	560
DN800 (32")	640

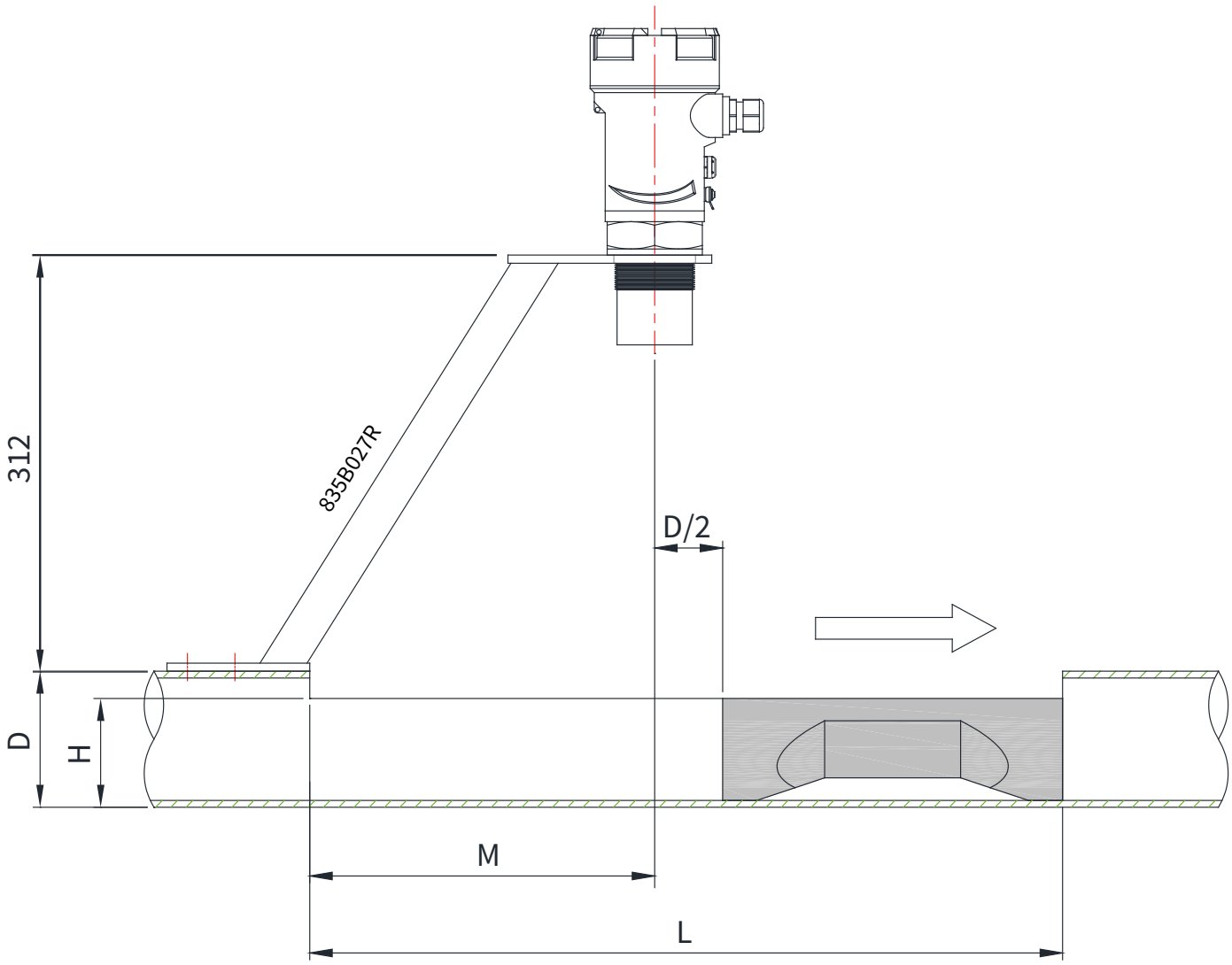




	D	F	X	E
DN100 (4")	105	75	16,6	250
DN150 (6")	175	130	29	400
DN200 (8")	175	130	29	400
DN250 (10")	275	205	46	600
DN300 (12")	275	205	46	600
DN350 (14")	350	262,5	58,5	600

	D	F	X	E
DN400 (16")	450	335	75	950
DN450 (18")	450	335	75	950
DN500 (20")	450	335	75	950
DN600 (24")	700	525	116,5	1450
DN700 (28")	700	525	116,5	1450
DN800 (32")	700	525	116,5	1450

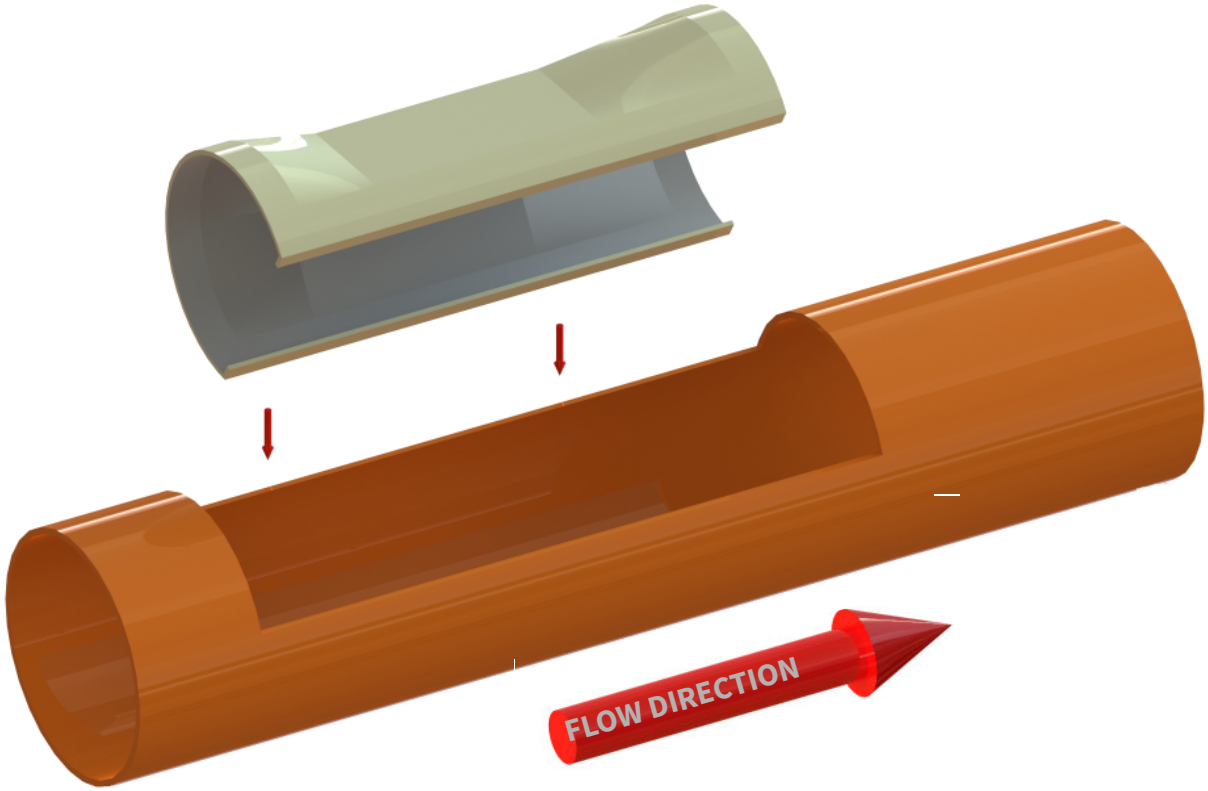

D/2
112
835A027R
D
H
M
L


312
835B027R
D/2
D
H
M
L

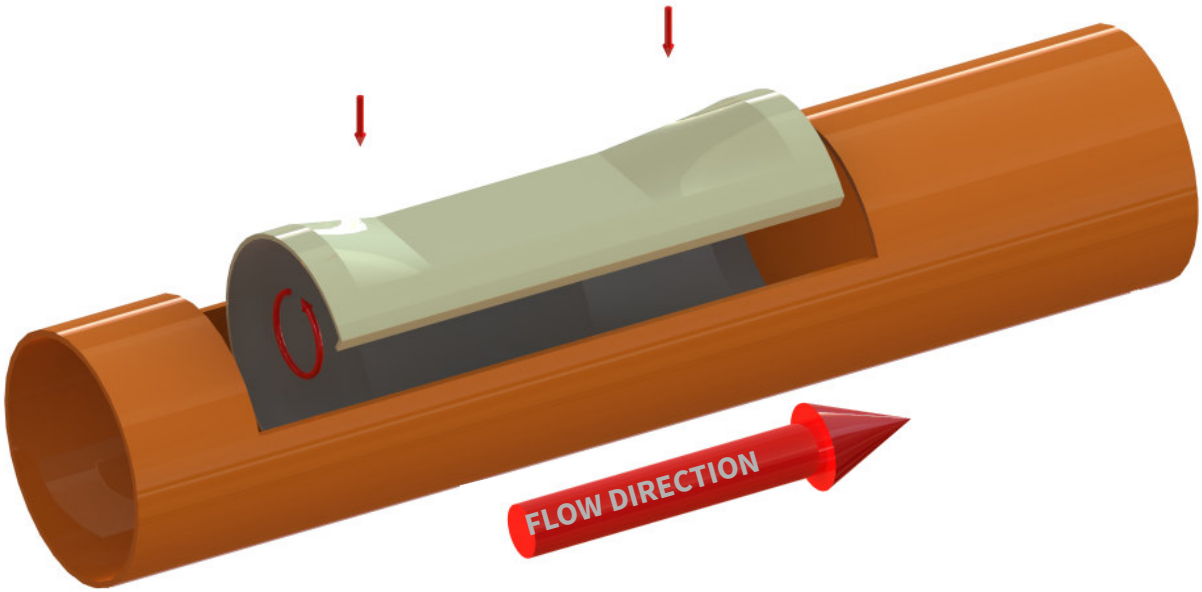
7.2 PALMER BOWLUS INSERTING INTO THE PIPE

7.2.1 DN100 - DN150 - DN250 - DN400 - DN600 - DN700 channels

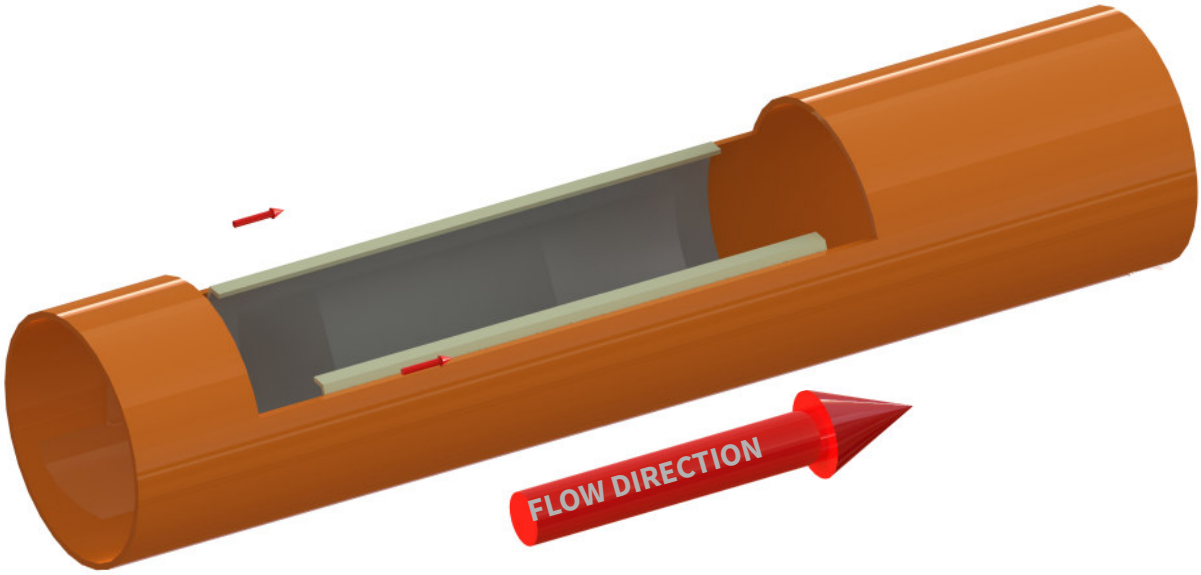
Rotate 90° the Palmer Bowlus channel



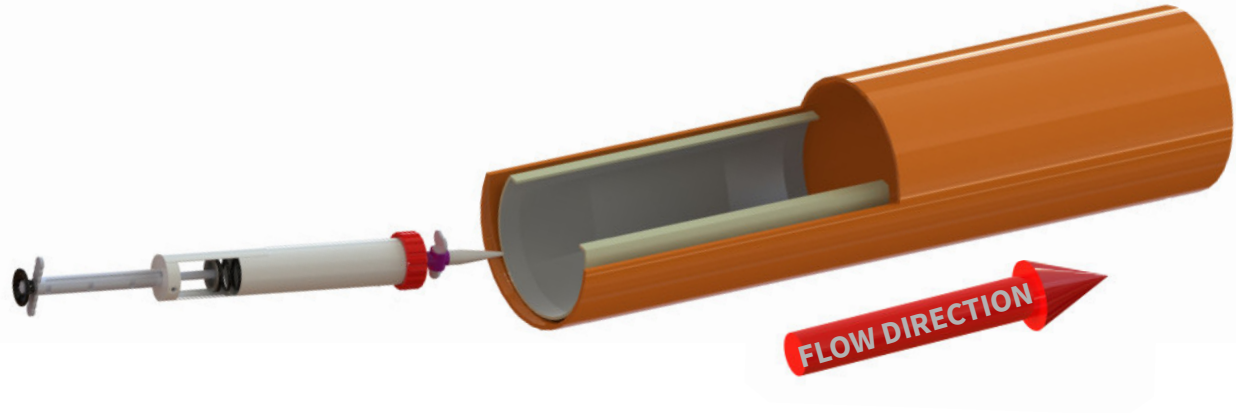
Put the Palmer Bowlus on the pipe bottom and turn to place it in plane



Slide the Palmer Bowlus into the pipe in the fluid flow direction, to move it away from the level measuring point, at a D/2 minimum distance.

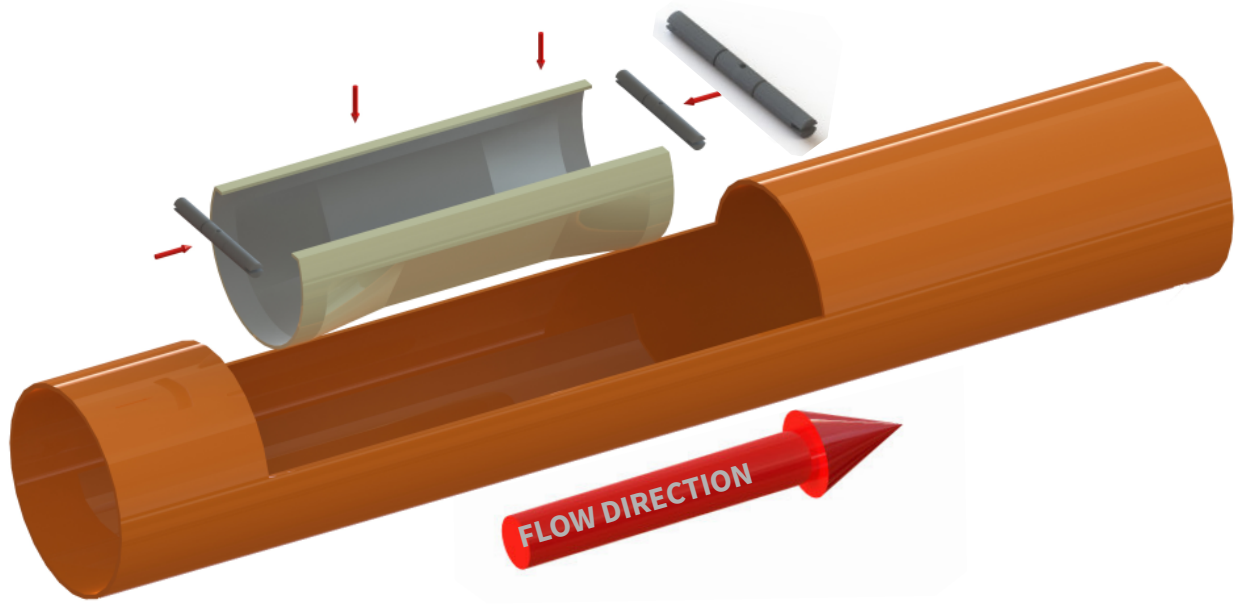


Seal the contact line between the Palmer Bowlus channel and the pipe, this to avoid that the fluid passes under the channel causing an flow measurement error.

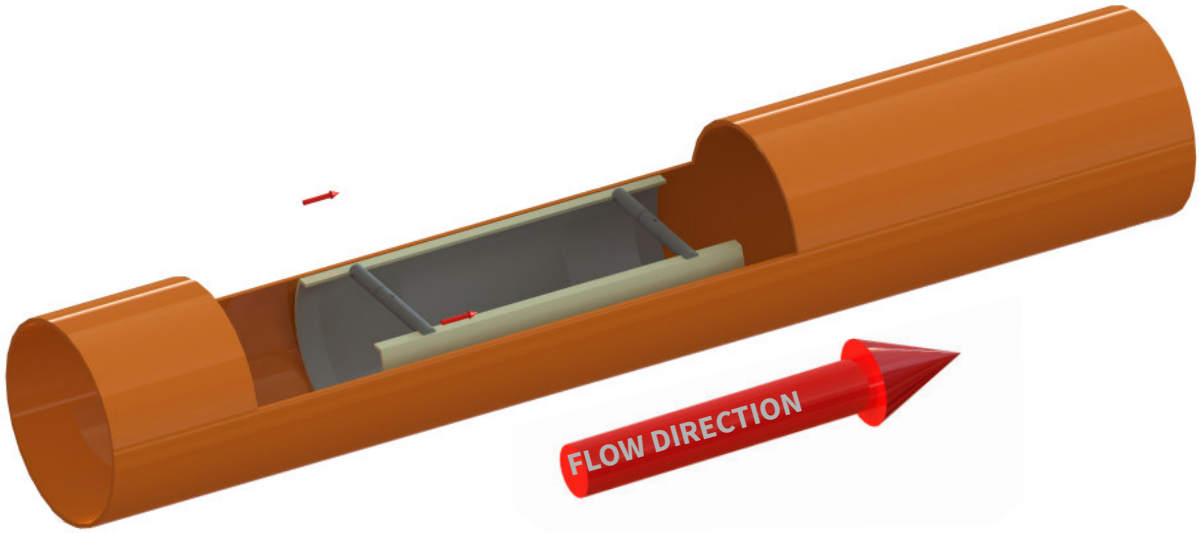


7.2.2 DN200 - DN300 - DN500 - DN800 channels

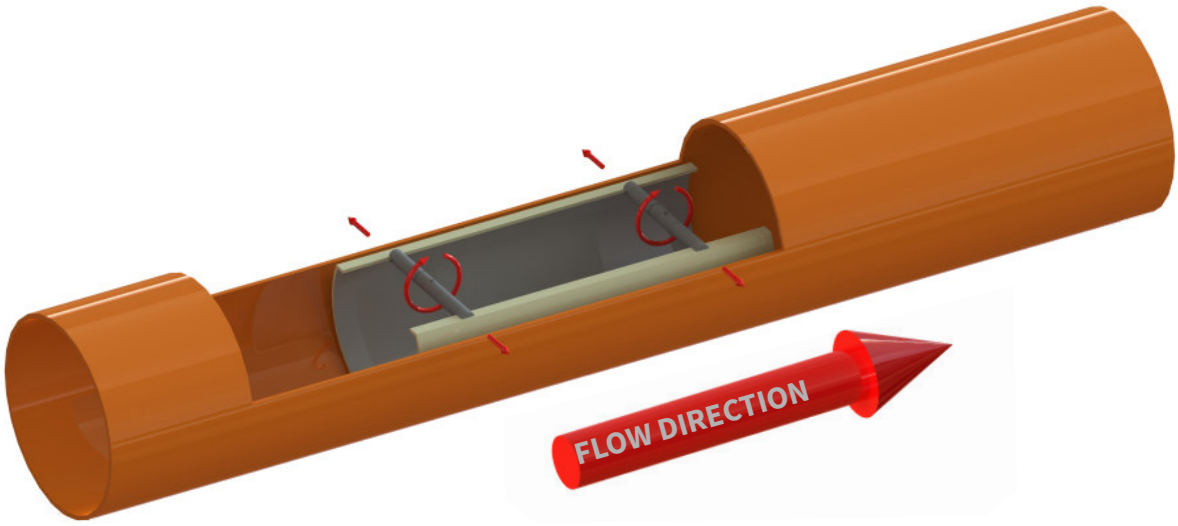
Insert the 2 supplied standoffs and put the Palmer Bowlus on the pipe bottom.



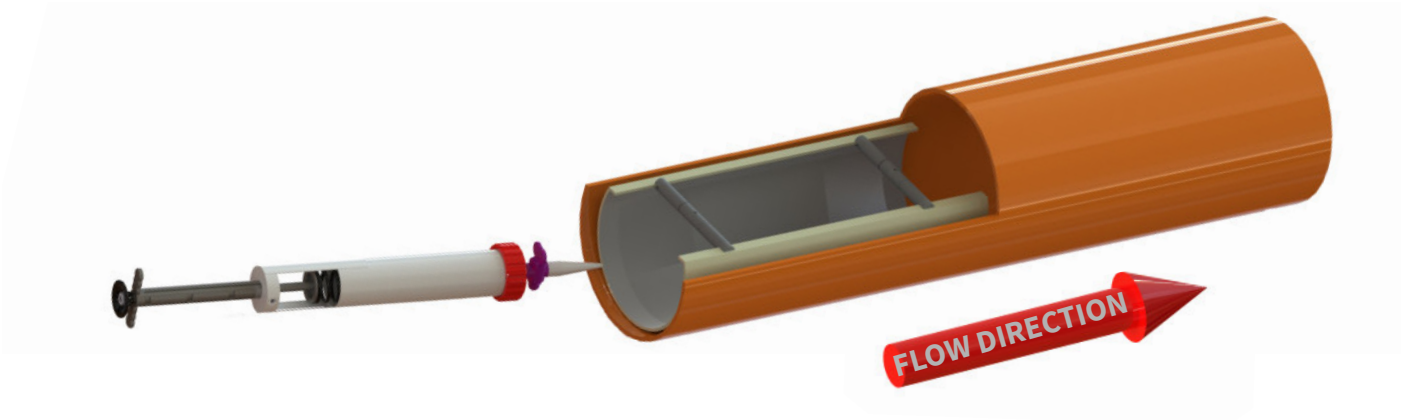
slide the Palmer Bowlus into the pipe in the fluid flow direction, to move it away from the level measuring point, at a D/2 minimum distance.



Adjust the standoffs, to adapt the the Palmer Bowlus outer diameter to the pipe internal diameter.



Seal the contact line between the Palmer Bowlus channel and the pipe, this to avoid that the fluid passes under the channel causing an flow measurement error



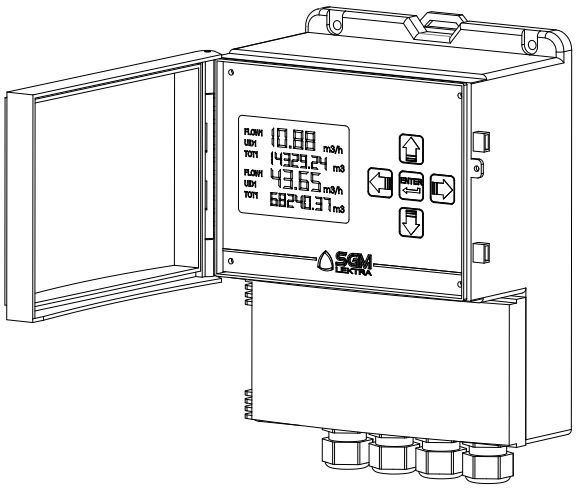
8-SGM LEKTRA flow measurement instrumentations

SGM LEKTRA has different solutions for the open channel flow measurement, perfectly matched with SGM LEKTRA prefabricated PALMER BOWLUS channels.

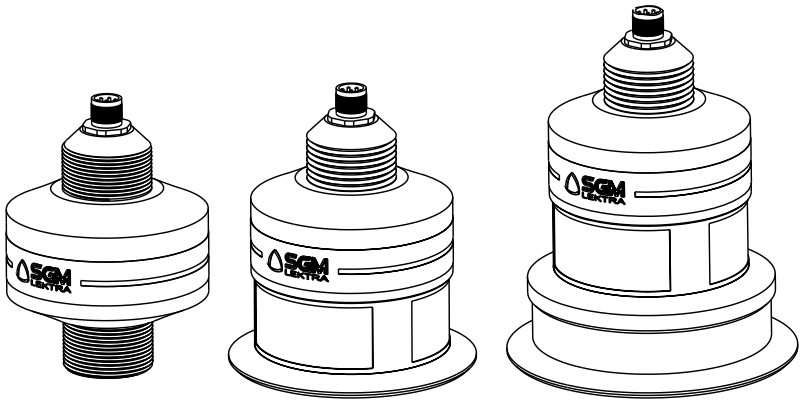
8.1 VLW90M

VLW90M is a multifunctional unit, suitable for via MODBUS RTU connection with PTU50, PTU51, PTU56, METER and KTU5 ultrasonic level sensors by SGM LEKTRA. VLW90M integrates the data acquisition and display management of: levels, flow rates, pumps. Integrated data logger with data storage on memory pen (USB)

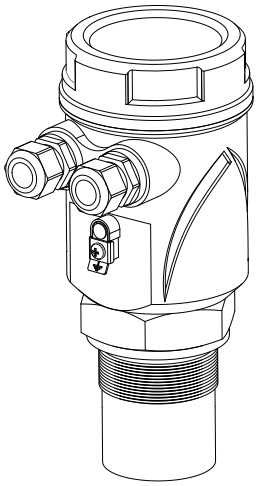
VLW90M



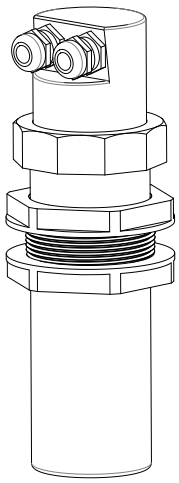
PTU50/51/56



METER



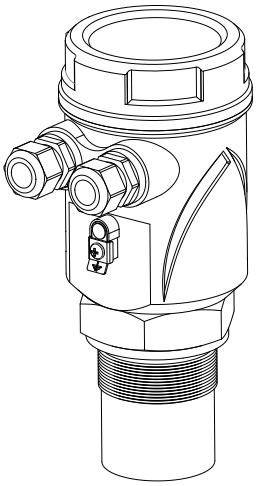
KTU5



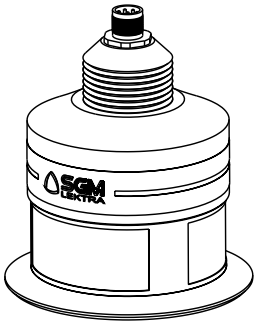
8.2 FLOWMETER

The nonintrusive system application is now preferred in the flow measurements field.
The SGM-LEKTRA developed the FLOWMETER/FLOW51 data processing unit to best exploit the its ultrasonic transmitter characteristics. The FLOWMETER/FLOW51 unit offers, together with its compactness, a simple start-up.
The FLOWMETERFLOW51 is able to process the instantaneous flow and the volume totalizer, with all Palmer Bowlus, Venturi, Pharshall channels and Standard Weirs, simply entering the Venturi flume or the weir geometric dimensions data.
The head calibration is done through “actual level” value automatic acquisition.

FLOWMETER



FLOW51



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