RIELS® INSTRUMENTS

Palmer-Bowlus

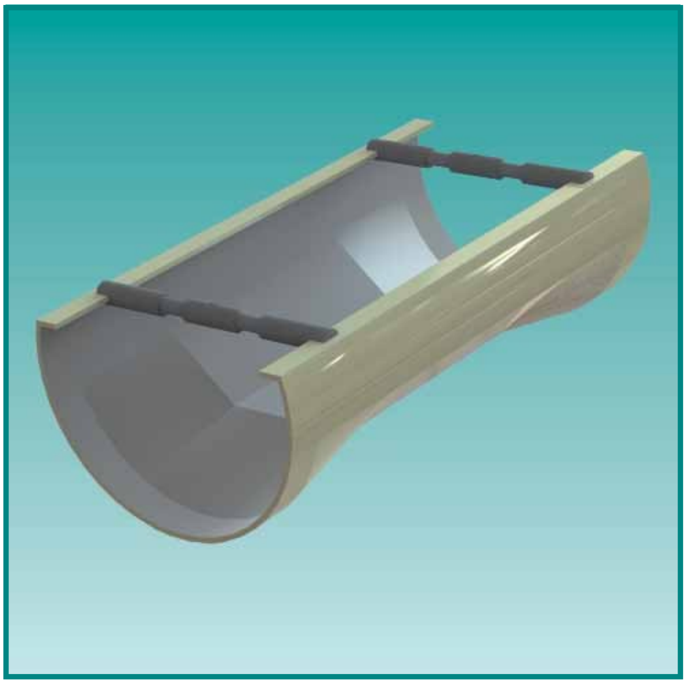
Pipe prominence modellers

825A132B

Features

- **Material:** **glass fibre**
- **Measuring range:**

DN100 (4"):	**0.45 ÷**	**(max. 8.9m3/h)**
DN150 (6"): 21m3/h	**0.68 ÷**	**(max. 22.1m3/h)**
		(max. 52.8m3/h)
DN200 (8"): 50m3/h	**1.12 to**	**(max. 82.0m3/h)**
DN250 (10"):	**1.29 ÷ 80m3/h**	**(max. 102.4m3/h)**
DN300 (12"):	**2.27 ÷ 100m3/h**	**(max. 262.3m3/h)**
DN400 (16"):	**2.23 ÷ 256m3/h**	**(max. 496.3m3/h)**
DN500 (20"):	**5.34 ÷ 490m3/h**	**(max. 709.4m3/h)**
DN600 (24"): 700m3/h	**10 to**	**(max. 1177.1m3/h)**
		(max. 1841.7m3/h)



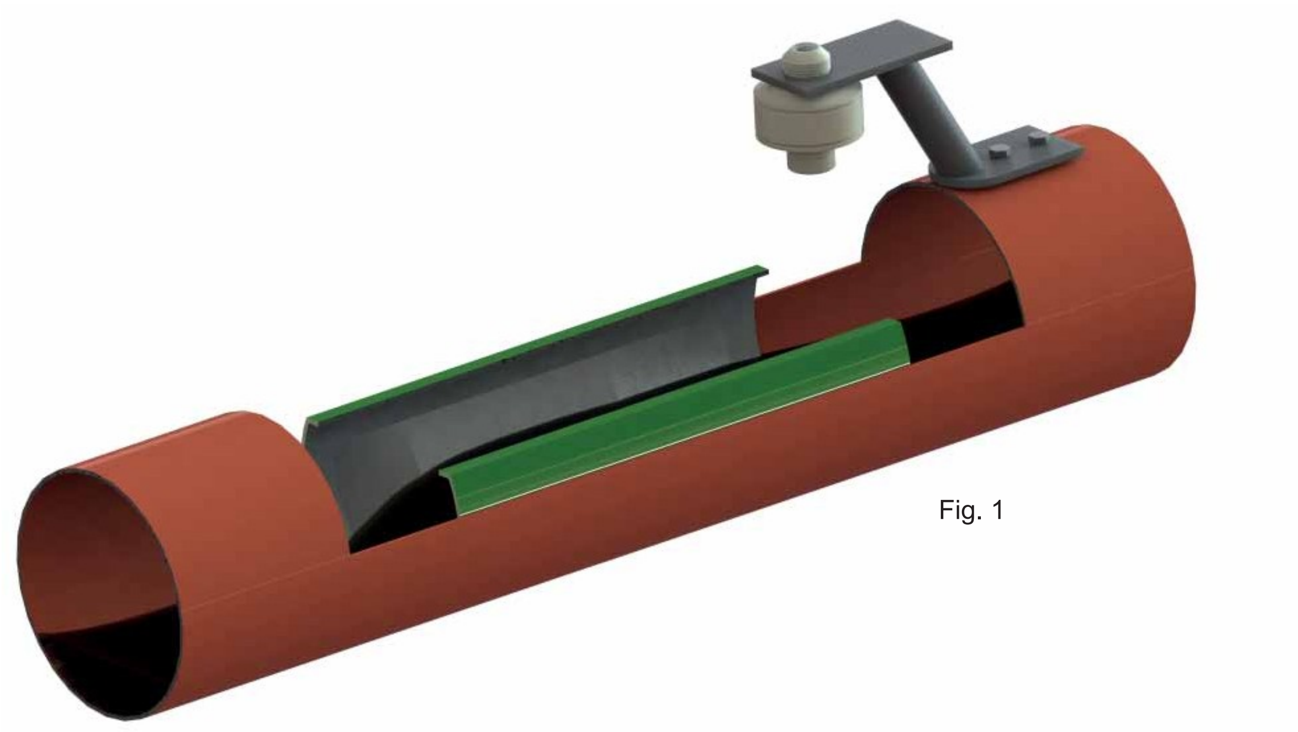


Fig. 1

- ***Cost-efficient system for flow measurement in outflow pipes or non-pressure pipes***
- ***Direct mounting in pipe or manhole***
- ***Ideal for flow measurements of circular pipes***
- ***Can be combined with RIELS FLOWMETER and VLW90M/PTU50-51 series ultrasonic flow transmitters***

1. General

The **Palmer-Bowlus** is essentially a hydraulic modeller designed to raise, upstream of the restriction, the fluid level during its outflow.
The head of the fluid upstream of the **Palmer-Bowlus** increases or decreases depending on the amount of fluid flowing over it. The head measured by a level transmitter is then used to calculate the value of the instantaneous flow rate.
Its main use is in pipes or conduits accessible through manholes.
Easy installation and low installation costs are the reason for the increasing number of applications of this flow measurement system.

2. Application

The **Palmer-Bowlus** artificial channel is routinely used in underground ducts with inspection manholes (fig.2), although its size has made it an interesting means of flow monitoring in many types of channels.
It is ideal for runoff studies and monitoring in permanent and temporary installations.
The low installation cost of **Palmer-Bowlus** channels makes them a viable alternative to Parshall channels, which have a more complex and costly installation.
The **Palmer-Bowlus** channel can be installed in 2 different ways:

1) opening the upper part of the tube and placing the **Palmer-Bowlus** channel directly into the opening created (see example in Figs. 1 and 2)

2) opening the upper part of the tube and inserting the **Palmer-Bowlus** channel into the intact part of the tube (see example in Figs. 3 and 4)

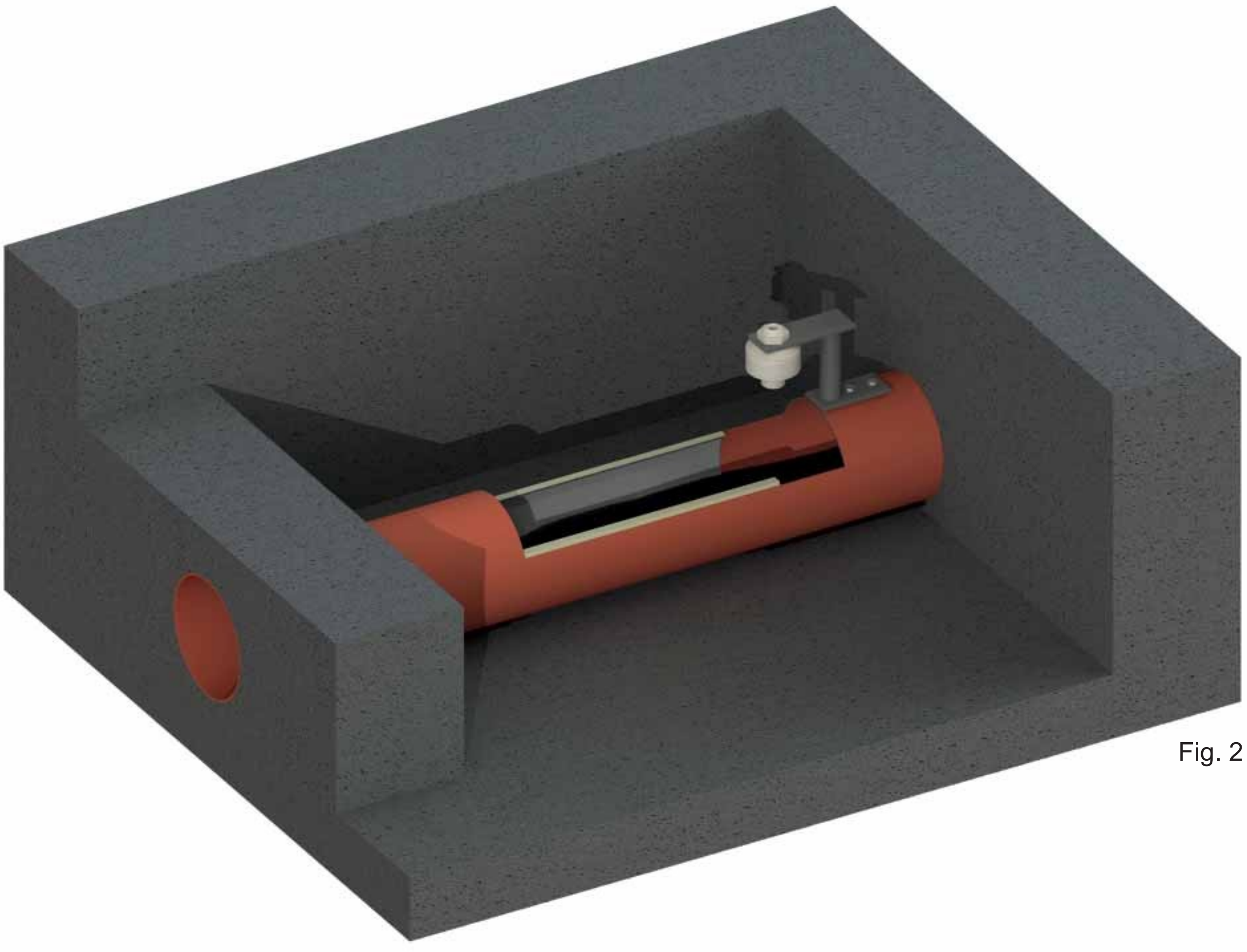


Fig. 2

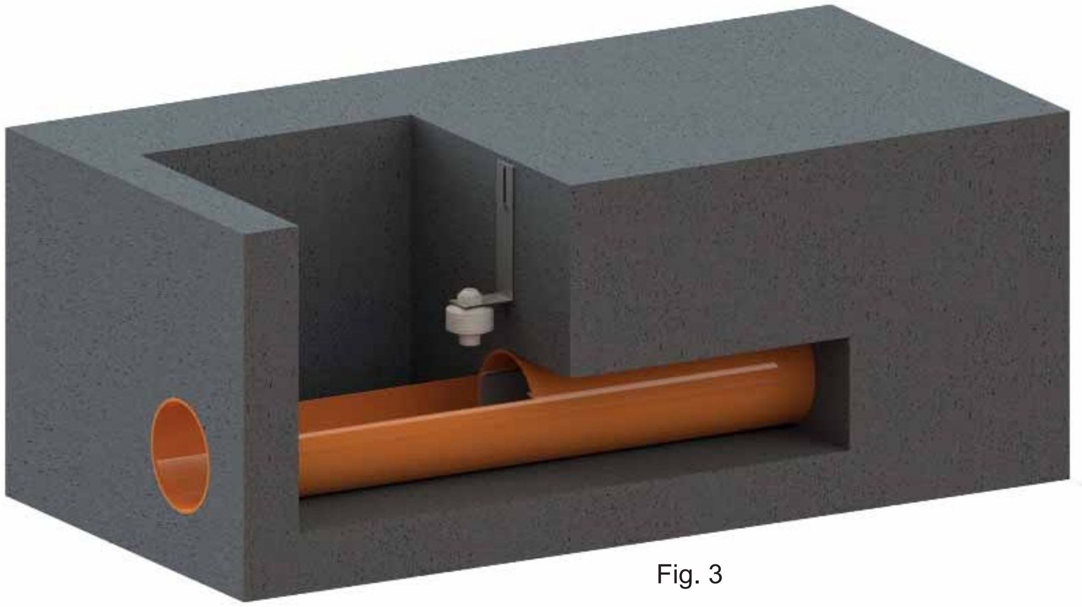


Fig. 3

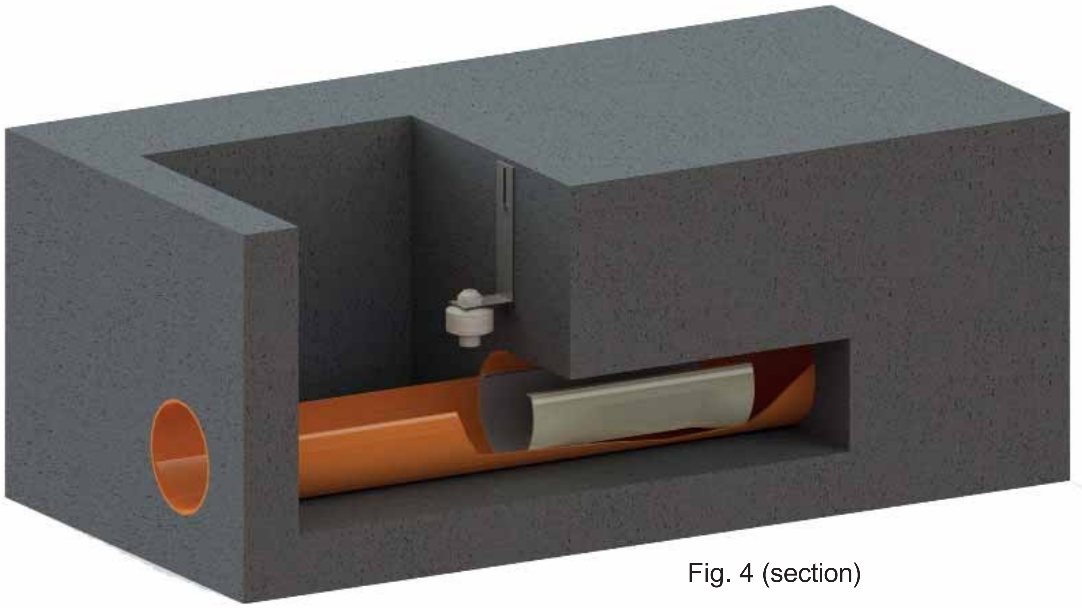


Fig. 4 (section)

3 . Accurate

Under optimal flow conditions, the Palmer-Bowlus artificial channel has a degree of measurement accuracy comparable to that of a Venturi artificial channel. However, a change in instantaneous flow produces a smaller change in level upstream of the restriction than would result with a properly sized Venturi flume. Therefore, measurement variations in instantaneous flow are often less distinguishable, although the accuracy is still comparable.

4 . Operativity

The Palmer-Bowlus artificial channel causes the fluid level upstream of the restriction to increase or decrease depending on the value of the instantaneous flow rate.

The slope of the channel must be less than 1%.

5. Curve of port

5.1 Curve port DN 100 - DN 150 - DN 200

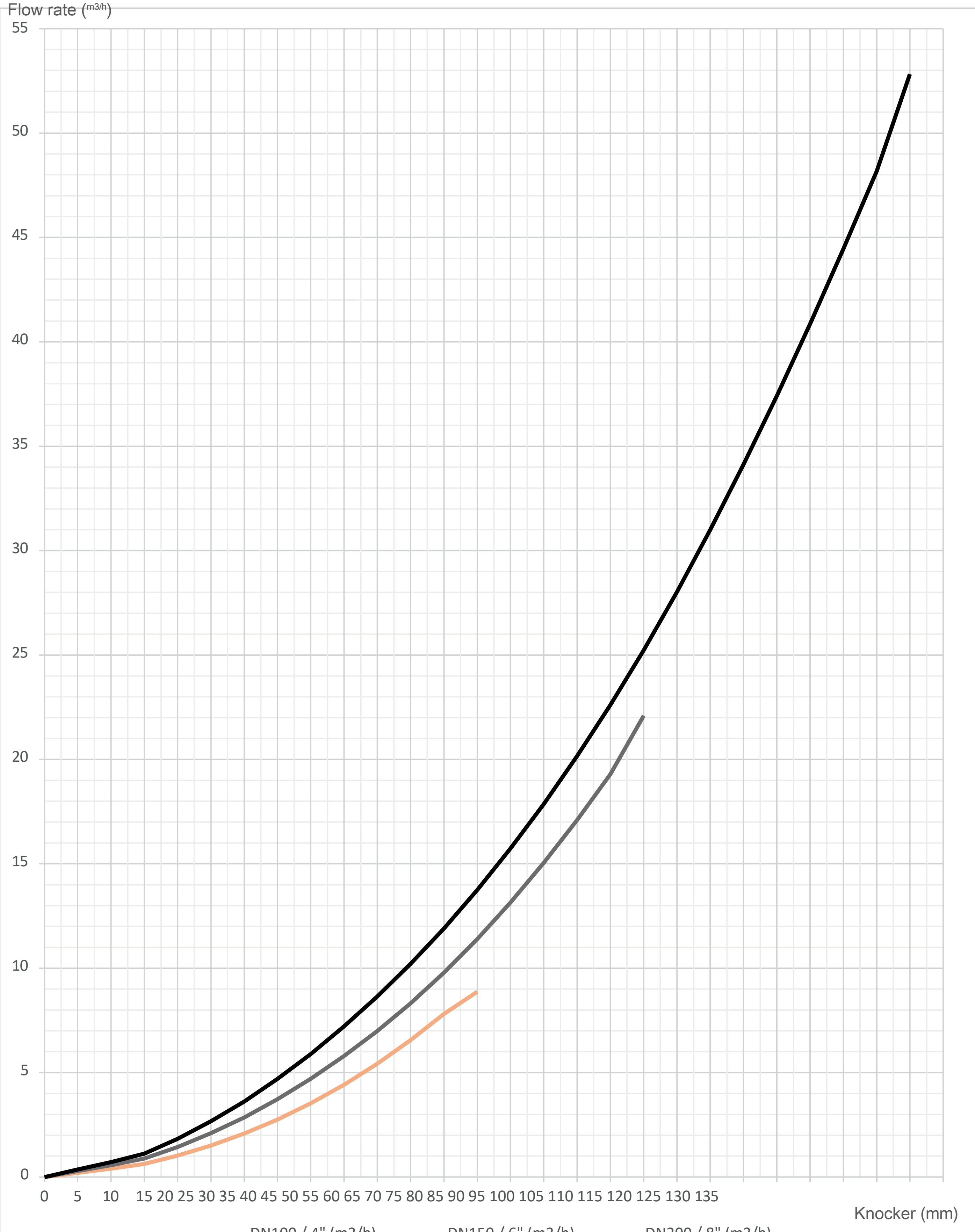


Fig. 5

5.2 Curve port DN 250 - DN 300

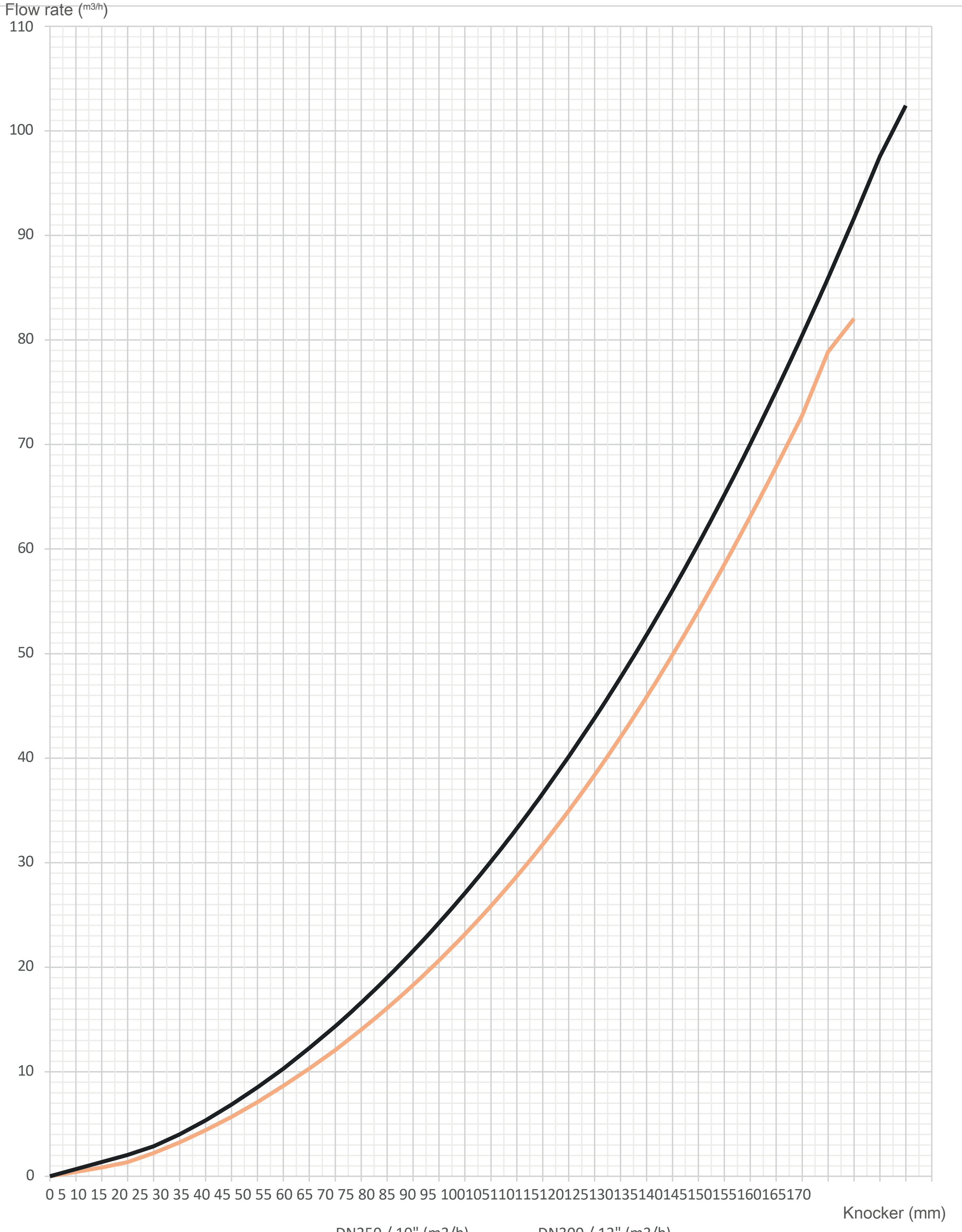


Fig. 6

5.3 Curve port DN 400 - DN 500

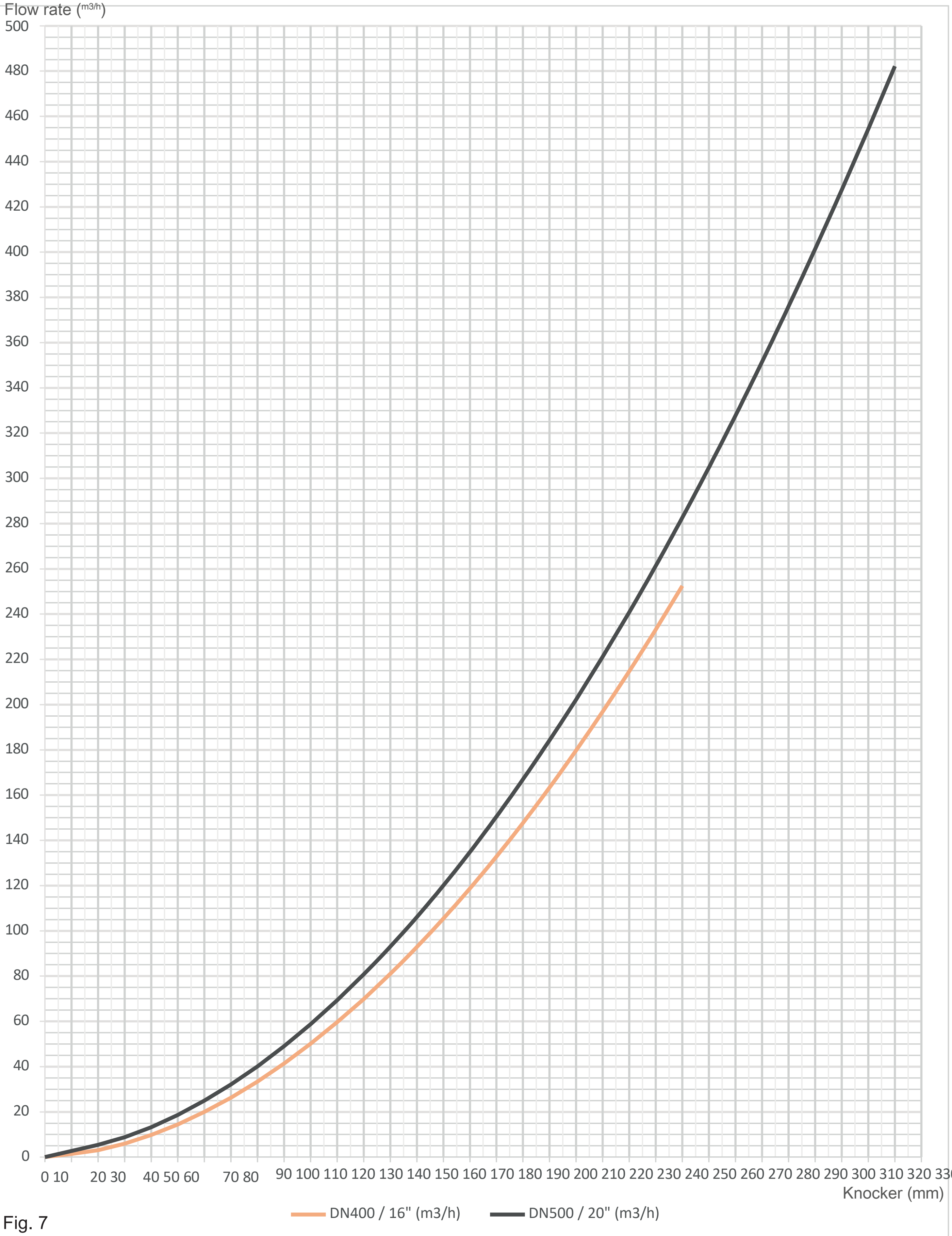


Fig. 7

5.4 Cur va por t DN 600 - DN 700

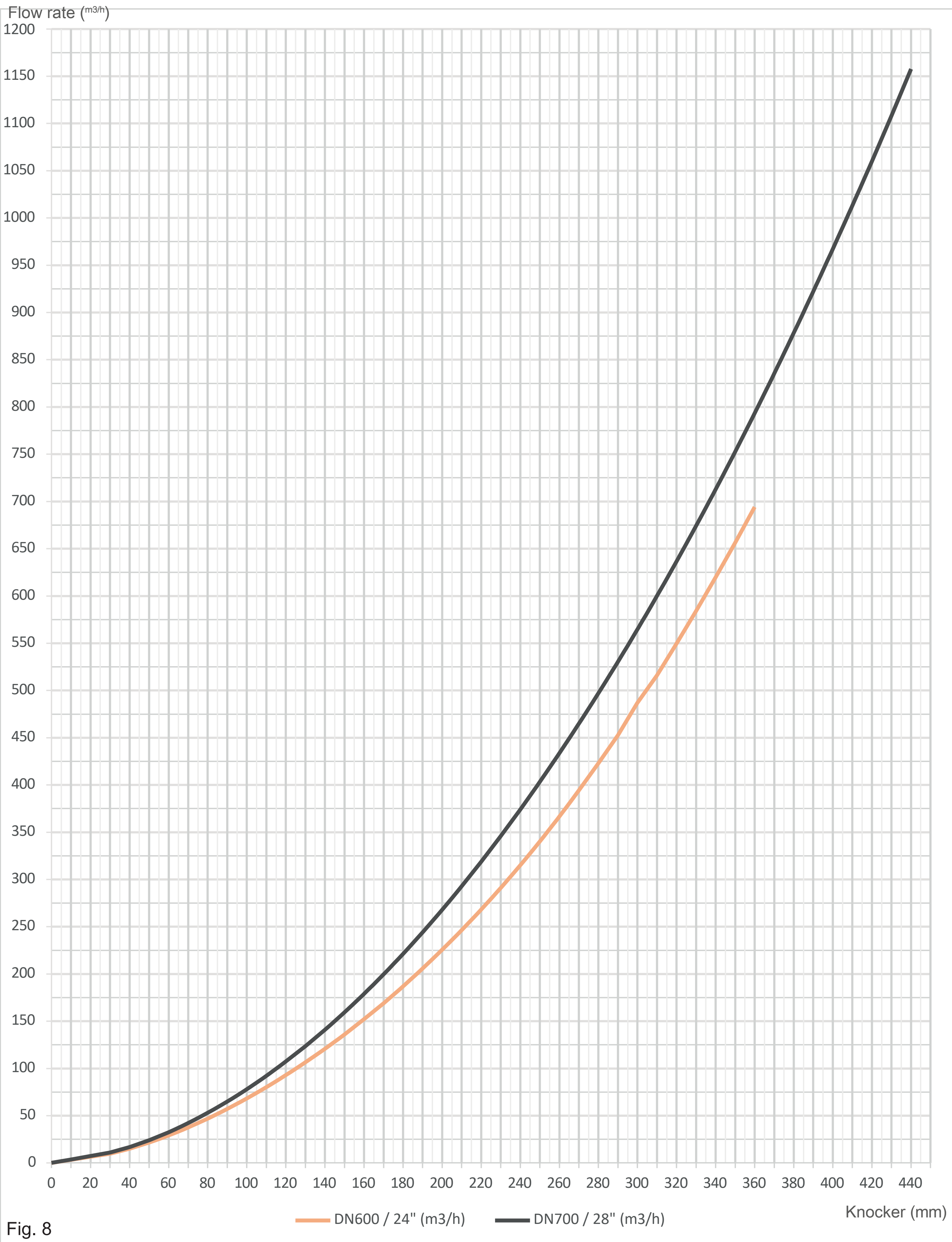


Fig. 8

5 . 3 Cur v a por t D N 800

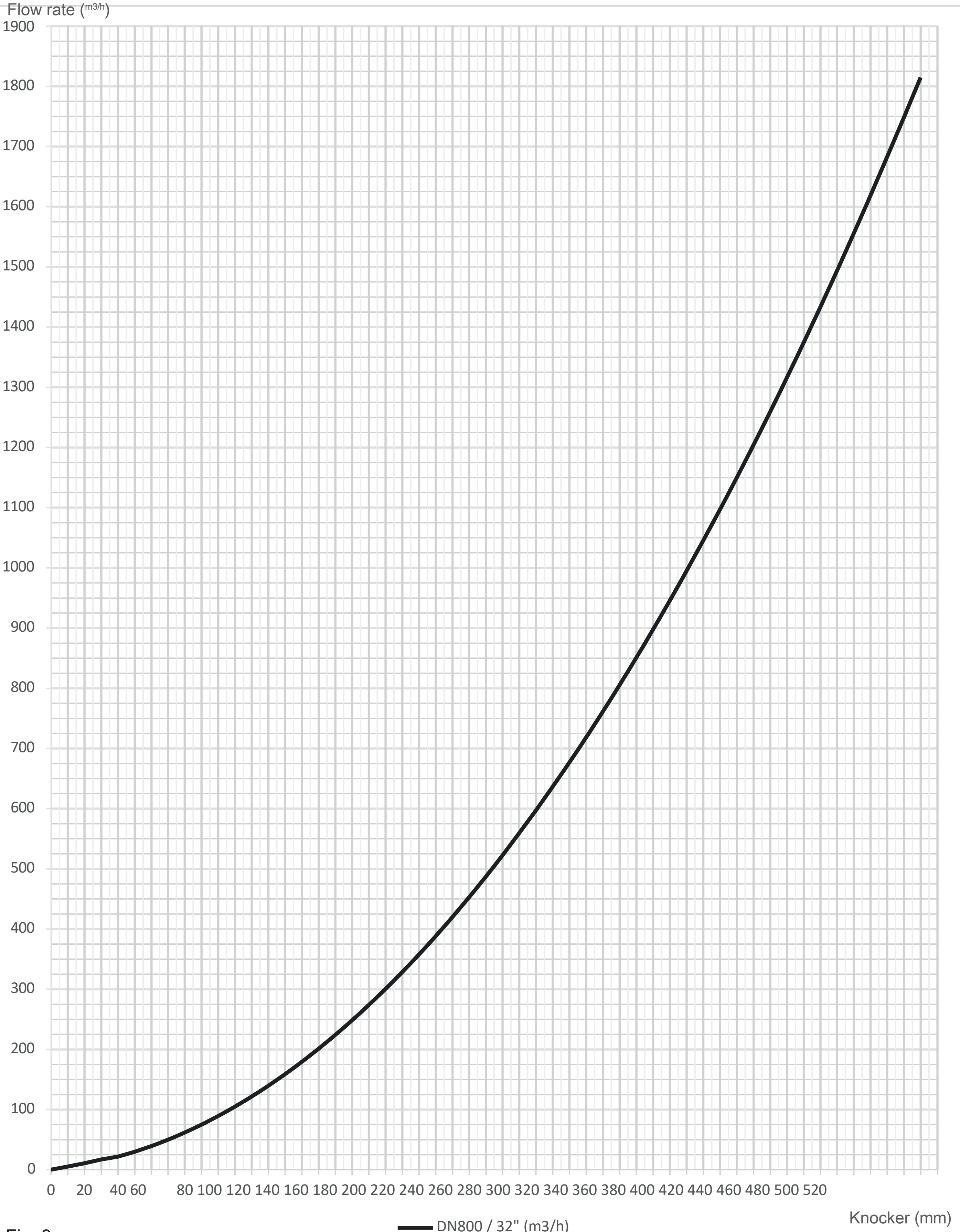
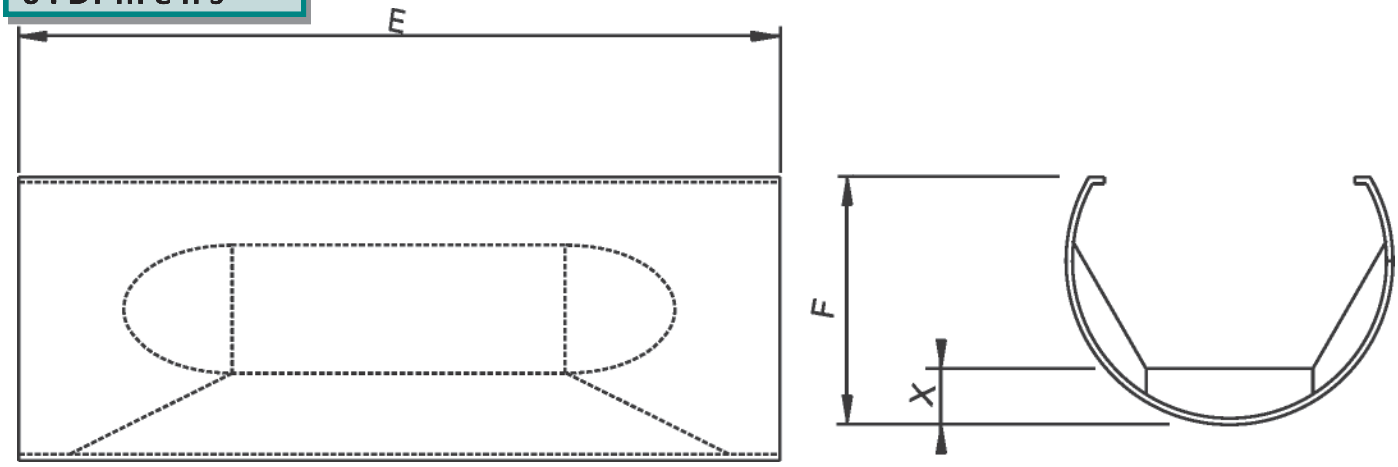


Fig. 9

6. Dimens



	E	F	X
DN100 (4")	250	75	17
DN150 (6")	400	132	29
DN200 (8")	400	125	29
DN250 (10")	600	208	46
DN300 (12")	600	200	46

	E	F	X
DN400 (16")	950	340	75
DN500 (20")	950	325	75
DN600 (24")	1350	530	117
DN700 (28")	1350	525	117
DN800 (32")	1350	500	117

Fig. 10

7. Installation

7.1 Finestra pipe

For mechanical installation, an opening, which we will call a ***window***, must be created at the top of the pipe, which is necessary for the insertion of the **Palmer Bowlus**. The following paragraphs explain how to determine the dimensions of the window.

7.1.1 Minimum window length (*L*)

The following dimensions must be taken into account to determine the minimum value of length '*L*' (see fig.12-a/b):

a) dimension '*E*' of the **Palmer Bowlus** channel (see fig.10)

b) distance 'D/2' (pipe Ø/2) that must be between the level measurement sensor and the beginning of the **Palmer Bowlus** itself (see fig.12-a/b)

c) size '*M*' of sensor mounting bracket or bracket (see fig.12-a/b). Calculation

example for a DN400 pipe with PTU50 or PTU51 sensors:

a) dimension '**E**' = **950mm** (see fig.10)

b) dimension '***D/2***' = **200mm** (tube **Ø** 400mm / 2 = 200mm)

c) size "***M***" = **143mm** (in fig.12-a the accessory **835A027R** for **PTU50** and **PTU51**)

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

Calculation example for a DN400 pipe with FLOWMETER sensors:

a) dimension '**E**' = **950mm** (see fig.10)

b) dimension '***D/2***' = **200mm** (tube **Ø** 400mm / 2 = 200mm)

c) dimension "***M***" = **258mm** (in fig.12-b the accessory **835B027R** for **FLOWMETERS**) The minimum value of "***L"*** will be: **950mm+200mm+258mm = 1408mm**

7.1.2 Pipe side wall height (*H*)

The value of the height '***H***' is given in the table in Fig. 11.

N.B. - The base of the height '***H***' must be the inside bottom of the tube (see fig.12-a/b)

	H
DN100 (4")	80
DN150 (6")	120
DN200 (8")	160
DN250 (10")	200
DN300 (12")	210
DN400 (16")	320
DN500 (20")	400
DN600 (24")	480
DN700 (28")	560
DN800 (32")	640

Fig. 11

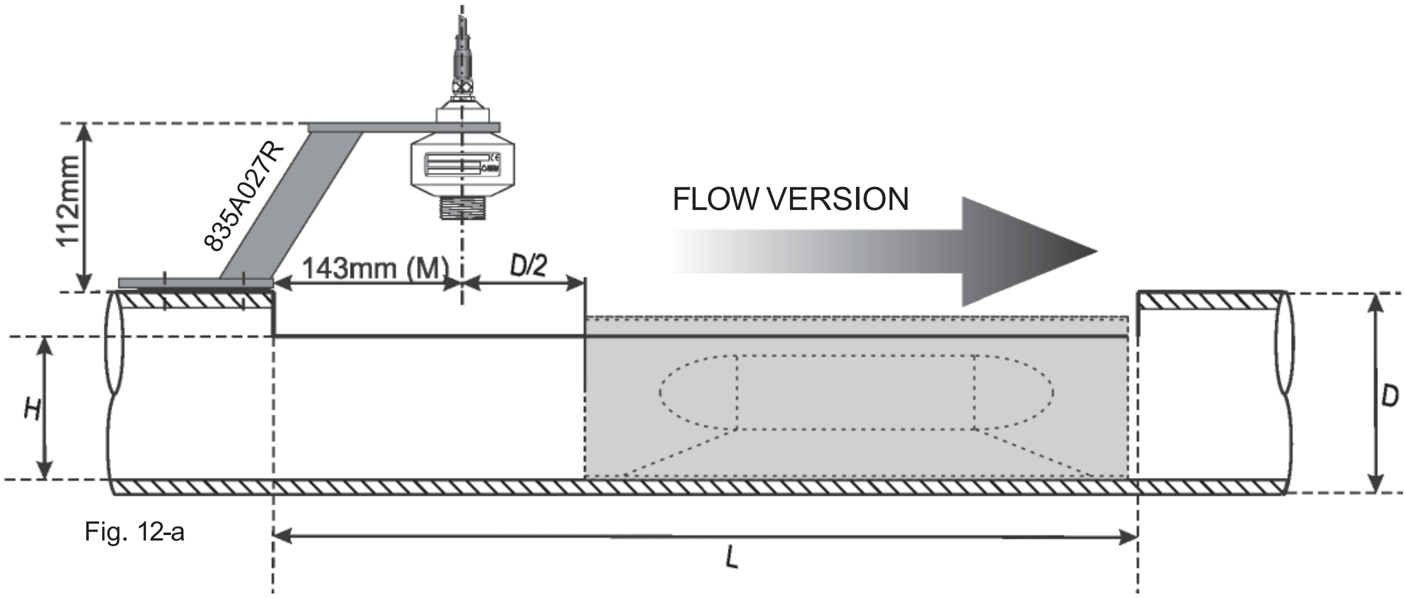


Fig. 12-a

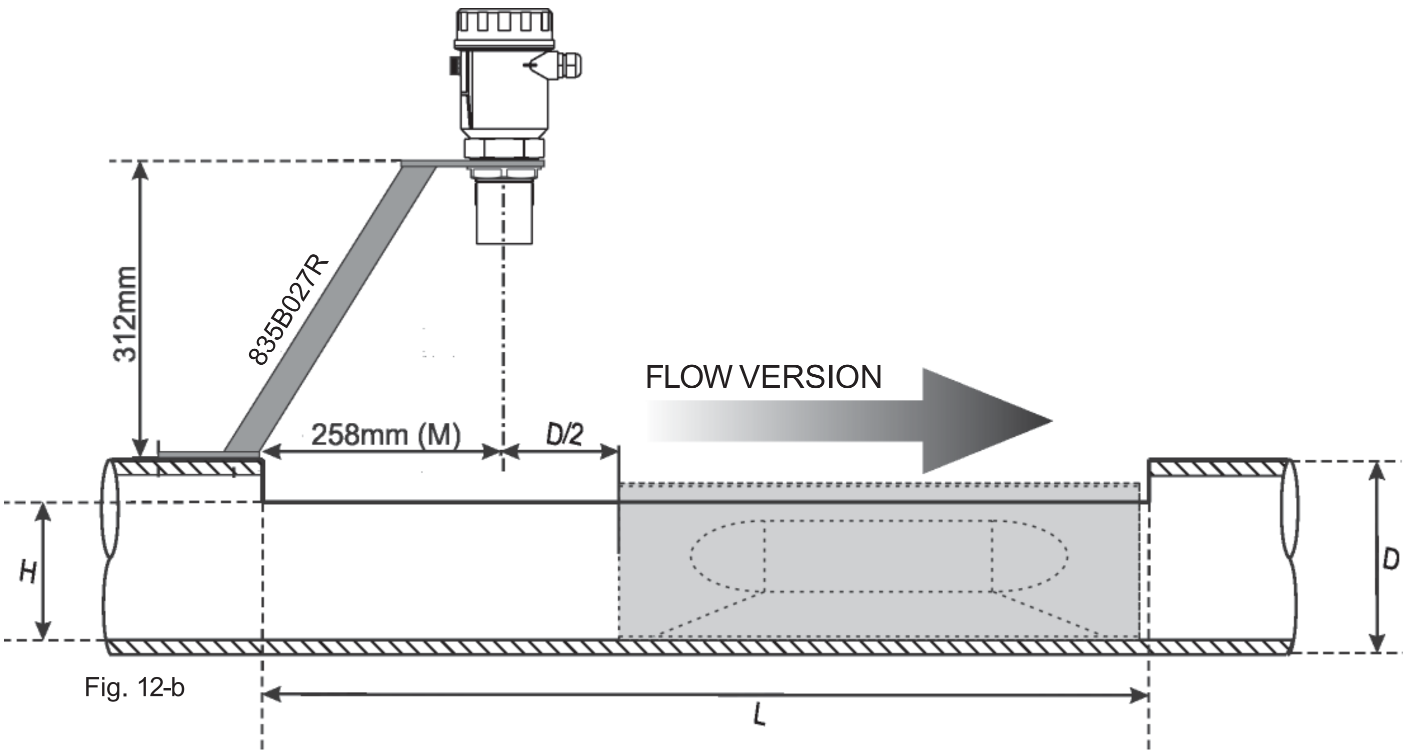


Fig. 12-b

7.2 Inseriment Palmer Bowlus in the pipe

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

a) Rotate the Palmer Bowlus channel by 90° (Fig. 13/A)

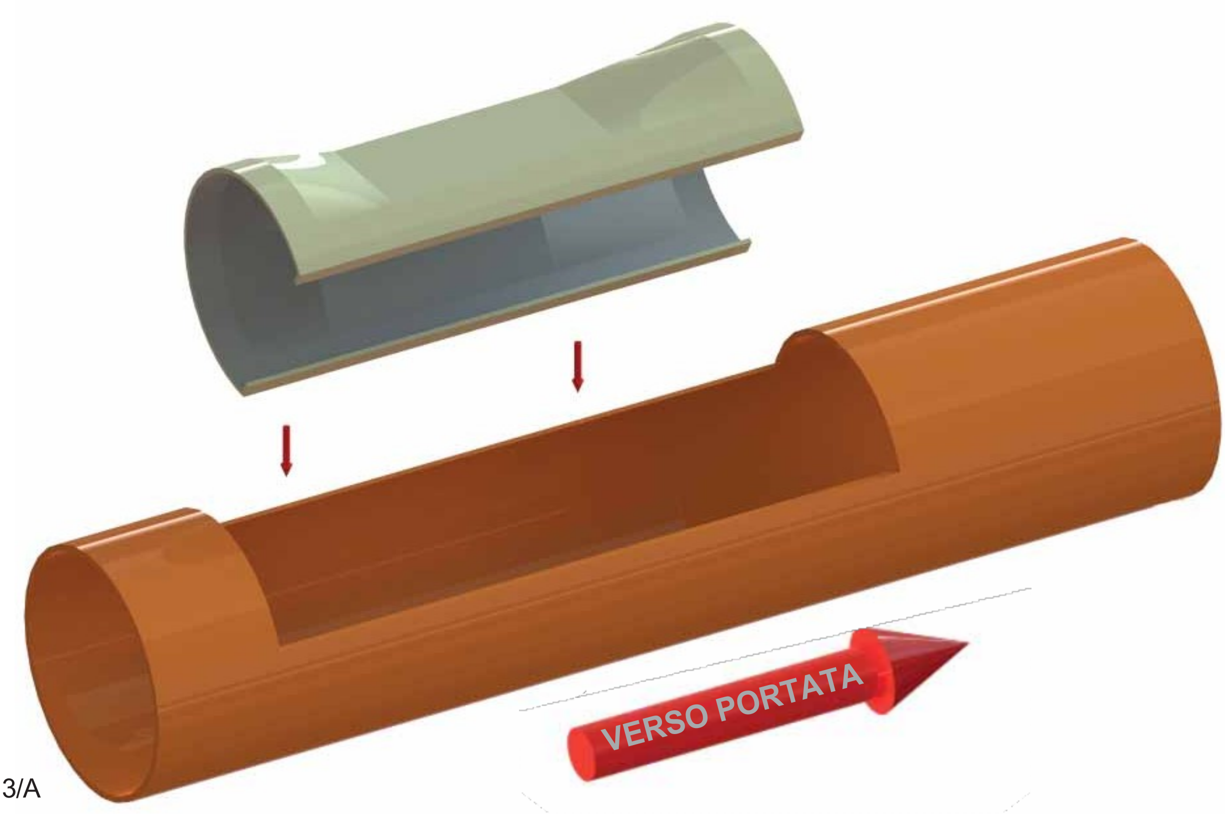


Fig. 13/A

b) insert the Palmer Bowlus to the bottom of the tube and rotate it to position it flat (Fig. 13/B)

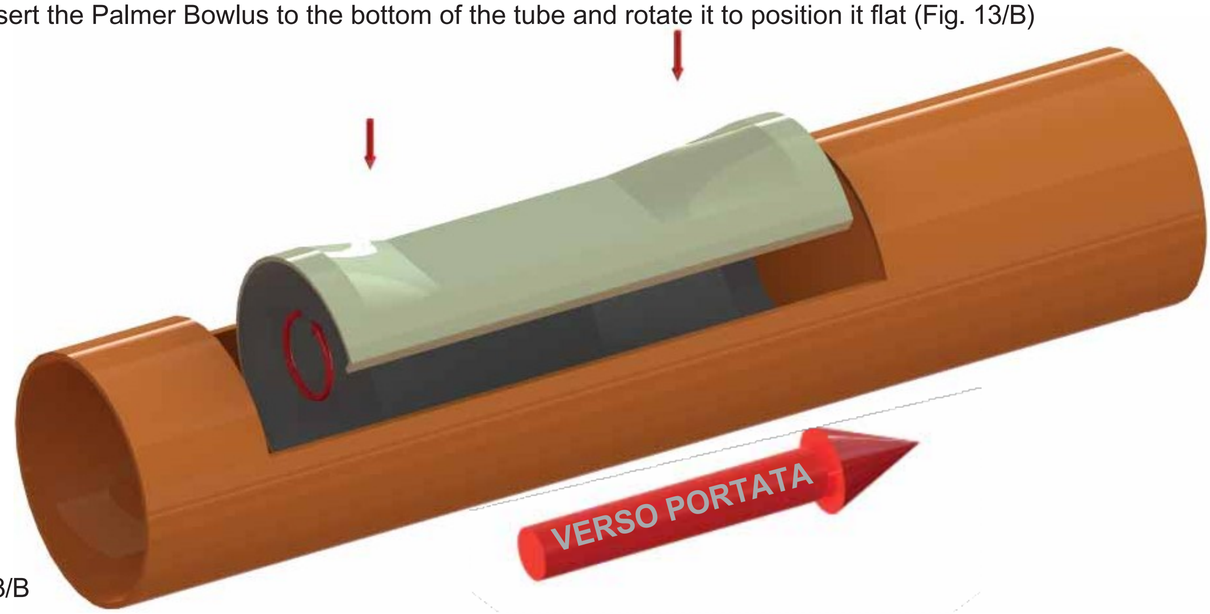


Fig. 13/B

c) slide the Palmer Bowlus into the pipe in the direction of fluid flow (Fig. 13/C), to move it away from the measuring point level at a distance of at least D/2 (fig.12-a/b)

Fig. 13/C

d) seal the contact lines between the Palmer Bowlus channel and the pipe to prevent fluid from flowing under the channel causing an error in flow measurement (fig.13/D)

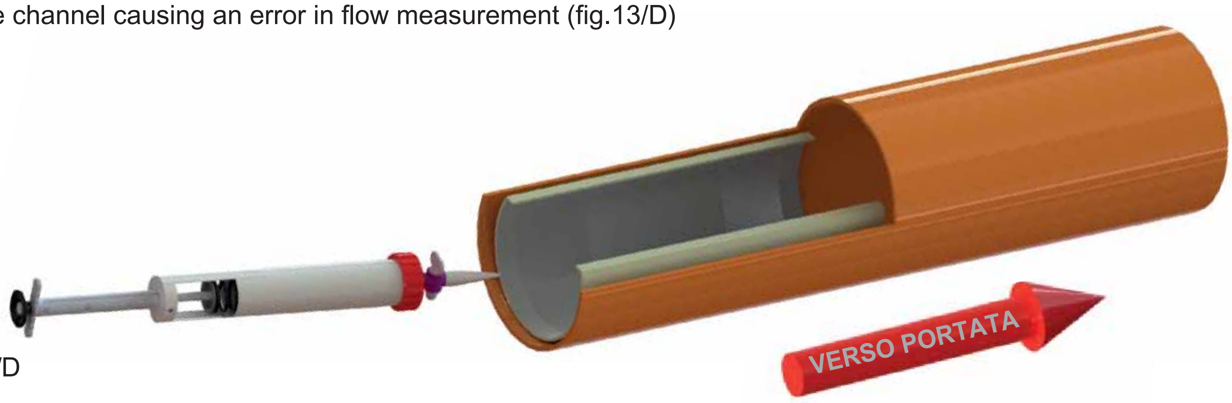


Fig. 13/D

7.2.2 Channels DN200 - DN300 - DN500 - DN800

a) insert the 2 spacers supplied and place the Palmer Bowlus on the bottom of the tube (fig.14/A)

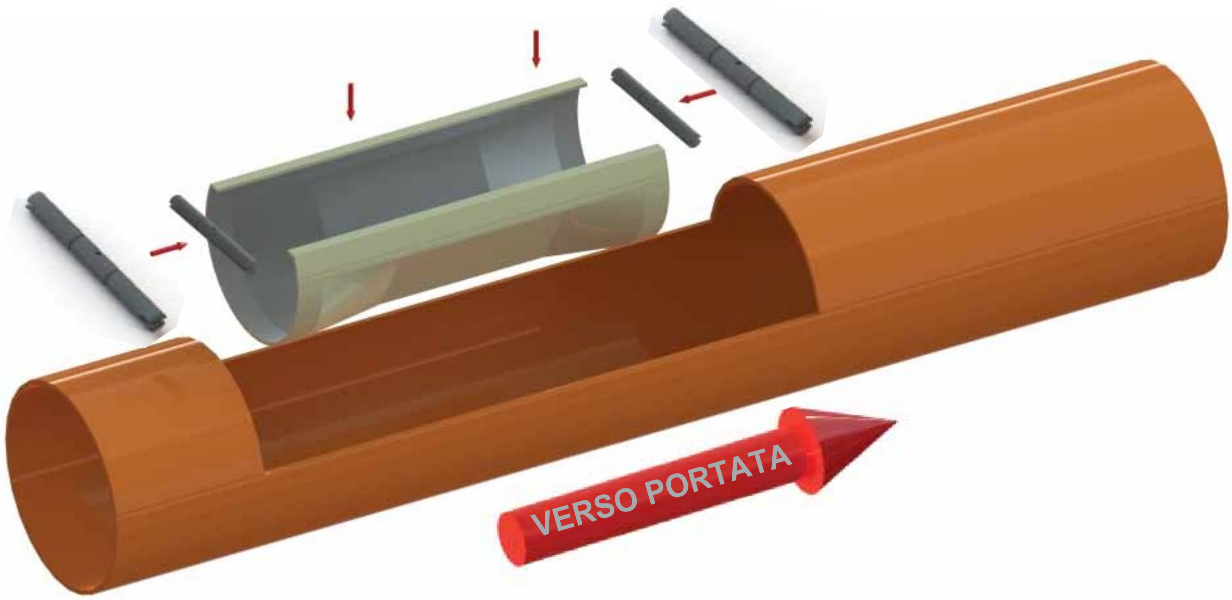


Fig. 14/A

b) slide the Palmer Bowlus in the tube in the direction of fluid flow (fig.14/B), to move it away from the level measuring point by a distance of at least D/2 (fig.12-a/b)

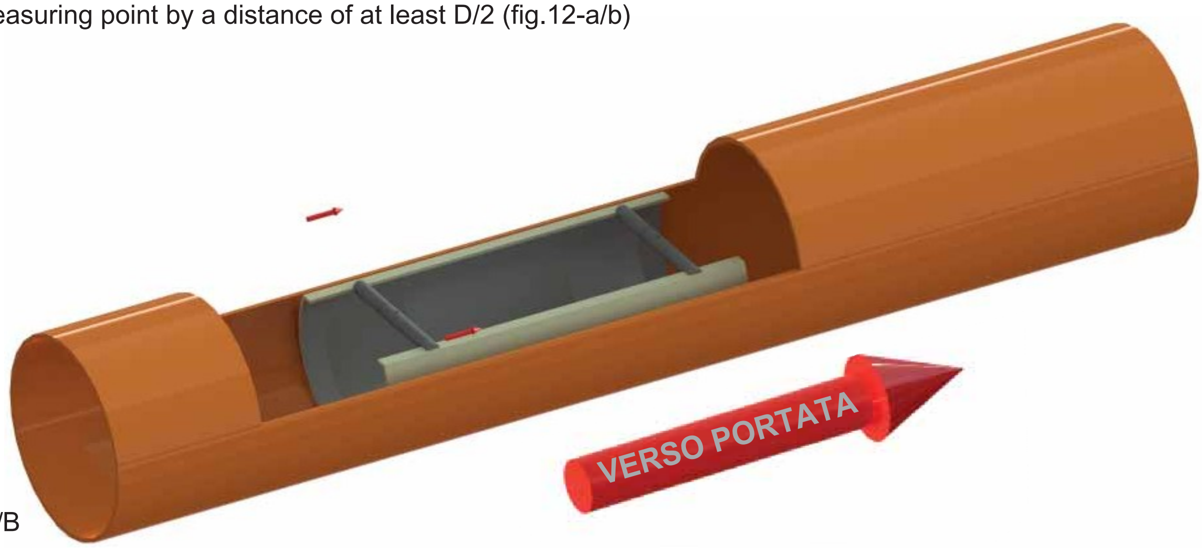


Fig. 14/B

c) Adjust the opening of the spacers (fig.14/C), to adapt the outer diameter of the Palmer Bowlus to the inner diameter of the pipe.

Fig. 14/C

d) seal the contact lines between the Palmer Bowlus channel and the pipe to prevent fluid from flowing under the channel causing an error in flow measurement

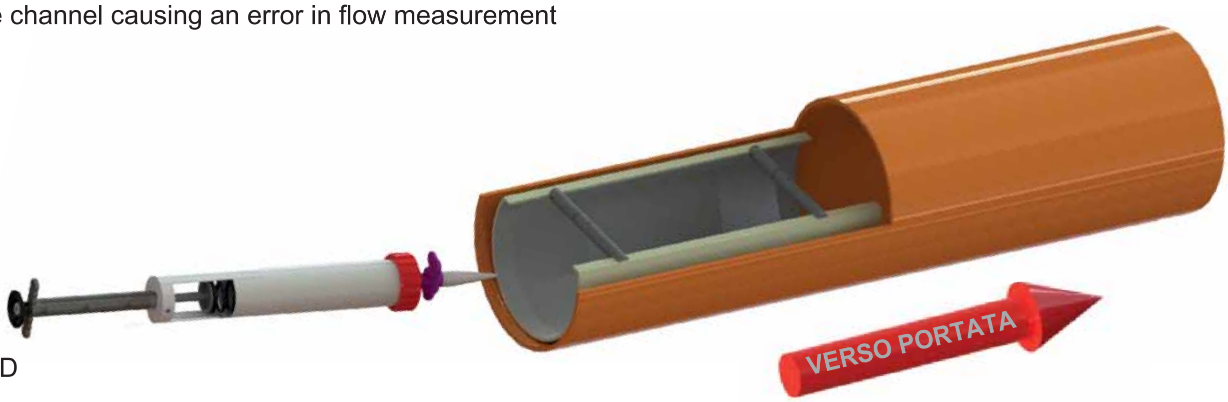


Fig. 14/D

8. Ma nut en z ion

Under normal operating conditions, the **Palmer-Bowlus** channel does not require periodic maintenance.

9 . A cc e ssion

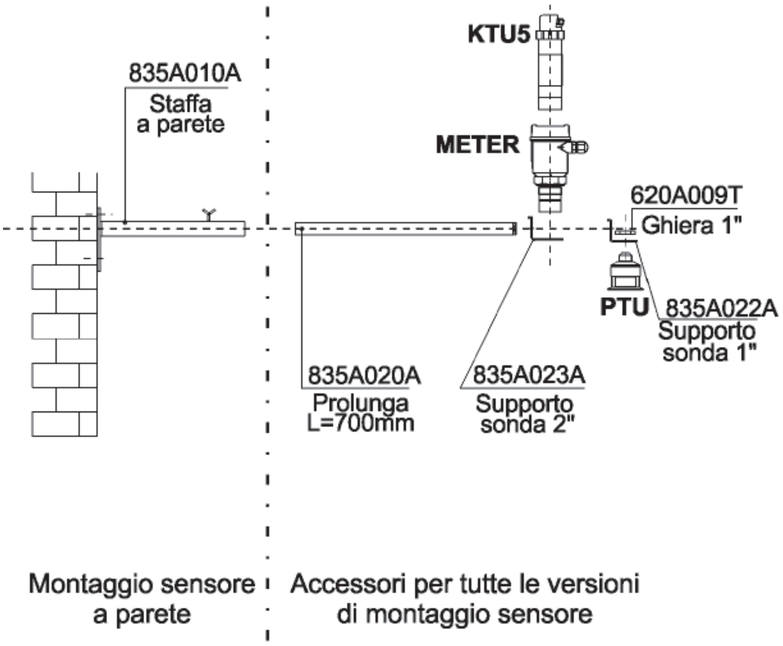


Fig. 15

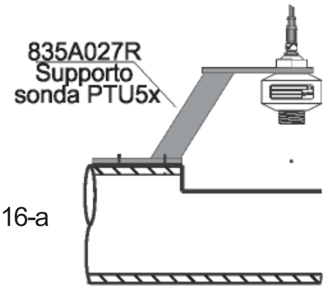


Fig. 16-a

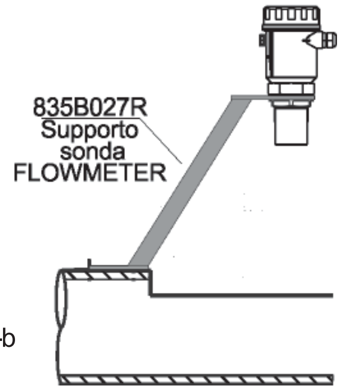


Fig. 16-b

10. RIE L SFlow Measuring Equipment

RIELS has several solutions for open channel flow measurement that can be perfectly matched to our prefabricated **PALMER BOWLUS** channels.

10.1 VLW90M

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

VLW90M PTU50 PTU51 PTU56 METER KTU5

- ***Flow measurements in open channels***
- ***Level and differential level measurements***
- ***Volume measurements***
- ***Control of up to 5 lifting pumps***
- ***MODBUS connection up to 8 ultrasonic sensors + 2 transmitters 4÷20mA***
- ***Large colour display***
- ***Datalogger on USB pendrive***
- ***Data entry via the 5 keys***
- ***IP66 housing for wall, DIN rail or pole mounting***
- ***MODBUS RTU port (RS485)***
- ***Cable length ultrasonic sensor connection up to 1Km***

10.2 FLOWMETER

The application of non-intrusive systems is now favoured in the field of flow measurement. For this reason, RIELS INSTR. has developed the **FLOWMETER** data processing unit to take full advantage of the characteristics of its ultrasonic probes. Together with its compactness, the **FLOWMETER** unit offers easy commissioning. The **FLOWMETER is capable of** processing instantaneous flow measurement and totalisation, with all **Venturi** channels, **Palmer Bowlus**, **Pharshall** and **Standard weirs**, simply by entering the geometric dimensions of the venturi or weir. The calibration of the weir is done by auto acquisition of the 'actual level' value.

- ***Flow measurements in open channels***
- ***24Vdc power supply***
- ***IP67 design; IP68 sensor***
- ***MODBUS RTU communication protocol***
- ***Output: 2 relay outputs***
  1 analogue output 4÷20mA

FLOWMETER