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# Guide for use and customization of controllers mod. C-210, C-310, F 9.02, F 9.50 coupled with FLS-100 sensor for flow rate measure.

Reliability of the system is subject to:

a) Sensor FLS-100 must be supplied with 5÷24VCC stabilized voltage and current < 30mA. If available, we recommend a supply tension of 12VCC to increase life of Hall.
b) A correct positioning of the sensor and its weld-on adapter mod.150S (see related technical sheet)
c) Flow velocity supported by the work range of the sensor (0,15÷8 mt/s); flow velocity must be 0,3÷6 mt/s to obtain an optimal response from the system
d) Flow viscosity between 0,5÷20 cST; 10% maximum percentage sediment, with particle size not exceeding 0,5mm
e) Electrical parts of the sensor can work up to 120°C Max. Sensor body is manufactured with PVC-C/PVDF/INOX AISI 316 material; material and o-ring choice depends on fluid type and working temperature/pressure (see related technical sheet updated according to latest very restrictive CE normative with a 25 years warranty on material).
f) For an easy tuning of the system, table with PPL (Pulse Per Litre) value taken on INOX pipe have been reported, with pipe diameter and thickness; for application with pipe of different material, please ask for proper table.

On C-210, C-310 controller, PPL decimal digit cannot be set, and must be rounded to nearest integer value: this result in an extra measure error.
For medium/high flow velocity and "KF" setting of 1 impulse = 1 litre, use of C-210 controller is not recommended as it has relays output: change factoring ratio (i.e. 1 impulse=10/100 litre) or use a different controller. If thickness value of the pipe is not reported in the table, it is possible to calculate the new PPL value.

**Conversion factor for calculating new PPL value with different internal pipe diameter:**

$$PPL\_NEW = PPL \times \frac{ID^2}{ID\_NEW^2}.$$

*where:*
**ID** = Table value of internal diameter (in mm)
**ID_NEW** = New value of internal diameter (in mm)
**PPL** = Table value of PPL
**PPL_NEW** = New value of PPL, calculated with new internal diameter

***EXAMPLE:***
Nominal Pipe Size (DN) = 40 mm
New internal diameter = 44,7 mm
*Applying formula:*

$$PPL\_NEW = 32{,}74 \times \frac{45{,}3^2}{44{,}7^2} = 32{,}74 \times \frac{2052{,}09}{1998{,}09} = 33{,}62$$

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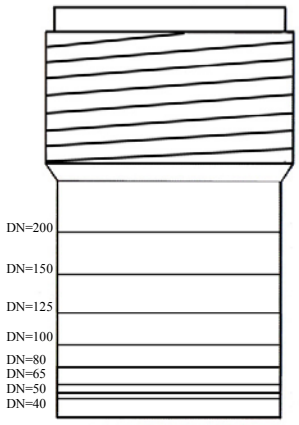
# Table of "PPL" value for INOX AISI316 pipe, with FLS sensor, mod.150S-FP adapter and C-210, C-310, CNT-03 controller.

| Nominal Diameter DN (mm) | Internal Diameter Thickness 1,5 mm | "KF" to be set on controller to obtain on output 1 Impulse = | | | |
|---|---|---|---|---|---|
| | | 1 litre | 10 litres | 100 litres | PPL |
| 40 (48,3) | 45,30 | 33 | 327 | 3274 | 32,74 |
| 50 (60,3) | 57,30 | 21 | 214 | 2145 | 21,45 |
| 65 (76,1) | 73,10 | 13 | 129 | 1289 | 12,89 |
| 80 (88,9) | 85,90 | 9 | 89 | 886 | 8,86 |
| 100 (114,3) | 111,30 | 5 | 48 | 483 | 4,83 |
| 125 (139,7) | 136,70 | 3 | 31 | 314 | 3,14 |
| 150 (168,3) | 165,30 | 2 | 21 | 210 | 2,10 |
| 200 (219,1) | 216,10 | 1 | 12 | 121 | 1,21 |

| Nominal Diameter DN (mm) | Internal Diameter Thickness 2 mm | "KF" to be set on controller to obtain on output 1 Impulse = | | | |
|---|---|---|---|---|---|
| | | 1 litre | 10 litres | 100 litres | PPL |
| 40 (48,3) | 44,30 | 34 | 342 | 3423 | 34,23 |
| 50 (60,3) | 56,30 | 22 | 222 | 2221 | 22,21 |
| 65 (76,1) | 72,10 | 13 | 132 | 1325 | 13,25 |
| 80 (88,9) | 84,90 | 9 | 91 | 906 | 9,06 |
| 100 (114,3) | 110,30 | 5 | 49 | 491 | 4,91 |
| 125 (139,7) | 135,70 | 3 | 32 | 318 | 3,18 |
| 150 (168,3) | 164,30 | 2 | 21 | 212 | 2,12 |
| 200 (219,1) | 215,10 | 1 | 12 | 122 | 1,22 |



150S-FP ADAPTER

On weld-on adapter mod.150S-FP are present 8 reference lines, corresponding to pipe internal diameter, from DN=40 to DN=200.
To obtain a correct assembling of the adapter, the reference corresponding to the nominal pipe diameter, must be aligned to the internal pipe edge.
To get the immersion level of the adapter with known nominal diameter of the pipe, you can use the formula:
*H = (0,12 x DN) + 3,5 mm*

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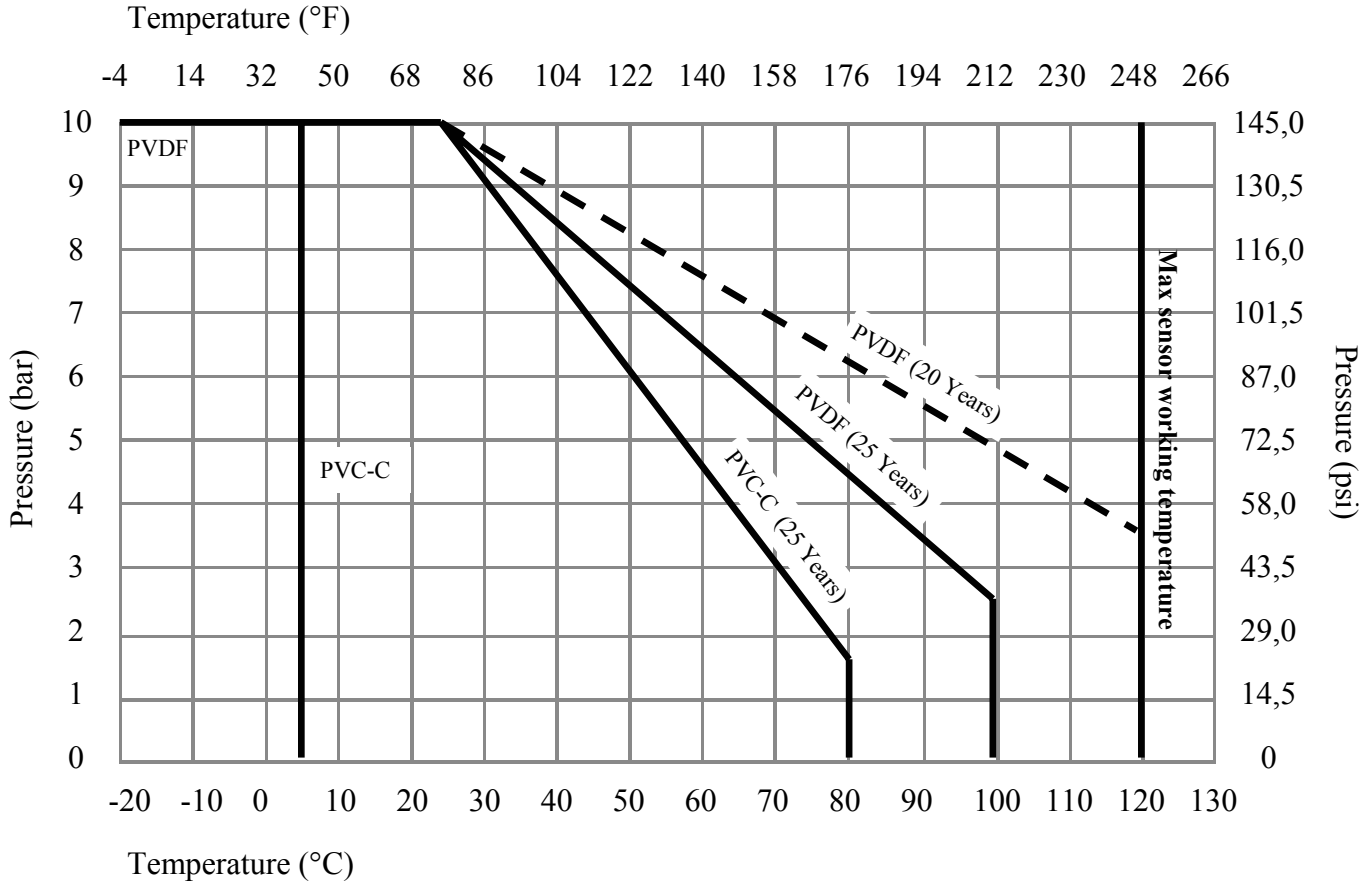
# Working Pressure/Temperature report (25 years life)

FLS-100 sensor

- PVC-C body
  - 10 bar (145 psi) at 25°C (77°F)
  - 1,5 bar (22 psi) at 80°C (176°F)
- PVDF body
  - 10 bar (145 psi) at 25°C (77°F)
  - 2,5 bar (36 psi) at 100°C (176°F)
  - 3,5 bar (51 psi) at 120°C (248°F) (20 years life)
- INOX316 body
  - 25 bar (363 psi) at 120°C (248°F)



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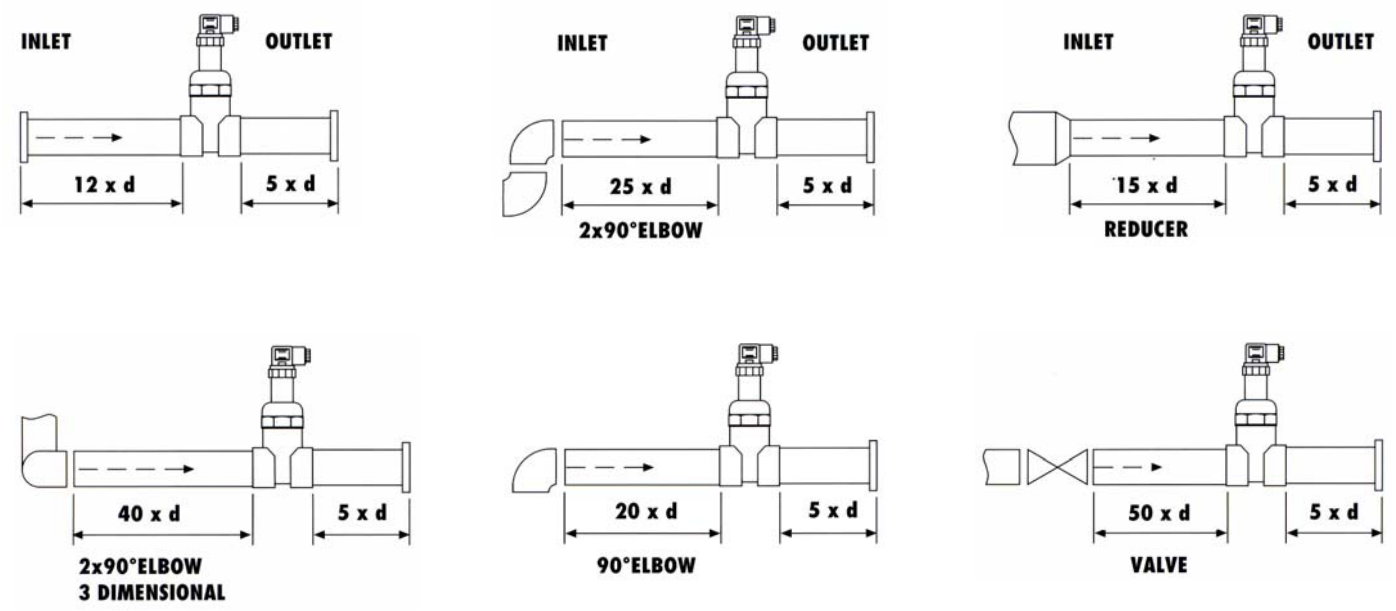
# INSTALLATION OF FLS-100 SENSOR

Inlet and Outlet Sections (DIN 1952).
Different piping configurations and obstacles in the flow line such as valves, elbows, pipe bends and strainer create varying amounts and profiles of disturbance and therefore they require different lengths of straight pipe to smooth the flow according to DIN-1952.
To ensure that all the FLS sensors can work to their full capability it is necessary to follow the DIN-1952 installation instructions whenever possible.

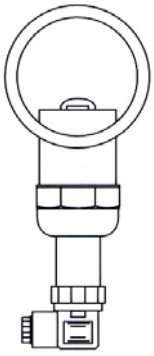



**Note:**
Make sure that the pipe line is always full and without air bubbles

## ASSEMBLING POSITIONS

- Fig. l: installation with no sediment present
- Fig. 2: installation with no air pockets present
- Fig. 3: installation if sediment or air pockets are present

**FIG. 1**



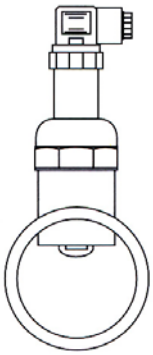


**FIG. 2**

**FIG. 3**