FLOW NO FLOW

Solids Flow Detection

USER MANUAL

SUMMARY

PO Box 799
Shalimar, FL 32579 USA

1 GENERAL

1.1 DESCRIPTION

Flow No Flow sensor has been specifically developed for solid flow detection into metallic closed pipes.

Flow No Flow is a sensor easy to install which fits all type of pipes.

This document describes the procedure for mounting the sensor and its connection. It also describes **Flow32** software and the procedure to calibrate the sensor.

1.2 DELIVERY PACKAGE

The **Pack Flow No Flow** is composed of the following elements:

  Compact Version	Flow No Flow sensor*.
	A half-bushing to weld on the pipe*.
	One 5m cable*.
	One USB cable (1.5m)*.
	Flow32.exe software*.
	One User Manual

*: Images of different elements are not contractual. They may vary depending on the model of the sensor.

1.3 OPERATING PRINCIPLE

Sensor is mounted on the pipe. It is necessary to drill a hole into the pipe and to weld a Bushing before introducing the waveguide sensor.

Flow No Flow sensor uses Doppler Effect principle to measure quantity of material passing through the pipe.

The principle of operation is as follows: an electromagnetic field is generated in the pipe. Once a particle passes through this field, it reflects a portion of the emitted signal. This reflected signal is measured by the sensor.
The sensor uses this measurement to determine the flow.

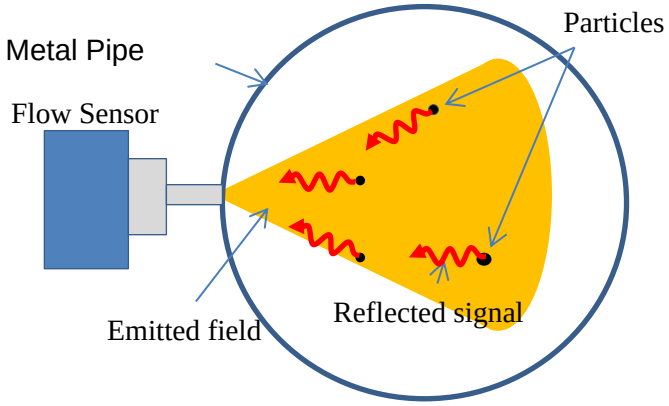


Fig 1. : Principle of Operating

Then, the **Flow32** software is used to parameter the detection threshold of the sensor.

2 SENSOR ASSEMBLY

2.1 MECHANICAL INSTALLATION

2.1.1 EQUIPMENT

- One **drill**.
- One spanner (or adjustable wrench) **SW-18**.
- Welding equipment.
- A depth gauge.

2.1.2 SENSOR POSITION DEFINITION

To ensure the best operating of the sensor, it's required to follow some rules to define the location in the pipe.

- Do not place sensor just before or just after a bend.

  - In the case of free fall pipe, the ideal is to keep a **minimum distance of 1 m** from the falling point.

  - To avoid any raising product in the conduit, we recommend positioning the sensor at least **0.5m** above the bottom of the conduit.

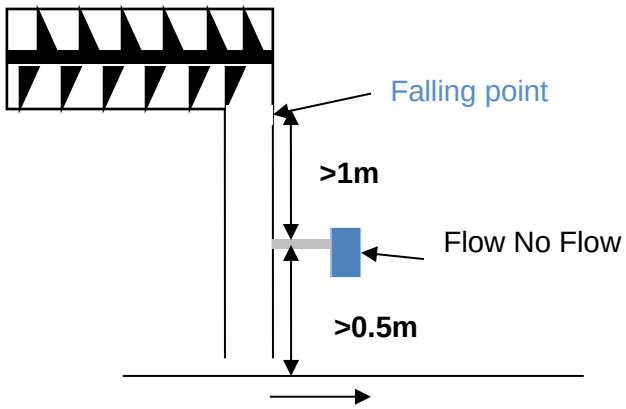


Fig 2. : Free fall

  - In the case of a pneumatic pipe, we recommend to keep a minimum distance equal to **five times the diameter of the pipe between bent and sensor**.

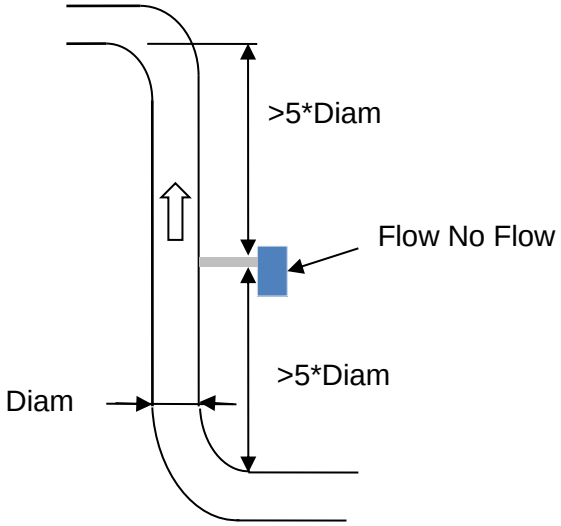


Fig 3. : Pneumatic pipe.

- In the case of horizontal pipe, place the sensor on the upper part of the pipe.

  However, it is strongly recommended to install the sensor in vertical pipe when it is possible.

2.1.3 MOUNTING PROCEDURE

IMPORTANT!

Make sure the pipe is completely empty and does not contain gas. In addition, if the pipe is pressurized before the mechanical installation is complete, the sensor may leave its location at high speed and cause serious injury.

During installation, wearing safety equipment is mandatory (safety glasses, protective clothes).

When possible, it's better to have a customized Bushing adapted to the thickness of the pipe.

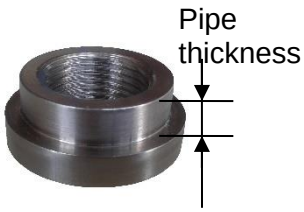


Fig 4. : Custom half-bushing.

If the half-bushing is not customized, the side to weld on the pipe is indicated by a mark.

Fig 5. : Half-bushing without shoulder.

1. Drill a hole diameter slightly greater than the outer diameter of the Bushing.

   In case of customized Bushing, drill a hole diameter slightly greater than the outer diameter of the part of the bushing with the shoulder.

   Make sure the drill hole has no burrs.

2. Positioning the half-bushing (see Package) and weld it to the pipe. It must be welded at 90° relative to the direction of product flow.

   For optimal operation, the sensor head should flush with the inside of the pipe (See Drawing below).

3. Screw the sensor by hand and finish with a spanner. A Teflon seal can be used to get a better sealing.

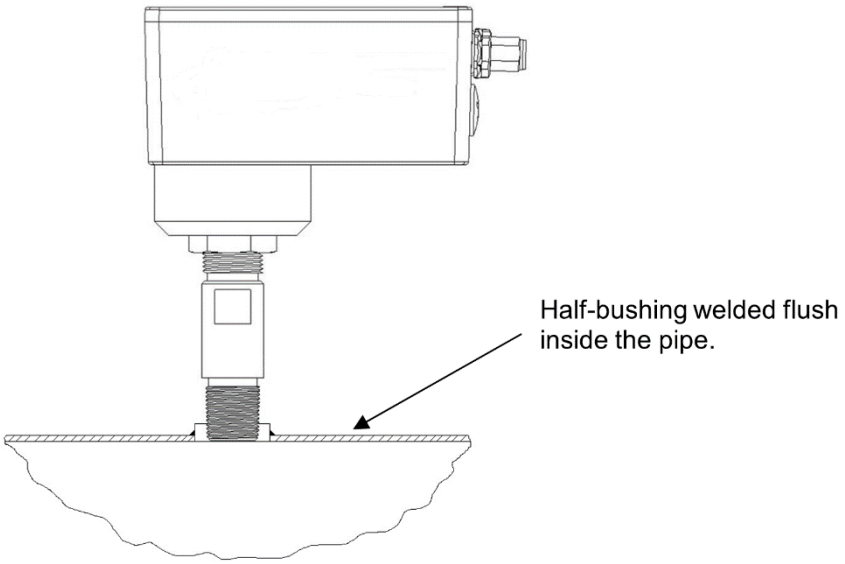


Fig 6. : Flow No Flow mounting.

2.2 ELECTRICAL CONNEXIONS

2.2.1 SENSOR CONNECTORS:

2.2.1.1 Connectors

The sensor has two connectors:

- One **connector M12** for 24 VDC power supply and analog outputs.
- A **mini USB port** used to configure the sensor. It is accessible by removing the protective cap.

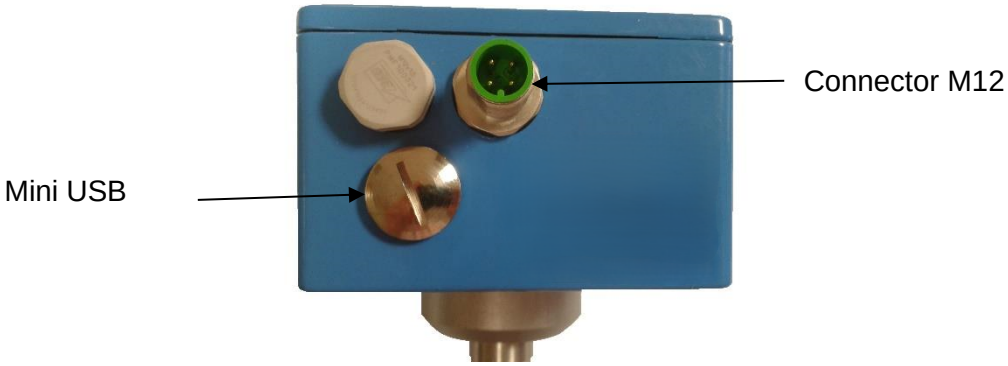


Fig 7. Connectors

2.2.1.2 Cable M12 – 5 pin / Flying leads

Cable is provided in the package (see Package).

Flow NO Flow (Blue Box)			Flow NO Flow compact
Pin #	**Color**	**Description**	**Color**
1	Brown	24VDC	Brown
2	White	Relay +	Yellow
3	Blue	0VDC	White
4	Black	Relay-	Green
-	Yellow/Green	Cable Shield	Yellow/ Green

Fig 8. Cable M12 – 5pts

The cable provides has an extra wire (Yellow/Green) it is necessary **to connect to the ground of the system.**

This connection is important because it will allow the sensor, which used microwave technology, not to be affected by the external environment.

2.2.1.3 Cables section

The minimum section for each cable is **0.25mm²(> AWG23)**.

2.2.1.4 Sensor Wiring (Blue box FNF):

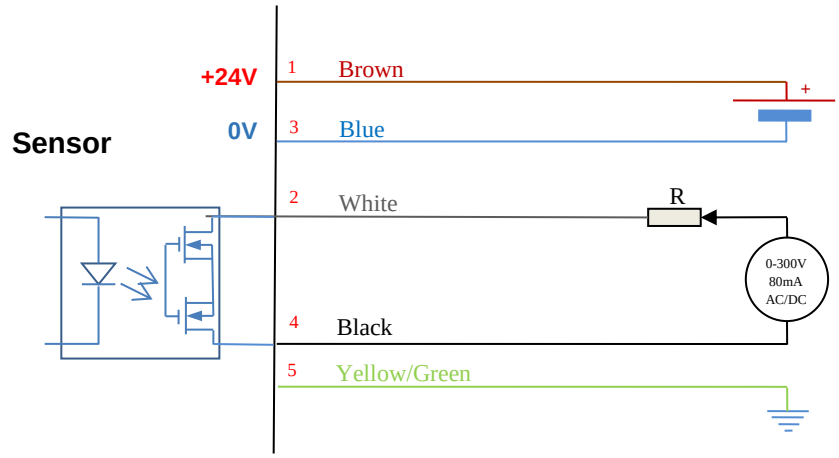


Fig 9. Sensor Wiring

2.2.1.5 Sensor Wiring (FNF compact):

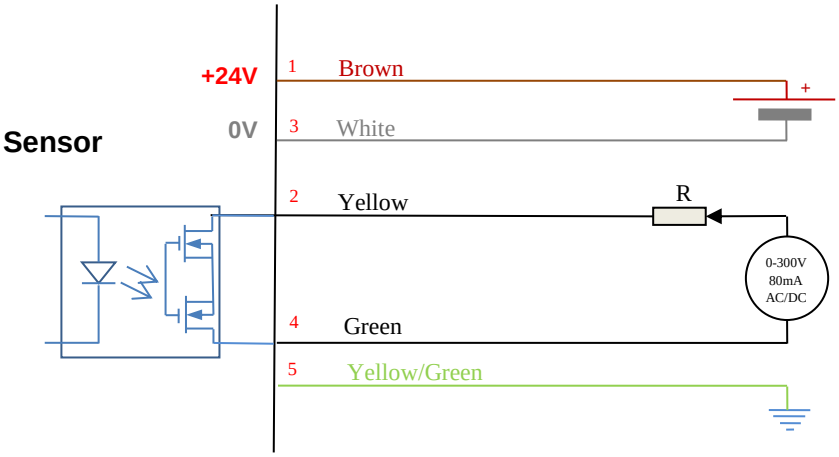


Fig 10. Sensor Wiring

3 FLOW32 SOFTWARE

FLOW32 Software is used to communicate with the sensor. It allows configuring sensor according to customer needs.

Flow32 is provided with delivery package (see Delivery Package).

3.1 INSTALLATION

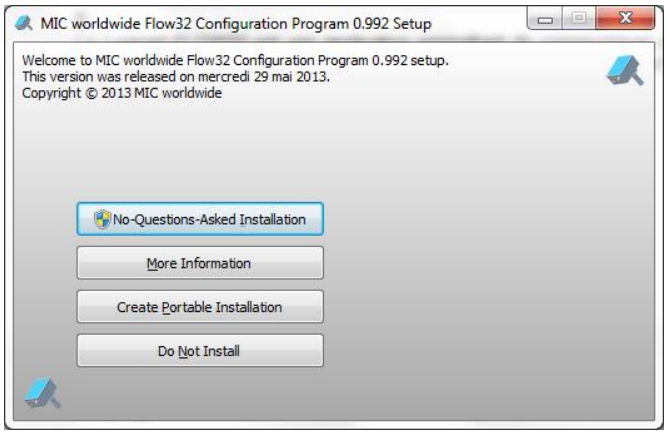
3.1.1 EQUIPMENT

It is necessary to have:

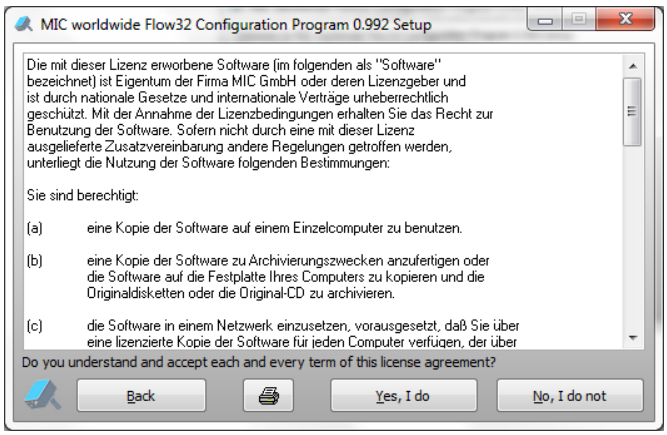
- A PC (Windows XP, Windows Vista, Windows 7, Windows 8) with USB connection.
- The media support (USB stick) containing installation kit (see This document describes the procedure for mounting the sensor and its connection. It also describes **Flow32** software and the procedure to calibrate the sensor.
- Delivery Package).

3.1.2 INSTALLATION PROCEDURE

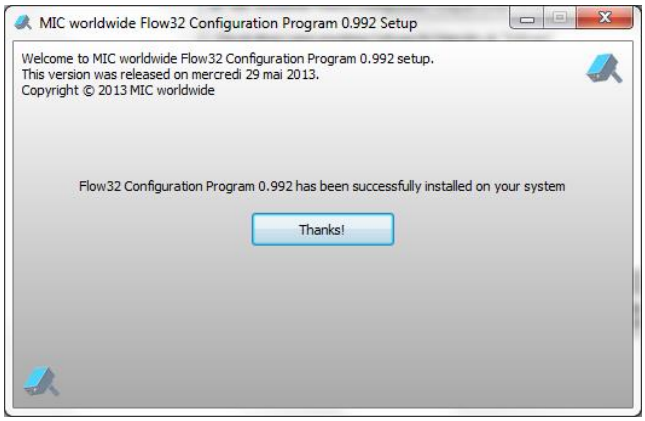
1. Start **Flow32.exe** application. The following window appears :



2. Select « **No Questions Asked Installation** ». The following window appears



3. Click« **Yes, I do** ». The installation takes a few seconds and the following window appears :



4. Click « **Thanks!** », you arrive on Flow32 startup window.

5. Select "**Sprache**" Menu to select English Langage.

Installation is complete. Click on **Close Program**.

4 SENSOR WIRING

4.1 EQUIPMENT

Equipment required is as follow:

- 1 **PC** with Flow32 installed.
- 1 **USB** cable provided in the package.
- 1 Sensor **Flow No Flow**.
- 1 **Power supply 24VDC** to power the sensor.

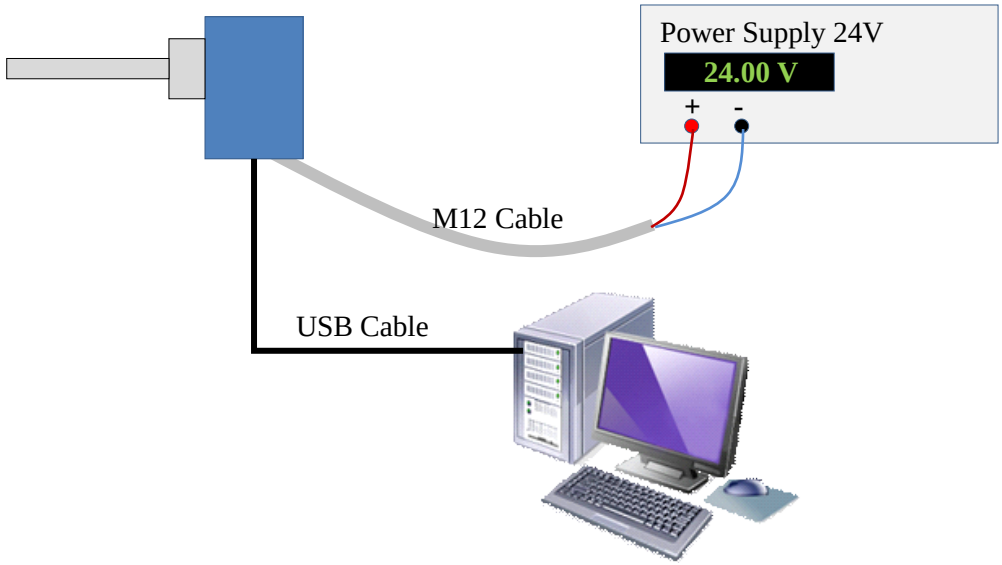
4.2 PROCEDURE

Always respect the order of steps below for proper operation of the sensor.

1. **Turn off the power supply** and **connect the sensor** to power.

2. **Power on** the sensor.

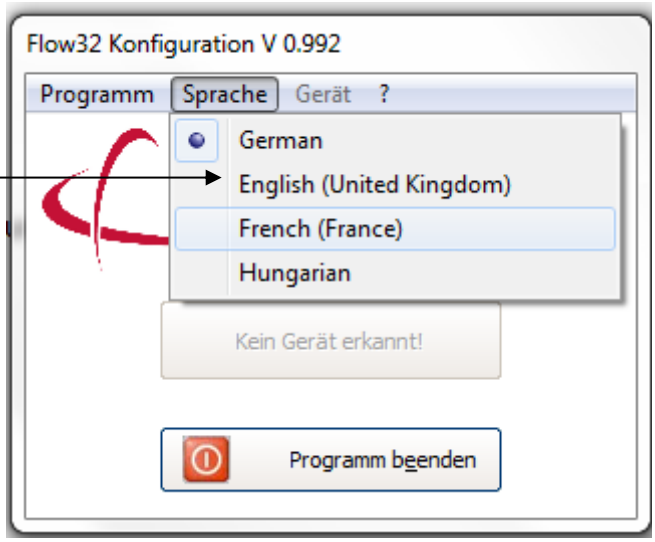
3. **Connect the sensor to the PC** using the USB cable.



5 FLOW32 DESCRIPTION

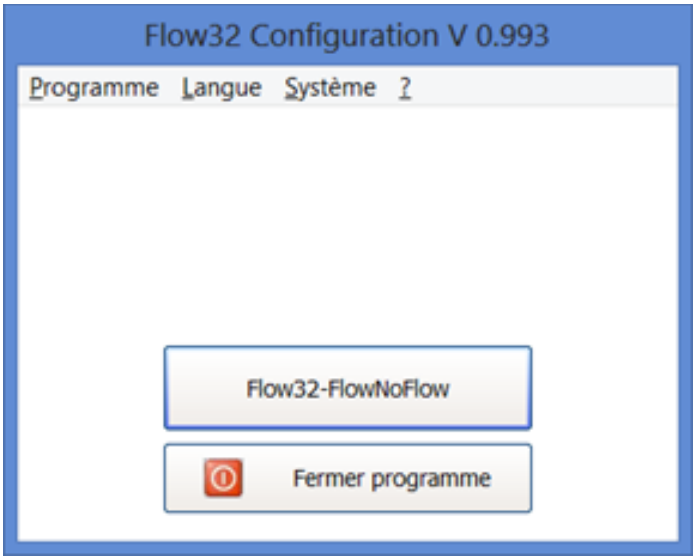
5.1 CONFIGURE FLOW32 IN ENGLISH

From the startup window select the 2nd tab « **English** ».



5.2 START WINDOW

When you click on the program icon, the start windows open, indicating which device is currently connected to the computer.



Four tabs are available:

5.2.1 PROGRAM -> OPTIONS:

In the **Program** tab, you can define path of parameters file.

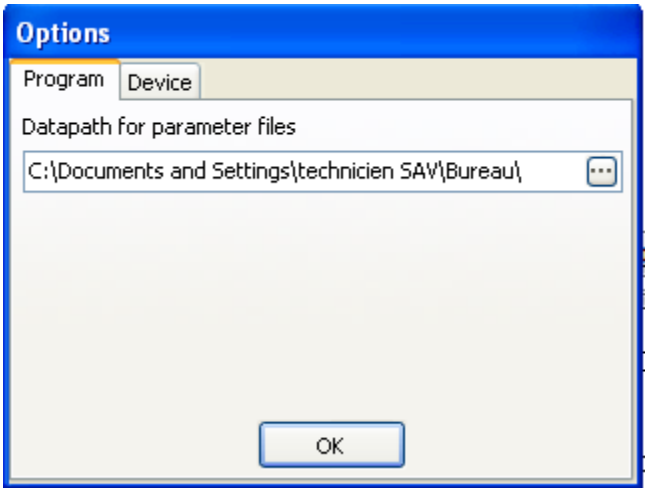


Fig 11. Program->Options->Program

On the **System** tab, you can choose to enable or disable various outputs of the device and the microwave gunn sensor. You can also rename your Device (your Flow No Flow).

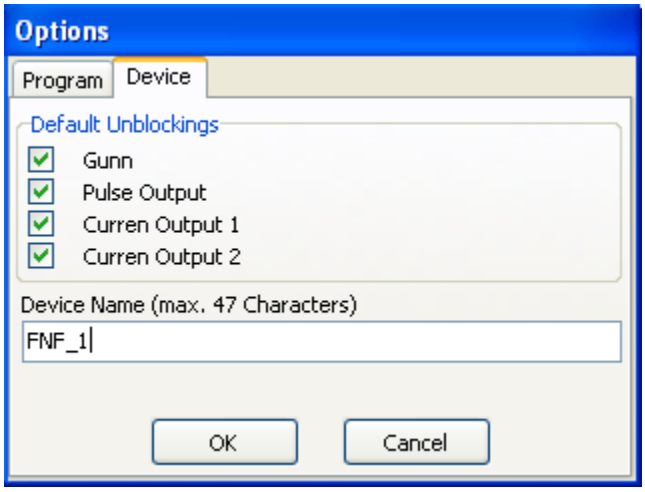


Fig 12. Program->Options->System

5.2.2 LANGUAGE:

It is possible to configure the software in :

- English.
- German.
- French.
- Hungarian.

5.2.3 SYSTEM-> SEE STATUS:

Here you can see the version of the device, its serial number and its internal information (temperature, supply voltage….)

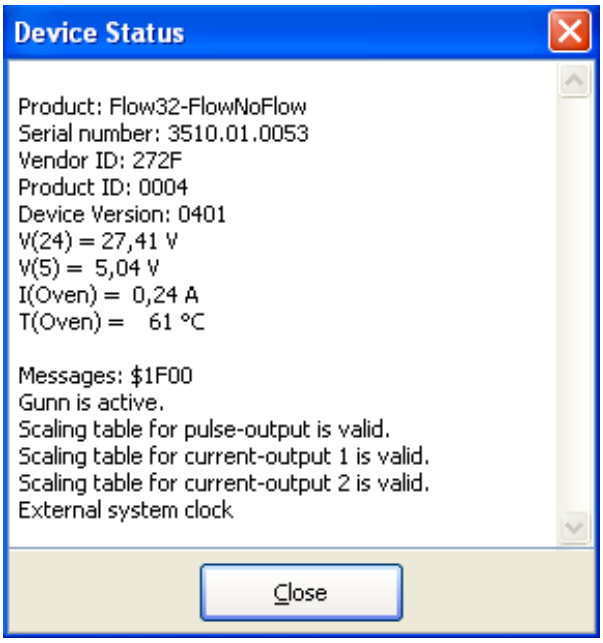


Fig 13. System->see status

5.2.4 TAB HELP (?):

This tab allows you to access to the help menu of the software

5.3 MAIN WINDOW

From the start screen, click on button « **Flow32 – FlowNoFlow** ».

A new window appears, it is the main calibration window of the connected device:

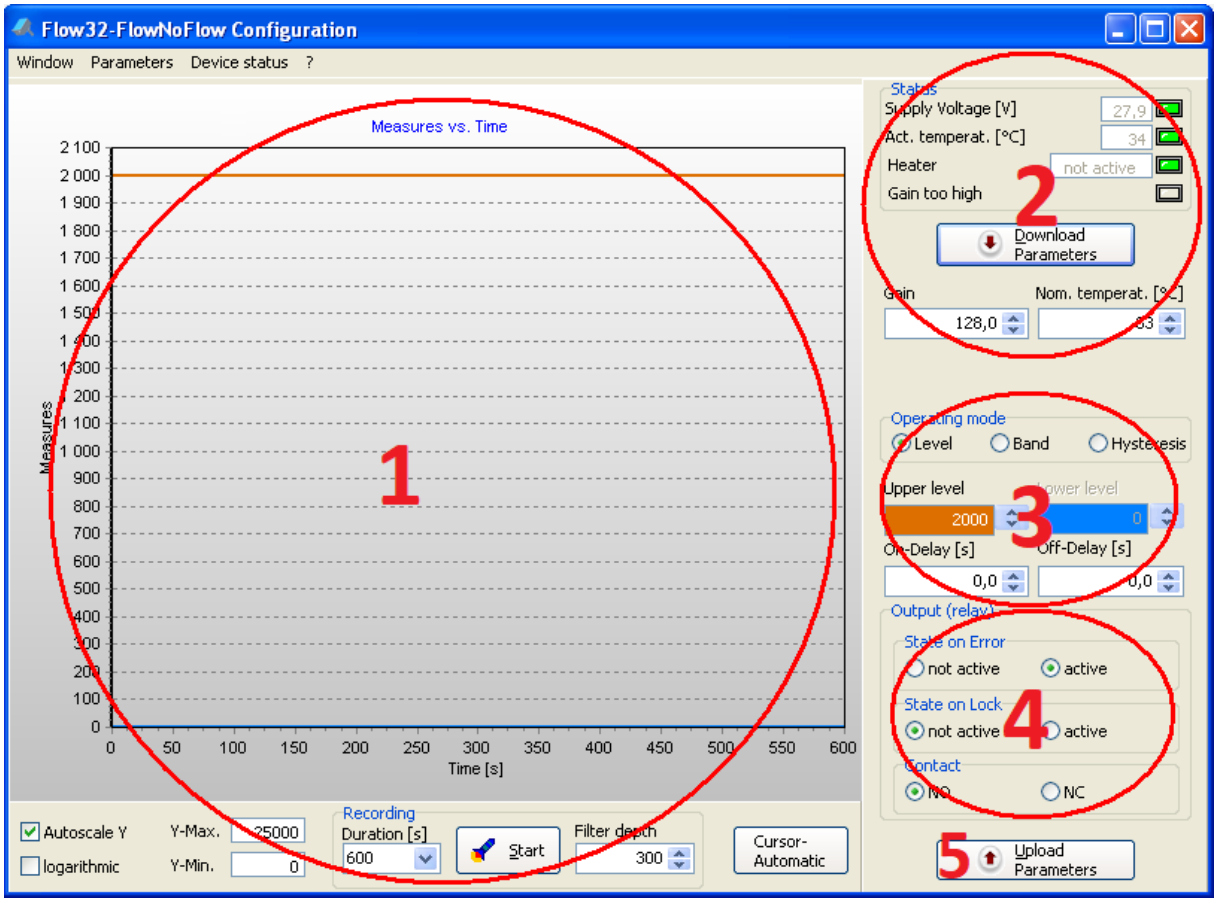


Fig 14. Main window

The window is divided into several parts:

- Graphic (1).
- Status / Gain and Nominal temperature parameters (2).
- Operating mode (3).
- Relay parameters (4).
- Parameters saving button (5).

5.4 GRAPHIC:

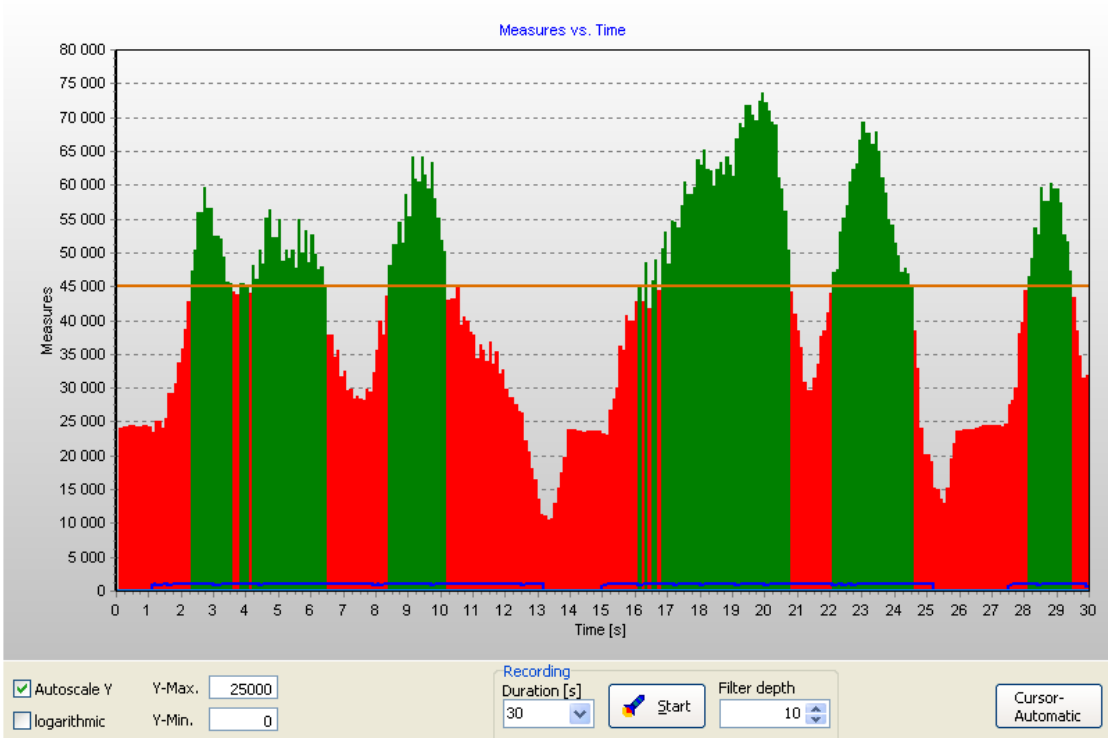


Fig 15. The graphic

It allows you to view the raw signal measured by the device over time.

- The **« Auto Y »** button defines if the scale of gross value (left) must be adjusted automatically or manually, in which case it is necessary to define the minimum scale value in fields **« Y-Max » and « Y-Min »**.

- The **« Logarithmic »** button displays the values of the graph on a logarithmic scale.

- **« Duration [s] »** defines the duration of recording (from 20s to 10mn).

- **« Start »** button starts measurement.

- **« Filter depth»** allows averaging the measures (1-500). It shows the number of previous measurements used to calculate the measured value.

  Ex: 1 No filtering
  10 The sensor averages on the 10 last measured samples.

- « **Cursor-Automatic** » calculates the average of all measurements displayed and sets the bar(s) threshold:
  - For « **Level** » operating mode, the level is set to the calculated average
  - In other modes, the upper line (orange) is fixed to the average value + 10%, the lower line (blue) is fixed to the average -10%.

5.5 SENSORS STATUS:

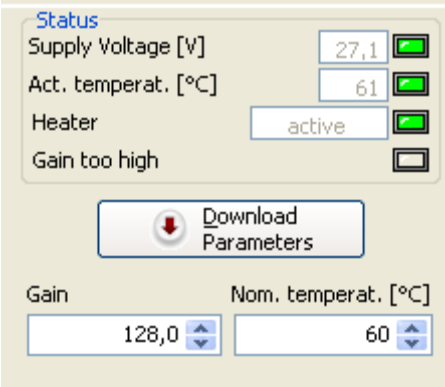


Fig 16. Status lights

Status gives several information about the device:

- **The supply voltage** being provided to the sensor: if the voltage is within the range tolerated by the sensor, a green light is on. If the voltage is too low or too high, the light will turn red.

- **Act temperature** of the device: it can be manually set in the field **« Nom Temperat. [°C] »**. We recommended to set the nominal temperature to **60°C**. Thus, the device constantly adjust his internal temperature to reach nominal temp.

- **Heater**: shows whether the Device is heating to reach nominal temperature (green light) or not (red light).

- **Gain too high**: The indicator lights red when the signal saturates due to too much flow. However, if the signal is too weak, it is possible to adapt the gain by increasing the value in the « **Gain** » field.

- The button « **Download parameters »** allows to retrieve calibration parameters currently stored in the connected sensor.

- **Gain**: allows amplification of the signal (from 1 to 256).

5.6 OPERATING MODE:

These buttons are used to select the relay switching behavior of the sensor:

5.6.1 LEVEL

In this mode, a threshold ("High Level") is defined depending of the amount of product to detect.
Above this level, the relay is active, the curve turns green.
Below this level, the relay is off, the curve becomes red.

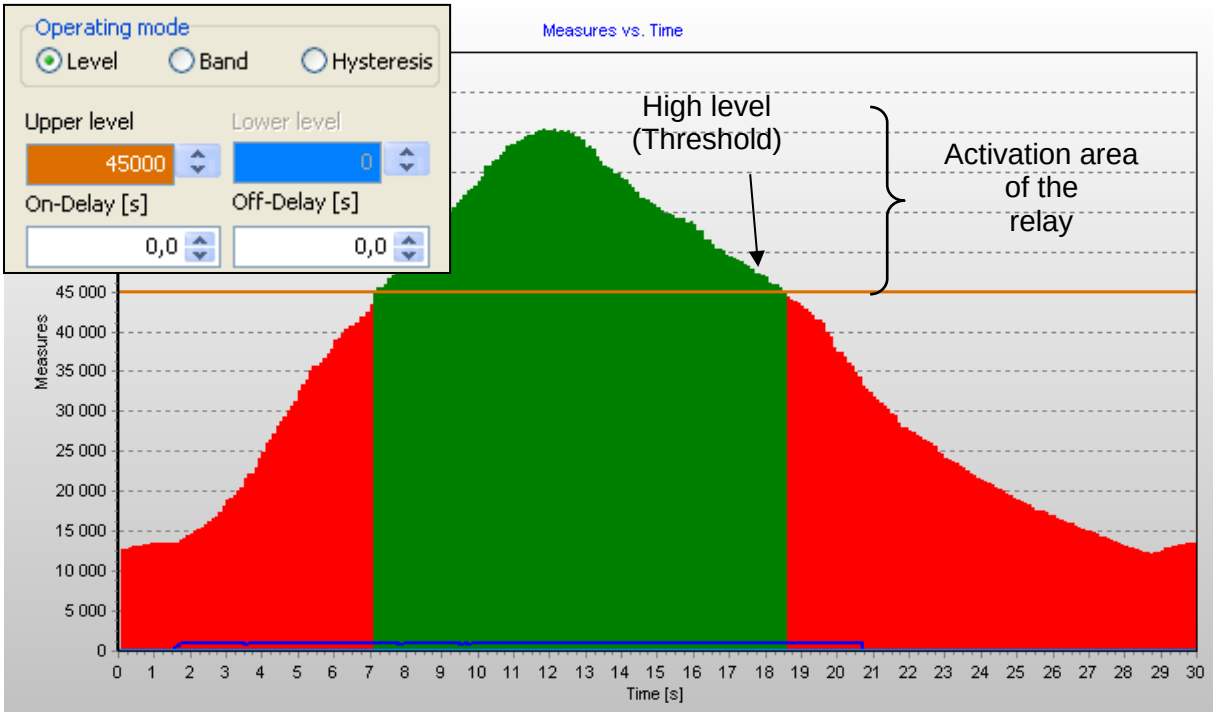


Fig 17. « Level » operating mode

« **On-Delay** » and « **Off-Delay** » control a delay (sec) in the change of state of the relay output. These limits are applied only after a switching state.
« **On-Delay** » corresponds to the activation of the relay output.
« **Off-Delay** » corresponds to the deactivation of the relay output.

5.6.2 BAND

This mode can be used to define an operating area.
Two limits are defined: an upper limit ("**Upper Level**") and a lower limit ("**Lower Level**"). You cannot adjust the upper level below the lower level.

When the amount of product is detected between these levels the relay output is activated, the curve is green.
Outsides these limits, relay output is disabled, the curve is red.

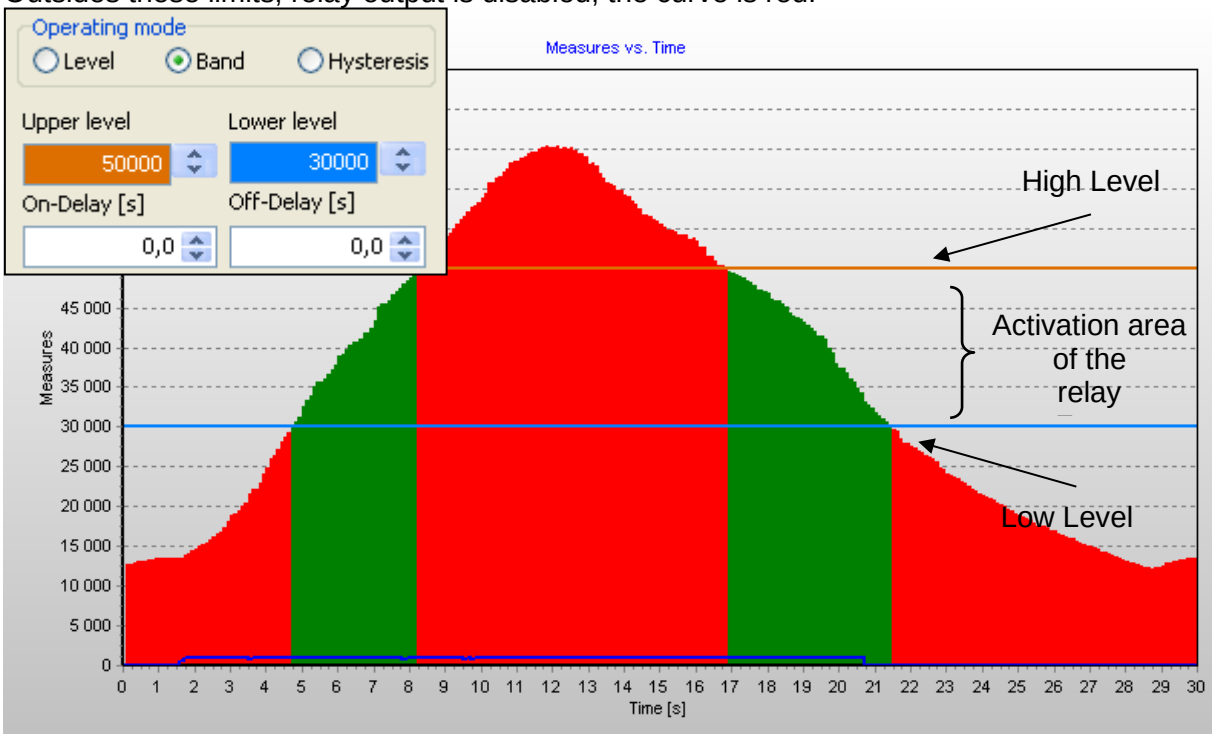


Fig 18. Operating Mode « Band »

« **On-Delay** » and « **Off-Delay** » control a delay (sec) in the change of state of the relay output. These limits are applied only after a switching state.
« **On-Delay** » corresponds to the activation of the relay output.
« **Off-Delay** » corresponds to the deactivation of the relay output.

5.6.3 HYSTERESIS

The hysteresis mode activates the relay when the detected amount of product crosses "**High Level**" and turns it off when it crosses the "**Low Level**".

Two limits are defined, an upper limit ("**High Level**") and a lower limit ("**Low Level**").

You cannot adjust the upper level below the lower level.
The curve is green when the relay output is activated.
The curve is red when the relay output is deactivated.

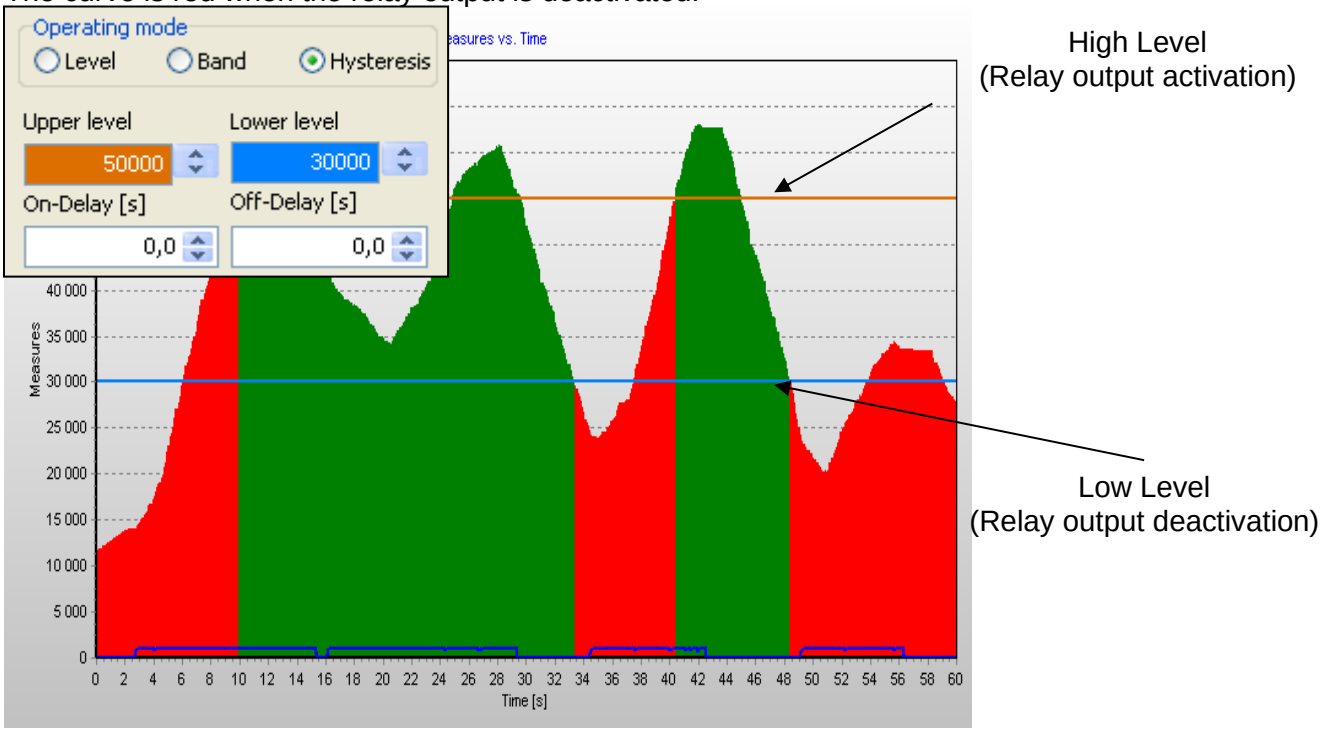


Fig 19. « Hysteresis » operating mode

« **On-Delay** » and « **Off-Delay** » control a delay (sec) in the change of state of the relay output. These limits are applied only after a switching state.
« **On-Delay** » corresponds to the activation of the relay output.
« **Off-Delay** » corresponds to the deactivation of the relay output.

5.7 RELAY OUTPUT SETTING

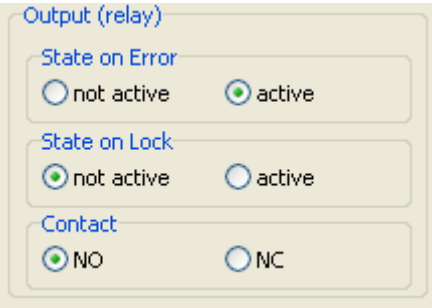


Fig 20. Relay output setting

« **State on error** »: This option determines the behavior of the relay if an error occurred.

« **State on Lock** »: This option determines the behavior of the relay when it is locked.

« **Contact** » allows to select how has to be the contact when the relay output is active (NO ; Normally Open, NC: Normally closed).

5.8 SAVING PARAMETERS

To save the parameters in the device, you have to click on the button 

When it flashes in green, it means that one of the parameters has been modified but has not been yet stored in the device.

6 CALIBRATION

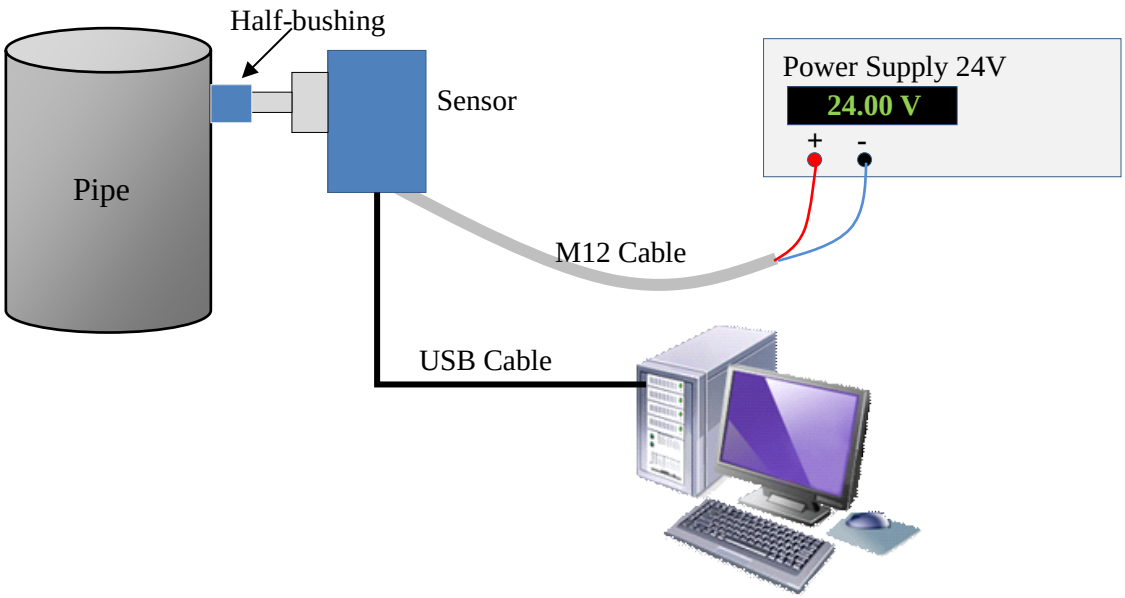
The calibration of a **Flow No Flow** sensor consists to define the limits of detection according to the flow we want to detect and the operating mode.

6.1 EQUIPMENT

The equipment needed for calibration is as follow:

- 1 **Flow No Flow** installed in the pipe and powered with 24VDC.
- 1 PC with software **Flow32** installed.
- 1 Cable USB (See Delivery This document describes the procedure for mounting the sensor and its connection. It also describes **Flow32** software and the procedure to calibrate the sensor.
- Delivery Package)**.**

6.2 CONNEXIONS



6.3 PROCEDURE

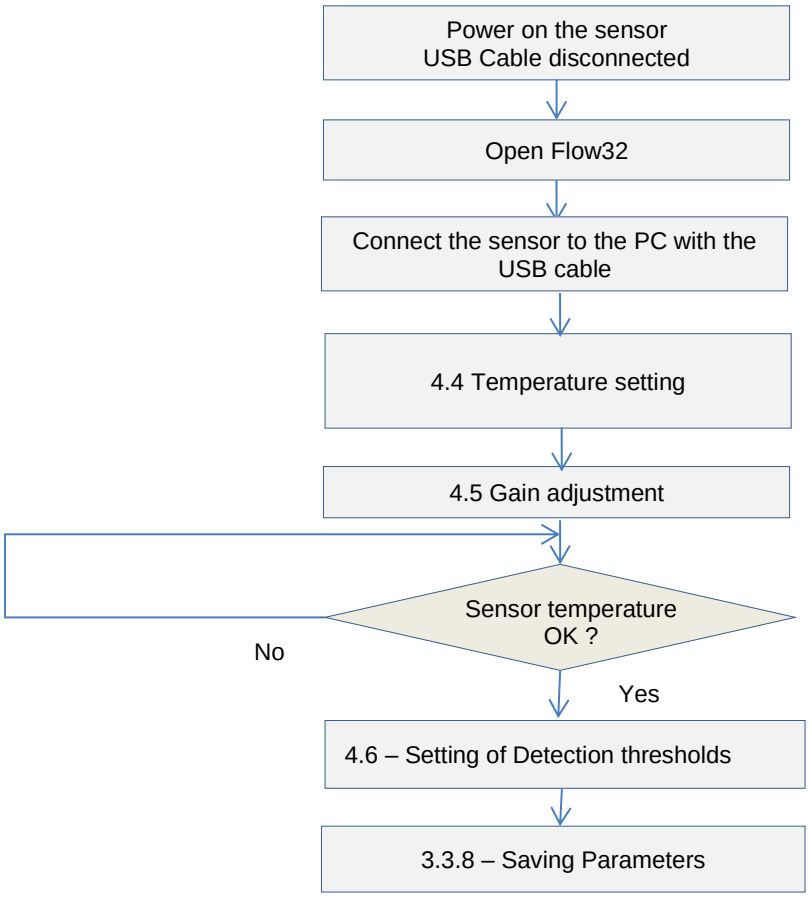


Fig 21. Calibration Chart

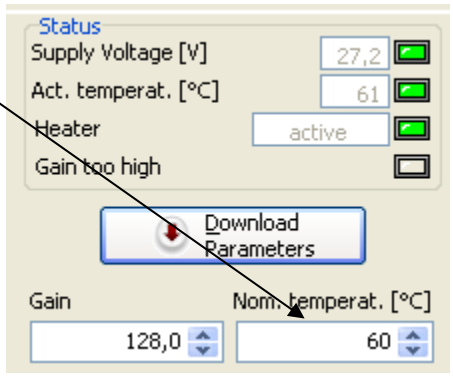
6.4 TEMPERATURE SETTING

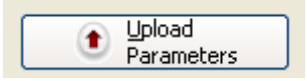
Start **Flow32**, open main window.

1. Check in the **Status** window, no light should be red.

If necessary, adjust the **nominal temperature**. We recommend to set nom temperature to **60°C**.

If the temperature light turns red, it is necessary to wait for stabilization of the nominal temperature by the sensor.
This may take 2 or 3 minutes.



When the temperature parameter is defined, click on 

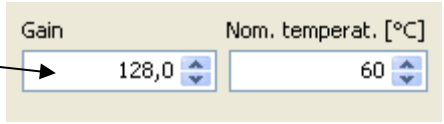
to save it on the device.

6.5 GAIN ADJUSTMENT

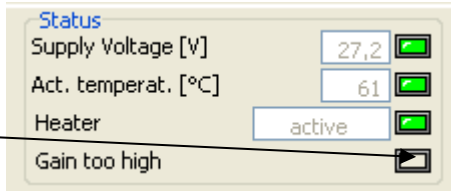
Adjust the flow in the pipe **to the maximum**.

Make a record by clicking on button « **Start** ». Make sure that recording duration is long enough.

To use maximum sensor dynamic it is necessary to adjust the **gain**.



This operation consists in increasing the gain value until the sensor saturates (light « **Gain too high »** flashes red).



Once saturation obtained, **decrease the gain of 10%**.

When the gain is defined, click on 

to save the parameters in the sensor.

6.6 SETTING OF DETECTION THRESHOLDS

Set the flow in the pipe to the wanted level of detection.

Make a recording by pressing the “start” button for the required time (we recommend a minimum of 120s).

Make sure that the curve is as constant as possible, start again the record if necessary.

You will have to determinate what is your real flow by making a weighing of product over a period as long as possible.

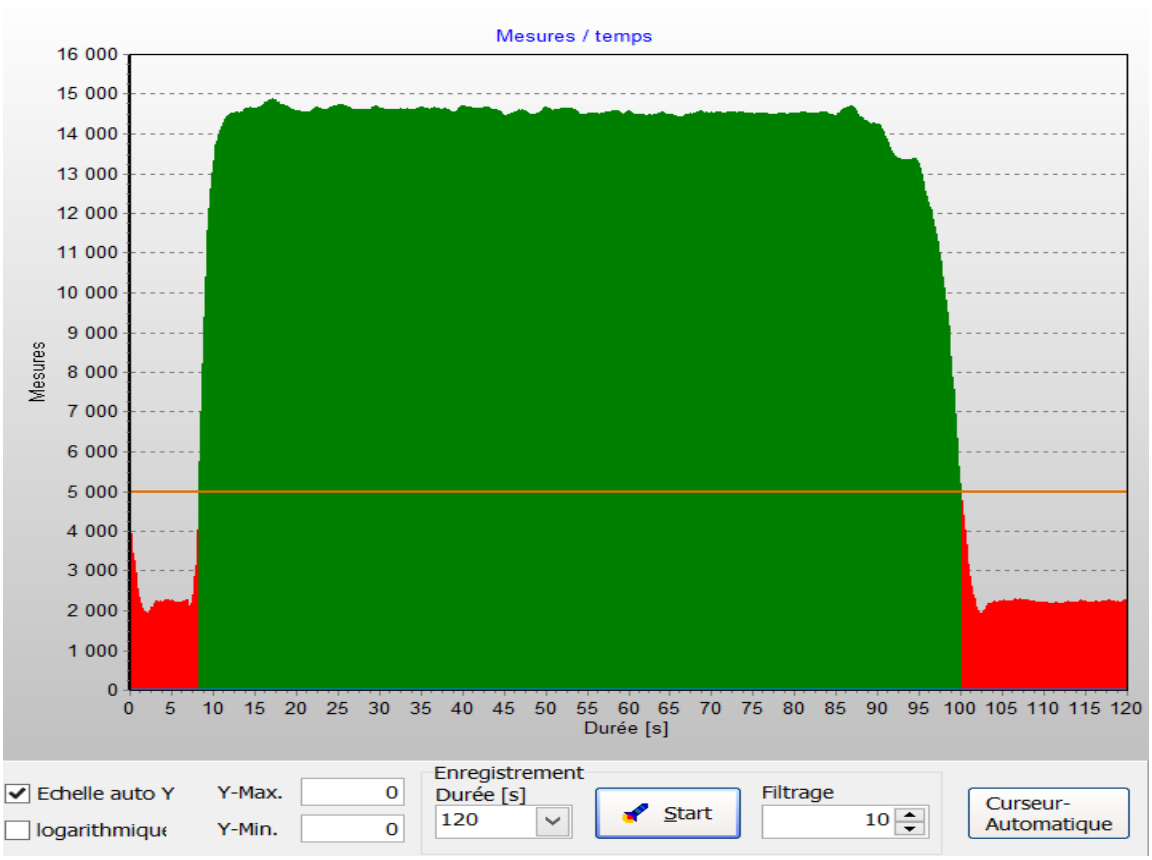


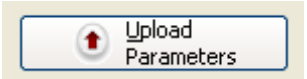
Fig 22. Exemple of raw values record

Define the average raw value during the passage of product. This value corresponds to level detected by the sensor.

In the example above, the average value is 14500.

Enter this value in the appropriate box according to the desired operating mode.
In the case of procedure Level ("high level") an only acquisition is needed.

In the Band and Hysteresis cases, another acquisition will be necessary to determine the second level ("low level")

Don't forget to click on the button 

to save the new parameters in the device.

7 TECHNICAL SPECIFICATIONS

Power.....	20 to 30 VDC
Current consumption.....	0.5 A Max
Dimensions…….	L 134mm / l 90mm / H 152mm / W 1kg
Storage temperature.....	-25°C … 75°C (without condensation)
Ambient temperature.....	-20°C … 60°C
Temperature in pipe …….....	-20°C … 150°C
Measurement accuracy ……...	2-5% (depending on calibration & process variables)
Maximum variation of Moisture……...	+/- 10% (higher values will decrease accuracy)
Maximum pressure in pipe …….....	80 bars 200bars(Option)
Protection.....	IP66 IP67(Option)

Output :

1 Relay Output:

- Maximum Voltage.....	30VAC or 30VDC
- Maximum Current……...	80mA

8 DRAWING

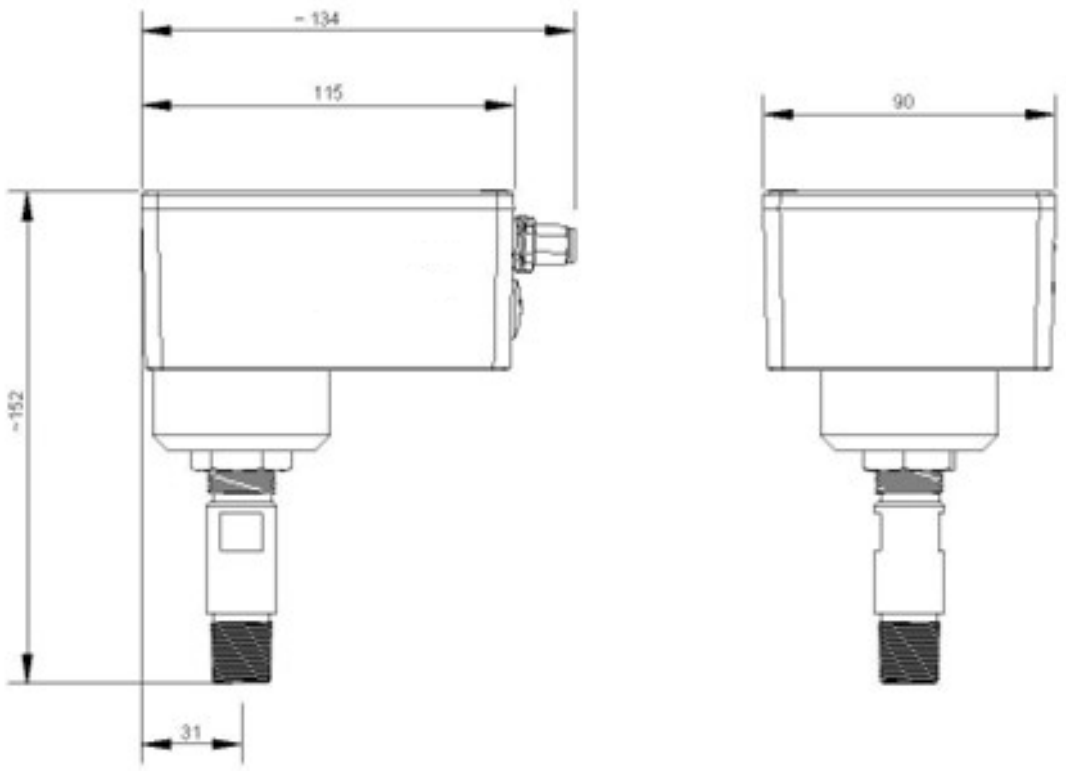


Fig 23. : Flow No Flow 100mm.

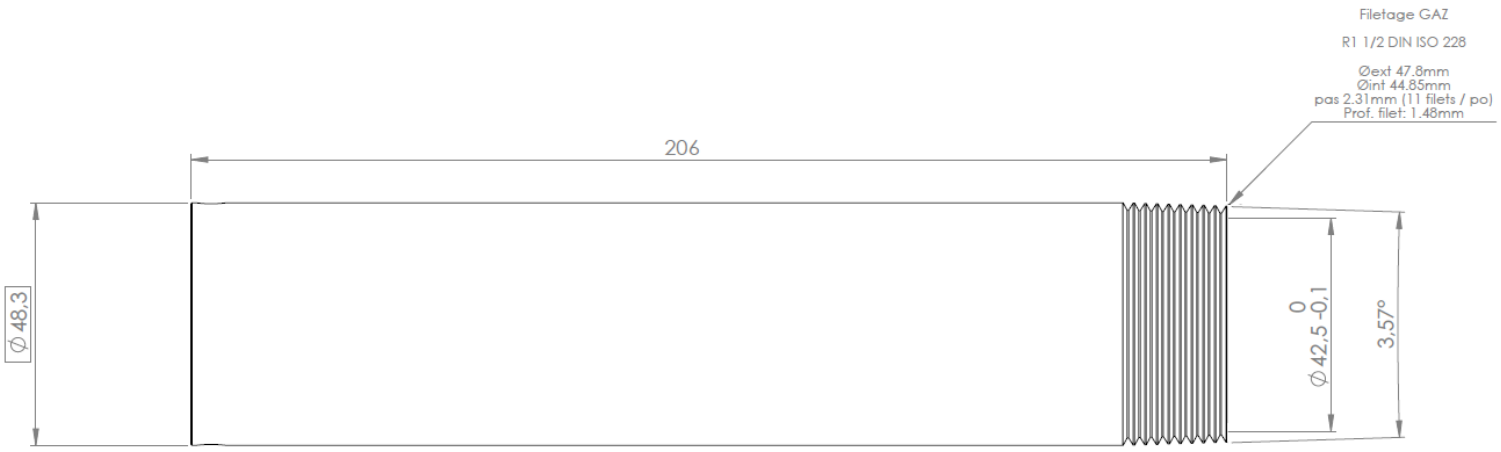


Fig 24. Flow No Flow Compact

9 MAINTENANCE

BEFORE INTERVENTION ON A SENSOR IN OPERATION.

- **Make sure the pipe is completely empty and does not contain gas. If the pipe is under pressure, the sensor may leave its location at high speed and cause injury.**
- **During intervention, wearing safety equipment is compulsory (safety glasses, protective clothes).**
- **Before starting intervention, make sure the sensor is not powered.**

- **Maintenance operations must be performed by a qualified technician.**

10 WARRANTY

The sensor is guaranteed (standard warranty) for 1 year spare parts and working from its date of shipment.

Warranty does not take into account transportation of defective parts, as well as travel costs of our technicians.

In the case of a non-validated commissioning in advance by our after sales department, warranty will not apply.

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