



Instructions manual

Series DFD420

Programmable pulse divider



The art of measuring

PREFACE

Thank you for choosing a product from Tecfluid S.A.

This instruction manual allows the installation, configuration, programming and maintenance. It is recommended to read it before using the equipment.

WARNINGS

- This document shall not be copied or disclosed in whole or in any part by any means, without the written permission of Tecfluid S.A.
- Tecfluid S.A. reserve the right to make changes as deemed necessary at any time and without notice, in order to improve the quality and safety, with no obligation to update this manual.
- Make sure this manual goes to the end user.
- Keep this manual in a place where you can find it when you need it.
- In case of loss, ask for a new manual or download it directly from our website www.tecfluid.com Downloads section.
- Any deviation from the procedures described in this instruction manual, may cause user safety risks, damage of the unit or cause errors in the equipment performance.
- Do not modify the equipment without permission. Tecfluid S.A. are not responsible for any problems caused by a change not allowed. If you need to modify the equipment for any reason, please contact us in advance.

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1 INTRODUCTION

The DFD420 pulse divider and transmitter has two basic functions:

Pulse input to pulse output converter, by means of a programmable divider factor.

Programmable frequency to current converter.

It adapts to series COVOL and TM flowmeters. Likewise, it can be connected to other sensors whose output signal is a potential free contact or a pickup.

2 RECEPTION

The pulse dividers series DFD420 are supplied ready for installation and operation.

Likewise, they are packaged for protection during transportation and storage.

3 ELECTRICAL CONNECTION

If a transmitter for DIN rail mounting without enclosure has been acquired, skip to point 3.1.

If the transmitter is supplied in an aluminium enclosure, unscrew the cover to access the inside of the equipment.

For the electrical installation it is recommended to use multiple conductor cables with individual cable sections in the order of 0.25 to 0.5 mm² in order to make it easier to connect.



Before starting the installation, check that the cable glands are the right size for the cables to be used, this will guarantee the instrument will stay watertight. The cable glands are for cables with outside diameters between 5 mm and 12 mm.

Peel the outside insulation to free the inner cables. Pass the cables through the cable glands and screw down in the corresponding positions of the terminal strip as indicated in the following point.

Once the wiring is finished make sure that the cables are well gripped by the cable glands to maintain the degree of protection.

3.1 Terminals

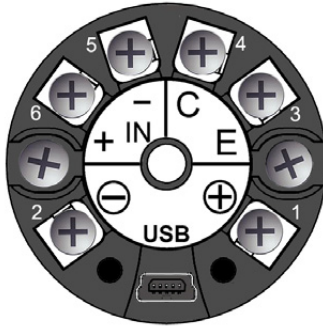


Before installing the equipment, check that the supply voltage available in the installation is compatible with the one marked on the label of the instrument.

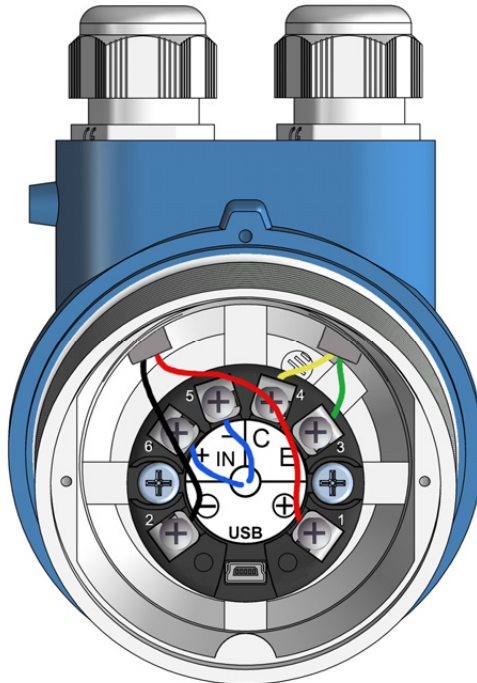
For the electrical connection, the DFD420 has a screw terminal strip.

To help in the connection of the equipment, the description of the terminals is marked on the center label of the transmitter.

Note: The DFD420 always needs to be connected to a power source, although the current loop information is not used.



<u>Terminal</u>	<u>Function</u>
1	Power supply and current loop (+)
2	Power supply and current loop (-)
3	Pulse output or alarm. Emitter
4	Pulse output or alarm. Collector
5	Input (-)
6	Input (+)



4 OPERATION

If the DFD420 transmitter is delivered associated to a COVOL or turbine flowmeters, the default configuration is such that the pulses at the output are equal to the input. The analog output indicates 4 mA when there is no flow and 20 mA at full scale.

In case that default settings need to be changed, the associated Tecfluid S.A. Winsmeter DFD software will be necessary.

5 ASSOCIATED SOFTWARE WINSMETER DFD

Device programming can be done by means of the associated software Winsmeter DFD, which allows working in a more comfortable and intuitive way.

Such software can be downloaded from the "Downloads" section of the Tecfluid S.A. website www.tecfluid.com/downloads

5.1 USB cable connection and software installation

Extract the files from the Winsmeter DFD.zip to a new system folder.

Execute the Setup.exe file and follow the steps for the installation.

In order to connect the converter to a computer an USB cable is required. This cable is type A at one end and mini USB type B at the other (cable not supplied).

The ends of the cables can be seen in the picture.



The USB connector is located at one end of the transmitter.

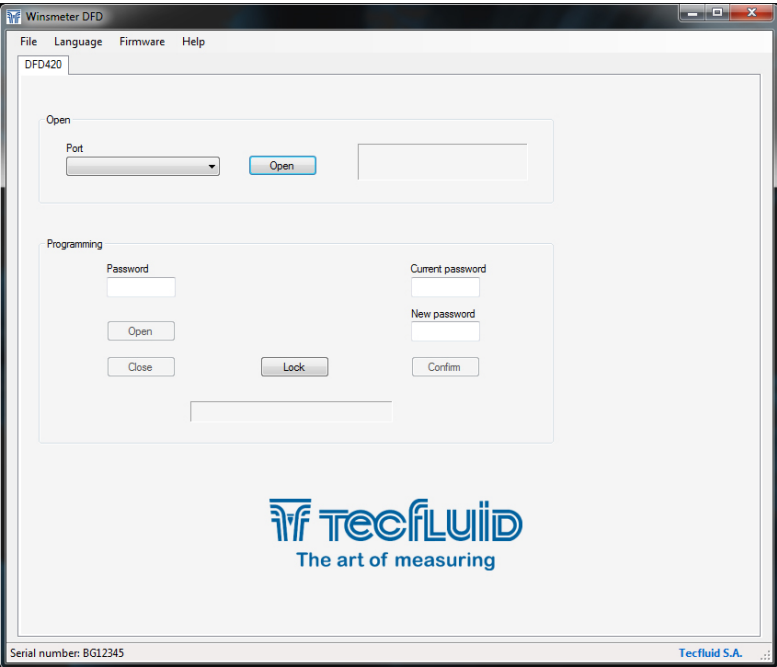


Mini USB type B connector

Connect the USB cable at one end to the DFD420 transmitter and at the other to the computer where the software is installed.

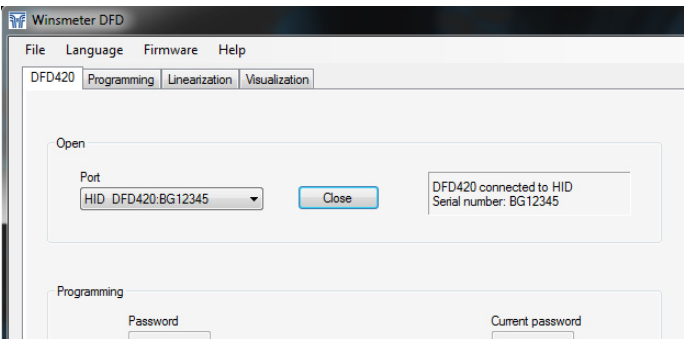
Power on the electronic transmitter.

Execute the program Winsmeter DFD following the sequence Start – Programs – Tecfluid S.A. - WinsmeterDFD.

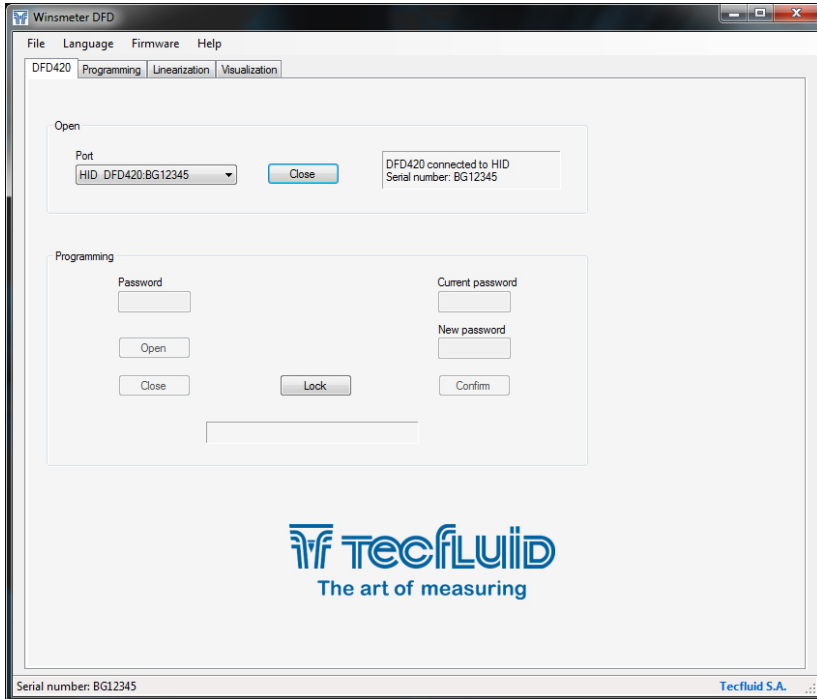


5.2 Port connection

In the "Port" section, choose the appropriate port for the converter. This will appear with the text HID DFD420 followed by its serial number. Then click "Open".



Once the port is open, the button “Lock” in the “Programming” section is activated.



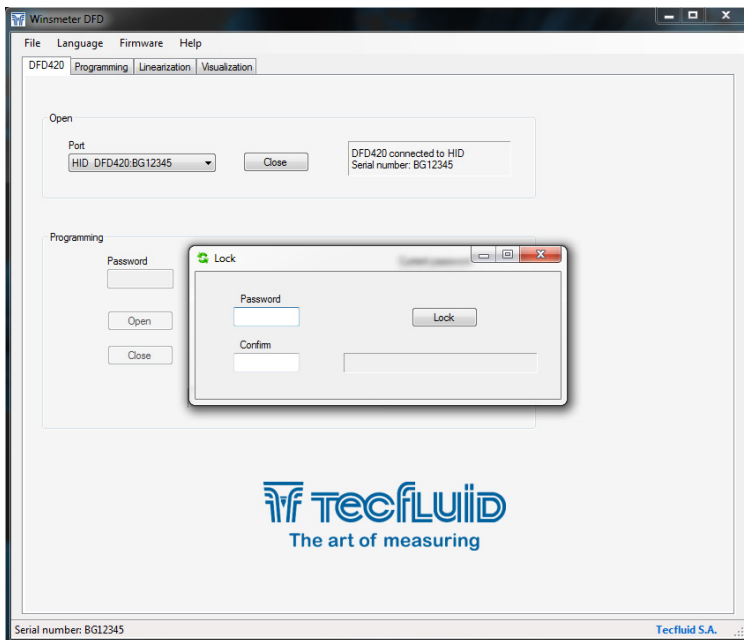
5.3 Password

The DFD420 converter can be locked so that programming data can be modified with previous access with a password.

By default the device is unlocked. All data can be modified by means of the program Winsmeter DFD.

To set a password access the converter must be unlocked. To do this, simply press the “Lock” button.

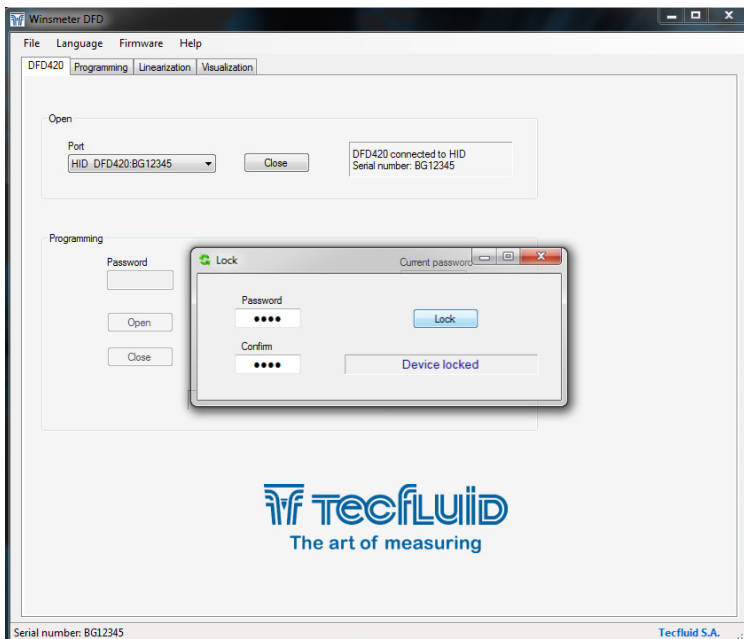
Once done, the following window will appear:



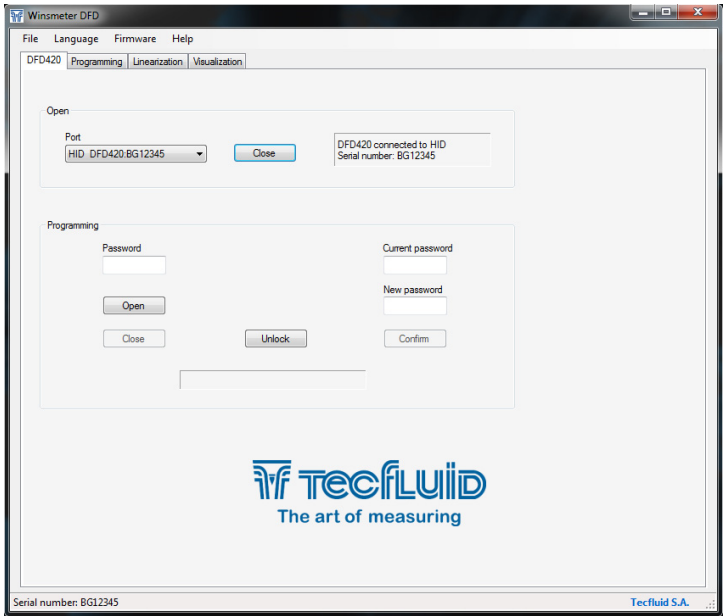
In the “Password” textbox a 4 numeric digit code should be entered, and in the “Confirm” textbox, the code is confirmed to avoid unintentional errors.

Once the password is confirmed, press the “Lock” button and the device will be locked.

The text “Device locked” will appear, and the program returns to the home screen.

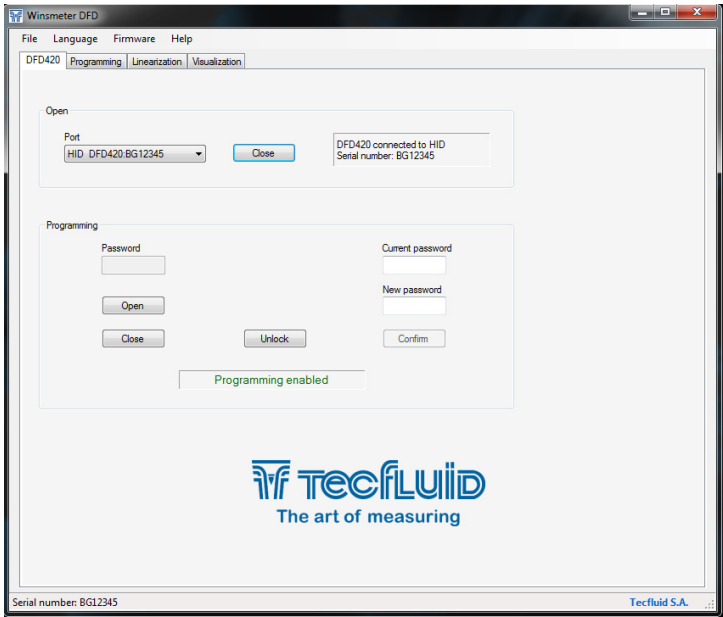


After accessing back to the port and pressing the “Open” button, the screen shows the textbox to enter or change the password.



5.4 Access to programming

Once the password is written, press “Enter” or the “Open” button and all data in the programming window will be modifiable. The text “Programming enabled” will appear at the bottom of the section. Furthermore, the device can be unlocked pressing the “Unlock” button.



To enter the programming window, simply press the corresponding tab.

Changing the parameters in this screen, the different functions of the equipment can be programmed. Once the changes are made, press the “Send” button to save all data in the device memory.

5.4.1 Sensor

In the sensor section the division factor, the input type and the hardware filter can be configured

The **Division factor** consists of an integer and three decimal digits.

It can be programmed to any value between 1 and 150000.

When a Factor = 1 is programmed, the DFD420 performs no processing software from input signal, such as the width of the output pulse. The pulses at the output will be identical to those at the input, with the only difference that the voltage levels and rise and fall times will correspond to those specified for the pulse output (see section 8).

The **Input type** determines what type of device is connected to the input of the DFD420. In the case of a Tecfluid S.A. sensor, select "Pulse" for COVOL oscillating piston flowmeters and "Pickup" for turbine flowmeters series TM.

When the input is selected as "Pulse" any equipment that have potential free contact or open collector output (e.g., a transistor or an opto-isolator) can be connected to the DFD420.

When the input is selected as "Pickup", sensors with a regular analog signal with a minimum voltage of 20 mV and a maximum of 5 Vpp can be connected. Normally these are signals from a coil or pickup.

The **Hardware filter** allows to select the frequency range of the input signal, in order to eliminate unwanted signals or interference outside the measuring range. Select "< 50 Hz" in case of COVOL oscillating piston flowmeters and "<1500 Hz" in case of turbine flowmeters series TM.

In order to program the device more intuitively, the flow rate **Units** can be changed so that the desired working units are selected. Programming parameters that have flow rate units will update their value when the units are changed.

5.4.2 Current loop

In this section parameters related to the current loop can be configured.

Values for 4 mA and 20 mA are those that correspond to the current range limits. Therefore, the current loop will give a linear signal between 4 mA and 20 mA when the input signal has a value between the programmed values in these textboxes.

In the textbox **Cut off**, the value below which the DFD420 output will be 4 mA can be programmed.

Note: When the input frequency or flow rate is below the Cut off value, the pulse output will stop working, except in the case of Division factor =1, since as explained in section 5.4, no software processing is performed.

In the box **Damping** the value in seconds of the filter can be programmed. This filter allows to obtain stable current readings despite fluctuations of the input frequency.

The integration time is selected in seconds, with a minimum value of 1 and a maximum value of 25 seconds.

When there is a sudden variation of the frequency then the filter should react as fast as possible to give a correct reading of the new value. Therefore, the filter controls for each reading the deviation of the instantaneous frequency with respect to a reference. If this deviation exceeds 25%, the filter will stop acting, indicating the instant value, and will start again the filtering process.

Note: The filter is inactive for input frequencies below 5 Hz.

5.4.3 Digital output

In the box **Digital output** this output can be configured as pulse output or as alarm. In the second case, the activation and deactivation values for the alarm can be programmed.

In the box **Duty cycle**, the width of the output pulse can be programmed as a percentage. The value indicates the percentage of time that the pulse is active with respect to a complete period. The minimum and maximum values of Duty cycle are 10 and 90%.

Note: Regardless of the Duty cycle value, the pulse width can not exceed 180 ms.

5.5 Current loop calibration

The DFD420 transmitter is delivered with the current output already calibrated. If you want to correct a derive of the 4 or 20 mA current values because they do not coincide with the ammeter used, it can be done by the following way:

To calibrate the 4 mA point, press the button "4 mA". The transmitter will fix the output to this value. Then enter the current value indicated in the multimeter and press the button "Prog. 4 mA". The transmitter will adjust its output and the multimeter will show 4 mA.

Follow the same steps for the 20 mA point.

Finally, press the "mA ON" button. The current loop will be calibrated.



Before making a current calibration, be sure that the ammeter used for that is showing the real measure.

5.6 Linearization

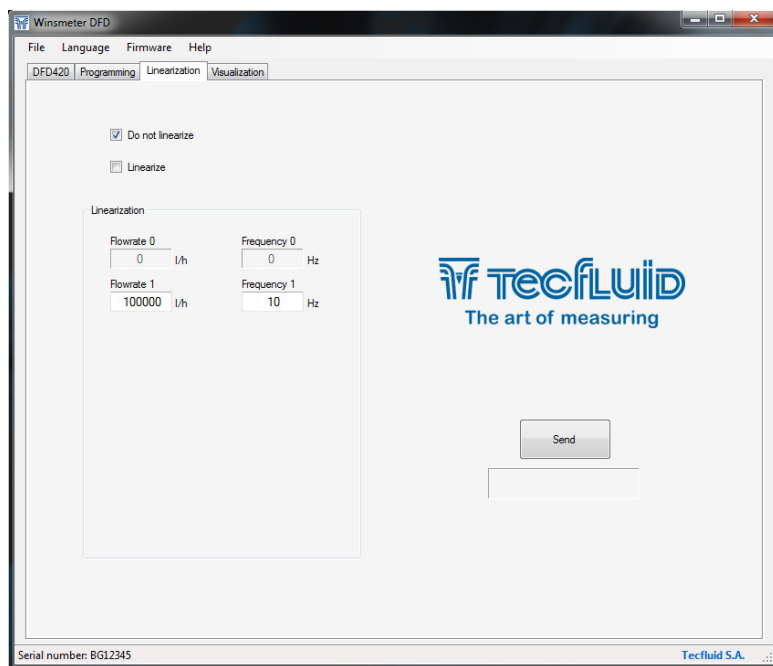
If the DFD420 is connected to a flowmeter whose response is linear, the "Do not linearize" checkbox should be clicked. It will be necessary to enter the full scale values of flow rate and frequency. These values are written in the "Scale Bottom Flow" and "Scale Bottom Frequency" boxes. The zero point, that is equivalent to a flow rate = 0 and a frequency = 0, does not need to be filled. It is implicit in the device.

On the other hand, if the DFD420 is connected to a flowmeter whose response is not linear enough to obtain the desired accuracy, the "Linearize" checkbox should be clicked. In this way a correction of the response by a six point linearization can be used.

To do this, the boxes corresponding to the six points of the scale should be filled. Each point consists of a flow rate and its corresponding frequency.

The zero point, that is equivalent to a flow rate = 0 and a frequency = 0, does not need to be filled. It is implicit in the device.

Once filled the boxes with the values, press the "Send" button and data will be saved into the device memory.

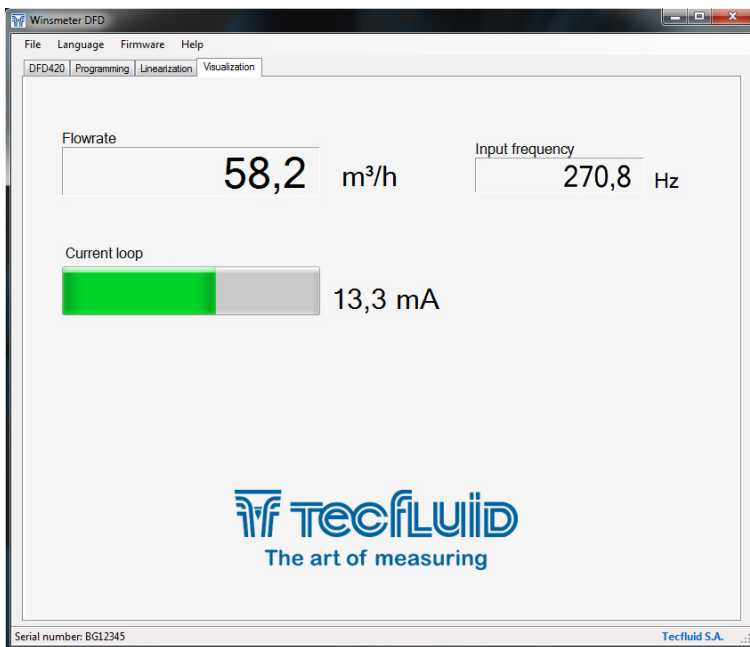


5.7 Visualization

When the communication with the computer port is established (see section 5.2), the tab "Visualization" opens. This tab lets you view real-time input frequency, as well as the flow rate, in case of having flow rate units selected.

The current value of the analog output and the status of the digital output if configured as alarm can also be shown.

It is an intuitive tool to verify that the instrument has been installed and programmed correctly.



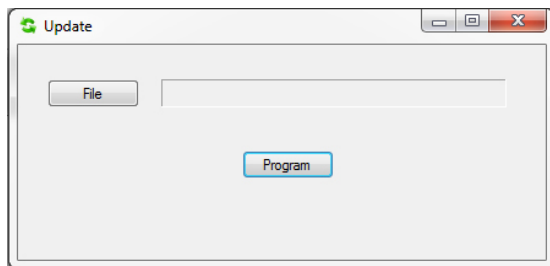
5.8 Firmware updates

New firmware updates can be published in the website. These updates contain improvements or bug fixes that make the equipment operates at best conditions.

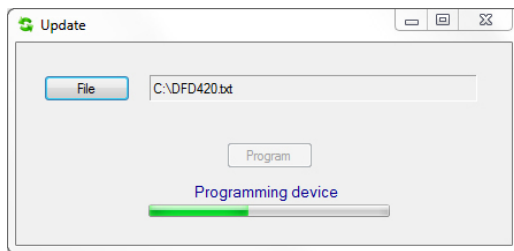
The updates can be downloaded from the following link of Tecfluid S.A. website:

www.tecfluid.com/download

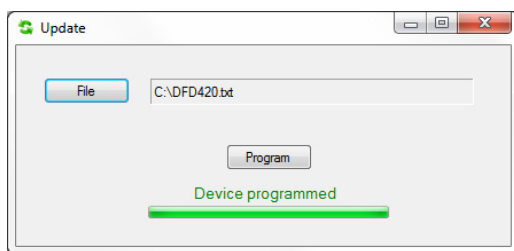
To update the device, go to menu "Firmware" - "Update", and a screen with the button "File" will appear. Pressing this button the file explorer can be accessed. The downloaded file has to be searched there.



Once the file is selected, press the "Program" button. A message "Programming device" will appear.



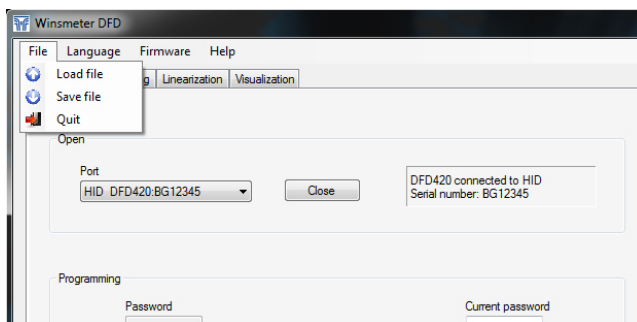
The process takes about 10 seconds, after which the message “Device programmed” will appear.



From this moment, the transmitter DFD420 already has the new version of Firmware.

5.9 Configuration file

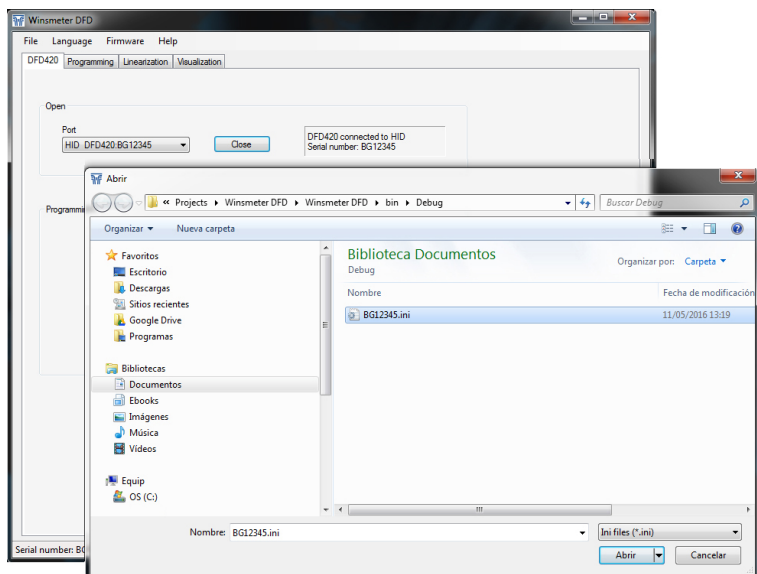
A device configuration backup can be made saving data to a file. To do this, go to menu “File” - “Save file”.



The file is saved in the same folder where the DFD Winsmeter software is located.

In the same way, a configuration data file can be loaded into the device. To do this, go to the menu “File” - “Load file”, and the file explorer will appear. The file has to be searched there.

The filename is the serial number and the extension is TXT.



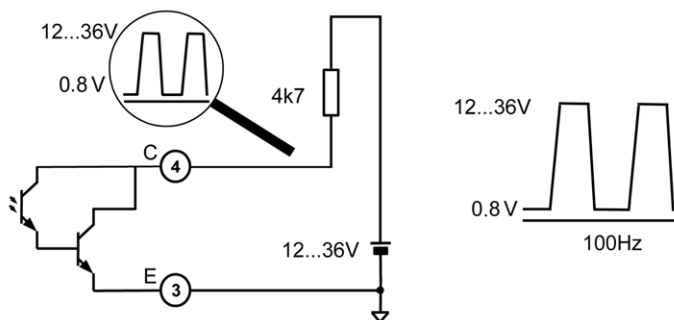
NOTE: When the configuration is saved into a file, the stored data are those in the device memory. These data may be different from those shown on the Winsmeter program. To ensure that the data match press the "Send" button in the "Programming" tab.



IMPORTANT: The USB connection is used only for the configuration and commissioning of the device. In no case it is intended to be used continuously, as a normal mode of operation in an industrial environment.

6 MAINTENANCE

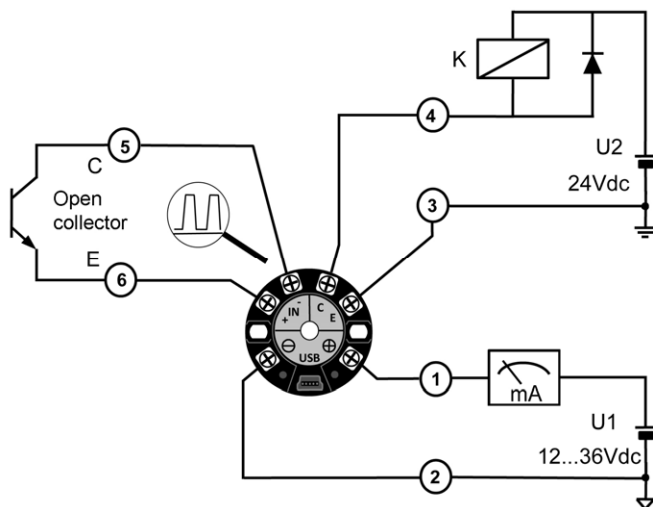
To check that the pulse output is working properly, the recommended test circuit is the following:



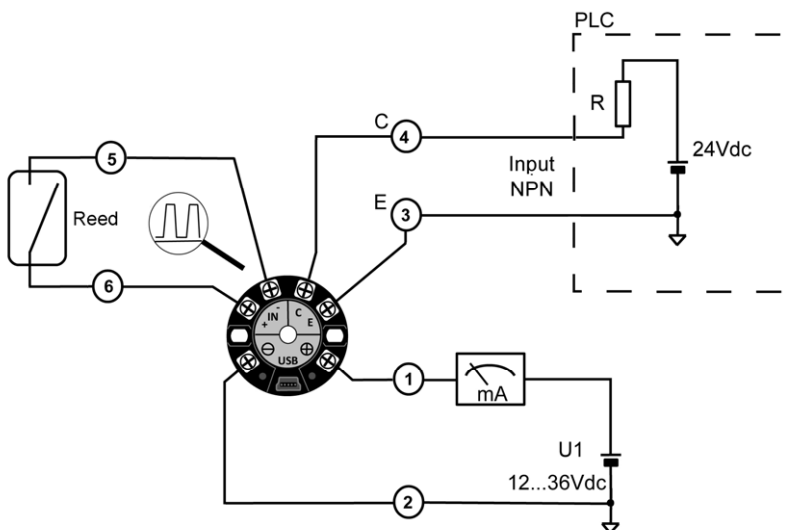
The obtained signal is shown in the figure on the right. Otherwise, no special maintenance is required.

7 CONNECTION EXAMPLES

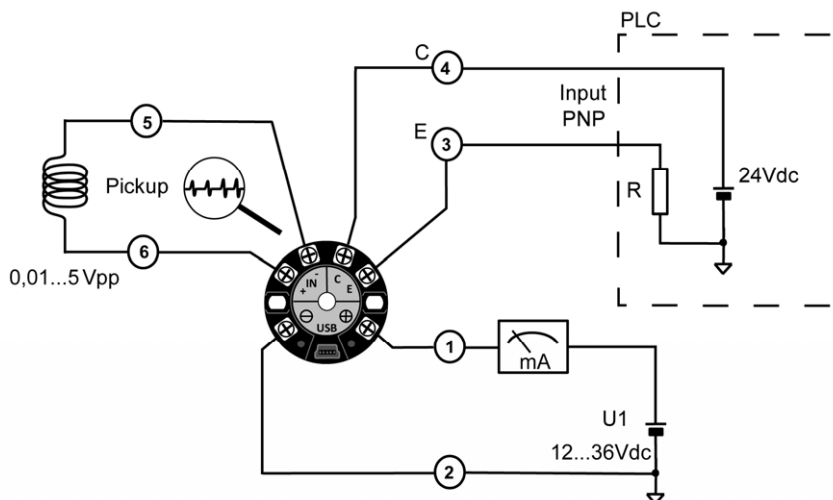
Three connection diagrams are shown below. The different inputs and outputs can be combined depending on the application.



Open collector input. Alarm output



Reed input. NPN output for PLC



Pickup input. PNP output for PLC

8 TECHNICAL CHARACTERISTICS

Accuracy: $\pm 0.5\%$

Linearity: $\pm 0.2\%$

Power supply (2 wires)

Minimum voltage: $0.02\text{ Z} + 12\text{ (Volt)}$ (Z is the load in the current loop in Ohm)

Maximum voltage: 36 VDC

Power consumption: Maximum 0.8 W

Pulse input

Compatible inputs: 0 to V_p , where $V_p = 3\text{ V} \dots 5\text{ V}$, NPN open collector, potential free contact

Frequency range: 0.1 Hz ... 1500 Hz

Pickup input

Amplitude range: 10 mVpp ... 5 Vpp

Analog output

4 - 20 mA, factory adjusted. Possibility of readjusting the current range

Maximum load in the 4-20 loop: $1.1\text{ k}\Omega$ (at a 36 VDC supply voltage)

Pulse output:

Optoisolated. NPN bipolar transistor. $V_{\text{max}}: 30\text{ VDC}$. $I_{\text{max}}: 30\text{ mA}$.

Output amplitudes: $0.8\text{ V} \dots \text{VDC}$ (VDC = supply voltage)

Division factor: 1 ... 150000, 3 decimals

Output frequency range: 0.01 Hz ... 1500 Hz

Pulse width: Programmable as a % (Duty cycle)

Maximum value: 180 ms

General characteristics

Ingress protection:

IP68 (supplied in aluminium housing)

Cable entries:

IP20 / IP00 (housing / terminals in rail DIN version)
2 x M20x1.5 cable glands for cables \varnothing 5 to 12 mm
in aluminium housing

Ambient temperature range:

-20°C ... +85°C

9 SAFETY INSTRUCTIONS

DFD420 converters are in conformity with all essential requirements of all EC directives applicable to them:

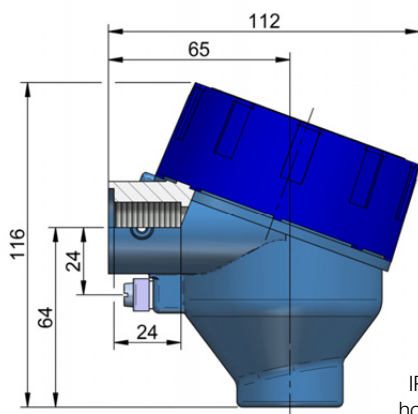
2014/30/EU Electromagnetic compatibility directive (EMC)

2012/19/EU Waste electric and electronic equipment (WEEE)

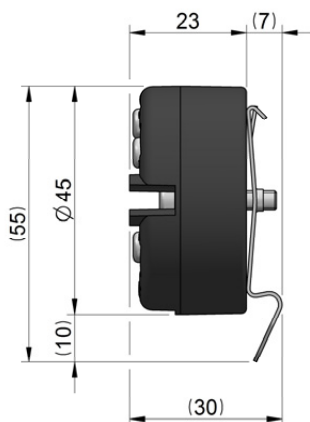
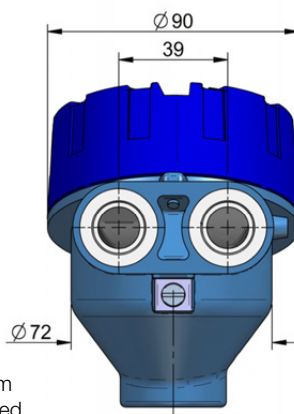


Declarations of conformity EC can be downloaded from the section “Downloads” of the Tecfluid S.A. website.

10 DIMENSIONS



IP68 aluminium
housing mounted



DIN rail mounting

WARRANTY

Tecfluid S.A. guarantee all the products for a period of 24 months from their sale, against all faulty materials, manufacturing or performance. This warranty does not cover failures which might be imputed to misuse, use in an application different to that specified in the order, the result of service or modification carried out by personnel not authorized by Tecfluid S.A., wrong handling or accident.

This warranty is limited to cover the replacement or repair of the defective parts which have not damaged due to misuse, being excluded all responsibility due to any other damage or the effects of wear caused by the normal use of the devices.

Any consignment of devices for repair must observe a procedure which can be consulted in the website www.tecfluid.com, "After-Sales" section.

All materials sent to our factory must be correctly packaged, clean and completely exempt of any liquid, grease or toxic substances.

The devices sent for repair must enclose the corresponding form, which can be filled in via website from the same "After-Sales" section.

Warranty for repaired or replaced components applies 6 months from repair or replacement date. Anyway, the warranty period will last at least until the initial supply warranty period is over.

TRANSPORTATION

All consignments from the Buyer to the Seller's installations for their credit, repair or replacement must always be done at freight cost paid unless previous agreement.

The Seller will not accept any responsibility for possible damages caused on the devices during transportation.



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Quality Management System ISO 9001 certified by



Pressure Equipment Directive 97/23/CE certified by



ATEX European Directive 94/9/CE certified by



The technical data described in this manual is subject to modification without notification if the technical innovations in the manufacturing processes so require.