instrumentación
para fluidos

Digital frequency divider DFD-2

Users Manual

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1. WORKING PRINCIPLE

The DFD has been designed to generate a series of output pulses proportional to the input pulses. The relationship between the output and input pulses is:

$$I_o = I_i \times K$$

I_o = Number of output pulses

I_i = Number of input pulses

K = Correlation factor

The value of **K** is selected by means of BCD switches and jumpers inside the instrument.

1.1 Operating Limits

The output frequency is always less than half the input frequency, that is to say **K ≤ 0.4999**.

1.2 Applications

a) The correction or rationalization of the number of pulses of measuring transducers, for example a flow meter which gives 5 pulses per litre and we wish to batch in litres, or a length measuring equipment which gives 10 pulses per inch and we want to work in meters.

b) Batching : Logically if we can give one output pulse for every **n** input pulses we can use the DFD for batching.

2. INSTALLATION

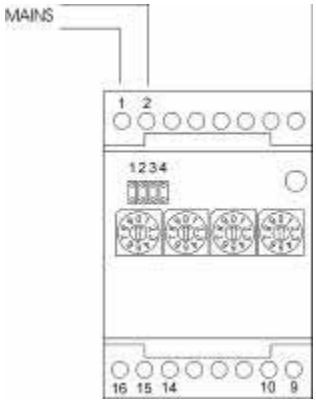
The DFD is housed in an IP40 plastic case for mounting on a panel inside an electric control panel. The plastic case has two holes for mounting with screws to DIN 46 121 and DIN 43 660, and also it has a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails.

Screw terminals are provided for external wiring. The terminals are protected against accidental contact in accordance with VDE 0100 Part 750, VDE 0160 Part 100 and VBG 4.

IMPORTANT : In order to comply with the electrical safety requirements as per IEC 1010-1, the installation of the equipment must take into account the following:

-The equipment must be installed inside an electrical mounting cabinet to avoid the possibility that the operator may touch a connection terminal.

-A mains switch must be provided to disconnect the equipment. This switch must be marked as the disconnecting device for the equipment and be within easy reach of the operator.



2.1 Mains connection

The mains supply voltage is connected to terminals 1 and 2. The mains voltage is indicated on the label at the side of terminals 1 & 2.

2.2 Input connection

The DFD is designed to be able to work with three basic types of inputs. The different types are selected by means of jumpers inside the instrument.

2.2.1 Pick-up Input

For the input from turbine flowmeters which use magnetic inductive pick-ups to detect the movement of the turbine blades, the wiring must be made as following:

DFD Terminal No.	Pick-up Terminal No.
14 shield	1 shield
15 live	2 live
16 live	3 live

"live" means the two ends of the pick-up coil.

The input cables must not be installed close to mains cables as these can induce errors due to electrical interferences.

2.2.2 Electrical contact or open collector input

For connecting inputs from reed switches etc., as one can find for example in COVOL counters or pulse generators with an open collector output (NPN transistor), the wiring must be made as following:

DFD Terminal No.	COVOL Terminal No.	NPN Open Collector
14 shield	1 shield	Emitter
15 no connection		
16 live	2 live	Collector

The shield is connected to one end of the reed switch and the live to the other end.

2.2.3 TTL input

For connecting inputs from electronic equipment with a TTL (5 V pulse) output the wiring must be made as following:

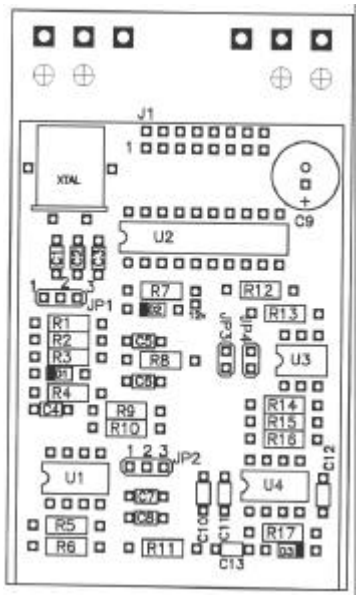
DFD Terminal No.	TTL Signal
14 shield	Common
15 no connection	
16 live	Live

2.3 Output connection

There are two types of pulse output for connecting to different types of equipment. If the clients order does not specify differently, the equipment is supplied configured for an open collector output. To change from open collector to TTL output, jumpers inside have to be changed (see 2.3.1 and 2.3.2).

To reach the jumpers, remove the top cover, prise open the sides of the case to release the clips on the terminal blocks and withdraw them, sliding the whole assembly out of the case.

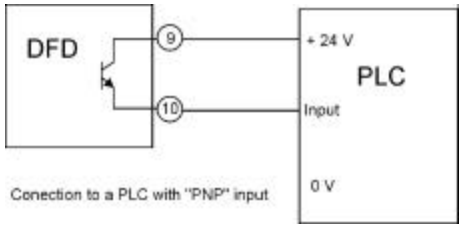
The jumpers are on the main board as shown in the drawing:

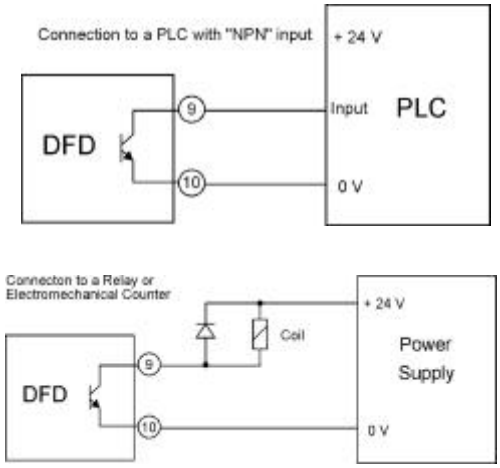


2.3.1 Isolated output

Terminal 10 is the emitter of an opto-isolated NPN transistor. Terminal 9 is the collector of this transistor. This open collector output can be used to drive electromagnetic counters or relays. There are no protective devices on this output, such as current or over-voltage limiting and these must be provided externally when needed. For this output mode the jumpers JP3 and JP4 should not be in position.

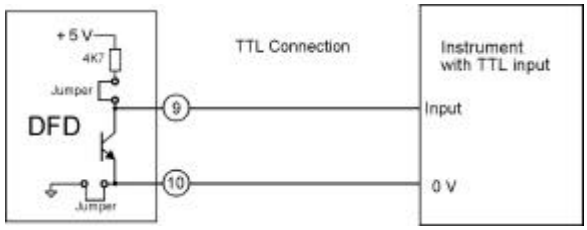
Some typical connections are given as follows:





2.3.2 TTL output

For the TTL (0 to 5 volts) output, terminal 10 is the common and terminal 9 is the live output. For this mode of output the jumpers JP3 and JP4 must be placed across the pins.

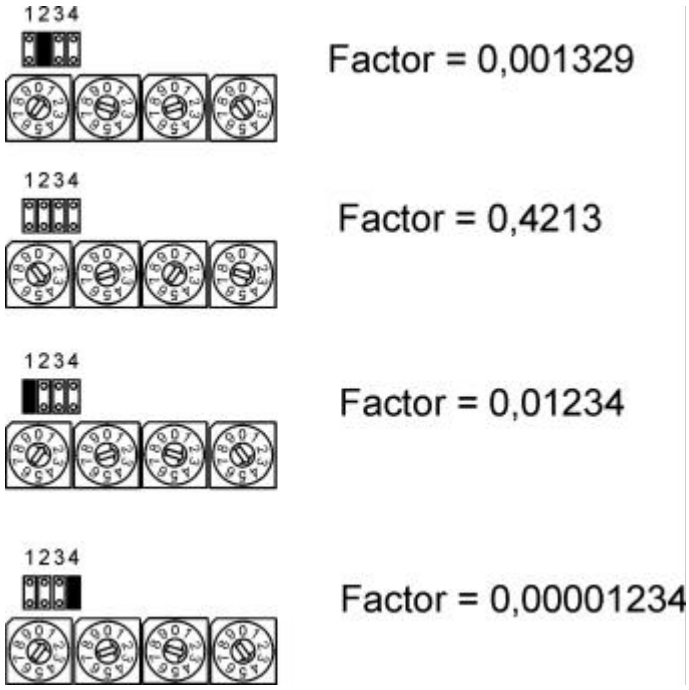


3. SETTING UP

Once the instrument is installed the only thing that has to be done is setting the multiplication factor which must be applied to the input frequency to obtain the output frequency. For example, if we have a turbine flowmeter which gives 752.22 pulses per litre and we want to totalize litres with a counter the relationship between the output and input frequencies will be 1/752.22; thus the factor (K) to be introduced will be 0,001329398. Given that we only have four significant digits this factor will be rounded off to 0,001329.

$$K = \frac{output}{input}\frac{pulses}{pulses} = \frac{1}{752.22} = 0.001329$$

To introduce this conversion factor we have four BCD coded switches and a jumper with four positions. With the four BCD coded switches we select the four significant digits and with the jumper we select the number of zeros between the decimal point and the first significant digit. To get to the switches, a screwdriver can be used to lever out the top cover, which is just clipped in its place.



In the examples given, the jumper is shown as a black filling.

In the four examples given, one can see the way to select the multiplication factor (K). The first example would be the selection of the factor in the case of the turbine flowmeter given above, in which the four significant digits have been selected with the BCD switches and the jumper has been put in the second position for the two zeros between the decimal point and the first significant digit.

Changes of the multiplication factor must be made when the instrument is switched off (no mains voltage), because this factor is read only when the instruments starts up (when the mains voltage is switched on).

4. TECHNICAL CHARACTERISTICS

4.1 Working conditions

The case has protection as per IP 40 and the terminals as per IP 20.

The working temperature limits are 0 to 50^{o}C

4.2 Mains supply

The standard mains voltage is 220 V ac 50/60 Hz. AC Mains voltages of 240 V, 110 V y 24 V 50/60 Hz. and 24 V dc supply voltage are available on order. The fuse should be 250 mA slow blow (T)

The power consumption is less than 1W.

The instrument is not supplied with a mains filter and in the exceptional cases that, due to high levels of mains interference, a mains filter is needed, this must be installed externally. Due to the low power consumption, almost any small mains filter will be adequate.

4.3 Outputs

The output has a duty cycle of about 50%. This means that he output will be "ON" for half the output cycle and "OFF" for the other half.

For example: If we have an output pulse every 30 seconds, then the output will be "ON" for 15 seconds and "OFF" for 15 seconds.

1. The TTL output is made by putting a 4700Ω resistor as a pull-up to 5 V for the opto-isolated transistor
2. The open collector (opto-isolated) output has the following characteristics:

   Maximum voltage : 30 V DC

   Maximum current : 50 mA

4.4 Pulse inputs

1. The input called "COVOL" is designed to work with an electrical contact which closes the circuit between terminals 1 and 2 of the COVOL flowmeter. Given that this type of input is generally slow and to avoid contact bounce this input is limited to about 200 pulses per second.
2. The pick-up input is designed to work with an inductive pick-up using a coil. The input frequency in this case is limited to about 1000 pulses per second.
3. The TTL input has a maximum frequency of about 2000 Hz.

Other types of inputs such as NAMUR, 24 V pulse are available on order.

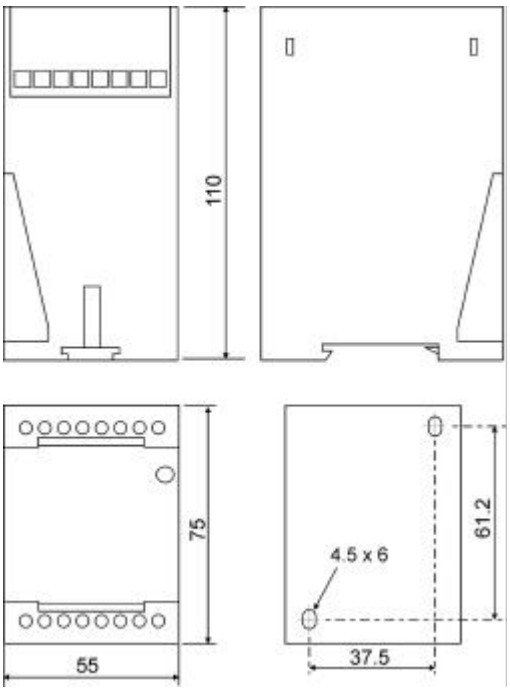
4.5 Norms and dimensions

The DFD-2 complies with the following norms:

Electrical safety	CEI 1010-1
EMC Immunity	UNE-EN 50082-1
EMC Emission	UNE-EN 50081-1

In the following drawings the outside dimensions and the layout of the fastening holes for screws are given. The layout of the fastening holes is given looking at the top of the instrument.

The weight of the instrument is approximately 300 g.



WARRANTY

Tecfluid S.A. GUARANTEES ALL ITS PRODUCTS FOR A PERIOD OF 12 MONTHS, maximum 18 months after consignment, against all defects in materials and workmanship.

This warranty does not cover failures which can be imputed to misuse, use in an application different to that specified in the order, the result of service or modification by un-authorized persons, bad handling or accident.

This warranty is limited to cover the repair or replacement defective parts which have not been damaged by misuse.

This warranty is limited to the repair of the equipment and all further and eventually following damages are not covered by this warranty.

In the event of consignment of equipment to our factory, this should be done with the equipment well packed and prepaid transport. Tecfluid S.A. will not accept any responsibility for damage done during transport. Together with the equipment, a note should be enclosed indicating the failure observed, the name, address and telephone number of the sender.l

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