Large Displays

FEMA ELECTRÓNICA

Series BDF

Large Displays for impulse count

BDF-xx-T1	Counter add + inhibit
BDF-xx-T2	Counter add + control substract
BDF-xx-T3	Counter add + substract
BDF-xx-T5	Counter quadrature x1
BDF-xx-T6	Counter quadrature x4

IDEAL SOLUTION for reading counting values at long distances from standard signals NPN, PNP, MECHANICAL, NAMUR, ... Display direct or scalable to engineering units Very strong housing and electrically protected units, designed for all type of industrial applications.

USER'S MANUAL
(1275R01)

Models T1, T2, T3, T5 and T6

Large displays for counting impulses

The BDF series of large displays for impulse counting applications is made of models «T1», «T2» , «T3», «T5» and «T6». All units are available in 4 and 6 digits format with 57mm or 100mm digit height.

All units have negative led sign, «RESET» function active by mechanical contact, and recognize impulse signals from standard sensors NPN, PNP, Mechanical Contact, Encoder, ... Counted impulses are scaled with internal programmable «Scaling Factors» before loaded on display. This allows the display of engineering units (meters, liters, ...). The decimal point position is programmable.

The mechanical of the BDF instruments is a very strong and sturdy aluminium housing anodized in black color, for panel mount, and for wall mount as an option. The front lens is antirreflexive and is firmly inserted on the aluminium profile with a rubber gasket around, providing IP65 protection on the front.

The signal wires are connected to plug-in screw clamps for higher security of the connections, accessible at the rear side of the instrument. The power is connected to a 3 terminal plug (2 power connections and 1 earth) containing an integrated protection fuse and an additional fuse as spare part.

Order reference

	Size	Model	Power	Color	Others	Adjust	Sensor
BDF -	**24** -	**T3** -	**0** -	**R** -	**---**	**1imp=+1**	**NPN**
	-24 -44 -26 -46	-T1 -T2 -T3 -T5 -T6	-0 (230 Vac) -1 (115 Vac) -6 (24 Vdc isolated)	-Red -Green (check for availability)	-65 *(IP65)** *-(empty)*	1imp=+1 1imp=3 1imp=1.5 ...	NPN PNP Namur Contact ...

* the IP65 option uses a completely different type of housing from the indicated in this documentation. Check the BDF IP65 housing documentation for more information.

Sizes

SIZE BDF-24 - Instrument with 4 digits digit 57mm height (2,3")

SIZE BDF-44 - Instrument with 4 digits digit 100 mm height (4,0")

SIZE BDF-26 .- Instrument with 6 digits 57mm digit height

SIZE BDF-46 .- Instrument with 6 digits 100mm digit height

Models

MODEL BDF-xx-T1 .- Counter ADD with INHIBIT function when connecting «Input2» to a logical «0» signal.

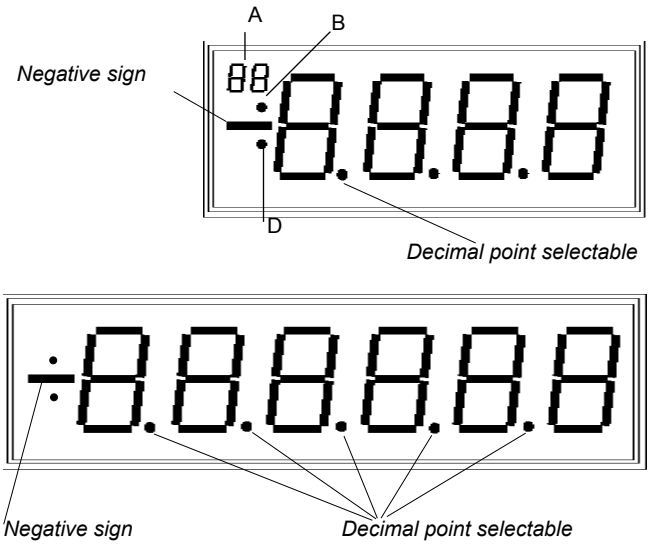
MODEL BDF-xx-T2 .- Counter ADD with SUBSTRACT function when connecting «Input2» to a logical «0» signal.

MODEL BDF-xx-T3 .- Counter ADD and SUBSTRACT with independent inputs. ADD impulses on «Input1» and SUBSTRACT impulses on «Input2»

MODEL BDF-xx-T5 .- Counter for quadrature signals (typical from bidirectional encoder) with automatic ADD/SUBSTRACT depending on phase differences between signals «A» and «B» (encoder turning clockwise or counterclockwise). 1 full cyle is 1 impulse.

MODEL BDF-xx-T6 .- Counter for quadrature signals (typical from bidirectional encoder) with automatic ADD/SUBSTRACT depending on phase differences between signals «A» and «B» (encoder turning clockwise or counterclockwise). 1 full cyle is 4 impulses.

Front view



The BDF Counter units are available in 4 and 6 digits format. All digits are 7 segment LED type with decimal point, negative sign and red color

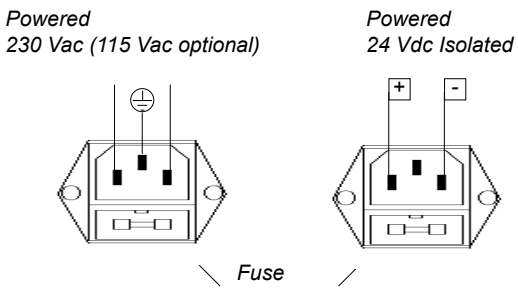
Leds «B» and «D» are lighted when the unit is being reprogrammed through the *«Programming Terminal»* on the rear cover

Digits «A» are only available in units with 4 digits. These small digits will light only when the unit is being reprogrammed through the *«Programming Terminal»* on the rear cover.

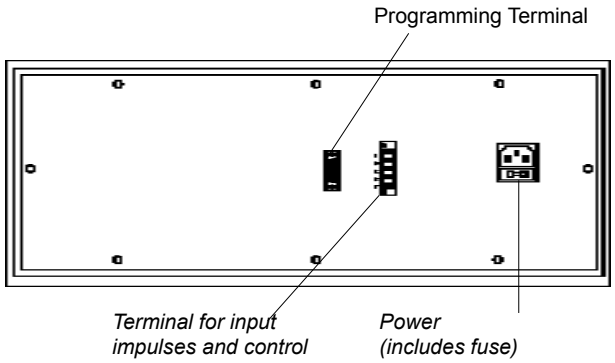
Power supply connections

The power connector allows one terminal for earth and two power terminals. Internal fuse is integrated on the connector and an additional fuse is available as a spare part. The value of the fuses depends on the power supply, and is according to rule IEC127/2

230 Vac - 200 mA fuse time-lag
115 Vac - 400 mA fuse time-lag
24 Vdc - 350 mA fuse fast



Rear view



General specifications

DISPLAY
4 or 6 digits in red color
7 segment Led
reading from -9999 to 9999 in 4 digits
reading from -999999 to 999999 in 6 digits
decimal point selectable
digit 57 mm (2,3") in BDF-24 and BDF-26
digit 100 mm (4,0") in BDF-44 and BDF-46
antirreflexive front filter
IP65 front protection

SENSORS
NPN Vmax on terminals +28Vdc
PNP Vmax on terminals +28Vdc
Namur Vmax on terminals +28Vdc
mechanical contact
Pick-up

PICK-UP
150 mVpp sensibility
100 mV hysteresis
26,5 KOhms Impedance
60Hz
Vmax ±50Vdc

Note - Sensor type is jumper selectable

FREQUENCY
model «T1» maximum 10 KHz
model «T2» maximum 10 KHz
model «T3» maximum 4 KHz
model «T5» maximum 5 KHz
model «T6» maximum 2,5 KHz

Vexc
+15 Vdc (±20%, 100mA)

ENVIRONMENTAL DATA
Working Temp. 0/+50ºC (32/122 ºF)
Storage Temp. -20/+85°C (-4/185ºF)
Rel. Humidity 0 to 85% non condensated

HOUSING
extruded aluminium
anodized in black color
for panel mount (optional wall mount)

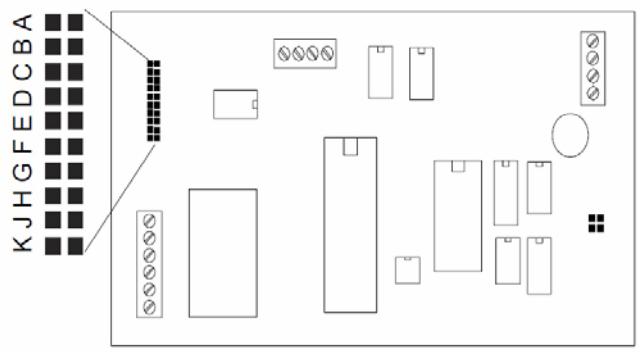
POWER SUPPLY
standard 230 Vac 50/60 Hz
(optional 115 Vac 50/60 Hz)
(optional 24 Vdc isolated)

CONSUMPTION
6 VA in series BDF-24 and BDF-26
12 VA in series BDF-44 and BDF-46

Internal jumpers

The instrument can select two levels of trigger for different NPN, PNP and NAMUR sensors, different types of input signals and two levels of filters. To access the selection jumpers, unscrew the rear side cover and locate the *«Control Board»* with the selection jumpers.

«Control board»



* Trigger levels for NPN, PNP, NAMUR

Trigger Level «LOW» .- Jumper H,G Closed

Logical Level «1» >3.75 Vdc
Logical Level «0» <1.50 Vdc

Trigger Level «HIGH» .- Jumpers H,G Open

Logical Level «1» >7.50 Vdc
Logical Level «0» <5.50 Vdc

* Antirrebound filter .- Jumpers J,K

Closed - Antirrebound filters at < 100 Hz
Open- Antirrebound filters at < 10 KHz

***Note** .- Use filters at <100Hz for inputs type mechanical contact, in order to filter rebounds on the contact.*

Connections terminal

The input signal is connected to the 5 pole plug-in screw terminal at the rear side cover of the instrument.

Terminal «B» provides a +15 Vdc (maximum 100 mA) signal to power-up sensors and transducers. Do not use this terminal to power sensors and transducers that need higher current.

The 2 inputs of the instrument are connected to terminals «C» (Input1) and «D» (Input2). The function for «Input2» is dependent on the model.

Model BDF-xx-T1 .- «Input2» is INHIBIT function, when connected to a logical «0» state

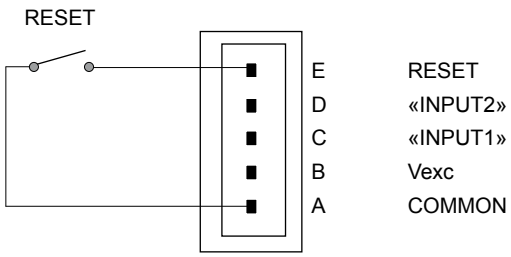
Model BDF-xx-T2 .- «Input2» activates SUBSTRACT function when connected to a logical «0» state

Model BDF-xx-T3 .- Impulses at «Input2» SUBSTRACT

Model BDF-xx-T5 .- «Input1» and «Input2» are associated to signals «A» and «B» of quadrature signals (typical signal from bidirectional encoder)

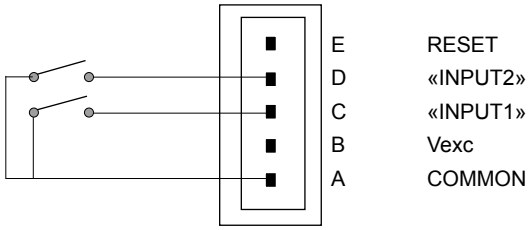
Model BDF-xx-T6 .- «Input1» and «Input2» are associated to signals «A» and «B» of quadrature signals (typical signal from bidirectional encoder)

All BDF Counter units have «RESET» function by mechanical contact on the rear side of the instrument. Connection is done betwen terminals «E» (Reset) and «A» (Common).

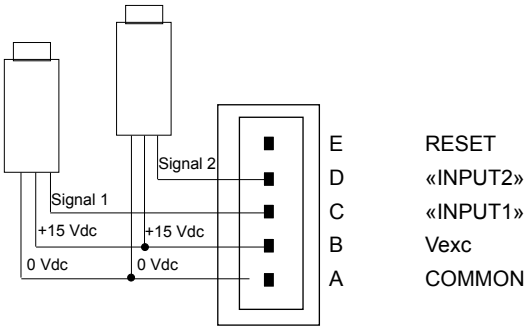


Sensor type selection and connection

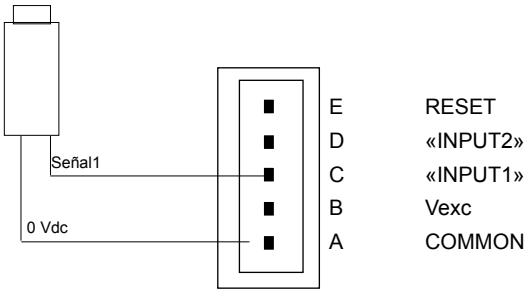
MECHANICAL CONTACT Jumpers ADF
«INPUT1» terminal «C» (Signal) and «A» (Common)
«INPUT2» terminal «D» (Signal) and «A» (Common)
***Note** - close internal jumpers J,K. See section 6*



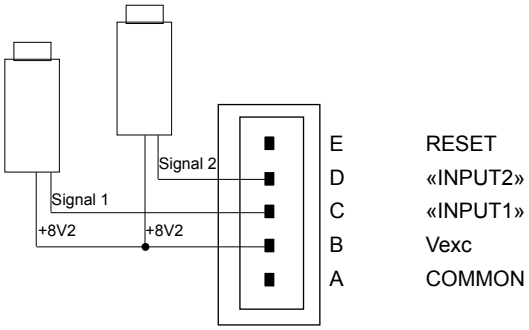
NPN Jumpers ADF
PNP Jumpers ABCDF
«INPUT1» terminal «C» (Signal), «A» (Com) and «B» (Vexc)
«INPUT2» terminal «D» (Signal), «A» (Com) and «B» (Vexc)



PICKUP Jumpers AE
«INPUT1» terminal C (Signal) and A (Common)
«INPUT2» not connected



NAMUR Jumpers BCDF
«INPUT1» terminal B (Vexc) and C (Signal)
«INPUT2» terminal B (Vexc) and D (Signal)



Programming the instrument

The BDF Counter instruments are configured by programming codes that activate internal «scale factors», decimal points, and other elements which scale the signal counted on display.

The programming of these codes is done through the 15 pin SUB-D connector at the rear side of the instrument. A «KBD Programming Keyboard» is needed, or the connections shown in Figure 1 need to be set-up.

Buttons «1» to «6» introduce the numerical characters 1, 2, 3, 4, 5 and 6 on display, button «#» executes «ENTER» on the displayed code. Button «*» adds negative sign in some codes.

Note - *When KBD (or contacts indicated in Figure 1) are connected to the BDF, the point placed under the negative sign will light. This led must be «on» during the reprogramming of the unit (if the led is not lightning, but the led on top of the negative sign lights, then press «*» to switch leds).*

Note *- When KBD (or contacts indicated in Figure 1) are connected to the BDF Ratemeter with 4 digits, the 2 small 7 segment displays on top left part will light. These digits are needed to program some codes which are 6 digit codes.*

Programming codes

The programming codes are made of 2 digits identifying the code, and a third digit identifying the value assigned to the code.

Code «41» with value «1» is represented as «41 1#». Button «#» acts as a validation of the code and value entered. If this button is not pressed, the unit will not validate the new value.

EXAMPLE

Introducing code «41 1#»

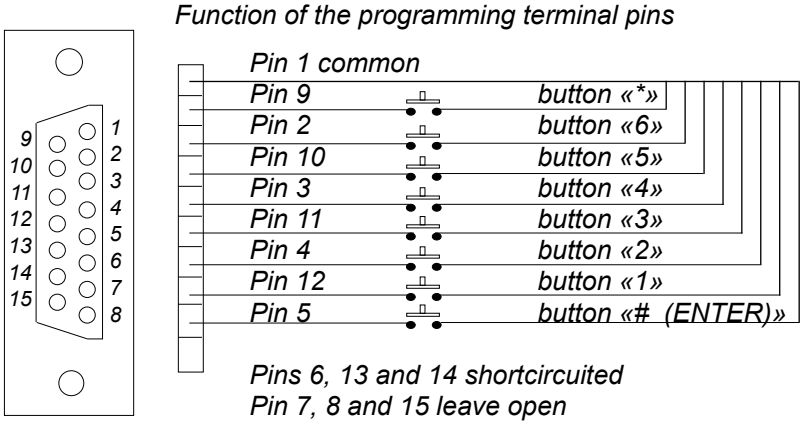
Press 4	Number 4 appears on display, to the left
Press 1	Number 1 appears on display, to the left The current value for code 41 appears to the right (it can be 1 or 2)
Press 2	Number 2 appears on display, to the right replacing the previous value
Press #	Validates the code and the value entered (in this case 41 1)

Note *.- After 6 seconds without introducing data, the instrument will cancel the programming code without validation.*

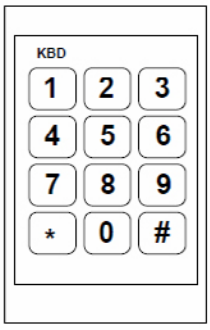
Note *.- Codes «1», «2» and «3» are special codes composed by only 1 digit. The value is a 6 digit numerical value and will load on display as soon as the code is pressed. The way to modify this value is to modify each digit value independently by pressing 1 to 6 and then # to validate the whole.*

Figure 1

Function of the programming terminal pins



KBD programming keyboard



Configure the counter model

«41 -1#» Resets the instrument configuration.
Activates the default parameters

Note - To place the negative sign, introduce codes «4», «1», «1», «*» and «#»

Note .- The led under the negative sign must be ON during the programming. If it is not lightning and the led on top of the negative sign is on, then press «*» to swtich leds.

Codes «43» select the type of counter to be active

«43 1#» BDF-xx-T1
«Input1» impulse input
Maximum frequency 9 KHz
«Input2» control for inhibit
Inhibits at logical «0» state

«43 2#» BDF-xx-T2
«Input1» impulse input
Maximum frequency 9 KHz
«Input2» control Add/Substract
Substracts at logical «0» state

«43 3#» BDF-xx-T3
«Input1» impulse Add
«Input2» impulse Substract
Maximum frequency 5 KHZ

«43 4#» this code does not apply

«43 5#» BDF-xx-T5 (quadrature signal x1)
«Input1» bidirectional encoder channel «A»
«Input2» bidirectional encoder channel «B»
Maximum frequency 4,5 KHz

«43 6#» BDF-xx-T6 (quadrature signal x4)
«Input1» bidirectional encoder channel «A»
«Input2» bidirectional encoder channel «B»
Maximum frequency 4,5 KHz

Configure the multipliers

«3» «Scale Factor»
multiplier between «0.0000» and «5.9999»
By default it is «1.0000»

«45 1#» «Multiplier» x1
«45 2#» «multiplier» x0.1
«45 3#» «multiplier» x0.01
«45 4#» «multiplier» x0.001
«45 5#» «multiplier» x0.0001

«44 1#» «flange multiplier» x1
Counts on down flange
«44 2#» «flange multiplier» x2
Counts on down and up flanges
Not compatible with code «43 6E»
Reduces maximum frequencies to half

Decimal point

«46 1# 0
«46 2# » 0.0
«46 3# » 0.00
«46 4# » 0.000
«46 5# »0.0000

Note - same codes but in negative, enable visualization of zeros to the left.. For example code «46 -2E» will visualize 00000.0

Functions with reset and alarms

«56 1E» Press «RESET», display loads «000000»

«56 2E» Press «RESET» , display loads «AL2» value and impulses substract from display

«56 3E» *Does not apply*

«56 4E» *Does not apply*

«56 5E» Press «RESET», display loads «000000» and when «AL2» value is reached, display loads «000000»

«56 6E» Press «RESET», display loads «AL2» value and impulses substract from display. When reaching «000000» displays loads «AL2» value, and impulses substract from display

«1»Displays value of memory «AL1»
«2»Displays value of memory «AL2»

To modify the memory values once loaded on display, press buttons 1,2,3,4,5,6 to modify each digit. Press «#» to apply the modified value.

Default parameters

«41 1#»	Default	
«42 3#»	Default	
«43 1#»	«Input1» input, «Input2» inhibit	
«44 1#»	«Flanges multiplier» x1	
«45 1#»	«Multiplier» x1	
«46 1#»	No decimal point	
«61 4#»	Default	
«62 1#»	Default	
«63 1#»	Default	
«64 4#»	Default	
«65 1#»	Default	
«51 2#»	«AL1» and «AL2» assigned to counter	
«52 3#»	Default	
«53»	Default	
«54 3#»	Default	
«55»	Default	
«56 1#»	Normal reset	
«66 1#»	Default	
«1»	500	value for memory «AL1»
«2»	1000	value for memory «AL2»
«3»	1.0000	«scale factor»

Limit on the internal counter

The BDF Counter instruments work with a 23 bit internal counter, allowing a maximum of 8.388.608 impulses to be counted (more than 8 million impulses). If this value is exceeded the sign led will activate and the counting will be substracting from the display. Do a «RESET» and the counter will recover normal functionality. Also internal memory «AL2» can be programmed to release a «RESET» automatically when a predefined value on display is reached (code «56 5E»).

Programming example

The default programming for the BDF Counter units is 1 impulse = 1, this means each impulse adds +1 to the display. If changing this relation is needed, then the programming codes need to be accessed to change the scale factors of the unit. We take as an example the reprogramming to 1 impulse = 0,2785.

a.- The scale factors available and the values we can activate are the following :

«Scale Factor»	selectable between -5.9999 to +5.9999
«Multiplication Factor»	selectable between x1, x0.1, x0.001, x0.0001
«Multiplication Flanges»	selectable at x1 or x2

b.- To generate a total scale factor of 0,2785 we can assign the following values :

«Scale Factor»	= 2,785
«Multiplication Factor»	= x0.1
«Multiplication Flanges»	= x1

c.- The codes to program are :

«3»	2,785
«45 2#»	
«44 1#»	

With this programming, each impulse received will add +0,2785 on memory. When 10 impulses have been received, display will show «0002».

d.- To program the same relation 1 impulse = 0,2785 but with 1 decimal, we program the following way :

1 imp = +0,2785 with reading XXX.X

which is the same as 1 imp = 2,785 and light the decimal point :

e.- To generate a total scale factor of 2,785 we can assign the following values :

«Scale Factor»	= 2,785
«Multiplication Factor»	= x1
«Multiplication Flanges»	= x1
«Decimal Point»	= XXX.X

c.- The codes to program are :

«3»	2,785
«45 2#»	
«44 1#»	
«46 2#»	Decimal point lightning at XXX.X

The possible combinations of scale factors and decimal points are very big. Take into consideration that the decimal point is only a led lightning, but it will not move the readings neither to the left nor to the right, and it will not multiply the reading in any case. Start always defining parameter «3» which is the only one able to define precise values, and then look for the appropriate fixed multiplication factors.

Mechanical dimensions

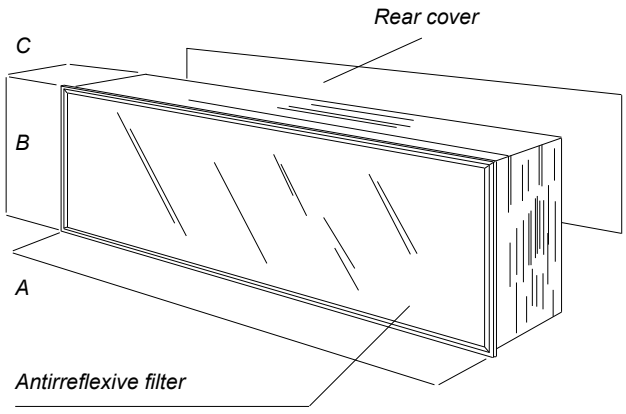
Size 24	A	B	C
4 digits 57mm (2")	264mm (10,40")	120mm (4,75")	112mm (4,41")

Size 44	A	B	C
4 digits 100mm (4")	480mm (18,90")	180mm (7,09")	112mm (4,41")

Size 26	A	B	C
6 digits 57mm (2")	384mm (15,12")	120mm (4,75")	112mm (4,41")

Size 46	A	B	C
6 digits 100mm (4")	668mm (27,10")	180mm (7,09")	112mm (4,41")

***Note** .- add 27mm to the «C» dimension for the power supply plug*



Panel cut-out and weights

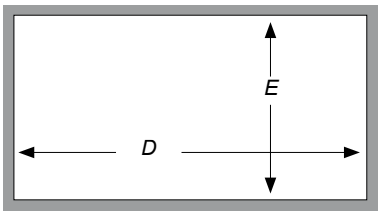
Size 24	D	E	weight
4 digits 57mm (2")	256mm (10,07")	112mm (4,40")	2.3 Kg (5 lbs)

Size 44	D	E	weight
4 digits 100mm (4")	472mm (18,58")	172mm (6,77")	5.0 Kg (11 lbs)

Size 26	D	E	weight
6 digits 57mm (2")	376mm (14,80")	112mm (4,40")	2.7 Kg (6 lbs)

Size 46	D	E	weight
6 digits 100mm (4")	680mm (36,77")	172mm (6,77")	5.7 Kg (12,5 lbs)

PANEL CUT-OUT

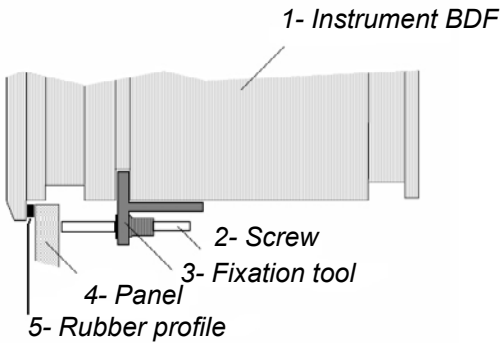


Panel width
Max. 14 mm (0,55")
Min. 2,5 mm (0,10")

Panel installation

Introduce instrument «1» into the panel cut-out and place the fixation piece «3» on each side. Place screw «2» through fixation piece «3» until it presses the panel «4» and is firmly fixed.

Note - The front of the instrument is sealed IP65. To have the same level of protection between the panel and the instrument, place a rubber profile (squared or round) as indicated «5».



Warranty

All instruments are warranted against all manufacturing defects for a period of 24 MONTHS from the shipment date. This warranty does not apply in case of misuse, accident or manipulation by non-authorized personnel. In case of malfunction get in contact with your local provider to arrange for repair. Within the warranty period and after examination by the manufacturer, the unit will be repaired or substituted when found to be defective. The scope of this warranty is limited to the repair cost of the instrument, not being the manufacturer eligible for responsibility on additional damages or costs.

CE Declaration of conformity

Manufacturer FEMA ELECTRÓNICA, S.A.
Altimira 14 - Pol. Ind. Santiga
E08210 - Barberà del Vallès
BARCELONA - SPAIN
www.fema.es - info@fema.es

Series-Models BDF-24 y BDF-44
T1, T2, T3, T5 and T6

The manufacturer declares that the instruments indicated comply with the directives and rules indicated below.

Directive of electromagnetic compatibility 2004/108/CEE
Directive of low voltage 73/23/CEE

Security rules	61010-1
Emission rules	50081-2
Immunity rules	50082-1

NOTE .- During an electromagnetic disturbance (10V/m) it is permitted a worst case error of 1% of the A/D range. The instrument will recover automatically its functionality when the disturbance stops, without need of the operator to reset or restart.

Barberà del Vallès October 2009
Daniel Juncà - Quality Manager

Precautions on installation

INSTALLATION PRECAUTIONS.- The installation and operation of this instrument must be done by qualified operators. This instrument DOES NOT have power switch and will start to operate as soon as the power supply is connected. The instrument has an internal protection fuse, according to IEC-127/2, and is located inside the power-supply connector. The values are

Fuse 200 mA Time Lag (for 230 Vac power)
Fuse 400 mA Time Lag (for 115 Vac power)
Fuse 350 mA Fast (for 24 Vdc power)

When the instrument is used to control machines or processes where the personnel or the process can be damaged, the appropriate security elements must be added to the system in order to protect the operator and / or the system.

SAFETY PRESCRIPTIONS.- This instrument has been designed and verified according to the UNE-20553 rules and is delivered in perfect conditions of operation. This manual contains the adequate information for the electrical installation. Before starting operations for connections, readjustment, substitution, maintenance, repair, etc, the instrument must be unplugged from the power supply. The instrument must be installed in places with good ventilation to avoid excessive heating, and far from sources of electrical noise or magnetic field generators, such as power relays, electrical motors, speed controls, etc... The instrument can not be installed in open places. Do not use until the installation is finished. The instrument is designed to be mounted on a metallic panel with the adequate protections. DO NOT clean the front lens with abrasive products (such as solvents, alcohol, etc) use a clean and water humid rag. Do not expose the instrument to excessive moisture. DO NOT operate the unit in the presence of flammable gases or fumes.

EXCITATION VOLTAGE Vexc.-
Instruments BDF-xx-32 and BDF-xx-36 supply an excitation voltage of 10 to 24 Vdc (50mA) to power transducers, available between terminals A and C. Do NOT connect these terminals to an external power supply, permanent damages may result on both instruments.

POWER SUPPLY .- Connect the Power Supply to the terminals indicated in this manual. Verify that the voltage and frequency of the power supply is according to the voltage and frequency values indicated in the label attached to the unit. DO NOT connect the instrument to power lines which are overloaded, or power lines with loads working in ON/OFF cycles, or with inductive loads.

SIGNAL WIRING .- Information to consider relating the wiring of the sensors, probes, transducers, etc. The wires can act as antennas and introduce electrical noise from the environment into the signal wires, specially if the wires are close to noise sources or electromagnetic sources. There are several rules generally known which should be taken into consideration for the wiring :

a.- DO NOT install impulse, control or signal wires together in the same conduits as the wires connected to power lines, connected to CC or AC engines, electromagnets, ...

b.- When using shielded wires, connect the shield to the common of the instrument, and leave not-connected the probe side

c.- The wires of impulse, control and signal should be placed in places far away from switches, transformers, control relays, etc...

IN CASE OF FIRE
1.- Disconnect the unit from the power supply.

2.- Give the alarm according to the local rules.
3.- Switch off all the air conditioning devices.
4.- Attack the fire with carbonic snow, do not use water in any case.

WARNING : In closed areas do not use systems with vaporized liquids.

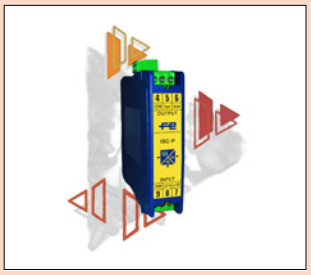
other products

Panel Meters
Standard 96x48mm

Panel Meters
Small 72x36 mm

Panel Meters
Miniature 48x24 mm

Large Displays
60 & 100 mm digit



Signal Converters
& Isolators

Panel Meters
Standard 96x48mm

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ELECTRONIC INSTRUMENTATION FOR INDUSTRY

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