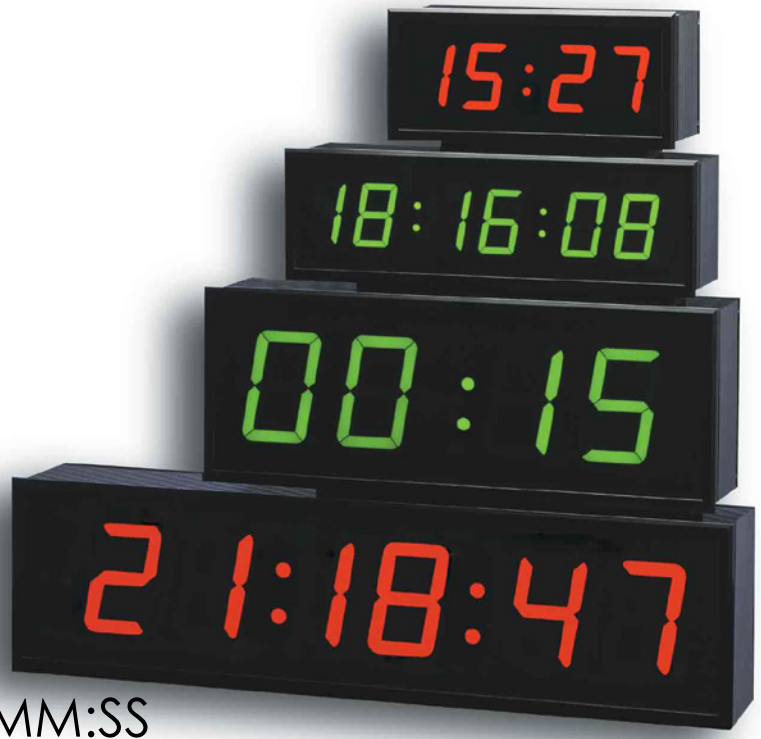
Large Displays

FEMA ELECTRÓNICA

Series BDF

Large Displays in clock format



BDF-xx-TC1	Clock MM:SS
BDF-xx-TC2	Clock HH:MM
BDF-xx-TC3	Clock HH:MM:SS
BDF-xx-TC4	Chronometer MM:SS
BDF-xx-TC5	Chronometer HH:MM
BDF-xx-TC6	Chronometer HH:MM:SS
BDF-xx-TCS	Unit SLAVE

IDEAL SOLUTION for reading time signals at long distances, with units in Real Time Clock format, or Chronometer with up and down counting. Very strong housing and electrically protected units, designed for all type of industrial applications.

USER'S MANUAL
(1281R01)

Models TC1 to TC6 and TC6

Large displays with clock and chronometer function

The BDF series of large displays for time signals is composed of units acting as Real Time Clocks, Chronometers with up and down counting functions, and «SLAVE» units for repeating time signals in synchronized time networks. All instruments are available in 4 and 6 digits format, with digit height 57mm and 100mm.

All «MASTER» units (Real Time Clocks and Chronometers) provide RS422 signal output to retransmit the time signal to the «SLAVE» units (TCS) creating synchronized time networks.

The Chronometers have independent controls for «START», «STOP» and «RESET» functions, and a selectable «PRESET» value. This «PRESET» defines the time to load on display when «RESET» is pressed on Down-Chronometers, and the «ALARM» time on Up-Chronometers. The «ALARM» state sets a digital transistor output to be active when reaching «00:00:00» with Down-Chronometers, or the value of «PRESET» with up-Chronometers.

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, and standard SUB-D connectors, 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
BDF -	**24** -	**TC2** -	**0** -	**R** -	**---**
	-24 -44 -26 -46	-TC1 -TC2 -TC3 -TC4 -TC5 -TC6 -TCS	-0 (230 Vac) -1 (115 Vac) -6 (24 Vdc isolated)	-Red -Green (check for availability)	-65 *(IP65)** *-(empty)*

* 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-TC1 .- Real Time Clock with «MM:SS» format. Time set through mechanical contacts on rear-side terminal. Output in RS422 to synchronize «SLAVE» units.

MODEL BDF-xx-TC2 .- Real Time Clock with «HH:MM» format. Time set through mechanical contacts on rear-side terminal. Output in RS422 to synchronize «SLAVE» units.

MODEL BDF-xx-TC3 .- Real Time Clock with «HH:MM:SS» format. Time set through mechanical contacts on rear-side terminal. Output in RS422 to synchronize «SLAVE» units.

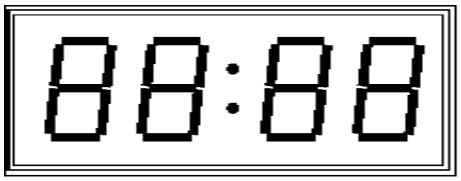
MODEL BDF-xx-TCS .- Unit with «SLAVE» function with RS422 input, receives signal from «MASTER» units (Real Time Clock or Chronometer) and visualizes on display the synchronized time.

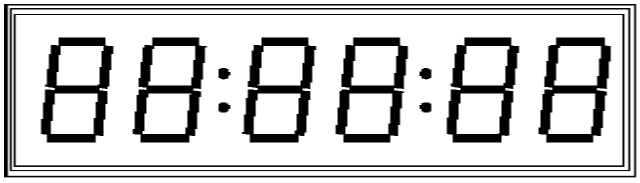
MODEL BDF-xx-TC4.- Chronometer with Up or Down function with «MM:SS» format. Controls for «START», «STOP» and «RESET». Digital transistor output when reaching «00:00» or the preset «ALARM» value. Output in RS422 to synchronize «SLAVE» units.

MODEL BDF-xx-TC5.- Chronometer with Up or Down function with «HH:MM» format. Controls for «START», «STOP» and «RESET». Digital transistor output when reaching «00:00» or the preset «ALARM» value. Output in RS422 to synchronize «SLAVE» units.

MODEL BDF-xx-TC6.- Chronometer with Up or Down function with «HH:MM:SS» format. Controls for «START», «STOP» and «RESET». Digital transistor output when reaching «00:00:00» or the preset «ALARM» value. Output in RS422 to synchronize «SLAVE» units.

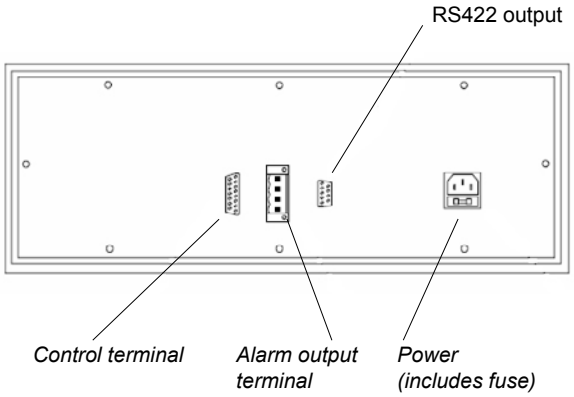
Front view





BDF Clock units are available in 4 or 6 digits format. Digits are 7 segment LED red color. The «:» symbol between digits is flashing in models with format «HH:MM», indicating that the units is working properly.

Rear view

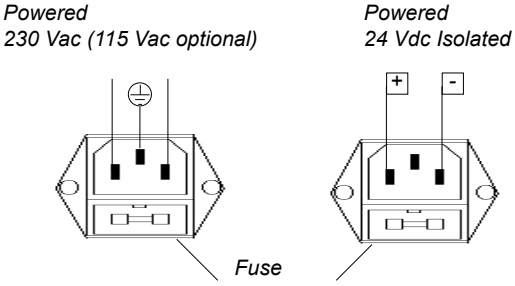


All units have a 15 pin SUB-D terminal to connect the control signals *(see section 8)* and time set, a 9 pin SUB-D terminal for RS422 communication and a 4 pole plug-in screw terminal to connect alarm output *(see section 9)*.

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



General specifications

DISPLAY 4 or 6 digits in red color
7 segment Led
digit height 57 mm (2,3") or 100mm (4")
maximum display «99:59» or «99:59:59»

REAL TIME CLOCK
Display up to «23:59» or «23:59:59»
Format 12 or 24 hours
Time set advance hours and minutes with mechanical contact
Accuracy ±1 minute per month
Memory 2 years with no power

TIME COUNTER
Display up to «99:59» or «99:59:59»
Accuracy ±1 sec. for start/stop sequence
Memory 2 years with no power
(the counting stops if no power connected)

Preset configurable
isolated transistor output
maximum 30 V (30 mA)

«SLAVE» UNITS
Display up to «99:59» or «99:59:59»
Input Signal RS422 ASCII

SERIAL OUTPUT
Signal RS422
Speed 1200 bps
No handshake transmits 1 time chain per second
Character 1 Start
8 Data No Parity
1 Stop

CONTROL LINES
State «1» > 3.6V
State «0» < 0.9V
Maximum Signal ±30V
Activation at failing edge *
Resistance selected Pull-Up *
Input Impedance 1KOhm against common *

*Note .- the activation on «raising edge» or «down edge» is jumper selectable. Also the selection of «Pull-Up» or «Pull-Down» polarization resistances is jumper selectable. To control de signals with a TTL signal level, select no polarization resistance (no pull-up, no pull-down) and the input impedances remain as follows :

signal 0 to 5 Vdc 100KOhm against common
signal >5Vdc 18 KOhm
signal <-0.6 Vdc 18 KOhm

Antirrebound filter at 5 Hz

ENVIRONMENTAL DATA
Working Temp. 0/+50ºC (32/122 ºF)
Storage Temp. -20/+85°C (-4/185ºF)
Rel. Humidity 0 to 85% non condensated
Protection IP65 (only front filter)

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

Start-up

When power is connected to the instrument, one of the following messages appear :

MAStEr	6 digit instrument in «MASTER» mode
MASt	4 digit instrument in «MASTER» mode
SLAUE	6 digit instrument in «SLAVE» mode
SLAU	4 digit instrument in «SLAVE» mode
CHIP	Error due to internal failure
SET	Data in memory corrupted Reconfigure the unit

Real time clock - operations

REAL TIME CLOCK UNITS
After message is displayed, the unit displays the actual time. If different time is to be set, use the control lines «HOUR», «MINUTE», «SECOND» to set-up the time of the instrument (*see section 8*)

Note.- *The activation of a «START», «STOP» or «RESET» control signal, switches the instrument to Chronometer mode. To switch back to Real Time Clock mode, unplug the power supply and plug again.*

Slave units

SLAVE UNITS
After message is displayed, the unit remains waiting for data on the RS422 terminal.

The TCS instruments are designed to work together with «MASTER» units from the same BDF Clock series (models TC1, TC2, TC3, TC4, TC5 and TC6) but they can be also controlled from PLC's or PC's. (*see section 10 for more information relating the data format transmitted on the RS422 line)*.The «SLAVE» instruments only have the RS422 terminal active. The other terminals are not functional.

Note *.- The RS422 communication line can be terminated with a JP1 resistance (Terminator).*

Upwards chronometer - operations

UP-CHRONOMETER UNITS
After message is displayed, the unit displays «00:00:00» or the last displayed value. Use the control lines «START», «STOP», «RESET» to control the counting (*see section 8*). If the unit has the «ALARM» function activated, when reaching the «PRESET» value the following sequence will be generated :

STOP	counting will stop at «PRESET» value
FLASH	display will flash
SIGNAL	transistor output will activate

Press «RESET» to leave the sequence above, and to load «00:00:00» value on display, to continue normal operation.

If the unit has the «ALARM» function not activated, when reaching «PRESET» it will continue counting Up until reaching «99:59:59», it will switch to «00:00:00» and continue counting up.

(see section 9 for more information on the «PRESET» value)

Downwards chronometer - operations

DOWN-CHRONOMETER UNITS
After message is displayed, the unit displays the «PRESET» value or the last displayed value. Use the control lines «START», «STOP», «RESET» to control the counting *(see section 8)*. If the unit has the «ALARM» function activated, when reaching «00:00:00» the following sequence will be generated :

STOP	counting will stop at «00:00:00»
FLASH	display will flash
SIGNAL	transistor output will activate

Press «RESET» to leave the sequence above, and to load the «PRESET» value on display, to continue normal operation.

If the unit has the «ALARM» function not activated, when reaching «00:00:00» it will switch to «99:59:59» and continue counting down.

(see section 9 for more information on the «PRESET» value)

Connections and operation

The BDF instruments working as Real Time Clocks, can be set on time by closing mechanical contacts between terminals 14,13 and 6 of the *«Control Terminal»* and *«GND»*. Each contact closed will add «+1» on the hours and minutes and will set seconds to zero.

Terminal 14 to *«GND»* .- Adds «HOUR»
Terminal 6 to *«GND»* .- Adds«MINUTE»
Terminal 13 to *«GND»* .- Resets «SECOND»

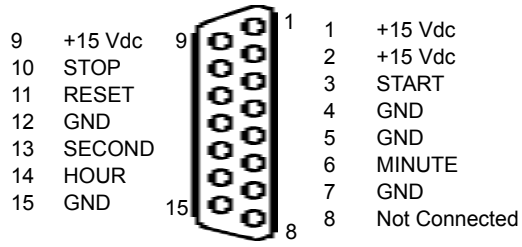
Note.- *The controls for «HOUR», «MINUTE» and «SECOND» are activated by mechanical contacts closed to «GND». Internally, the terminals are connected to +15Vdc through a Pull-Up 4K7 resistor.*

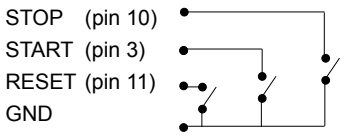
The BDF instruments working as Chronometers with up or down function have 3 controls for «START», «STOP» and «RESET». By default, these functions are activated by *«Down-Edge»* with a mechanical contact to *«GND»*. Internally, the terminals are connected to +15Vdc through a Pull-Up 4K7 resistor.

Terminal 11 to *«GND»*.- «RESET»
Terminal 3 to *«GND»*.- «START»
Terminal 10 to *«GND»*.- «STOP»

Note *.- Each control line can be configured independently to be activated by «Down-Edge» or «Rising-Edge». To configure to «Down-Edge» use jumpers JP6, JP7, JP8 and place the polarization resistors ad «Pull-Down» (Jumpers JP5, JP9, JP10). Note that in this case, the signals will be activated with a mechanical contact connected to «+15 Vdc» (allowable at the same «Control Terminal»)*

Control Terminal





Alarm y preselection

ALARM
Chronometer units have an «ALARM» function which activates when the display reaches «00:00:00» on Down-Chronometers, or when the display reaches the «PRESET» value on Up-Chronometers. When the «ALARM» activates, the following procedure occurs :

STOP	time counting stops
FLASH	display flashes
SIGNAL	the transistor output gets active

When pressing «RESET» the unit will reset the display to «00:00:00» or to the «PRESET» value.

Note *.- The «ALARM» function can be disabled by acting on internal jumpers (see section 11).*

PRESET
Chronometer units have a «PRESET» value that can be configured to a predefined display time.

Down-Chronometer units will load the «PRESET» value on display when pressing a «RESET», and will count down from the «PRESET» value when «START» is pressed.

Up-Chronometer units will activate «ALARM» when reaching the «PRESET» value.

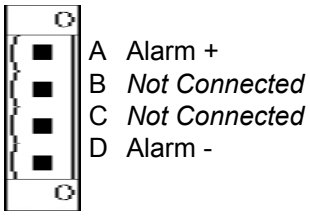
CONFIGURING THE «PRESET» VALUE
Stop the counting of the chronometer («STOP»). Press «SECOND» (pin 13) and the «PRESET» value will appear on display.

Note *.- Only the 4 most significant digits of the «PRESET» can be modified. Instruments with «HH:MM:SS» format can modify the HH and MM values. Units with «HH:MM» and «MM:SS» formats can modify all 4 digits.*

Maintaining «SECOND» pressed, press «HOUR» or «MINUTE» to increase the value of the «PRESET». The default value for the «PRESET» is «01:01:00» (or «01:01» for units with 4 digits).

Note *.- Pressing «Hour» and «Minute» simultaneously will set the «PRESET» value to «00:00:00»*

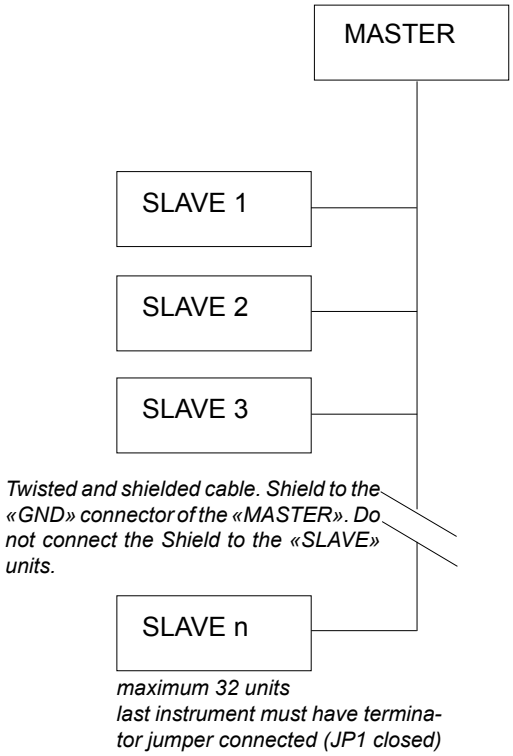
Alarm Connections



Synchronized time networks - RS422 - Slave units

All BDF Clock units with «MASTER» function (Real Time Clocks and Chronometers) have a RS422 ASCII output connection to send data to «SLAVE» units. All «SLAVE» units receive this data and show on display the same time as the «MASTER» time, being both units time synchronized.

Conection between «MASTER» and «SLAVE» is direct, connecting pins «A» to «A» and «B» to «B». No additional configuration is needed.



TRANSMITTED DATA FORMAT

For applications where the «SLAVE» unit is controlled from a «MASTER» which does not belong to the BDF Clocks series (PLC or PC), the information for the HH:MM:SS (or HH:MM or MM:SS) to display must be transmitted to the «SLAVE» in the following format:

Model TC1 and TC4	MM.SS «CR»
Model TC2 and TC5	HH.MM «CR» and HH «NUL» MM «CR»
Model TC3 and TC6	HH.MM.SS «CR»

***Note** .- in models «HH:MM» two different data types are sent, in order to activate / deactivate the central points between the HH and the MM. This creates a blinking effect showing that the unit is receiving data and working correctly.*

Codes sent correspond to the following HEX characters:

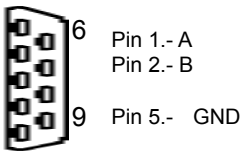
«H»	«30» to «39» HEX (0 to 9 decimal)
«M»	«30» to «39» HEX (0 to 9 decimal)
«S»	«30» to «39» HEX (0 to 9 decimal)
«.»	character «2E» HEX
«-»	character «2D» HEX
«NUL»	character «00» HEX
«CR»	character «0D» HEX

Format	1 bit Start
	8 bits Data No Parity
	1 bit Stop

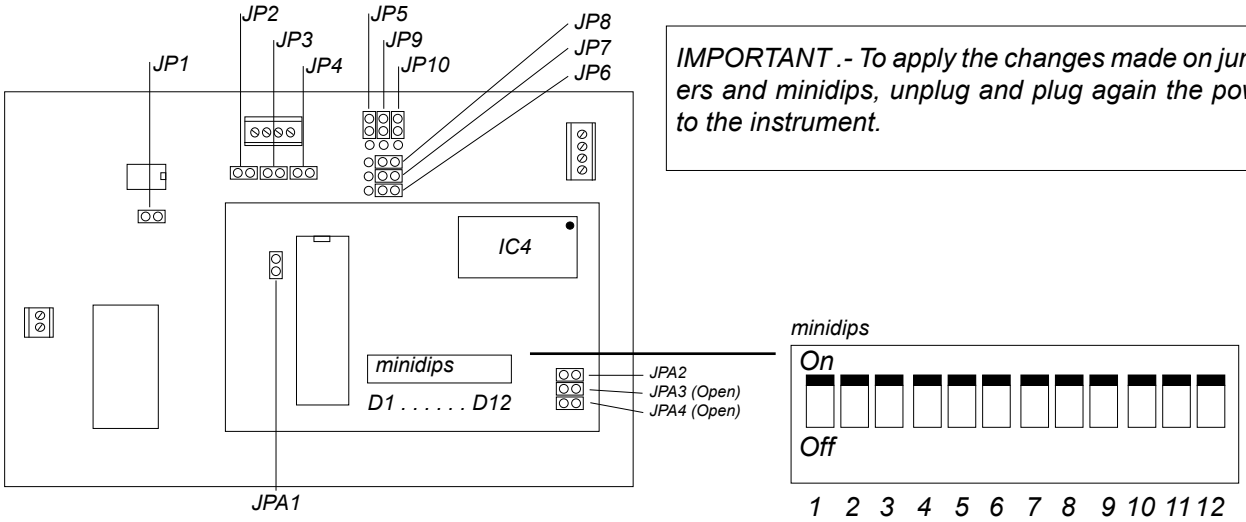
***Note** .- When «MASTER» unit is not showing a valid time value on display (it is being reconfigured or the «ALARM» state is active) the data format sent on the RS422 bus is :*

-- «NUL» -- «NUL» -- «CR»
-- «NUL» -- «CR»
-- «NUL» -- «CR»

Connections RS422



Internal configuration



IMPORTANT .- To apply the changes made on jumpers and minidips, unplug and plug again the power to the instrument.

RS422 Bus Terminator
JP1 Closed RS422 with terminator (220 Ohms)

Antirrebound Filters for Control Signals
JP2 Closed Antirrebound filter for "STOP" (5 Hz)
JP3 Closed Antirrebound filter for "START" (5 Hz)
JP4 Closed Antirrebound filter for "RESET" (5 Hz)

Configuring the Control Signals

Configuration for the 1 KOhm polarization resistors for control signals. Depending on the position of the jumpers, the polarization resistors will be configured as Pull-Up ( ) or Pull-Down ( ).

JP5 Stop
JP9 Start
JP10 Reset

The control signals will be activated by "Rising-Edges" ( ) or "Down-Edges"( ).

JP6 Start
JP7 Stop
JP8 Reset

By default, configuration is "activation by "Down-Edges" for all controls, "Pull-Up" resistances and connections through mechanical contact to "GND"

Master or Slave units
JPA2 Close for "SLAVE" units (TCS)
Remove IC4
JPA2 Open for "MASTER" units (TC1, TC2, TC3, TC4, TC5 and TC6)

Alarm *(dip1)*	Active	on
	Inactive	off
Chronometer Up./Down. *(dip2)*	Down	on
	Up	off
Luminosity *(dip3, dip4)*	100%	on on
	75%	on off
	50%	off on
	25%	off off
Real Time Clock type *(dip5)*	HH:MM	on
	MM:SS	off

***note** .- for HH:MM:SS select HH:MM and jumper JPA2 closed*

Real Time Clock mode *(dip6)*	24 hours	on
	12 hours	off
Output RS422 *(dip7)*	Newport mode	on
	standard	off
Type of unit *(dip8)*	Chronometer	on
	Clock	off
(dips9, 10, 11 y 12)	not used	off

Units with 4 or 6 digits
Jumper JPA1 Closed 6 digits
Jumper JPA1 Open 4 digits

BLANK SECTION

Mechanical dimensions

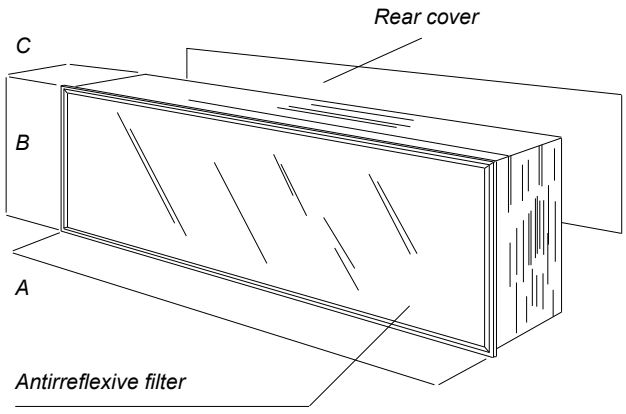
Size 24	A	B	C
4 digits 57mm (2")	264mm (10,40")	120mm (4,75")	112mm (4,41")

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

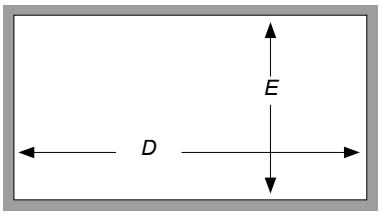
Size 24	D	E	weight
4 digits 57mm (2")	256mm (10,07")	112mm (4,40")	2.3 Kg (5 lbs)

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

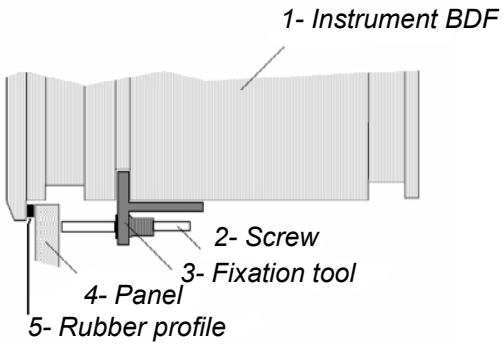


Panel width
Max. 14 mm (0,55")
Min. 2,5 mm (0,10")

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
TC1, TC2, TC3, TC4, TC5, TC6 and TCS

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.

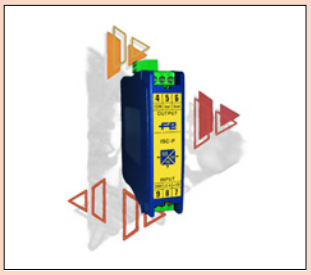
other products

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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