

Series BDF

Large Displays for Temperature



BDF-xx-21	for Pt100 / RTD probes
BDF-xx-22	for thermocouple J
BDF-xx-23	for thermocouple K
BDF-xx-24	for thermocouple T
BDF-xx-25	for thermocouple E
BDF-xx-26	for thermocouple S
BDF-xx-27	for thermocouple R
BDF-xx-28	for thermocouple L

IDEAL SOLUTION for reading temperature values at long distances from standard «Pt100 / RTD» probes and «Thermocouples» signals. Very strong housing and electrically protected units, designed for all type of industrial applications.

Models 21 to 28

Large displays for Pt100 and Thermocouple probes

The BDF series of large displays for temperature signals is composed of instruments model «21» for «PT100 / RTD» probes in 2 and 3 wire systems, and instruments model «22», «23», «24», «25», «26», «27» and «28» for several types of standard thermocouples («J», «K», «T», «E», «S», «R», «L»). All these instruments are available in 4 digits format, with digit height of 57mm and 100mm, and negative led sign.

The instrument is connected to the temperature probe («PT100 / RTD» or thermocouple) and directly displays the temperature value scaled in «°C». In case the probe breaks, the instrument displays «9999» in flashing mode for advise.

The instrument for «PT100 / RTD» allows for an automatic compensation of the ohmic resistance of the probe wires up to 10 Ohms. The instruments for thermocouple allow automatic compensation of the «Cold Junction» of the ther-

mocouples. It is recommended to connect the thermocouple to the instrument using compensated wire, the same type as the thermocouple connected.

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 antir-reflexive 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
BDF	- 24	- 21	- 0	- R	- ---
	-24 -44	-21 -22 -23 -24 -25 -26 -27 -28	-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")

Models

MODEL BDF-xx-21 .- Temperature display for «RTD/PT100» probes in 2 and 3 wire systems, with automatic compensation for the ohmic wire resistance up to 10 Ohms. Sensor curve linearized according to IEC751-DIN43760

MODEL BDF-xx-22 .- Temperature display for Thermocouple «J» (Fe-Kons) with automatic «Cold Junction» compensation, and detection for broken probe. Sensor curve linearized according to IEC584, IPTS1968, ANSI/MC96.1, DIN43710

MODEL BDF-xx-23 .- Temperature display for Thermocouple «K» (Cr-Al) with automatic «Cold Junction» compensation, and detection for broken probe. Sensor curve linearized according to IEC584, IPTS1968, ANSI/MC96.1, DIN43710

MODEL BDF-xx-24 .- Temperature display for Thermocouple «T» (Cu-Kons) with automatic «Cold Junction» compensation, and detection for broken probe. Sensor curve linearized according to IEC584, IPTS1968, ANSI/MC96.1, DIN43710

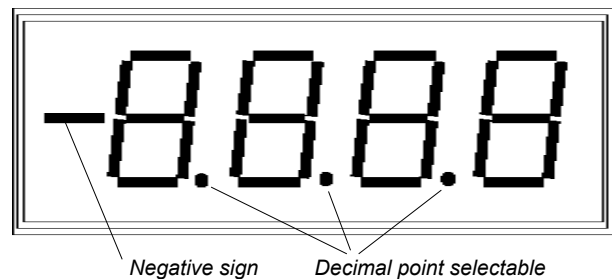
MODEL BDF-xx-25 .- Temperature display for Thermocouple «E» (Cr-Kons) with automatic «Cold Junction» compensation, and detection for broken probe. Sensor curve linearized according to IEC584, IPTS1968, ANSI/MC96.1, DIN43710

MODEL BDF-xx-26 .- Temperature display for Thermocouple «S» (Pt-PtRh10%) with automatic «Cold Junction» compensation, and detection for broken probe. Sensor curve linearized according to IEC584, IPTS1968, ANSI/MC96.1, DIN43710

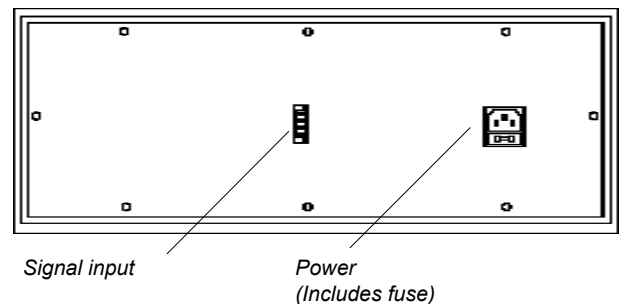
MODEL BDF-xx-27 .- Temperature display for Thermocouple «R» (Pt-PtRh13%) with automatic «Cold Junction» compensation, and detection for broken probe. Sensor curve linearized according to IEC584, IPTS1968, ANSI/MC96.1, DIN43710

MODEL BDF-xx-28 .- Temperature display for Thermocouple «L» o «DIN-J» (Fe-Kons) with automatic «Cold Junction» compensation, and detection for broken probe. Sensor curve linearized according to IEC584, IPTS1968, ANSI/MC96.1, DIN43710

Front view



Rear view



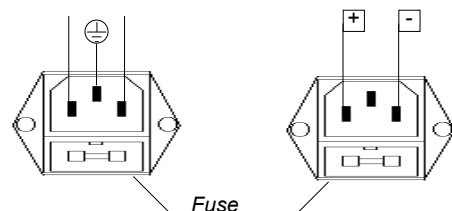
Power supply connections

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

Powered
230 Vac (115 Vac optional)

Powered
24 Vdc Isolated



General specifications

DISPLAY 4 digits in red color
7 segments Led type
negative sign«-»
digit 57mm (2,3") with BDF-24 Series
digit 100 mm (4") with BDF-44 Series
Antirreflexive front filter
IP65 front protection

A/D CONVERTER

dual slope autozero, mean value
integration time 100 msec.
2,5 readings/ second
400 KHz Quartz crystal oscillator

BROKEN PROBE automatic detection. Advises with flashing display at «9999» reading

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

CONSUMPTION 6 VA for BDF-24 Series
12VA for BDF-44 Series

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

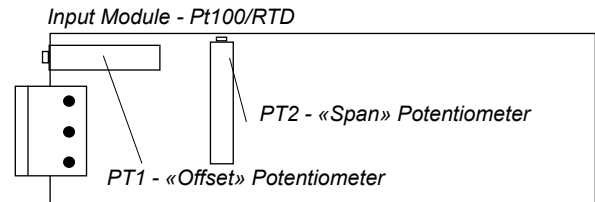
WEIGHT 2.3 Kg (5,0 lbr) for BDF-24 Series
5.0 Kg (11,0 lbr) for BDF-44 Series

ENVIRONMENTAL DATA

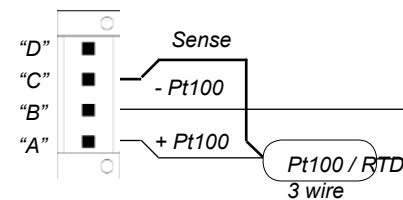
Working Temp. 0/+50°C (32/122 °F)
Storage Temp.-20/+85°C (-4/185°F)
Relative Hum. 0 to 85% non condensated

Model 21 for Pt100

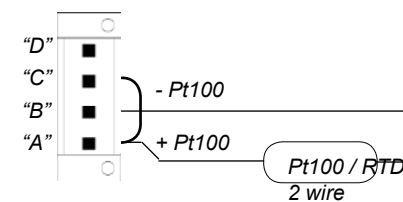
Model 21
Sensor PT100
Temperature -100.0 a +650.0 °C
Accuracy 0.4% ±1 digit
Resolution 0.1 °C
Compensation up to 10 Ohms



Connections for «Pt100/RTD» 3 wires

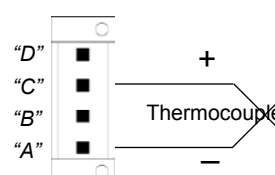
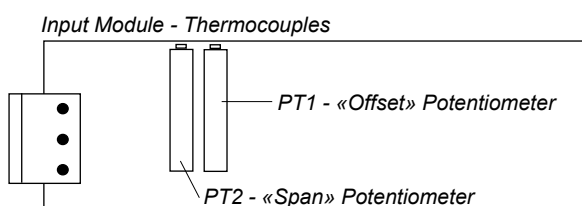


Connections for Pt100/RTD 2 wires
Note - short circuit terminals C and A



Models 22 to 28 for Thermocouples

Model	Thermocouple	Temperature	Accuracy	Resolution	Compensation
22	J	-50 to +600 °C	0.5% ±1 Digit	1°C	from 0 to +50°C
23	K	0 to+1250 °C	0.5% ±1 Digit	1°C	from 0 to +50°C
24	T	-50 to +400 °C	0.5% ±1 Digit	1°C	from 0 to +50°C
25	E	0 to +650 °C	0.2% ±1 Digit	1°C	from 0 to +50°C
26	S	+970 to+1750 °C	0.1% ±1 Digit	1°C	from 0 to +50°C
27	R	+1000 to+1750 °C	0.2% ±1 Digit	1°C	from 0 to +50°C
28	L (DIN-J)	-50 to +600 °C	0.5% ±1 Digit	1°C	from 0 to +50°C



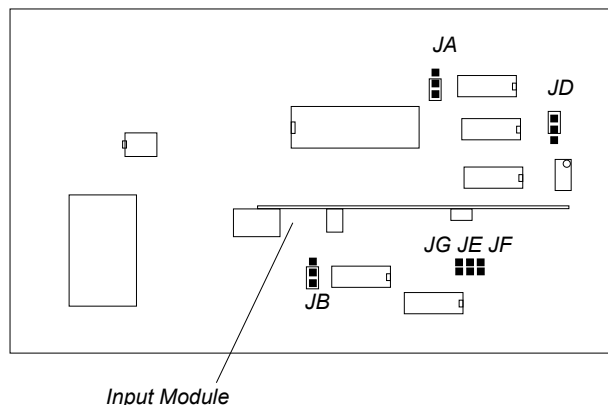
Connections for Thermocouples
Note .- Use compensated cable, the same type as the thermocouple

Control board

On the «Control Board» is placed the «Input Module», and the jumpers for «Decimal Point» selection.

Note - Do not operate the potentiometers placed on the «Control Board».

«Control Board»



Jumper JA

- reading «/1» (for «PT100/RTD» units)
- reading «/10» (for thermocouples units)

Jumper JD

- digit fixed to «0»
- digit free (all units)

Jumper JB

- FLASH on «Control Board» (all units)
- FLASH on module

Decimal Point

- ■ ■ JG = XXX.X
- ■ ■ JE = X.XXX
- ■ ■ JF = XX.XX

Instrument recalibration

In case a recalibration of the reading values for the displays is needed, generate the desired signal at the input terminals (with a «Pt100/RTD» simulator or thermocouple simulator) and operate the potentiometers «SPAN» and «OFFSET» according to the instructions indicated in the following examples:

Example .- Recalibrate a «BDF-xx-21» instrument for a «PT100/RTD» probe

- a.- Unplug the instrument from the power supply
Unscrew the rear side cover to access the «Control Board» and the «Input Module»
- b.- Connect a «Pt100/RTD» simulator to the input signal terminal. Plug the power supply, and leave 3 minutes for warm-up
- c.- Place jumper «JG» on the «Control Board» to light the decimal point
- d.- Generate 0°C and operate PT1 «Offset Potentiometer» to fix a reading of «000.0»
- e.- Generate 650°C and operate PT2 «Span Potentiometer» to fix a reading of «650.0»
- f.- Repeat the steps for generating signal / adjust reading at «0°C» and «650°C» until the reading is correct.

Note .- the value in Ohms for the signals used in this example are 0°C = 100.0 Ohms and 650°C = 329.51 Ohms

Example .- Recalibrate a «BDF-xx-22» instrument for a thermocouple «J» probe

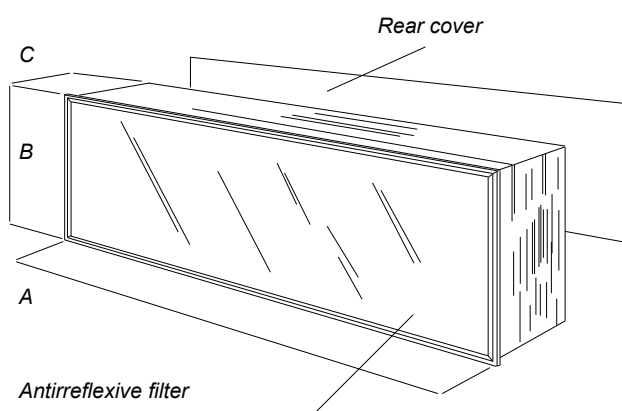
- a.- Unplug the instrument from the power supply
Unscrew the rear side cover to have access to the «Control Board» and to the «Input Module»
- b.- Connect a thermocouple «J» simulator to the input signal terminals. Plug the power supply, and leave 3 minutes for warm-up
- c.- Generate -50°C and operate PT1 «Offset Potentiometer» to fix a reading of «-50»
- d.- Generate 600°C and operate PT2 «Span Potentiometer» to fix a reading of «600»
- e.- Repeat the steps for generating signal / adjust reading at «-50°C» and «600°C» until the reading is correct.

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")

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

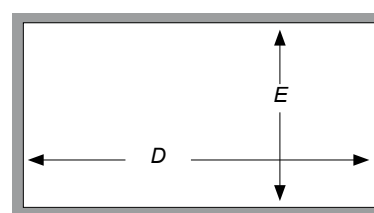


Panel cut-out and weights

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)

PANEL CUT-OUT

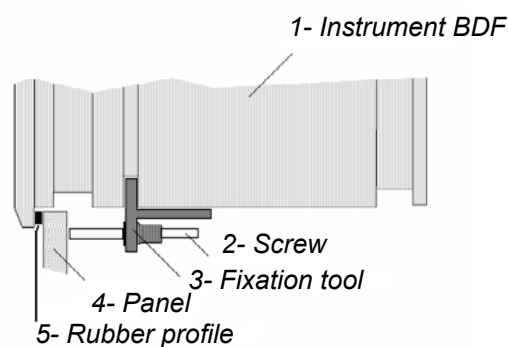


Panel width
Max. 14 mm (0,55")
Min. 2,5 mm (0,10")

Panel installation

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

Note .- The front of the instrument is sealed with a protection level 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- BDF-24 y BDF-44
Models 21, 22, 23, 24, 25, 26, 27 and 28

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 V_{exc} .-

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

www.fema.es

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