



INSTALLATION AND OPERATION MANUAL

Software Version 2.2x

code 81611C / Edition 08 - 03/08 ENG



GENERAL INDEX

	Page		
1	Preliminary instructions	2	Functions
	General description	2	
	Electrical interface	2	4
	Preliminary warnings	3	Configuration and programming
2	Installation and connection	4	5
	Electrical power supply	4	Technical specifications
	Notes concerning electrical safety and		
	Electromagnetic compatibility	4	6
	Advice for correct installation		Accessories
	for EMC	5	
	Instrument power supply	5	
	Inputs and outputs connection	5	
	Dimensions and cut-out	6	
	Installation with panel mounting	6	
	Warnings and instructions for		
	mounting to the panel	6	
	Nominal ambient conditions	6	
	Electrical connections	7	



The contents of each section are summarized
immediately following the section heading

Graphic symbols used

To distinguish between the type and importance of the information provided in these instructions for use, graphic symbols have been used as a reference to make interpreting the information clearer.



Indicates the contents of the various manual sections, the general warnings, notes, and other points to which the reader's attention should be drawn.



Indicates a suggestion based on the experience of the GEFran Technical Staff, which could prove especially useful under given circumstances



Indicates a particularly delicate situation that could affect the safety and correct working operation of the controller, or a rule that must be strictly observed to avoid dangerous situations



Indicates a reference to Detailed Technical Documents available on the GEFran web site **www.gefran.com**



Indicates a condition of risk for the safety of the user, due to the presence of dangerous voltages at the points shown

1 • PRELIMINARY INSTRUCTIONS



This section contains information and warnings of a general nature which should be read before proceeding with controller installation, configuration and use.

General Description

Microprocessor based indicator in both 48x48 (1/16 DIN) formats manufactured with SMT.

The instruments have a lexan membrane faceplate (guaranteed to IP65) which has 3 keys, a 4 digit display and 3 indicating LED's for the output statuses.

The input signal can be selected from a wide range of sensors:

- Potentiometer (minimum 100Ω)
- Load cell with sensitivity autoranging between 1,5 and 3,3mV/V
- Strain-gauge pressure sensor

The selection is made using the faceplate keys.

The programming of the instrument is made easy by grouping the parameters in function blocks and by a simplified data entry menu.

The configuration can be simplified even further using the PC programming kit made up of a connection cable and a menu guide program that runs under Windows (see data sheet code WINSTRUM).

A configurable personal software protection code (password protection) can be used to restrict the levels of editing and displaying the configuration parameters.

Electrical Interface

All connection terminals (power supply, inputs, outputs, options) are grouped together on the back of the instrument.

For technical specifications and performance details refer to Section 5 "Technical Specifications".

Preliminary Warnings



The following preliminary warnings should be read before installing and using the series 4B48 indicator.

This will allow the controller to be put into service more quickly and will avoid certain problems which may mistakenly be interpreted as malfunctions or limitations of the instrument.

- Immediately after unpacking the instrument, make a note of the order code and the other identification data given on the label affixed to the outside of the container and copy them to the table below. These details must always be kept close at hand and referred to the personnel involved in the event of help from Gefran Customer Service Assistance.

SN:		(Serial n°)
CODE:		(Finished product code)
TYPE:		(Order Code)
SUPPLY:		(Type of electrical power supply)
VERS:		(Software version)

- Check also that the instrument is complete and has not been damaged at all during transit, and that the package contains not only the controller and these Instructions for Use, but also the kit for fixing to the panel and the dust protection seal - see: Installation with Panel Fixing in Section 2. Any inconsistencies, omissions or evident signs of damage should be reported immediately to your Gefran sales agent.
- Check that the order code corresponds with the configuration requested for the application the instrument is needed for.
 - N°. and Type of Inputs/Outputs available
 - Presence of the necessary options and accessories
 - Mains voltage supply

Example: 4B 48 – 4 – 01 – 0
Model 4B 48
Sensor power supply 1,2Vdc (potentiometer)
Power supply 11...27Vac/dc
- Before installing the instrument serie 4B 48 on the control panel of the machine or host system, refer to the paragraph "Dimensions and Cut-out" in Section 2 "Installation and Connection".
- Where configuration by PC is provided for, make sure the interface RS232 cable is available and the CD-ROM containing the WINSTRUM software. For the order code refer to Section 6 "Accessories".



Users and/or system integrators who wish to know more about the concepts of serial communication between standard PC and/or Gefran Industrial PC and Gefran Programmable Instruments, can access the various technical reference Documents in Adobe Acrobat format available in the Download section of the Gefran Web Site **www.gefran.com** including:

- Serial Communication
- MODBus Protocol

In the same Download section of the Gefran Web Site **www.gefran.com** the instrument serie 4B 48 reference manual is available in Adobe Acrobat format, containing a detailed description of all the adjustable parameters and procedures. In the event of presumed instrument malfunction, before contacting Gefran Technical Service Assistance, refer to the F.A.Q. Section (Frequently Asked Questions) on the Gefran Web Site **www.gefran.com**

2 • INSTALLATION AND CONNECTION



This section contains the instructions necessary for correct installation of the instrument 4B 48 into the machine control panel or the host system and for correct connection of the controller power supply, inputs, outputs and interfaces.



Before proceeding with installation read the following warnings carefully!
Remember that lack of observation of these warnings could lead to problems of electrical safety and electromagnetic compatibility, as well as invalidating the warranty.

Electrical power supply

- the instrument is NOT equipped with an On/Off switch: the user must provide a two-phase disconnecting switch that conforms to the required safety standards (CE marking), to cut off the power supply upstream of the instrument.
The switch must be located in the immediate vicinity of the instrument and must be within easy reach of the operator.
One switch may control more than one controller.
- if the instrument is connected to NOT isolated electrical equipment (e.g. thermocouples), the earth connection must be made with a specific conductor to prevent the connection itself from coming directly through the machine structure.
- if the instrument is used in applications with risk of damage to persons, machinery or materials, it is

essential to connect it up to auxiliary alarm equipment. It is advisable to make sure that alarm signals are also triggered during normal operation. The instrument must NOT be installed in flammable or explosive environments; it may be connected to equipment operating in such atmospheres only by means of appropriate and adequate types of interface, conforming to the applicable safety standards.

Notes Concerning Electrical Safety and Electromagnetic Compatibility:

CE MARKING: EMC Conformity (electromagnetic compatibility)

in accordance with EEC Directive 89/336/CEE modified by Directive 93/68.

The instrument series 4B 48 are mainly designed to operate in industrial environments, installed on the switchboards or control panels of productive process machines or plants.

As regards electromagnetic compatibility, the strictest generic standards have been adopted, as indicated in the table below.

BT Conformity (low tension) in accordance with Directive 73/23/CEE modified by Directive 93/68.

EMC conformity has been tested with the following connections.

Function	Cable type	Length
Power supply cable	1mm ²	1m
Strain gauge input, potentiometers, linears,	1mm ²	3m

EMC Emission		
Generic standards, emission standard for residential commercial and light industrial environments	CEI EN 61000-6-3 CEI EN 61000-6-4	
Emission enclosure	CEI EN 61000-6-3	
Emission AC mains	CEI EN 61000-6-4	Group 1 Class B
Radiated emission	CEI EN 61326 CISPR 16-2	Class B
EMC Immunity		
Generic standards, immunity standard for industrial environments	CEI EN 61000-6-2	
Immunity ESD	CEI EN 61000-4-2	4 kV contact discharge level 2 8 kV air discharge level 3
Immunity RF interference	CEI EN 61000-4-3 /A1	10 V/m amplitude modulated 80 MHz-1 GHz 10 V/m amplitude modulated 1.4 GHz-2 GHz
Immunity conducted disturbance	CEI EN 61000-4-6	10 V/m amplitude modulated 0.15 MHz-80 MHz (level 3)
Immunity burst	CEI EN 61000-4-4	2 kV power line (level 3) 2 kV I/O signal line (level 4)
Immunity pulse	CEI EN 61000-4-5	Power line-line 1 kV (level 2) Power line-earth 2 kV (level 3) Signal line-earth 1 kV (level 2)
Immunity Magnetic fields	CEI EN 61000-4-8	100 A/m (level 5)
Voltage dips, short interruptions and voltage immunity tests	CEI EN 61000-4-11	100%U, 70%U, 40%U,
LVD Safety		
Safety requirements for electrical equipment for measurement, control and laboratory use	CEI EN 61010-1	



Advice for Correct Installation for EMC

Instrument power supply

- The power supply to the electronic equipment on the switchboards must always come directly from an isolation device with a fuse for the instrument part.
- The electronic instruments and electromechanical power devices such as relays, contactors, solenoid valves, etc., must always be powered by separate lines.
- When the electronic instrument power supply is strongly disturbed by the commutation of transistor or power units or motors, an isolation transformer should be used for the controllers only, earthing the screen.
- It is essential that the plant has a good earth connection:
 - the voltage between neutral and earth must not be >1V
 - the Ohmic resistance must be < 6Ω;
- If the mains voltage fluctuates strongly, use a voltage stabilizer.
- In the proximity of high frequency generators or arc welders, use adequate mains filters.
- The power supply lines must be separate from the instrument input and output ones.

Inputs and outputs connection

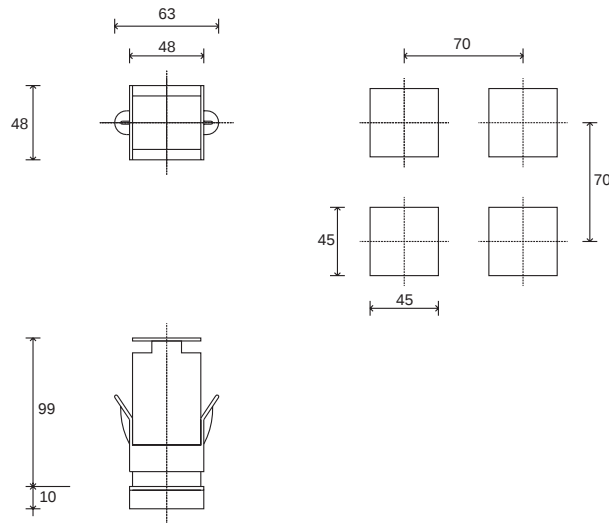
- The externally connected circuits must be doubly isolated.
- To connect the analogue inputs and analog outputs the following is necessary:
 - physically separate the input cables from those of the power supply, the outputs and the power connections.
 - use woven and screened cables, with the screen earthed in one point only.
- To connect the relay outputs (contactors, solenoid valves, motors, fans, etc.), fit RC groups (resistance and condensers in series) in parallel to the inductive loads that operate in Alternating Current.

(Note: all the condensers must conform to VDE (class X2) standards and withstand a voltage of at least 220V AC. The resistances must be at least 2W).
- Fit a 1N4007 diode in parallel with the coil of the inductive loads that operate in Direct Current.



GEFRAN S.p.A. declines all responsibility for any damage to persons or property caused by tampering, neglect, improper use or any use which does not conform to the characteristics of the controller and to the indications given in these Instructions for Use.

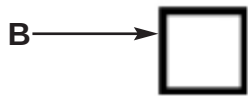
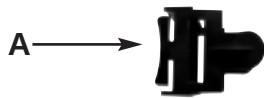
Dimensions and cut-out



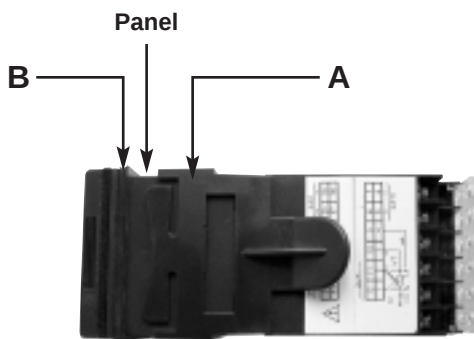
Installation with panel mounting

As well as the actual instrument and these instructions for use, the controller package also contains:

- panel fixing kit (A)
- 1 protective seal against dust and water spray (B)



Fit the instrument to the panel as shown in the figure.



Warnings and instructions for mounting to the panel



Instructions for installation category II, pollution level 2, double isolation.

- only for models with 11...27Vac/dc power supply: supply from Class 2 or low voltage limited energy source
- the power supply lines must be separate from the controller input and output ones
- group the instruments together keeping them separate from the powered part of the relay
- do not install high-power remote switches, contactors, relays, thyristor power units (especially the "phase angle" type), motors, etc. in the same switchboard
- avoid dust, humidity, corrosive gasses and heat sources
- do not block the ventilation holes: the working temperature must be between 0...50°C
- surrounding air: 50°C
- use 60/75°C copper (Cu) conductor only, wire size range 2x N. 22 - 14AWG, Solid/Stranded
- use terminal tightening torque 0.5Nm

Nominal ambient conditions

Altitude	Up to 2000m
Working/storage temperature	0...50°C/-20...70°C
Non condensing relative humidity	20...85%



Before supplying the Indicator with power, make sure that the mains voltage is the same as that shown in the last number of the order code.

Example:

4B 48 - 4 - 01 - 0 = 11...27Vac/dc

4B 48 - 4 - 01 - 1 = 100...240Vac

Electrical Connections

!

~ (23) PWR ~ (24)

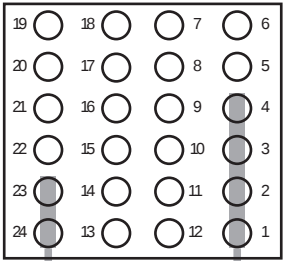
Standard:

100 to 240Vac ±10%

Optional:

11 to 27Vac/dc ±10%

50/60Hz

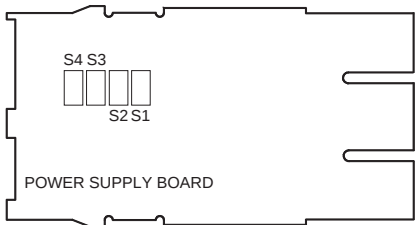
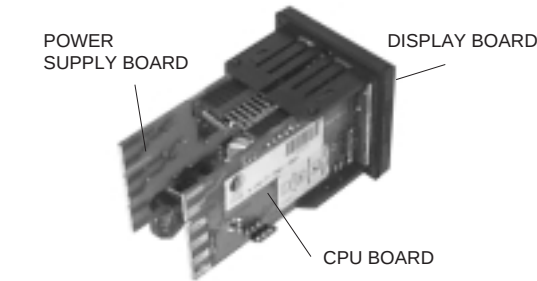


Inputs

Potentiometer input

Strain-gauge probe input (4 wires)

Device structure: identification of boards



Enable sensor				
	S1	S2	S3	S4
1V	OFF	OFF	OFF	ON
5V	OFF	OFF	ON	OFF
10V	OFF	ON	OFF	OFF
15V	ON	OFF	OFF	OFF
24V	OFF	OFF	OFF	OFF

3 • FUNCTIONS

"Raise" and "Lower" keys:

These keys are used for any operation that requires a numerical parameter to be raised or lowered. ••The speed of change is proportional to the time the key is pressed. •• The operation is not cyclic: once the maximum (minimum) limit is reached, there will be no further increase (decrease) of the value, even if the key remains pressed.

The keys can be configured to perform reset, hold, display of the peak value, etc. as determined by the 't.U.' and 't.d.' parameters on the 'In' menu.



PV display: Indication of process variable

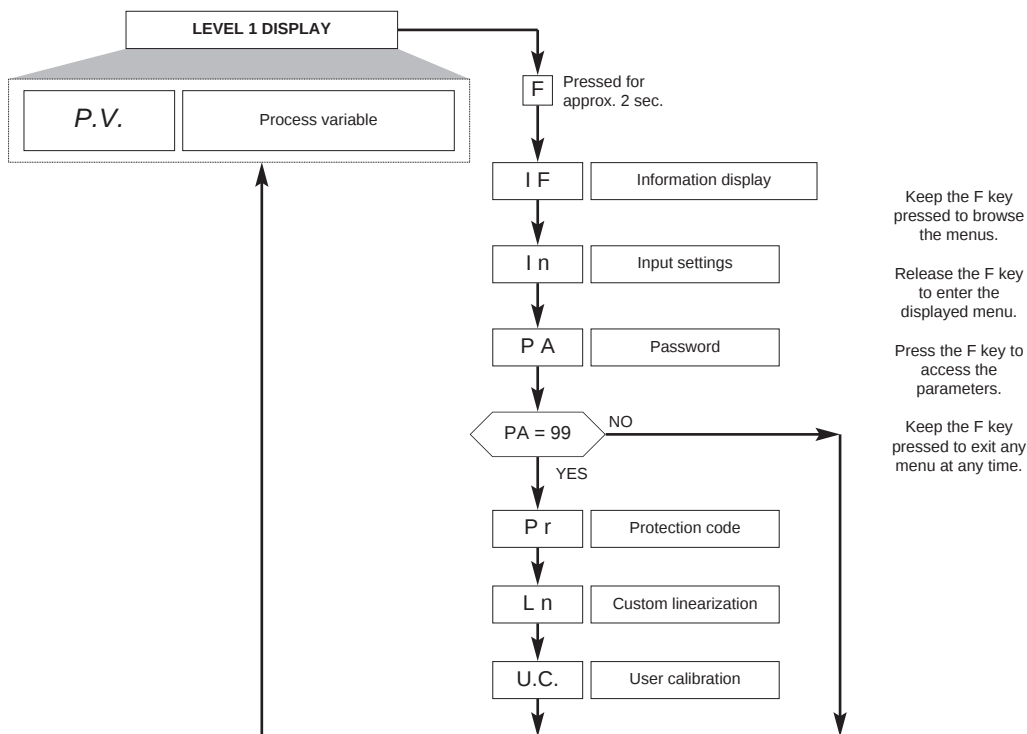
- Indication of 'Hi' or 'Lo' out of range
- Indication of open circuit (br) or short circuit (Er)
- Display of configuration and calibration messages
- Interrupted probe excitation signal (Eb)

Label with engineering units

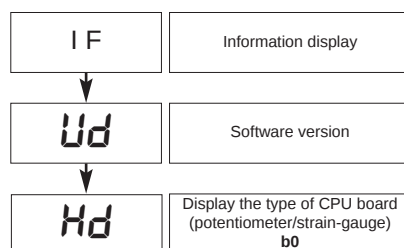
Function key:

- Gives access to different configuration stages ••
- Confirms any parameter changes

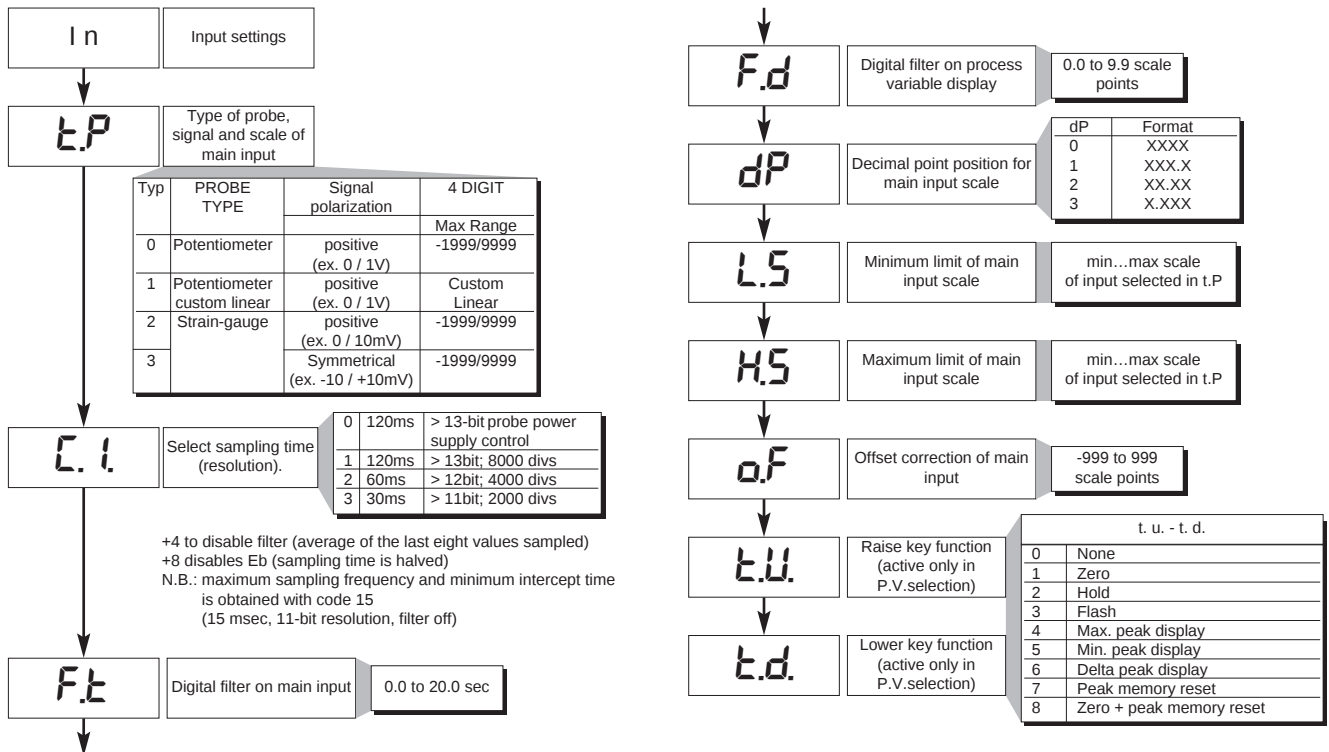
4 • PROGRAMMING and CONFIGURATION



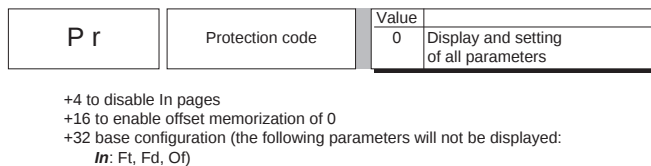
• Information display



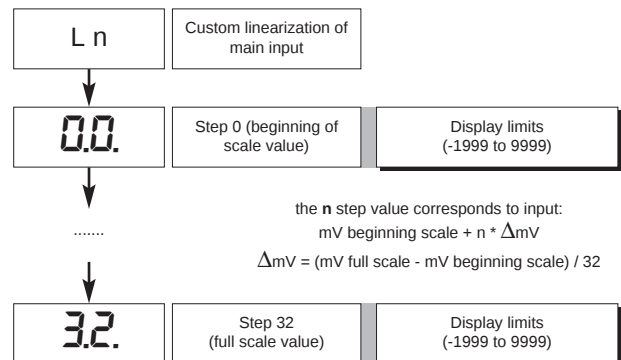
• POTENTIOMETER/STRAIN-GAUGE input parameters



• Protection



• Custom Linearization



• Eb Function

The standard device is produced with parameter C.I.= 8, with sampling time of 120 msec and Eb function disabled. The Eb function lets you detect if the probe power supply is interrupted. This function is valid for probe currents > 20mA (8mA in version 2.0x)

Example:

- probe voltage 10V
- strain-gauge resistance 350Ω

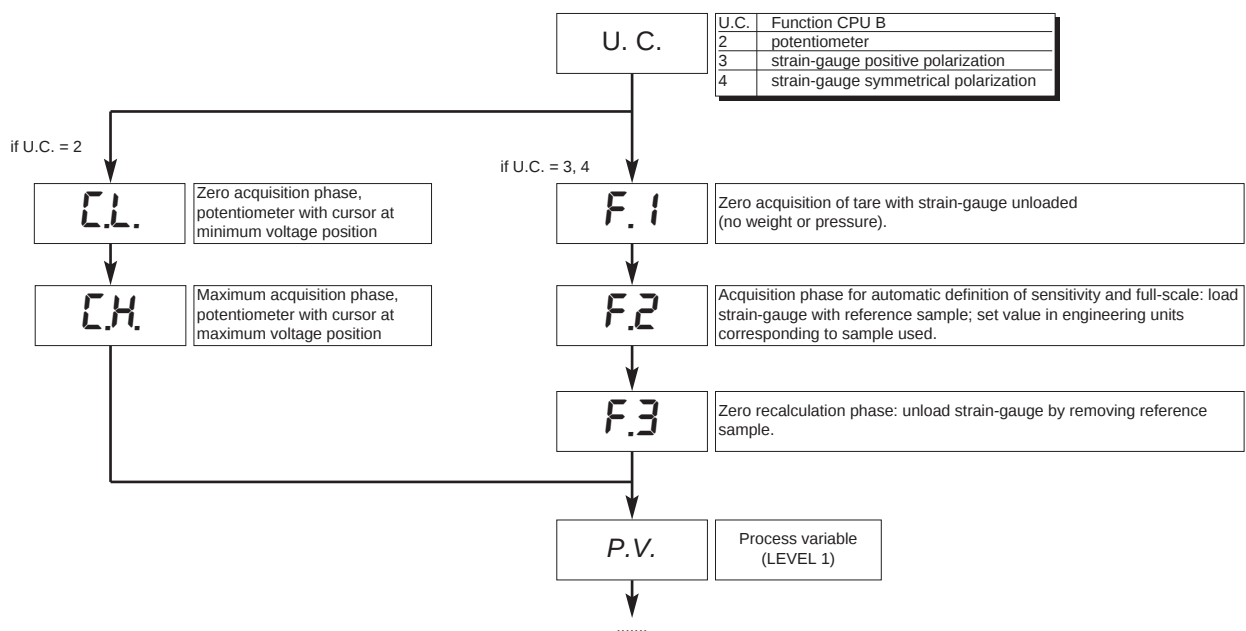
$$\text{current} = \frac{V}{R} = \frac{10}{350} \approx 28\text{mA}$$

or for three probes connected in parallel

- probe voltage 10V
- strain-gauge resistance 350Ω

$$\text{current} = \frac{V}{R} = \frac{10}{\frac{350}{3}} = \frac{30}{350} \approx 85\text{mA}$$

• User Calibration



Note: between the calibration phases some seconds could be requested to elaborate data

• UCAL: strain-gauge calibration

a) Positive signal polarization

Suppose we test a probe (load cell) with sensitivity of 2mV/V, powered at 10V.

The input signal range is 0 to 20mV. From unloaded to loaded cell you should see a value from 0 to 1000.

Set scale limits: L.S. = 0; H.S. = 1000. Calibration procedure: U.C. = 3.

Phase F1: unload the cell (equal to applying input voltage of 0mV). Wait 2 seconds for the signal to stabilize. Press key F.

Phase F2: load the cell with a sample weight: for example, 80% of total weight (equal to applying input voltage of 80% of 20mV (2mV*10V) = 16mV). On display, set a value equal to 80% of H.S. = 800.

Press key F.

Phase F3: unload the cell (equal to applying input voltage of 0mV). Wait 2 seconds for the signal to stabilize. Press key F (calibration finished).

b) Suppose we test a probe (force sensor) with sensitivity of 2mV/V, powered at 10V.

The input signal range is -20mV to 20mV. From maximum compression to maximum traction you should see a value from -1000 to 1000. Set scale limits: L.S. = -1000; H.S. = 1000.

Calibration procedure: U.C. = 4.

Phase F1: do not apply any traction or compression to the sensor (equal to applying input voltage of 0mV).

Wait 2 seconds for the signal to stabilize. Press key F.

Phase F2: apply compression equal to 80% of total compression (equal to applying input voltage of 80% of 20mV (2mV*10V) = 16mV). On display, set a value equal to 80% of H.S. = 800.

Press key F.

Phase F3: do not apply any traction or compression to the sensor (equal to applying input voltage of 0mV).

Wait 2 seconds for the signal to stabilize. Press key F (calibration finished).

5 • TECHNICAL SPECIFICATIONS

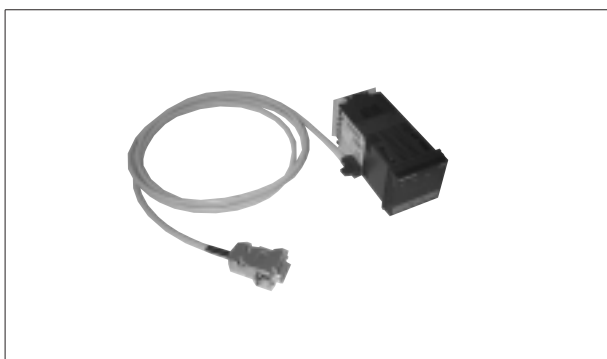


This section contains a list of the Technical Specifications for the instrument.

Display	4 digit red, digit height 10mm
Keys	3 mechanical keys (INC, DEC, F)
Accuracy	0.25% f.s. at 25°C ambient temperature, $t_s=120\text{msec}$
Resolution	Function of settable sample time: > 13bit, s.t. 120 msec. with probe power supply control > 12bit, s.t. 30 msec. (60msec with probe power supply control) > 11bit, s.t. 15 msec. (30msec with probe power supply control)
Main input	Differential input: • from strain-gauge 350Ω (for pressure, force, etc.), sensitivity (5mV/V with strain-gauge max power 15V, 7.5mV/V with max power 10V - 15mV/V with max power 5V), positive or symmetrical polarization, calibration with automatic calibration of sensitivity, interrupted probe power signal • potentiometer with $1.2V \geq 100\Omega$ power supply
Linear scale ranges	-1999 to 9999 configurable decimal point position; possible 32 segment linearization
Transmitter / Sensor Power Supply	1,2Vdc for potentiometer > 100Ω 5Vdc, 10Vdc, max. 120mA (for strain-gauge) 15Vdc, 24Vdc, max. 50mA (for transmitter)
Power supply (switching)	(standard) 100...240Vac $\pm 10\%$ - 5,5VA (optional) 11...27Vac/dc $\pm 10\%$ - 5,5VA 50/60Hz
Fuse (inside device, not operator serviceable)	100...240Vac/dc - type T - 500mA - 250V 11...27Vac/dc - type T - 1,25A - 250V
Faceplate protection	IP65
Working / Storage temperatures	0...50°C/-20...70°C
Relative humidity	20...85% Hr non-condensing
Environmental conditions of use	For internal use only, altitude up to 2000m
Installation	Panel mounting, extractable from front
Weight	150g in the complete version

6 • ACCESSORIES

• RS323 interface cable for configuration



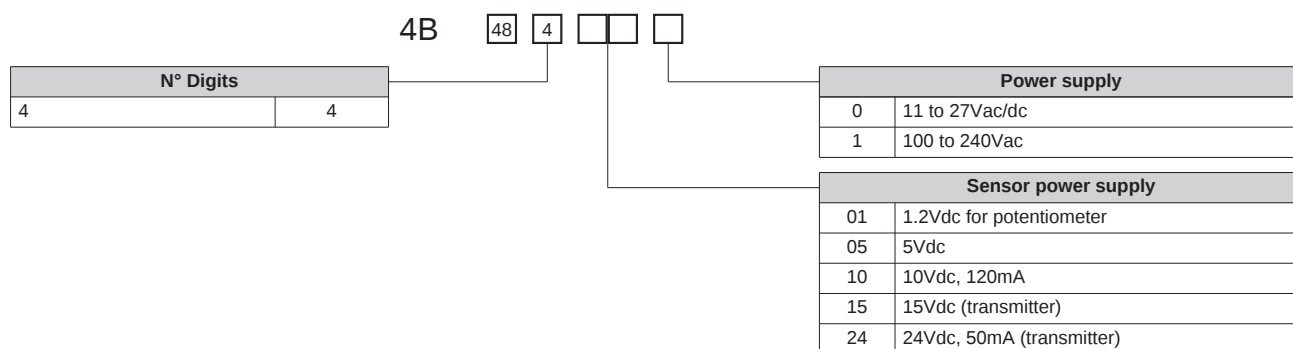
N.B.: the PC configuration cable is supplied with the programming software.

WARNING: make the connection with the device powered and with inputs and outputs disconnected.

• ORDER CODE

WSK-0-0-0

Interface cable + CD Winstrum



Kindly contact GEFTRAN for information on available codes.

• WARNINGS



WARNING: this symbol indicates danger.

It is seen near the power supply circuit and near high-voltage relay contacts.

Read the following warnings before installing, connecting or using the device:

- follow instructions precisely when connecting the device.
- always use cables that are suitable for the voltage and current levels indicated in the technical specifications.
- the device has no ON/OFF switch: it switches on immediately when power is turned on. For safety reasons, devices permanently connected to the power supply require a two-phase disconnecting switch with proper marking. Such switch must be located near the device and must be easily reachable by the user. A single switch can control several units.
- if the device is connected to electrically NON-ISOLATED equipment (e.g. thermocouples), a grounding wire must be applied to assure that this connection is not made directly through the machine structure.
- if the device is used in applications where there is risk of injury to persons and/or damage to machines or materials, it MUST be used with auxiliary alarm units. You should be able to check the correct operation of such units during normal operation of the device.
- before using the device, the user must check that all device parameters are correctly set in order to avoid injury to persons and/or damage to property.
- the device must NOT be used in inflammable or explosive environments. It may be connected to units operating in such environments only by means of suitable interfaces in conformity to local safety regulations.
- the device contains components that are sensitive to static electrical discharges. Therefore, take appropriate precautions when handling electronic circuit boards in order to prevent permanent damage to these components.

Installation: installation category II, pollution level 2, double isolation

- power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label.
- install the instrumentation separately from the relays and power switching devices
- do not install high-power remote switches, contactors, relays, thyristor power units (particularly if "phase angle" type), motors, etc... in the same cabinet.
- avoid dust, humidity, corrosive gases and heat sources.
- do not close the ventilation holes; working temperature must be in the range of 0...50°C.

If the device has faston terminals, they must be protected and isolated; if the device has screw terminals, wires should be attached at least in pairs.

• **Power:** supplied from a disconnecting switch with fuse for the device section; path of wires from switch to devices should be as straight as possible; the same supply should not be used to power relays, contactors, solenoid valves, etc.; if the voltage waveform is strongly distorted by thyristor switching units or by electric motors, it is recommended that an isolation transformer be used only for the devices, connecting the screen to ground; it is important for the electrical system to have a good ground connection; voltage between neutral and ground must not exceed 1V and resistance must be less than 60Ω; if the supply voltage is highly variable, use a voltage stabilizer for the device; use line filters in the vicinity of high frequency generators or arc welders; power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label.

• **Input and output connections:** external connected circuits must have double insulation; to connect analog inputs (TC, RTD) you have to: physically separate input wiring from power supply wiring, from output wiring, and from power connections; use twisted and screened cables, with screen connected to ground at only one point; to connect adjustment and alarm outputs (contactors, solenoid valves, motors, fans, etc.), install RC groups (resistor and capacitor in series) in parallel with inductive loads that work in AC (*Note: all capacitors must conform to VDE standards (class x2) and support at least 220 VAC. Resistors must be at least 2W*); fit a 1N4007 diode in parallel with the coil of inductive loads that operate in DC.

GEFRAN spa will not be held liable for any injury to persons and/or damage to property deriving from tampering, from any incorrect or erroneous use, or from any use not conforming to the device specifications.