



170.IU0.LHI.0A0



USER MANUAL

LHI

INDEX

MOUNTING REQUIREMENTS	1
DIMENSIONS AND REAR TERMINALS	2
PANEL CUT OUT	3
WIRING GUIDELINES	3
PRELIMINARY HARDWARE SETTINGS	8
CONFIGURATION PROCEDURE	9
OPERATING MODE	14
Normal display mode	14
Indicators	14
Key functions in normal display mode	14
Operative parameter display mode	15
Key functions in operative parameter display mode	15
Operating parameters	16
Peak detections	16
Alarm functions	17
Serial link	17
ERROR MESSAGES	18
GENERAL SPECIFICATIONS	19
MAINTENANCE	22
DEFAULT PARAMETERS	A.1
APPENDIX B	B.1

MOUNTING REQUIREMENTS

Select a mounting location with the following characteristics:

- 1) Minimal vibration.
- 2) An ambient temperature range between 0 and 50°C (32 and 122 °F).
- 3) Easy access to the rear of the instrument.
- 4) No corrosive gases (sulfuric gas, ammonia, etc.).
- 5) No water or other fluid (i.e. condensation).
- 6) Relative humidity of 20% to 85% non condensing.

The instrument can be mounted on a panel up to 15 mm (0.591 in) thick with a square cutout of 45 x 45 mm (1.772 x 1.772 in). For outline refer to Dimensions and Panel Cutout.

Panel surface texture must be better than 6.3 µmm.

The instrument is shipped with a rubber panel gasket (50 to 60 Sh). To insure the IP65 and NEMA 4 protection, insert the panel gasket between the instrument and the panel as shown below.

Install the instrument as follows:

- 1) Insert the instrument in the gasket.
- 2) Insert the instrument in the panel cutout.
- 3) Pushing the instrument against the panel, insert the mounting bracket.
- 4) Torque the mounting bracket screws between 0.3 and 0.4 Nm (2.66 and 3.54 lbf-in).
- 5) To insure NEMA 4X/IP65 protection, make sure the instrument does not move within the cutout .

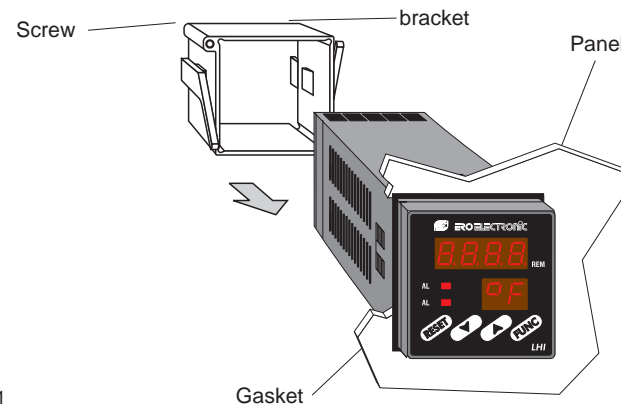
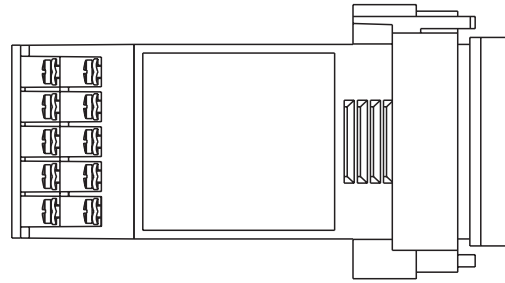
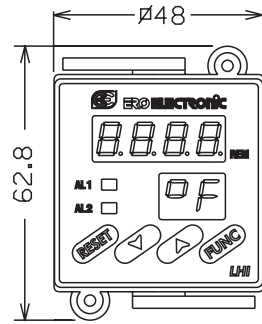
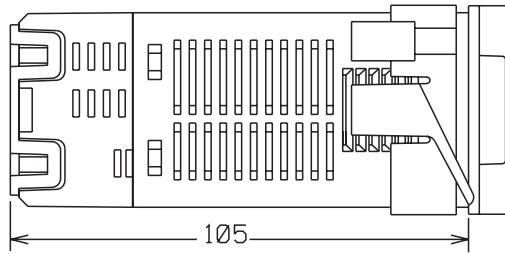
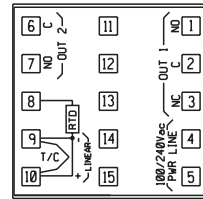


Fig. 1

DIMENSIONS AND REAR TERMINAL BLOCKS



Without RS-485



With RS-485

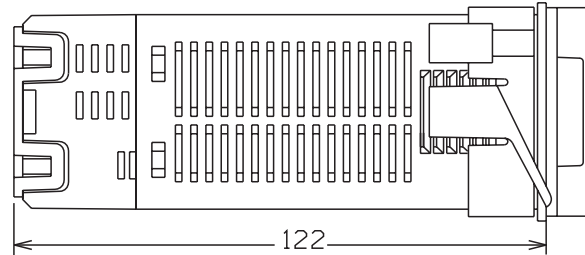
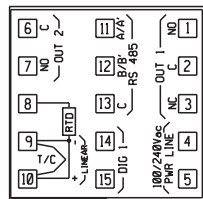


Fig.2

PANEL CUTOUT

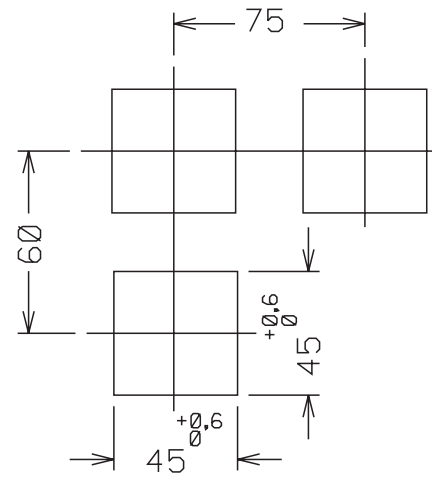


Fig.3

WIRING GUIDELINES

A) Measuring Inputs

NOTE: Any external components (like Zener diodes, etc.) connected between sensor and input terminals may cause errors in measurement due to excessive and/or not balanced line resistance or possible leakage currents.

TC Input

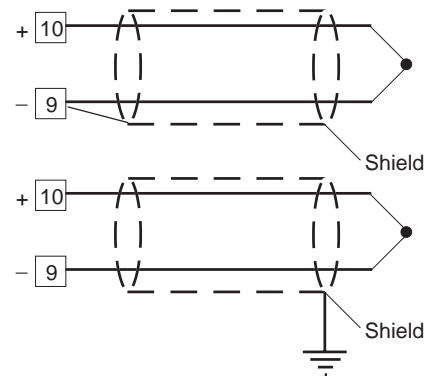


Fig. 4 THERMOCOUPLE INPUT WIRING

NOTE:

- 1) Do not run input wires with power cables.
- 2) For TC wiring use proper compensating cable, preferably shielded (see Appendix B).
- 3) Shielded cable should be grounded at one end only.

RTD INPUT

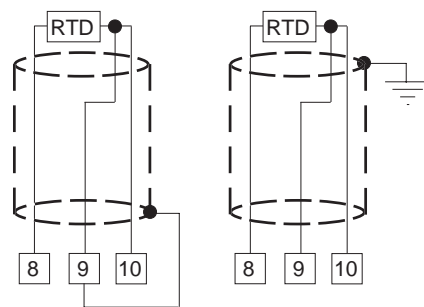


Fig. 5 RTD INPUT WIRING

NOTE:

- 1) Don't run input wires together with power cables.
- 2) Pay attention to the line resistance; a high line resistance may cause measurement errors.
- 3) When shielded cable is used, it should be grounded at one side only to avoid ground loop currents.
- 4) The resistance of the 3 wires must be the same.

LINEAR INPUT

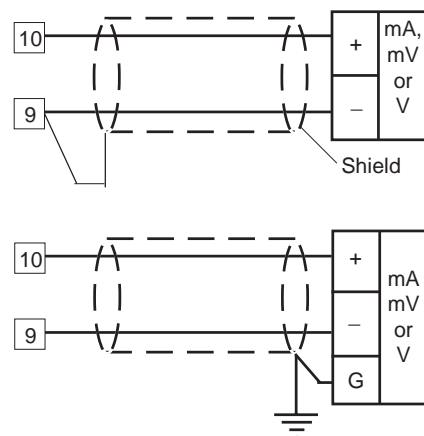


Fig. 6 mA, mV AND V INPUTS WIRING

NOTE:

- 1) Don't run input wires together with power cables.
- 2) Pay attention to the line resistance; a high line resistance may cause measurement errors.
- 3) When shielded cable is used, it should be grounded at one side only to avoid ground loop currents.
- 4) The input impedance is equal to:
 Less than 5 Ω for 20 mA dc input
 Greater than 1 M Ω for 60 mV dc input
 Greater than 400 K Ω for 5 V dc and 10 V dc input

B) Logic Input

This input is used for remote alarm reset when the manual reset of the alarm is selected.

Safety note:

- Do not run logic input wiring with AC power cables.
- Use an external dry contact capable of switching 0.5 mA, 5 Vdc.
- The instrument needs 100 ms to recognize a contact status variation.
- The logic inputs are **NOT** isolated by the measuring input.

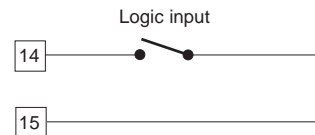


Fig.7

C.1) Relay Outputs

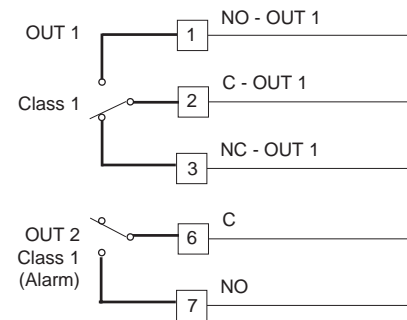


Fig. 8

The OUT 1 contact rating is 3A/250V AC on resistive load.

The OUT 2 contact rating is 2A/250V AC on resistive load.

The number of operations is 1×10^5 at specified rating.

- NOTES**
- 1) To avoid electric shock, connect power line at the end of the wiring procedure.
 - 2) For power connections use No 16 AWG or larger wires rated for at least 75 °C.
 - 3) Use copper conductors only.
 - 4) Don't run input wires with power cables.

All relay contacts are protected by varistor against inductive load with inductive component up to 0.5 A.

The following recommendations avoid serious problems which may occur, when relay outputs are used with inductive loads.

C.2) Inductive Loads

High voltage transients may occur switching inductive loads.

Through the internal contacts these transients may introduce disturbances which can affect the performance of the instrument.

For all the outputs, the internal protection (varistor) assures a correct protection up to 0.5 A of inductive component.

The same problem may occur when a switch is used in series with the internal contacts as shown in Fig. 9.

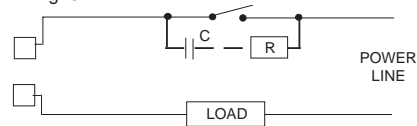


Fig. 9 EXTERNAL SWITCH IN SERIES WITH THE INTERNAL CONTACT

In this case it is recommended to install an additional RC network across the external contact as show in Fig. 9

The value of capacitor (C) and resistor (R) are shown in the following table.

LOAD (mA)	C (μF)	R (Ω)	P. (W)	OPERATING VOLTAGE
<40 mA	0.047	100	1/2	260 V AC
<150 mA	0.1	22	2	260 V AC
<0.5 A	0.33	47	2	260 V AC

The cable involved in relay output wiring must be as far away as possible from input or communication cables.

D) Serial Interface (option)

RS-485 interface allows to connect up to 30 devices with one remote master unit.

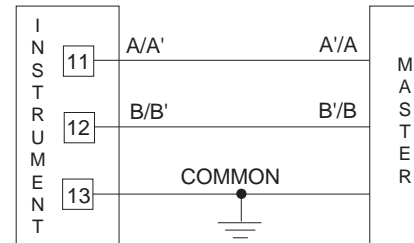


Fig. 10 - RS-485 WIRING

The cable length must not exceed 1.5 km at 9600 BAUD.

NOTE: The following report describes the signal sense of the voltage appearing across the interconnection cable as defined by EIA for RS-485.

- The "A" terminal of the generator shall be negative with respect to the "B" terminal for a binary 1 (MARK or OFF) state.
- The "A" terminal of the generator shall be positive with respect to the "B" terminal for a binary 0 (SPACE or ON)

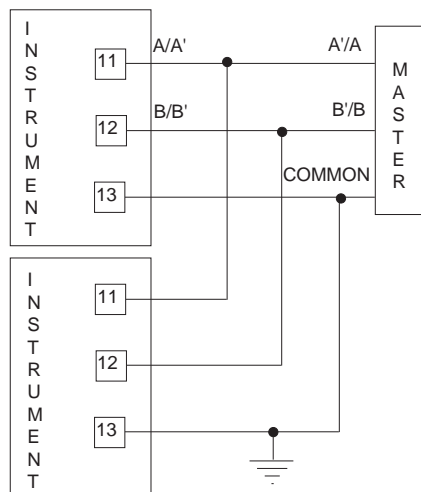


Fig.11

E) Power Line and grounding

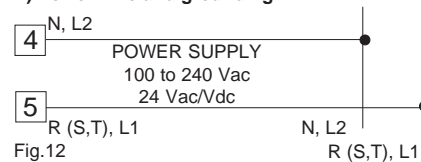


Fig.12

NOTE:

- 1) Before connecting the power line, check that the voltage is correct (see Model Number).
- 2) For supply connections use 16 AWG or larger wires rated for at least 75 °C.
- 3) Use copper conductors only.
- 4) Do not run input wires with power cables.
- 5) Polarity does not matter for 24 Vdc wiring.
- 6) The power supply input is **NOT** fuse protected. Please provide it externally.

Power supply	Type	Current	Voltage
24 V AC/DC	T	500 mA	250 V
100/240 V AC	T	125 mA	250 V

When fuse is damaged, it is advisable to verify the power supply circuit, so that it is necessary to send back the instrument to your supplier.

- 7) Safety requirements for permanently connected equipment:
 - Include a switch or circuit-breaker in the installation.
 - Place the switch in close proximity to the equipment and within easy reach of the operator.
 - Mark the switch as the disconnecting device for the equipment.
- NOTE: A single switch or circuit-breaker can drive more than one instrument.
- 8) When the NEUTRAL line is present, connect it to terminal 4.
 - 9) To avoid shock and possible instrument damage, connect power last.

PRELIMINARY HARDWARE SETTINGS

- 1) Remove the instrument from its case.
- 2) Set J106 according to the desired input type as shown in the following figure.

INPUT TYPE	J106			
	1-2	3-4	5-6	7-8
TC-RTD	close	open	open	open
60 mV	close	open	open	open
5 V	open	close	open	open
10 V	open	open	close	open
20 mA	open	open	open	close

LHI without RS-485

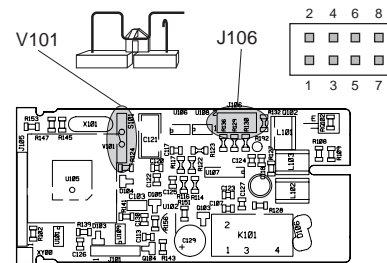


Fig.13.B

LHI with RS-485

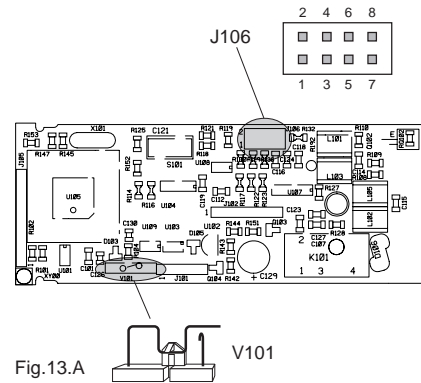


Fig.13.A

CONFIGURATION PROCEDURE

CONFIGURATION KEY FUNCTIONS

- RESET** In Configuration Mode, used only to scroll back parameters without to memorize a new parameter value.
- ▼ Used in Configuration Mode to decrease the parameter value.
- ▲ Used in Configuration Mode to increase the parameter value.
- FUNC** Used to memorize the new parameter value and go to the next parameter.
- ▼ + ▲ Loads the default parameters.
- ▲ + FUNC or ▼ + FUNC
Increases/decreases values at a higher rate when modifying parameters.
- ▲ + RESET or ▼ + RESET
Jumps to the Maximum or Minimum parameter value when modifying parameters.

CONFIGURATION PROCEDURE

- 1) Remove the instrument from its case.
- 2) Open switch V101 (See illustrations under "Preliminary Hardware Settings.")
- 3) Re-insert the instrument in its case.
- 4) Switch on power to the instrument.
The upper display will show COnF.
NOTE : If "CAL" indication is displayed, press immediately the ▲ pushbutton and return to the configuration procedure.
- 5) Press the ▼ key and the lower display will show the firmware version.

Press the "FUNC" key to start the configuration procedure with the first parameter (L1).

The following is a complete list of parameters. The lower display will show the parameter code (L1 to d1) and the upper display will show the selection code or numerical value. No timeout is applied in the configuration mode.

L1 = Serial Interface Protocol

(Skipped if option is not available.)
OFF = No serial interface
nbUS= Modbus
jbUS = Jbus

L2 = Serial Link Device Address

(Skipped if option is not available or L1 = OFF)
Range: from 1 to 255
NOTE: EIA standard allows no more than 31 device connected by one RS-485.

L3 = Baud Rate for Serial Link

(Skipped if option is not available or L1 = OFF)
Range: from 600 to 19200 baud.
(19200 baud is shown on display as 1920)

L4 = Byte Format for Serial Link

(Skipped if option is not available or L1 = OFF)
8E = 8 bits + even parity
8O = 8 bits + odd parity
8 = 8 bits without parity

r1 = Input Type and Range Value

0 = TC J	From	-100	to	1000	°C
1 = TC K	From	-100	to	1370	°C
2 = TC T	From	-200	to	400	°C
3 = TC E	From	-100	to	800	°C
4 = TC N	From	-100	to	1400	°C
5 = TC S	From	-50	to	1760	°C
6 = TC R	From	-50	to	1760	°C
7 = TC B	From	0	to	1820	°C
8 = TC L	From	-100	to	900	°C
9 = TC U	From	-200	to	600	°C
10 = TC G	From	0	to	2300	°C
11 = TC D	From	0	to	2300	°C
12 = TC C	From	0	to	2300	°C
13 = TC Plat. II	From	-100	to	1400	°C
14 = RTD Pt 100	From	-200	to	850	°C
15 = Linear	From	0	to	60	mV
16 = Linear	From	12	to	60	mV
17 = Linear	From	0	to	20	mA
18 = Linear	From	4	to	20	mA
19 = Linear	From	0	to	5	V
20 = Linear	From	1	to	5	V
21 = Linear	From	0	to	10	V
22 = Linear	From	2	to	10	V
23 = TC J	From	-150	to	1830	°F
24 = TC K	From	-150	to	2500	°F
25 = TC T	From	-330	to	750	°F
26 = TC E	From	-150	to	1470	°F
27 = TC N	From	-150	to	2550	°F
28 = TC S	From	-60	to	3200	°F
29 = TC R	From	-60	to	3200	°F
30 = TC B	From	32	to	3300	°F
31 = TC L	From	-150	to	1650	°F
32 = TC U	From	-330	to	1110	°F
33 = TC G	From	0	to	4170	°F
34 = TC D	From	0	to	4170	°F
35 = TC C	From	0	to	4170	°F
36 = TC Plat. II	From	-150	to	2550	°F
37 = RTD Pt100	From	-330	to	1560	°F

r2 = Decimal Point Position

(Available only for linear range r1 = 15 to 22)

- - - - - . = No decimal
 - - - - . _ = One decimal figure
 - - . - - - = Two decimal figures
 - . - - - = Three decimal figures

r3 = Initial value of the readout scale

(Available only for linear range r1 = 15 to 22)

Range: From -1999 to 9999

r4 = final value of the readout scale

(Available only for linear range r1 = 15 to 22)

Range: From -1999 to 9999

r5 = Offset Adjustment

Range: From -500 to 500

Offset value algebraically added to the measured value.

r6 = Time constant for filter on displayed value

Range: From 0 (filter OFF) to 8 seconds.

(First order filter with selected time constant.)

r7 = Alarm action on input fault.

When the instrument detect an input failure condition, the alarm will operate as in presence of:

uP = as in presence of the full scale value.

doun = as in presence of the initial scale value.

P1 = Alarm 1 Function

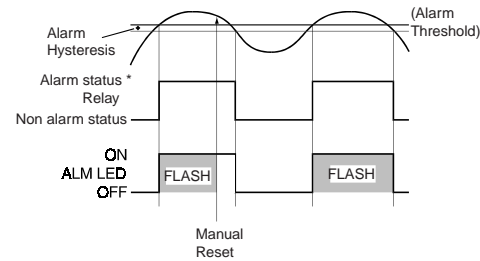
nonE = Not provided
 AL.P = Process alarm

P2 = Alarm 1 configuration

(Skipped when P1 = nonE)
 H.A. = High alarm with automatic reset
 L.A. = Low alarm with automatic reset
 H.A.Ac = High alarm with automatic reset and "Silence" function.
 L.A.Ac = Low alarm with automatic reset and "Silence" function.
 H.L. = High alarm with manual reset
 L.L. = Low alarm with manual reset

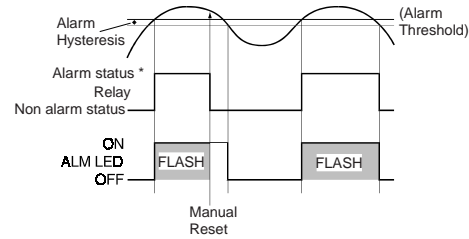
NOTE: The "Silence" function allows the manual reset of the alarm even if the alarm condition is still in progress.

Example for P2 = H.A.



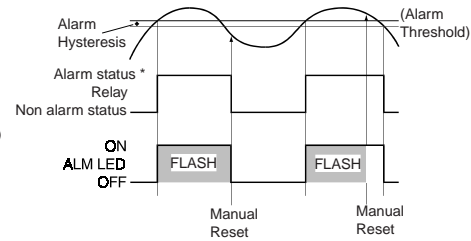
* Alarm Status: Relay energized (P3 = dir)
 Relay de-energized (P3 =rEV)

Example for P2 = H.A.A.c



* Alarm Status: Relay energized (P3 = dir)
 Relay de-energized (P3 =rEV)

Example for P2 = H.L.



* Alarm Status: Relay energized (P3 = dir)
 Relay de-energized (P3 =rEV)

P3 = Alarm 1 Action

(Skipped when P1 = nonE)
 dir = Direct action
 (Relay energized in alarm condition)
 rEV = Reverse action
 (Relay energized in non-alarm condition)

P4 = Alarm 1 Stand-by (mask) Function
(Skipped when P1= none)
OFF = Stand-by function disabled
On = Stand-by function enabled

This stand-by function masks an Alarm condition at start up until the process variable reaches the alarm threshold plus or minus hysteresis.

P5 = Alarm 2 Function
(Skipped when the option is not available)
nonE = Not provided
AL.P = Process alarm

P6 = Alarm 2 configuration
(Skipped if option is not available or P5 = nonE)
H.A. = High alarm with automatic reset
L.A. = Low alarm with automatic reset
H.A.Ac = High alarm with automatic reset and "Silence" function.
L.A.Ac = Low alarm with automatic reset and "Silence" function.
H.L. = High alarm with manual reset
L.L. = Low alarm with manual reset

NOTE: The "Silence" function allows the manual reset of the alarm even if the alarm condition is still in progress.

P7 = Alarm 2 Action
(Skipped if option not is available or P5 = nonE)
dir = Direct action
(Relay energized in alarm condition)
rEV = Reverse action
(Relay energized in non-alarm condition)

P8 = Alarm 2 Stand-by (mask) Function
(Skipped if option is not available or P5= nonE)
OFF = Stand-by function disabled
On = Stand-by function enabled

This stand-by function masks an Alarm condition at start up until the process variable reaches the alarm threshold plus or minus hysteresis.

P9 = Delay on Stand-by (mask) Function
(This parameter is available when at least one alarm is configured with the stand by function)
Range: from 0 (delay disabled) to 120 seconds.

At power up, this delay forces the alarms to OFF for the programmed time and then it starts the stand by function.

PF = Time Constant for Filter on Measured Value for Alarms Action
(Skipped if P1 = nonE and option is not available or P5 = nonE)
Range: From 0 (filter OFF) to 8 seconds
(First order filter with selected time constant.)

n 1 = Safety Lock

- 0 = UNLOCKed. The device is always UNLOCKed and all parameters can be modified.
- 1 = LOCKed. The device is always LOCKed and no parameters can be modified
- From 2 to 9999 = This number is a password, to be used in run time (see "nn"), to LOCK/ UNLOCK the device.

t1 = Timeout Selection

- tn10 = 10 second timeout
- tn30 = 30 second timeout

d1 = Digital Input (contact closure)

(This is a read only parameter)

- Enb = Digital input enabled
- dIS = Digital input disabled

(The digital input is used for remote alarm reset when the manual reset of the alarm is selected.)

The configuration procedure is now complete.
The display should show "COntF".

OPERATING MODE

- 1) Remove the instrument from its case.
- 2) Set switch V101 (see fig. 13) to the closed position.
- 3) Re-insert the instrument in its case.
- 4) Switch on the instrument.

Normal Display Mode

On power up the upper display shows the measured value while the lower display shows the engineering unit (°C or °F) (no indication when linear input is selected); this starts is named "Normal Display Mode."

By pressing the ▲ or ▼ key, it is possible to change the displayed information; therefore, one of the following display modes can be selected:

- 1) The upper display shows the maximum measured value detected from the power up or from the last peak reset.
The lower display shows "Ph."
This information is lost at power down and at power up the device will display the process variable.
- 2) The upper display shows the minimum measured value detected from the power up or from the last peak reset.
The lower display shows "PL."
This information is lost at power down and at power up the device will display the process variable.

Indicators

"AL1" = Indicates alarm 1 status as follows:

- Flashes when alarm 1 is ON
- ON when alarm 1 has been reset but the alarm condition is still present.
- OFF when alarm 1 is OFF

"AL2" = Indicates alarm 2 status as follows:

- Flashes when alarm 2 is ON
- ON when alarm 2 has been reset but the alarm condition is still present.
- OFF when alarm 2 is OFF

"REM" = Indicates the remote status of the instrument.

- Flashes when instrument is in remote mode.
- OFF when instrument is in local mode

Key Functions in Normal Display Mode

"FUNC" = By pressing it, the display changes from "Normal Display Mode" to "Operative Parameter Display Mode."

= Pressing it for more than ten seconds initiates the Lamp Test. During the Lamp Test the device functions normally while all display segments and LED's are lit with a 50% duty cycle. No timeout is applied to a lamp test. Press the "FUNC" key again to end the Lamp Test.

"▲" or "▼" = By pressing these keys it is possible to change the displayed information. See "Normal Display Mode" on previous page.

"RESET" = Press and hold for 1 second to manually reset the alarms.

"RESET" + "FUNC" = allows to clear the maximum and minimum data hold memories.

Operative Parameter Display Mode

The "FUNC" key initiates the Operative Parameter Display Mode when pressed for less than 10 seconds in the "Normal Display Mode."

The lower display shows the parameter code while the upper display shows the parameter value or status. The value of the selected parameter can be modified with the ▲ and ▼ keys.

Press the "FUNC" key again to store the new value and advance to the next parameter.

If no keys are pressed within the timeout period (see t1), the display will automatically return to the "Normal Display Mode" in the previous display and any modification of the last displayed parameter will be lost.

All parameters can be modified only when the device is UNLOCKed.

The LOCK/UNLOCK status can be selected in configuration using "n1" parameter or during the operating mode with the "nn" parameter (password).

To switch from LOCKED to UNLOCKED, assign to the "nn" parameter a value equal to the "n1" parameter setting. To switch from UNLOCKED to LOCKED, assign to the "nn" parameter any number other than the n1 parameter setting. When the device is in remote mode (the serial link controls the device) no parameters can be modified.

Key Functions in Operative Parameter Display Mode

- FUNC = Pressing the "FUNC" key, the instrument stores the new setting (if changed) and goes to the next parameter.
- ▲ or ▼ = Changes the setting of the selected parameter.
- RESET = Pressing the "RESET" key, the instrument goes back to the previous parameter without to store the new setting of the selected parameter.
- "RESET" + "FUNC" = allows to clear the maximum and minimum data hold memories.
- ▲ + FUNC or ▼ + FUNC
Increases/decreases values at a higher rate when modifying parameters.
- ▲ + RESET or ▼ + RESET
Jumps to the Maximum or Minimum parameter value when modifying parameters.

OPERATING PARAMETERS

Some of the following parameters may not appear, depending on the configuration.

Lower Description
Display

nn **Software Key**
(Skipped if n1 = 0 or 1)
ON = the device is LOCKED.
OFF = the device is UNLOCKED.
When it is desired to switch from LOCK to UNLOCK condition, set a value equal to "n1" parameter.
When it is desired to switch from UNLOCK to LOCK condition, set a value different from "n1" parameter.

A1 **Alarm 1 Threshold**
(Skipped when P1 =nonE)
Ranges: Span limits

A2 **Alarm 2 Threshold (optional)**
(Skipped when the option is not fitted or P5 = nonE).
Ranges: Span limits

H1 **Alarm 1 Hysteresis**
(Skipped when P1 =nonE)
Range: From 0.1% to 10.0% of the input span or 1 LSD

H2 **Alarm 2 Hysteresis (optional)**
(Skipped when the option is not fitted or P5 = nonE)
Range: From 0.1% to 10.0% of the input span or 1 LSD

PEAK detection

When the instrument is in normal display mode, by pushing the ▲ or ▼ pushbutton it is possible to modify the displayed information as follows:

- with the first ▲ pushbutton pressure, the lower display will show "PH" while the upper display will show the maximum measured value;
- with the second ▲ pushbutton pressure, the lower display will show "PL" while the upper display will show the minimum measured value;
- with the third ▲ pushbutton pressure, the instrument will return in normal display mode.

By the ▼ pushbutton it is possible to display the same informations in reverse order.

The peak memorization starts, automatically, when switching on the instrument and cannot be stopped.

To clear the previous values, push RESET and FUNC pushbuttons contemporarily.

Note: this visualization do not disappear after time out. Push ▲ or ▼ pushbutton in order to display the measured value.

Alarm functions

The alarms can be programmed as automatic or manual reset or the "Silence" function.

The "Silence" function is a typical function of the alarm annunciators (see ISA "Alarm annunciator operational sequence") and it is usually applied to audible alarm indications (horn). This function allows the manual reset of the alarm even if the alarm condition is still in progress.

It is also possible to assign to the alarm a stand by (mask) function.

This function masks the alarm condition at instrument start-up until process variable reaches the alarm threshold plus or minus hysteresis. Graphic examples of the alarm behaviour are shown at page 11.

Serial Link (optional)

The device can be connected to a host computer via serial link.

The host can put the device in LOCAL (parameters are controlled via keyboard) or in REMOTE (functions and parameters are controlled via serial link). REMOTE is shown by the decimal point to the left of "RMT" which is on the right side of the numeric display.

Via serial link it is possible to read and/or to modify all the operative and configuration parameters.

The following conditions must apply to implement this function:

- 1) Configure parameters L1 through L4 with the front keyboard
- 2) The device must be in the Operating mode.

For other details require ENG 818-E document.

ERROR MESSAGES

Overrange, Underrange and Sensor Break Indications

This device detects input fault conditions. (OVERRANGE, UNDERRANGE OR SENSOR BREAK). When the process variable exceeds the span limits established by configuration parameter r1 an OVERRANGE condition will appear as:

A digital display showing the number '0000' in a seven-segment font.

An UNDERRANGE condition will appear as:

A digital display showing the number '-000' in a seven-segment font.

A sensor break is signalled as "OPEN". On the mA/V input, a sensor break can be detected only when the range selected has a zero elevation (4/20 mA, 12/60 mV, 1/5 V or 2/10 V.)

On the RTD input "shrt" is signalled when input resistance is less than 15 Ω (short circuit sensor detection).

This device detects reference junction errors or errors on the internal autozero measurement. When a fault is detected the alarms assume an upscale/downscale reading in accordance with r7.

Error Messages

On power up, the instrument performs a self-diagnostic test. When an error is detected, the lower display shows an "Er" indication while the upper display shows the code of the detected error.

Error List

100	Error in EEPROM writing
150	Short circuit on CPU's outputs
200	Error on "protect register" in EEPROM
XXX	Configuration parameter error.
301	Error on calibration of selected input.
307	rj input calibration error.
400	Error on operative parameter.
500	Error on autozero measurement.
502	Error on reference junction measurement.
510	Error during calibration procedure.

Dealing with Error Messages

- 1) When a configuration parameter error is detected, repeat the configuration procedure of that specific parameter.
- 2) If an error 400 is detected, simultaneously press the ▼ and ▲ keys to load the default parameters and then repeat the control parameter setup.
- 3) For all other errors, contact your Service Representative.

GENERAL SPECIFICATIONS

Case: Polycarbonate grey case

Self extinguishing degree: V-0 according to UL.

Front protection - designed and tested for IP 65 (*) and NEMA 4X (*) for indoor locations (when panel gasket is installed).

(*) Test were performed in accordance with IEC 529, CEI 70-1 and NEMA 250-1991 STD.

Installation: panel mounting.

Rear terminal board: 15 screw terminals (screw M3, for cables from ϕ 0.25 to ϕ 2.5 mm² or from AWG 22 to AWG 14), connection diagram and safety rear cover.

Dimensions: 48 x 48 mm (according to DIN 43700); depth

- 122 mm for models with RS-485.

- 105 mm for models without RS-485

Weight: 250 g. max. (8.75 oz.).

Power supply : (switching mode) from 100 to 240 V AC. 50/60 Hz (+10 % to -15 % of the nominal value) or

24 V DC/AC (\pm 10 % of the nominal value).

Power consumption: 8 VA.

Insulation resistance: > 100 M Ω according to IEC 1010-1.

Isolation voltage: 1500 V r.m.s. according to IEC 1010-1.

Common mode rejection ratio:

120 dB @ 50/60 Hz.

Normal mode rejection ratio: 60 dB @ 50/60 Hz.

Electromagnetic compatibility and safety

requirements: This instrument is marked CE.

Therefore, it is conforming to council directives 89/336/EEC (reference harmonized standard EN 50081-2 and EN 50082-2) and to council directives 73/23/EEC and 93/68/EEC (reference harmonized standard EN 61010-1).

Installation category: II

D/A conversion: dual slope integration.

Sampling time :

- for linear inputs = 250 ms.

- for TC or RTD inputs = 500 ms.

Display updating time: 500 ms.

Resolution: 30000 counts.

Temperature Drift

- Less than 200 ppm/ $^{\circ}$ C of full span for mV and TC ranges 0, 1, 3, 4, 8, 13, 23, 24, 26, 27, 31, 36 (CJ excluded).

- Less than 300 ppm/ $^{\circ}$ C of full span for mA, V and TC ranges 10, 11, 12, 33, 34, 35 (CJ excluded)

- Less than 400 ppm/ $^{\circ}$ C of full span for RTD and TC range 9, 32 (CJ excluded).

- Less than 500 ppm/ $^{\circ}$ C of full span for TC ranges 2, 5, 6, 25, 28, 29 (CJ excluded).

- Less than 600 ppm/ $^{\circ}$ C of full span for TC ranges 7, 30.

NOTE: Precision and drift guaranteed (for $T > 300^{\circ}$ C/ 570° F).

Accuracy: \pm 0.2% f.s.v. @ 25 $^{\circ}$ C and nominal power supply voltage.

Operative temperature: from 0 to +50 $^{\circ}$ C (32 to 122 $^{\circ}$ F).

Storage temperature: from -20 to +70 $^{\circ}$ C (-4 to 158 $^{\circ}$ F).

Humidity: from 20% to 85 % RH not condensing.

INPUTS

A) THERMOCOUPLE

Type : J, K, T, E, N, S, R, B, L, U, G(W), D(W3), C(W5), Platinel II, °C/°F selectable.

External resistance: 100 Ω max, maximum error 0,1% of span.

Burn out: It is shown as an overrange condition (standard). It is possible to obtain an underrange indication by cut and short.

Cold junction: automatic compensation from 0 to 50 °C.

Cold junction accuracy : 0.1 °C/°C

Input impedance: > 1 MΩ

Calibration : according to IEC 584-1 and DIN 43710 - 1977.

STANDARD RANGES TABLE

T/C type	Ranges			
J	0	-100 / 1000 °C	23	-150 / 1830 °F
K	1	-100 / 1370 °C	24	-150 / 2500 °F
T	2	-200 / 400 °C	25	-330 / 750 °F
E	3	-100 / 800 °C	26	-150 / 1470 °F
N	4	-100 / 1400 °C	27	-150 / 2550 °F
S	5	-50 / 1760 °C	28	-60 / 3200 °F
R	6	-50 / 1760 °C	29	-60 / 3200 °F
B	7	0 / 1820 °C	30	32 / 3300 °F
L	8	-100 / 900 °C	31	-150 / 1650 °F
U	9	-200 / 600 °C	32	-330 / 1110 °F
G(W)	10	0 / 2300 °C	33	0 / 4170 °F
D(W3)	11	0 / 2300 °C	34	0 / 4170 °F
C(W5)	12	0 / 2300 °C	35	0 / 4170 °F
P.(*)	13	-100 / 1400 °C	36	-150 / 2550 °F

(*) P. equal to Platinel II

B) RTD (Resistance Temperature Detector)

Input: for RTD Pt 100 Ω, 3 wire connection.

Input circuit: current injection.

°C/°F selection: via front pushbuttons or serial link.

Line resistance: automatic compensation up to 20 Ω/wire with no measurable error.

Calibration: according to DIN 43760

Burn out : The instrument detect the open condition of one or more wires. It is able to detect also the short circuit of the sensor.

STANDARD RANGES TABLE

Input type	Ranges		
RTD Pt 100 Ω	14	- 200 / 850 °C	
DIN 43760	37	- 330 / 1560 °F	

C) LINEAR INPUTS

Read-out: keyboard programmable between -1999 and +9999.

Decimal point: programmable in any position

Burn out: the instrument shows the burn out condition as an underrange condition for 4-20 mA, 1-5 V and 2-10 V input types.

It shows the burn out condition as an underrange or an overrange condition (selectable by soldering jumper) for 0-60 mV and 12-60 mV input types. No indication are available for 0-20 mA, 0-5 V and 0-10 V input types.

STANDARD RANGES TABLE

Input type		Impedance	Accuracy
15	0 - 60 mV	> 1 M Ω	0.2 % + 1 digit @ 25°C
16	12 - 60 mV		
17	0 - 20 mA	< 5 Ω	
18	4 - 20 mA		
19	0 - 5 V	> 400 k Ω	
20	1 - 5 V	> 400 k Ω	
21	0 - 10 V		
22	2 - 10 V		

E) LOGIC INPUT

This instrument is provided of 1 logic input used for remote alarm reset.

NOTES:

- 1) Use an external dry contact capable of switching 0.5 mA, 5 V DC.
- 2) The instrument needs 100 ms to recognize a contact status variation.
- 3) The logic inputs are **NOT** isolated by the measuring input.

OUTPUTS**Output updating time :**

- 250 ms when a linear input is selected
- 500 ms when a TC or RTD input is selected.

Output 1

Type: relay SPDT contact .

Contact rated: 3 A at 250 V AC on resistive load.

Function: Alarm output

Action: direct/reverse programmable by front keyboard.

Output 2

Type: relay SPST contact .

Contact rated: 2 A at 250 V AC on resistive load.

Function: Alarm output

Action: direct/reverse programmable by front keyboard.

ALARMS

Action: Direct or reverse acting.

Alarm functions: process alarm.

Operative mode : High or low programmable.

Threshold : programmable in engineering unit within the input span.

Hysteresis: programmable from 0.1 % to 10.0 % of the input span.

Alarm reset: automatic reset, manual reset or "Silence" function is programmable.

Stand by (mask) alarm: the alarm can be configured with or without stand by (mask) function.

**SERIAL COMMUNICATION INTERFACE
(OPTION)**

Type: Isolated RS-485

Protocol type: MODBUS or JBUS.

Baud rate: programmable from 600 to 19200
BAUD.

Byte format: 8 bit.

Parity: even, odd or none programmable.

Stop bit: one.

Address: from 1 to 255.

Output voltage levels: according to EIA
standard.

MAINTENANCE

- 1) REMOVE POWER FROM THE POWER
SUPPLY TERMINALS AND FROM RELAY
OUTPUT TERMINALS
- 2) Remove the instrument from case.
- 3) Using a vacuum cleaner or a compressed air
jet (max. 3 kg/cm²) remove all deposit of dust
and dirt which may be present on the louvers
and on the internal circuits trying to be careful
for not damage the electronic components.
- 4) To clean external plastic or rubber parts use
only a cloth moistened with:
 - Ethyl Alcohol (pure or denatured) [C₂H₅OH] or
 - Isopropil Alcohol (pure or denatured)
[(CH₃)₂CHOH] or
 - Water (H₂O)
- 5) Verify that there are no loose terminals.
- 6) Before re-inserting the instrument in its case,
be sure that it is perfectly dry.
- 7) re-insert the instrument and turn it ON.

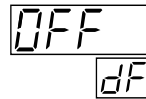
APPENDIX A DEFAULT PARAMETERS

DEFAULT PARAMETERS

Loading Default Operating Parameters

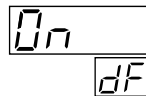
The control parameters can be loaded with predetermined default values. These are the settings loaded into the instrument prior to shipment from the factory. To load the default values proceed as follows:

- a) Press and hold the ▼ key and press the ▲ key; the displays will show:



OFF
dF

- b) Press either the ▼ or ▲ key; the display will show:



On
dF

- c) Press the "FUNC" key; the display will show:



LOAD

This indicates that the loading procedure has been initiated. After about 3 seconds the loading procedure

is complete and the instrument reverts to the "Normal Display Mode." The following is a list of the default operating parameters loaded during the procedure:

Default Operating Parameters List

Parameter	Default Value
Software Key	Unlock
Alarm 1 Threshold	Initial scale value
Alarm 2 Threshold	Initial scale value
Alarm 1 Hysteresis	0.1%
Alarm 2 Hysteresis	0.1%

Loading Default Configuration Parameters

The configuration parameters can be loaded with predetermined default values. These are the settings loaded into the instrument prior to shipment from the factory. To load the default values proceed as follows:

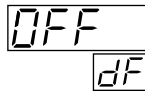
- a) Internal switch V101 must be open.
- b) The upper display will show:

The LCD display shows the text "CO nF" in a monospaced font.

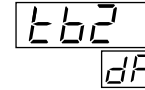
- c) Press the ▼ key; the lower display will show the firmware version.

The LCD display shows "CO nF" on the top line and "AD" on the bottom line.

- d) Still holding the ▼ key, press the ▲ key; the display will show:

The LCD display shows "OFF" on the top line and "dF" on the bottom line.

- e) Press the ▲ key to select Table 1 (European) or Table 2 (American) default parameters; the display will show:

The LCD display shows "t b 2" on the top line and "dF" on the bottom line.

- f) Press the FUNC key; the display will show:

The LCD display shows the text "LOAD" in a monospaced font.

This indicates that the loading procedure has been initiated. After about 3 seconds the procedure is complete and the instrument reverts to the "CO nF" display. The following is a list of the default configuration parameters loaded during the procedure:

PARA.	Table 1	Table 2
	European	American
L1	nbUS	nbUS
L2	1	1
L3	19200	19200
L4	8E	8E
r1	Type J (-100 to 1000 °C)	Type J (-150 to 1830 °F)
r2	----	----
r3	-100	-150
r4	1000	1830
r5	0	0
r6	1 second	1 second
r7	uP	uP
P1	AL.P	AL.P
P2	H.A.	H.A.Ac
P3	rEV	rEV
P4	OFF	OFF
P5	nonE	nonE
P6	H.A.	H.A.Ac
P7	rEV	rEV
P8	OFF	OFF
P9	0 seconds	0 seconds
PF	1 second	1 second
n1	0	0
t1	10 seconds	30 seconds

APPENDIX B

THERMOCOUPLE COMPENSATING CABLE COLOR CODES.

Thermocouple Material	British BS 1843	American ANSI MC 96.1	German DIN 43710	French NFE 18-001
T Copper Constantan	+ White - Blue Blue	+ Blue - Red Blue	+ Red - Brown Brown	+ Yellow - Blue Blue
J/L Iron Constantan	+ Yellow - Blue Black	+ White - Red Black	+ Red - Blue Blue	+ Yellow - Black Black
K Nickel Chromium Nickel Aluminium	+ Brown - Blue Red	+ Yellow - Red Yellow	+ Red - Green Green	+ Yellow - Purple Yellow
R Platinum/Platinum 13% Rhodium	+ White - Blue Green	+ Black - Red Green	+ Red - White White	+ White - Green Green
S Platinum/Platinum 10% Rhodium	+ White - Blue Green	+ Black - Red Green	+ Red - White White	+ White - Green Green
E Chromel Constantan	+ Brown - Blue Brown	+ Violet - Red Violet	– –	– –
B Platinum 30% Rh Platinum 6% Rh	– – –	+ Grey - Red Grey	– – –	– – –
N Nicrosil / Nisil		–	–	–

**Ero Electronic S.r.l.**

Via E. Mattei, 21
28100 Novara
Italy
Tel. +39 0321481111
Fax +39 0321481112
eroelectronic@ero.eurotherm.co.uk

BENELUX

ERO Electronic Benelux SA/NV
Rue Val Notre Dame 384
MOHA 4520 (WANZE)
Tel. 085-274080
Fax 085-274081
ero.electronic@skynet.be

BRASIL

ERO ELECTRONIC DO BRASIL Industria
e Comercio Ltda.
Rua Garibaldi, 659 - Conj. 202
90035-050 PORTO ALEGRE
Tel. 051-2214888
Fax 051-2214734
erobr@nutecnet.com.br

CHINA

TIANJIN VEGA COMPANY Ltd
(TAIF)
Hebei District
300232 TIANJIN
Tel. 022-26273296
Fax 022-26273297

FRANCE

ERO Electronic SARL
Zac du Chêne
34, Rue du 35ème Régiment d'Aviation
69673 BRON CEDEX
Tel. 0478267979
Fax 0478267800

GERMANY

ERO Electronic GmbH
Ottostrasse 1
65549 LIMBURG A.D. LAHN
Tel. 06431-95680
Fax 06431-57493

NETHERLAND

ERO Electronic Nederland
Ganieelan 4
2404 CH Alphen a/d Rijn
Tel. 0172-420400
Fax. 0172-420395
sales@eroelectronic.nl

SOUTH AFRICA

ERO Electronic S.A. Pty Ltd
Aigro House
1343, Spokeshave Avenue
Stormill Ext 2 ROODEPOORT
Tel. 011-4742278/9
Fax 011-4749404
P.O. Box 43112
Industria 2042
ero-sa@kingsley.co.za

SPAIN

ERO ELECTRONIC IBERICA
Calle La granja, 74
Pol. Ind. Alcobendas
MADRID
Tel. 091-6618194
Fax. 091-6619093

U.K.

ERO U.K.
Unit 1, Cygnet Trading Estate
Faraday Close
Durrington, Worthing
WEST SUSSEX BN13 3RQ
Tel. 01903-693322
Fax. 01903-693377

U.S.A.

AMERICAN ERO Electronic Corp
BARRINGTON, ILL. 60010
Tel. 0847-382-0881
Fax 0847-382-0240

U.S.A.

BARBER COLMAN
Industrial Instruments Div.
P.O. BOX 2940
Loves Park, IL - 31132 - 2940
Tel. 0815-637-3000
Fax 0815-637-5341
jgsearle@ad.com