Panel Meters

FEMA ELECTRÓNICA

Series S

Panel meter 72x36mm

Model S40-T

Pt100/RTD
Thermocouples

Panel meter for Pt100/RTD (2 and 3 wires), and thermocouples J, K, T, E, S, R, N, C, L and X with temperature display in degrees celsius (ºC) or fahrenheit (ºF). Selectable Pt100/RTD resolution at 1º or 0.1º, and manual offset available. Thermocouple measure with internal CJC selectable (enabled or disabled). Selectable behavior in case of sensor break ('to_high' or 'to_low'). Reduced size 72x36mm. Reading with 4 digits. Maximum and minimum display memory, steps, alarms with single or double setpoints, 5 levels of brightness, ... Universal AC and DC power modules and up to 2 modules for signal retransmission and control (relay outputs, analogue outputs, ...).

USER'S MANUAL
(2264R05)

1. Meter S40-T

Panel meter 72x36mm size for Pt100/RTD and Thermocouples

Panel meter for temperature signals, accepts Pt100/RTD with 2 and 3 wires, and thermocouples J, K, T, E, S, R, N, C, L and X. Temperature display in degrees celsius (ºC) or fahrenheit (ºF). Thermocouple cold junction compensation selectable. Manual offset selectable. Selectable behavior for alarms in case of sensor break ('to_high' or 'to_low').

Instrument with reduced 72x36mm size. Resolution 4 digits with negative sign ("*9999*"/"*-1999*").

Management for up to 2 alarms with 1 or 2 setpoints each alarm, with hysteresis and delays. Provides memory for maximum and minimum, display on selectable steps, password and selectable levels of brightness.

Power options with universal AC and DC ranges, and space for 2 additional control and/or signal retransmission modules.

Standard IP54 front protection. Optional green led.

Connections via plug-in screw terminals and configuration via three front push-buttons. For application on industrial environments.

1.1 Order reference

	Model	Power	Option1	Option2	Others
S40 -	**T** -	**H** -	**---** -	**---** -	**---**
		-H *(85-265 Vac/dc)* -L *(11-60 Vdc and 24/48 Vac)*	-R1 *(1 relay)* -AO *(Analogue Output)* - *(empty)*	-R1 *(1 relay)* -AO *(Analogue Output)* - *(empty)*	**-G** *(green led)* - *(empty)*

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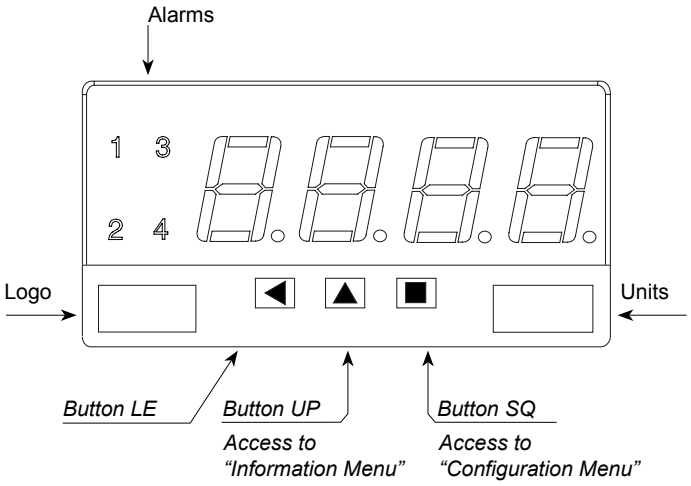
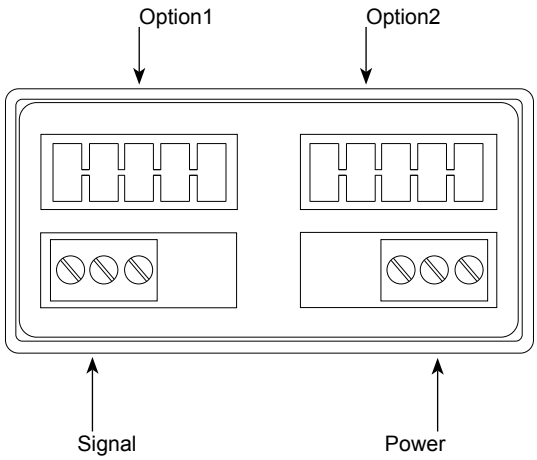
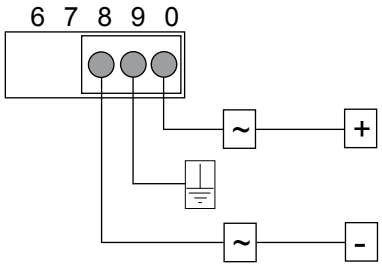
1.2 Front View



1.3 Rear View



1.4 Power Connections



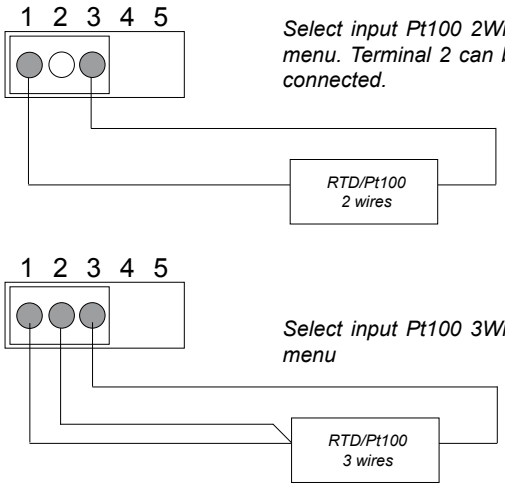
Earth connection - Although a terminal is offered for earth connection, the connection is optional. The instrument does not need this connection for correct functioning nor for compliance with the security regulations.

Fuse - To comply with security regulation 61010-1, add to the power line a protection fuse acting as disconnection element, easily accessible to the operator and identified as a protection device.

Power "H"	fuse 250mA time-lag
Power "L"	fuse 400mA time-lag

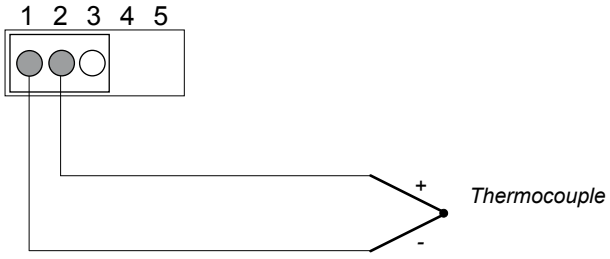
1.5 Signal connections - Pt100 / RTD

Measure can be selected for 2 or 3 wire systems.



1.6 Signal connections - Thermocouples

To configure, select the appropriate thermocouple type in the configuration menu.



1.7 Technical data

Digits 4
Type 7 segments, red
Height 14 mm
Display maximum 9999
Display minimum -1999
Decimal point selectable 8.8.8.8.
Overrange 9999 flashing
Underrange -1999 flashing

Signals accepted Pt100/RTD and Thermocouples
Temperature scale ITS90
Display units ºC or ºF, selectable

Thermocouple data
Thermocouples accepted J, K, T, E, S, R, N, C, L, X
(Thermocouple X is a linear 10uV/ºC signal)
Resolution 1º
Ranges see table 3
Max. error at 25ºC see table 3
Offset drift see table 3
Span drift* see table 3
**Note - span drift includes also the offset drift*
CJC automatic ("On"/"Off" selectable)
CJC accuracy <1.0ºC
CJC thermal drift <0.04º/ºC
On sensor break "to_high" or "to_low", selectable
Acquisitions 3 acquisitions / second

Pt100/RTD data
Sensors accepted 2 or 3 wire, selectable
Resolution 1º or 0.1º, selectable
Ranges see table 3
Alpha Alpha385 or Alpha390, selectable
Max. error at 25ºC see table 3
Offset drift see table 3
Span drift * see table 3
**Note - span drift includes also the offset drift*
Cable compensation up to 14 Ohm
Compensation accuracy <0.02ºC / Ohm
Acquisitions 4 acquisitions / second

1.7 Technical data (cont.)

Power
Power "H" 85 to 265 Vac/dc
Power "L" 11 to 60 Vdc and 24/48Vac
Consumption <4W
Isolation 3500Veff for power "H"
2000Veff for power "L"
all levels tested for 60 seconds

Configuration 3 frontal push buttons

Functions available
Steps yes, configurable
Memory of maximum yes
Memory of minimum yes
Password yes, configurable
Double setpoints yes
Brightness control yes, 5 levels

Options maximum 2

Mechanical
Mounting panel
Connections plug-in screw terminals
Weight <150 grams
Housing materials ABS, polycarbonate, vergaflex
Front size 72x36mm
Panel cut-out 69x32.5mm
Deep from panel 98mm (including terminal)

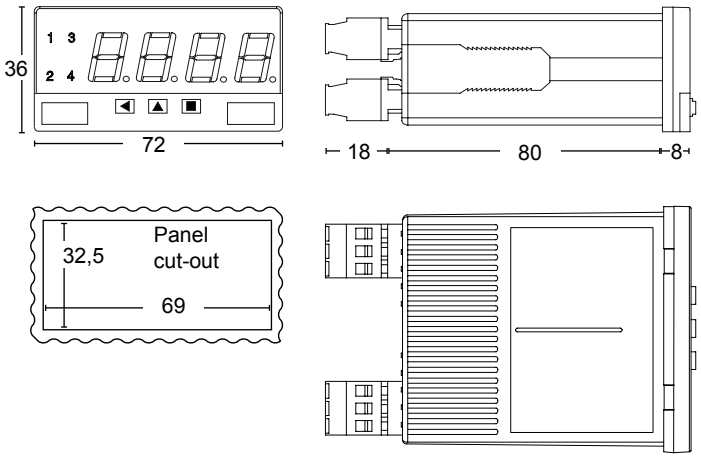
Front protection IP54

Temperature Operation 0 to 50ºC
Temperature Storage –20 to +70ºC
Warm-up 15 minutes

Type	*Range ºC*	*Max. error at 25ºC**	*Range ºF*	*Offset drift*	*Span drift* *includes offset drift*
Pt100/RTD	*800 / -200 ºC*	*<0.2ºC*	*1562 / -328 ºF*	*0.05º/ºC*	*0.10º/ºC*
Thermocouple J	*1200 / -200 ºC*	*<2ºC*	*2192 / -328 ºF*	*0.05º/ºC*	*0.20º/ºC*
Thermocouple K	*1372 / -200 ºC*	*<2ºC*	*2372 / -328 ºF*	*0.05º/ºC*	*0.20º/ºC*
Thermocouple T	*400 / -200 ºC*	*<2ºC*	*752 / -328 ºF*	*0.02º/ºC*	*0.02º/ºC*
Thermocouple E	*1000 / -200 ºC*	*<2ºC*	*1832 / -328 ºF*	*0.05º/ºC*	*0.20º/ºC*
Thermocouple S	*1768 / -50 ºC*	*<4ºC*	*2282 / -58 ºF*	*0.20º/ºC*	*0.20º/ºC*
Thermocouple R	*1600 / -50 ºC*	*<4ºC*	*2912 / -58 ºF*	*0.20º/ºC*	*0.20º/ºC*
Thermocouple N	*1300 / -200 ºC*	*<2ºC*	*2372 / -328 ºF*	*0.05º/ºC*	*0.20º/ºC*
Thermocouple C	*2320 / 0 ºC*	*<2ºC*	*4192 / 32 ºF*	*0.02º/ºC*	*0.02º/ºC*
Thermocouple L	*900 / -200 ºC*	*<2ºC*	*1652 / -328 ºF*	*0.05º/ºC*	*0.20º/ºC*
Thermocouple X	*4000 / -200 ºC*	*<2ºC*	*7232 / -328 ºF*	*0.02º/ºC*	*0.02º/ºC*

Table 3 - Thermocouple and PT100/RTD specifications

1.8 Mechanical dimensions (mm)



1.9 Operating the menus

The instrument has two menus accessible to the user :

"*Configuration Menu"* (key SQ)

"*Information Menu"* (key UP)

The *"Configuration Menu"* allows to change the configuration of the instrument. Access to the *"Configuration Menu"* can be password protected with the function "*PASSWORD*". During operation with the *"Configuration Menu"* the alarms are kept "*on-hold*". When leaving the *"Configuration Menu"* the instrument performs a restart, and new configuration is applied. On restart of the instrument, also the control output modules are restarted (relays, analogue outputs, ...).

The *"Information Menu"* is for information only, and it does not accept changes on the displayed information. To enter the *"Information Menu"* press the "*UP*" button. It is not affected by the "PASSWORD" function. Leaving the *"Information Menu"* returns to the measuring state of the instrument, without restart of the unit.

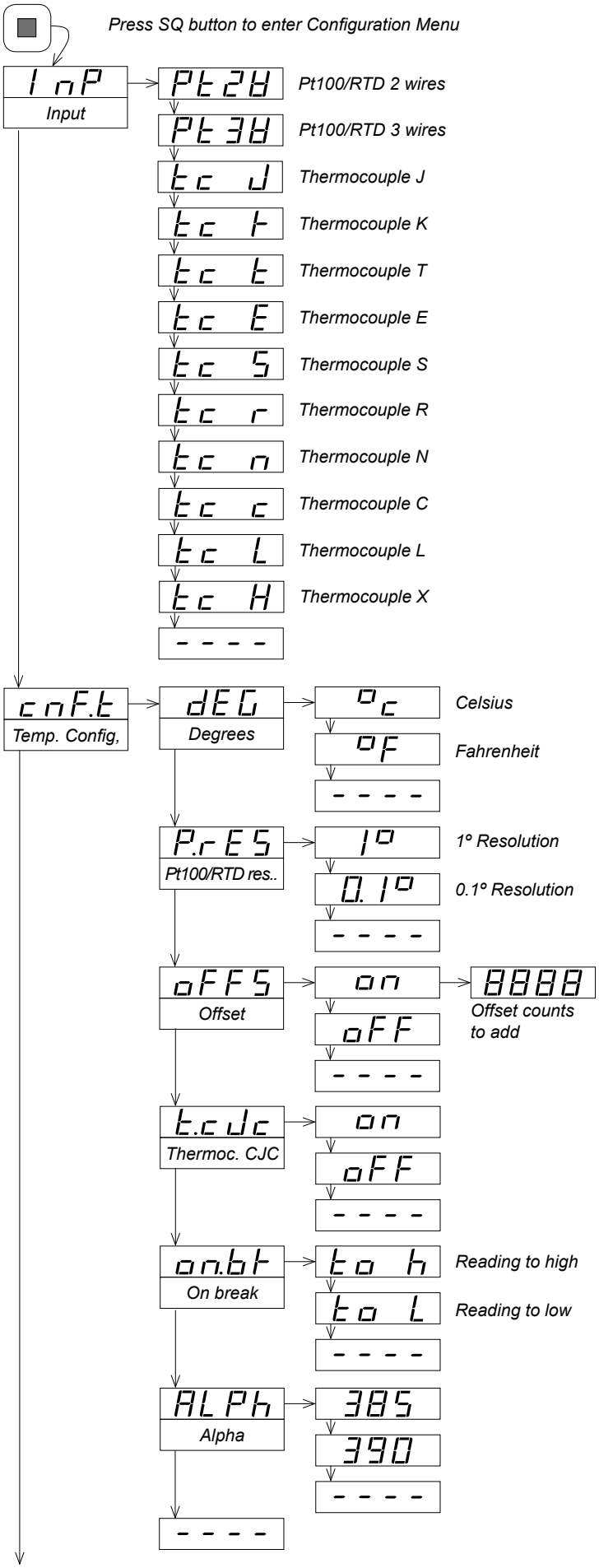
Rollback - After 30 seconds without interaction from the operator, the instrument leaves the menu and returns to the previous working mode. In case of configuration menu, all changes are discarded.

Button SQ - Selects the menu entry currently displayed. When entering a numeric value (for example a setpoint value) validates the value on display.

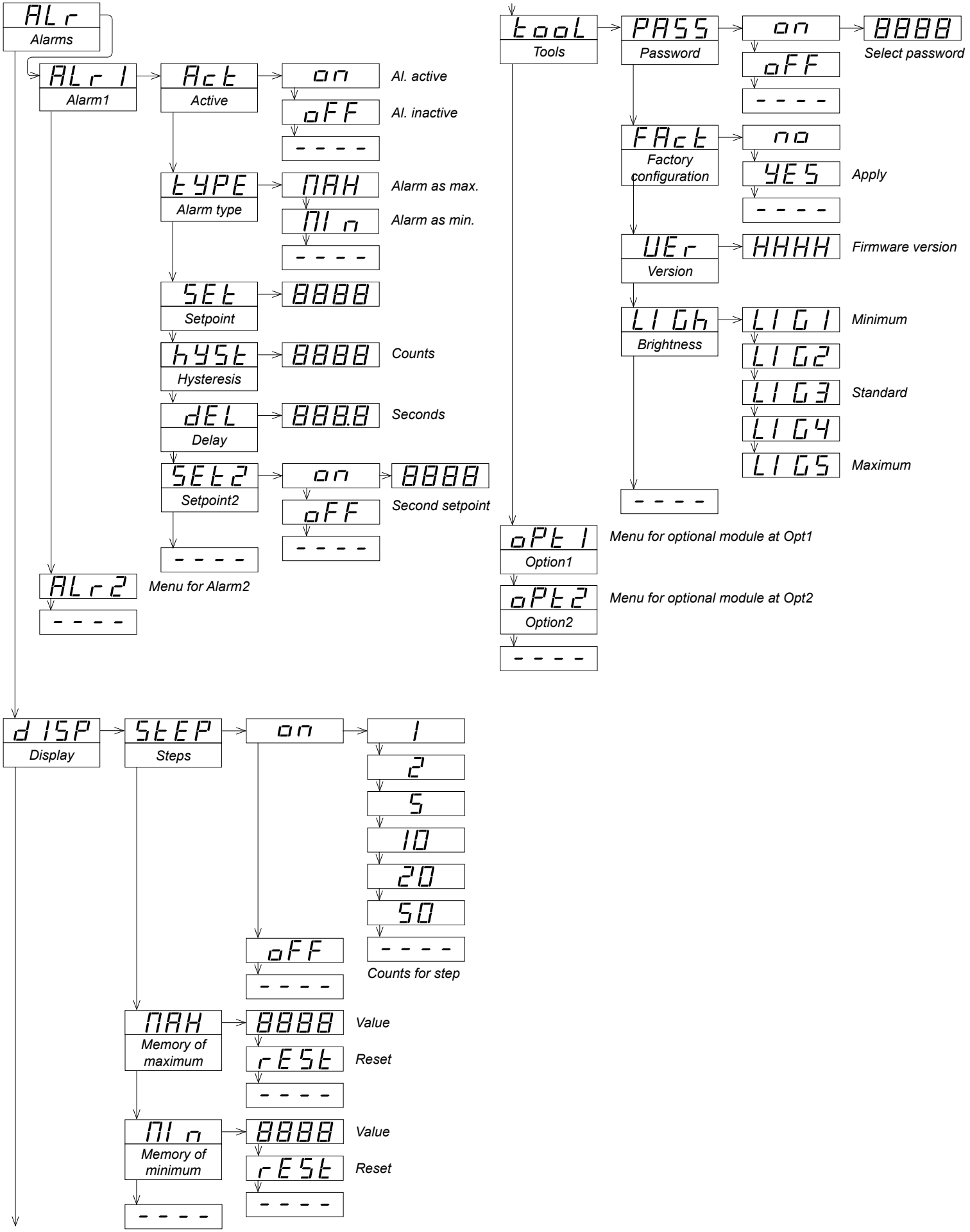
Button UP - Moves vertically on the menu entries. When entering a numeric value (for example a setpoint value) modifies the current digit by increasing its value up from 0 to 1, 2, 3, 4, 5, 6, 7, 8, 9.

Button LE - Leaves the current menu. Pressing LE several times will leave all menus. When leaving all menus in the configuration menu, changes will be saved . When entering a numeric value (for example a setpoint value) it moves from one digit to the next. Each digit value can then be modified with the UP button.

1.10 Configuration menu



1.10 Configuration menu (cont.)



1.10.1 Input menu

The input menu selects the input signal range. Options available are Pt100/RTD 2 or 3 wires, and thermocouples J, K, T, E, S, R, N, C, L and X.

Note - Thermocouple X is a linear signal at 10uV/ºC.

1.10.2 Temperature configuration

The temperature configuration menu sets the function parameters for Pt100/RTD and thermocouple sensors.

Degrees (DEG) - Value "ºC/ºF". Select the temperature to be displayed in celsius or fahrenheit degrees.

Pt100/RTD resolution (P.RES) - Value "1º/0.1º". Resolution for the Pt100/RTD. Select to display with degree or tenth of degree resolution.

Offset (OFFS) - Value from "-9999" to "9999" counts. Offset to be added to the reading. Both for Pt100/RTD and thermocouples.

Thermocouple Cold Junction Compensation (T.CJC) - Value "On/Off". Select "On" for automatic CJC compensation in the instrument. Select "Off" to disable the CJC compensation.

On break (ON.BK) - Value "to_h/to_l". Select "To L" to make the reading go to minimum, in case of probe broken. Select "To H" to make the reading go to maximum in case of probe broken.

Alpha (ALPH) - Value "385/390". Select "385" or "390" according to your Pt100/RTD sensor.

1.10.3 Alarms

The instrument can manage up to 2 alarms. These alarms control optional relays R1 (see section 2.1) which can be installed at slots Opt1 and Opt2. More alarms can be achieved by installing special control modules R2 and R4. Configuration menus for special modules are not listed in this document.

Active (ACT) - Value "ON/OFF". Defines if the instrument has to manage this alarm or not. Select "OFF" for alarm not managed.

Type (TYPE) - Value "MAX/MIN". Defines the behavior of the alarm as maximum or minimum alarm. The alarms configured as maximum are activated when the display value is equal or higher than the setpoint. The alarms configured as maximum are deactivated when the display is lower than the setpoint. The alarms configured as minimum have the inverse behavior.

Setpoint (SET) - Value from "9999" to "-1999". Alarm set point.

Hysteresis (HYST) - Value from "0" to "9999". Points of hysteresis. The hysteresis applies on the deactivation of the alarm.

Delay (DEL) - Value from "0.0" to "99.9" seconds. Delay to be applied to the relay activation and deactivation. Relays are activated and deactivated X seconds after the activation / deactivation of the alarm. The delay affects only to the relays. The delay does not affect to the front leds.

Setpoint2 (SET2) - Value from "-1999" to "9999". Second setpoint. The second setpoint allows for the creation of activation windows. If the alarm is configured as maximum with setpoint 1000 and setpoint2 is configured at 1500, the alarm will be activated between 1000 and 1500 and the alarm will be deactivated when display is <1000 and >1500. Setpoint2 is affected on the same way as the setpoint with hysteresis and delays.

1.10.4 Display

Functions on this menu allow for configuration of the visualization.

Steps (STEP) - Display changes on predefined steps. Values are 1, 2, 5, 10, 20 and 50. The display is made in steps of X counts. For example, select a step of 20 will make the display to change in steps of 20 (1420, 1440, 1460, ...).

Maximum (MAX) - Memory of maximum display. Indicates the maximum value of display since the last reset of the memory. Memory is reset on the following cases : manual reset from the Configuration Menu (Maximum), change on the input signal (Input), modification on the scaling (Scaling), change on the decimal point (dP), modification of the linearization segments, or instrument power-down.

Minimum (MIN) - Memory of minimum display. Indicates the minimum value of display since the last reset of the memory. Memory is reset on the following cases : manual reset from the Configuration Menu (minimum), change on the input signal (Input), modification on the scaling (Scaling), change on the decimal point (dP), modification of the linearization segments, or instrument power-down.

1.10.5 Tools

Password (PASS) - Select a number to act as password. This password will be requested when entering the Configuration Menu. To deactivate the password select "Off".

Factory Settings (FACT) - Factory default configuration. Select "yES" to activate the factory default configuration.

Version (VER) - Firmware version installed.

Light (LIGH) - Luminosity. Select between 5 predefined levels of luminosity.

1.10.6 Menu OptX - Options

Menu options OPT1 and OPT2 give access to the configuration menus of the options installed at slots Opt1, Opt2 and Opt3. This menu depends on the installed option. If there is no option installed the instrument shows "*NONE*". Control modules R1 are controlled from the standard alarm menu (see section 1.12.7).

1.11 Default factory configuration

Sensor	Pt100 2Wire
Degrees	ºC
Resolution	0.1º
Offset	0
On Break	To high
Alpha	385
Alarms 1 and 2	
Active	Off (not managed)
Type	maximum
Setpoint	1000
Hysteresis	0 counts
Delay	0.0 seconds
Setpoint2	Off
Display	
Steps	Off
Memory of maximum	-1999
Memory of minimum	9999
Tools	
Password	Off
Brightness	3

1.12 Messages and errors

When the instrument detects that the displayed value does not correspond to the input value, the display will flash and alternate with a message.

"**h.udr**" Hardware underrange. The thermocouple signal is lower than minimum readable signal (-30mV).

"**h.oVr**" Hardware overrange. The thermocouple signal is higher than maximum readable signal (80mV).

"**d.udr**" Display underrange. The Pt100/RTD is shortcircuited.

"**hoLd**" The instrument is showing the value present when the hold function was activated. Hold function is active.

"**Min**" The instrument displays the minimum displayed value in memory. The minimum visualization is active.

"**MAX**" The instrument displays the maximum displayed value in memory. The maximum visualization is active.

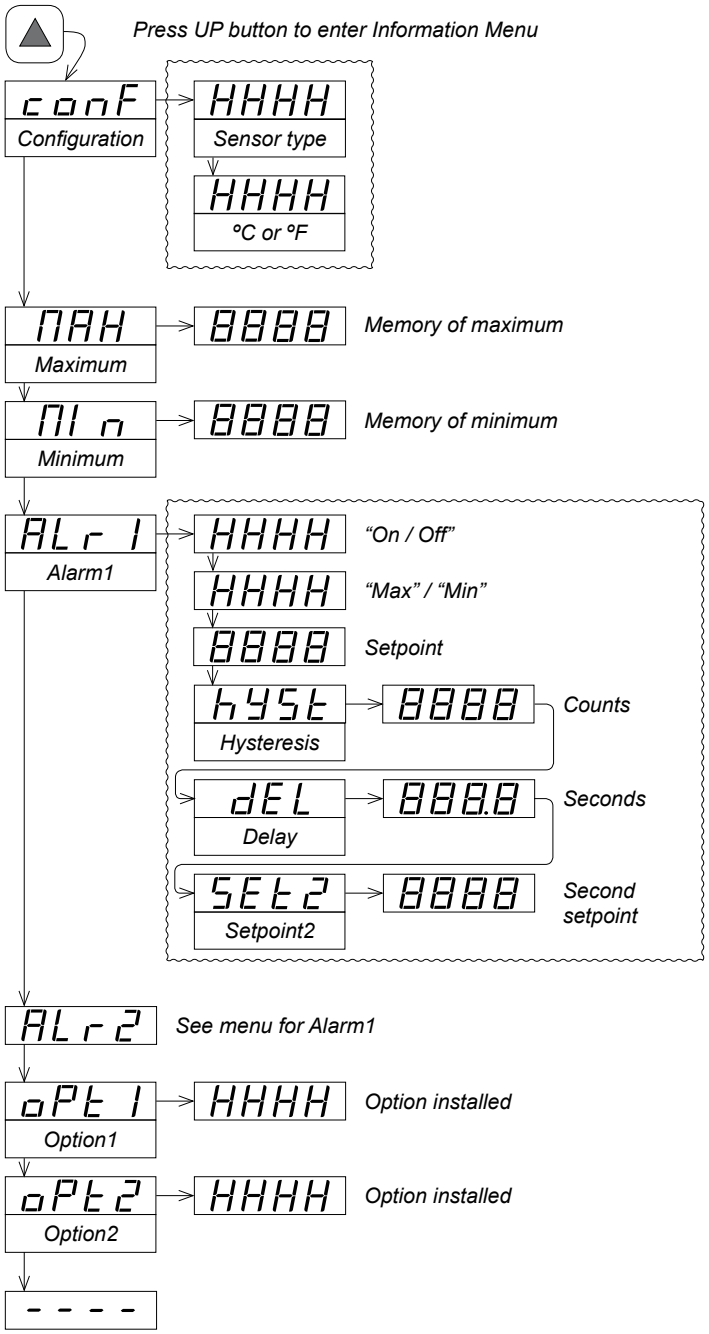
"**brk**" The instrument displays "brk" with either "9999" or "-1999" when : 1) resistance measured is higher than 390 Ohms (higher than 850ºC for PT100/RTD measure), or 2) in case the third wire ohm is higher than 15 Ohm, or 3) thermocouple measure is open circuit.

"**Err.1**" Password incorrect.

"**Err.2**" The instrument has detected an installed option but was unable to communicate.

"**E.101**" Option is installed but the type can not be recognized.

1.13 Information menu



1.13.1 Information menu

Configuration (Conf) - Information on the configured input sensor and the degrees selected.

Maximum (MAX) - Value of the maximum display.

Minimum (Mln) - Value of the minimum display.

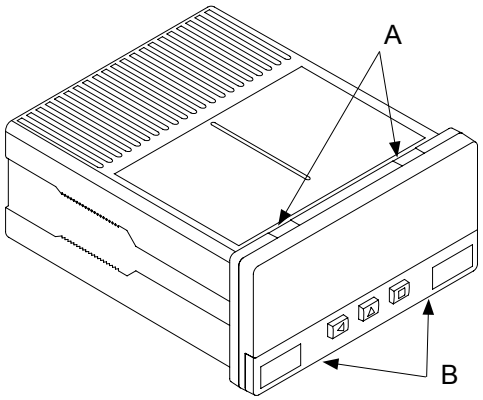
AlarmX (ALX) - Configuration of alarm X. The sequence of information shows if the alarm is being managed ("On/Off"), the alarm type ("Max/Min"), the setpoint, the hysteresis value, the activation delay and the value of setpoint2 ("Off" or the setpoint2 value).

OptionX (OptX) - Type of module installed. If there is no module shows "nonE".

1.14 Accessing the instrument

You may need to access the inside of the instrument to insert additional modules. Use a flat screwdriver to unlock the upper clips marked with "A". Then unlock the lower clips marked with "B" and move out the front filter. Let the inside of the instrument slide out of the housing.

To reinsert the instrument make sure that all modules are correctly connected to the pins on the display module. Place all the set into the housing, assuring that the modules correctly fit into the internal guiding slides of the housing. Once introduced, place again the front filter by clipping first the upper clips "A" and then the lower clips "B".



Risk of electric shock. Removing the front cover will grant access to the internal circuits. Disconnect the input signal to prevent electric shock to the operator. Operation must be performed by qualified personnel only.

1.15Warranty

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 mal-function 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. .

1.16 Installation precautions

Risk of electrical shock. Instrument terminals can be connected to dangerous voltage.

Instrument protected with double isolation. No earth connection required.

Instrument is in conformity with CE rules and regulations. See "CE Declaration of Conformity" further in this document.

This instrument has been designed and verified according to the 61010-1 CE security regulation, and is designed for applications on industrial environments. See the "CE Declaration of Conformity" further in this document for information on the category of measure and the degree of pollution levels that apply.

Installation of this instrument must be performed by qualified personnel only. This manual contains the appropriate information for the installation. Using the instrument in ways not specified by the manufacturer may lead to a reduction on the specified protection level. Disconnect the instrument from power before starting any maintenance and / or installation action.

The instrument does not have a general switch and will start operation as soon as power is connected. The instrument does not have protection fuse, the fuse must be added during installation.

The instrument is designed to be panel mounted. An appropriate ventilation of the instrument must be assured. Do not expose the instrument to excess of humidity. Maintain clean by using a humid rag and do NOT use abrasive products such as alcohols, solvents, etc.

General recommendations for electrical installations apply, and for proper functionality we recommend : if possible, install the instrument far from electrical noise or magnetic field generators such as power relays, electrical motors, speed variators, ... If possible, do not install along the same conduits power cables (power, motor controllers, electrovalves, ...) together with signal and/or control cables.

Before proceeding to the power connection, verify that the voltage level available matches the power levels indicated in the label on the instrument.

In case of fire, disconnect the instrument from the power line, fire alarm according to local rules, disconnect the air conditioning, attack fire with carbonic snow, never with water.

1.17 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

Products S40-T

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

Electromagnetic compatibility directive 2004/108/CE
Low voltage directive 2006/95/CE

Security rules EN-61010-1

Instrument Fixed
Permanently connected
Pollution degree 1 and 2 (without condensation)
Isolation Double
Category CAT-II

Electromagnetic compatibility rules EN-61326-1

EM environment Industrial

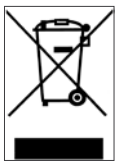
Immunity levels

EN-61000-4-2	By contact ±4 KV	Criteria B
	By air ±8 KV	Criteria B
EN-61000-4-3		Criteria A
EN-61000-4-4	On AC power lines : ±2 KV	Criteria B
	On DC power lines : ±2 KV	Criteria B
	On signal lines : ±1 KV	Criteria B
EN-61000-4-5	Between AC power lines ±1 KV	Criteria B
	Between AC power lines and earth ±2 KV	Criteria B
	Between DC power lines ±1 KV	Criteria B
	Between DC power lines and earth ±2 KV	Criteria B
	Between signal lines and earth ±1 KV	Criteria B
EN-61000-4-6		Criteria A
EN-61000-4-8	30 A/m at 50/60 Hz	Criteria A
EN-61000-4-11	0 % 1 cycle	Criteria A
	40 % 10 cycles	Criteria A
	70 % 25 cycles	Criteria B
	0 % 250 cycles	Criteria B

Emission levels

CISPR 11	Instrument Class A, Group 1	Criteria A

Barberà del Vallès November 2014
Daniel Juncà - Quality Manager



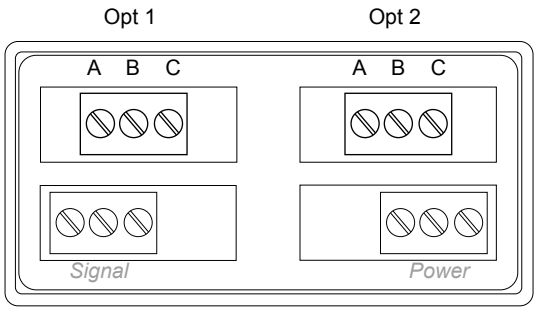
According to directive 2012/19/EU, electronic equipment must be recycled in a selective and controlled way at the end of its useful life.

2. Output and control modules

2.1 Module R1

Module with 1 relay. Up to a maximum of two R1 modules can be installed in one S Series panel meter. For more relay output needs, check special modules R2 and R4. For more information see document *2657_S40_OPTIONAL_MODULES* at *www.fema.es*

Relay type	3 contacts (Common, NC, NO)
Maximum current	8A (resistive load)
Voltage	250 Vac continuously
Installable at	Option1 and/or Option2

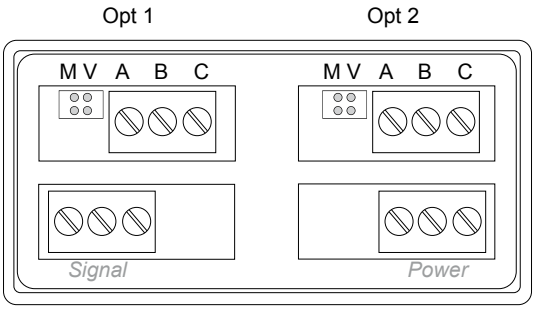


Terminal A	Common
Terminal B	NO - Normally Open
Terminal C	NC - Normally Closed

2.2 Module AO

Module with 1 analogue output. Configurable 4/20mA or 0/10Vdc. Output signal proportional to the reading. Scaling through the frontal keypad. Up to a maximum of two AO modules can be installed in one S Series panel meter. For more information see document *2657_S40_OPTIONAL_MODULES* at *www.fema.es*

Output	4/20mA, 0/10Vdc selectable
Accuracy	0.1% FS
Isolated	yes, 1000Vdc
Thermal drift	50 ppm/ºC for Vdc 60 ppm/ºC for mA
Installable at	Option1 and/or Option2



Jumper M	mode mA
Jumper V	mode Vdc
Terminal A	Vexc (+13.8Vdc @25mA)
Terminal B	Signal output (mA or Vdc)
Terminal C	GND

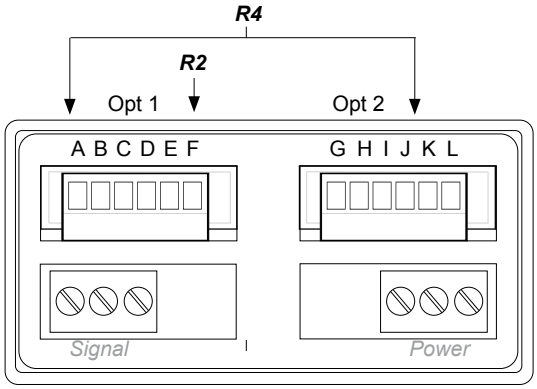
2.3 Modules R2, R4

Special modules with 2 and 4 relays. Use special modules R2 or R4 when standard R1 modules do not provide required functionality for your application. Only one special module R2 or R4 can be installed in an S Series panel meter. Special modules R2 and R4 are not compatible with R1 modules.

Configuration is done through the OPTx entry of the configuration menu. Functionality for R2 and R4 modules differs from standard R1 modules. For more information see document *2657_S40_OPTIONAL_MODULES* at *www.fema.es*

Number of relays	2, or 4
Relay type	3 contacts (Common, NO, NC)
Maximum current	6A (resistive load) (each relay)
Voltage*	250 Vac continuously
Installable at slot	Opt.1. R2 fills OPT1 R4 fills OPT1 and OPT2
Terminal	Plug-in screw terminals pitch 3.81mm

** Terminals approved for 300V (according to UL1059, groups B and D) and 160V (according to VDE in CAT-III and pollution degree 3).*



Terminal A	Relay1 Common
Terminal B	Relay1 NO - Normally Open
Terminal C	Relay1 NC - Normally Closed
Terminal D	Relay2 Common
Terminal E	Relay2 NO - Normally Open
Terminal F	Relay2 NC - Normally Closed
Terminal G	Relay3 Común
Terminal H	Relay3 NO - Normally Open
Terminal I	Relay3 NC - Normally Closed
Terminal J	Relay4 Common
Terminal K	Relay4 NO - Normally Open
Terminal L	Relay4 NC - Normally Closed

3. More options and accessories

3.1 Option G

Green led option.

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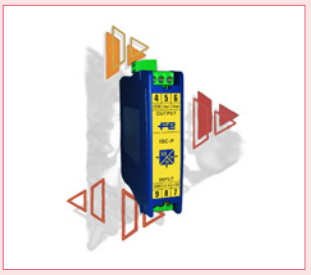
other products

Panel Meters
Standard 96x48mm

Panel Meters
Small 72x36mm

Panel Meters
Miniature 48x24mm

Large Displays
60&100mm digit



Signal Converters
& Isolators

Bar Meters

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ELECTRONIC INSTRUMENTATION FOR INDUSTRY

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