

Series K . Module AO

Isolated analog output

PANEL METERS . OPTIONAL CONTROL MODULES

Analog output for K Series panel meters. Signal output configurable to 0/10Vdc or 4/20 mA and proportional to the instruments reading. Signal output in 4/20 mA configurable for active or passive loop. Accepts direct scaling (positive slope) and inverse scaling (negative slope). Analog output is isolated from input signal and power circuits.

1. AO module

Analog output module

Analog output module with 4/20 mA or 0/10 Vdc configurable signal output. Output current loop configurable as active or passive. Signal output proportional to the instruments reading. Fully configurable scaling, in direct (positive slope) or inverse (negative slope) scaling.

Up to a maximum of 3 analog output modules can be installed in a single instrument, all outputs isolated between them and isolated from the power and input signal circuits.

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1.1 How to order

To order **pre-installed** AO modules into K Series panel meters, see the 'How to order' section into the panel meter user's manual, for information on how to build the order reference.

To order **standalone** AO modules, for **delayed** installation into K Series panel meters, use the following ordering reference : 'BK-AO'

1.2 How to install the AO module

To install a AO module into a K Series panel meter :

1. open the instrument housing (see section 1.9)
2. install the module in the preferred slot 'Opt.1', 'Opt.2' or 'Opt.3', and close the instrument
3. close jumpers 'M' or 'V' as required (see section 1.4)
3. configure the module as indicated in the 'Configuration menu' (see section 1.8)
4. connect the signal terminals (see section 1.6)

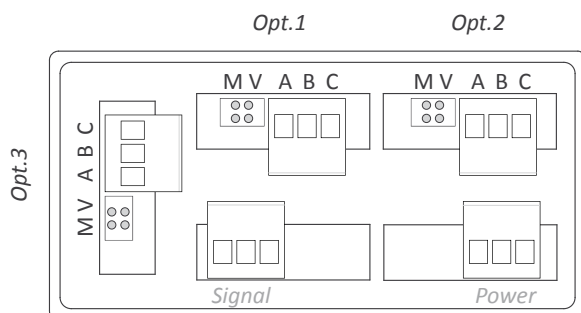
Configuration from instrument front keypad, through menu entries 'Opt.1', 'Opt.2' or 'Opt.3', depending on the position the module is installed (see section 1.10).

The RTU module can be ordered pre-installed into a K Series panel meter, or standalone for delayed installation, as it does not require soldering or special configuration.

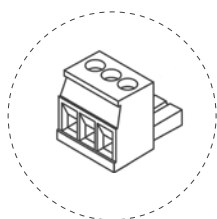
1.3 Technical specifications

Slots allowed	'Opt.1', 'Opt.2', 'Opt.3' (see section 1.10)
Scaling	related to the instruments reading direct or inverse slope
Output ranges	4/20 mA active loop 4/20 mA passive loop 0/10 Vdc
maximum signal output	mA, 10.5 Vdc
minimum signal output	0 mA, -50 mVdc
Load impedances	
in 4/20 mA active	≤350 Ohms
in 4/20 mA passive	≤800 Ohms
in 0/10 Vdc	≥10 KOhms
Vexc (terminal C)	+13.8 Vdc ± 0.4 Vdc maximum 25 mA short-circuit protected
Accuracy (at 25 °C)	<0.1 % FS
Thermal stability	60 ppm/°C in mA mode 50 ppm/°C in Vdc mode
Step response (0% to 99% signal)	<130 mSeconds (<400 mSeconds for M40-T)
Isolation	1000 Vdc
Configuration	3 button front keypad
Temperature	operation from 0 to 50 °C storage from -20 to +70 °C
Warm-up	15 minutes

1.4 Rear view



Terminal A	Vexc
Terminal B	Signal in mA or Vdc
Terminal C	GND
Jumper M	closed for 'mA' mode
Jumper V	closed for 'Vdc' mode



Detail of the plug-in screw terminals provided with the instrument. The instrument is provided with all terminals needed, both male and female.

1.5 Analog output saturation

If the analog output module generates a saturated signal (higher than 10.5Vdc / 22mA or lower than -50mVdc / 0mA), there are three situations that may cause this behavior :

1 - normal saturation of the analog output due to the configuration applied to the 'AO' module. Example : an 'AO' module configured as 4/20 mA = 0/1000 will reach saturation at 22mA when the display reading is higher than 1125 counts (approx.)

2 - saturation due to display reading, originated when the display reading is in overrange (reading higher than 9999) or underrange (reading lower than -1999). The analog output signal will automatically saturate to indicate the abnormal situation.

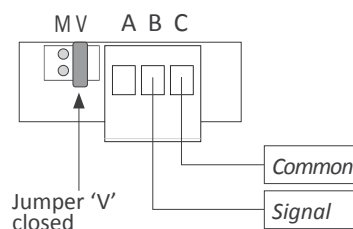
3- saturation due to signal, originated when the acquisition circuit of the instrument is saturated (hardware overrange / hardware under-range). Example : with a K40-D instrument, configured to measure a range of 100Vdc, when signal is higher than 120Vdc, the instrument can not correctly read the signal in the configured range and will activate the 'hardware overrange' state. The analog output module will also saturate the signal output, to indicate the abnormal situation.

1.6 Signal connections

• Mode 0/10Vdc

Load resistance $\geq 10\text{K}\Omega$ ms.

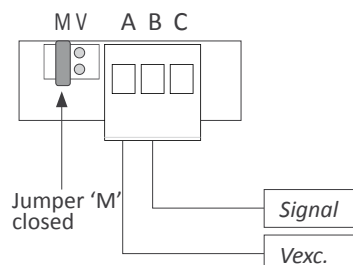
Terminal 'A' provides +13.8Vdc $\pm 0.4\text{Vdc}$, maximum 25mA, to power transducers, if needed.



• Mode 4/20mA active

Load resistance $\leq 350\Omega$ ms.

The output current loop is powered from the 'AO' module. Maximum current is limited to 25mA. Current flows out of terminal 'A' and flows into terminal 'B'.

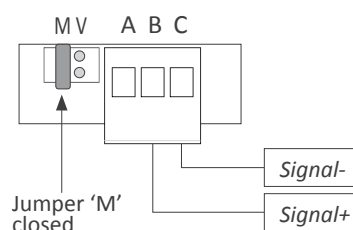


• Mode 4/20mA passive

Load resistance $\leq 800\Omega$ ms (calculated for a 24Vdc powered loop).

The output current loop is powered from an external power supply. Voltage between terminals 'B' and 'C' must not exceed 27Vdc.

Current flows into terminal 'B' and flows out of terminal 'C'.



1.7 Error codes

• 'Er.34' is displayed when leaving the 'Scaling' ('ScAL') menu, when the signal output has been configured to a lower level below 0Vdc or 0mA.

• 'Er.35' is displayed when leaving the 'Scaling' ('ScAL') menu, when the signal output has been configured to a higher level above 10Vdc or 20mA.

• 'Er.36' is displayed when leaving the 'Scaling' ('ScAL') menu, when the scaling points 'high' and 'low' have been configured with non acceptable values. Try to avoid conditions of the following type :

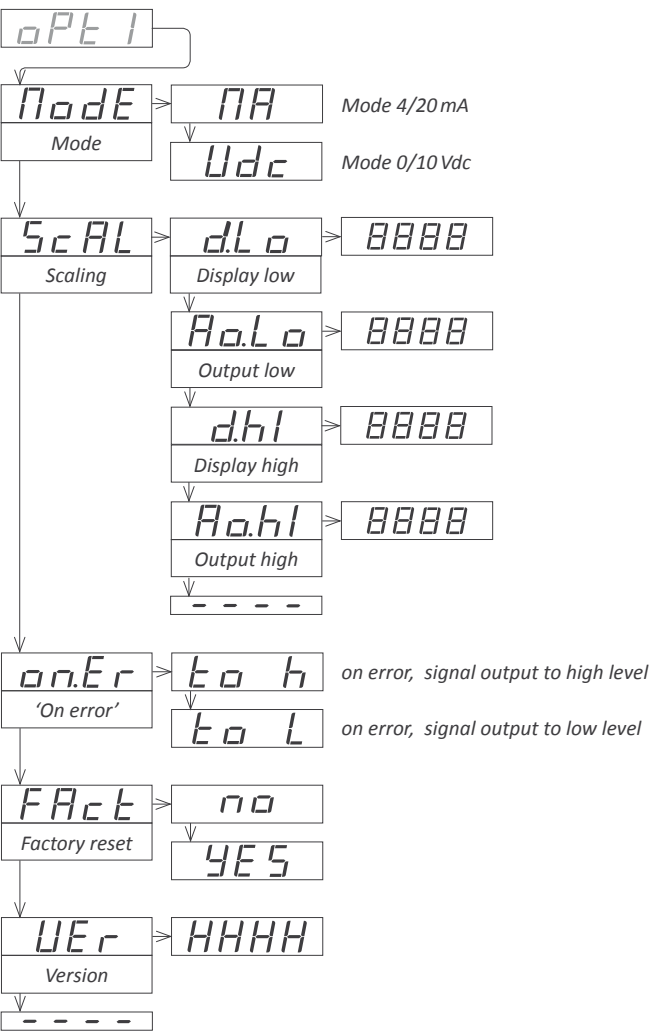
'd.Hi'='d.Lo'

'Ao.Hi'='Ao.Lo'

('Ao.Hi'-'Ao.Lo')>('d.Hi'-'d.Lo')

1.8 Configuration menu

To access the 'configuration menu' of the module, press the [■] key for 1 second, and then move through the menu with the [▲] key until the 'Opt.X' entry, corresponding to the slot where the module is installed (see section 1.10) is displayed. Press the [■] key to access the module configuration menu. See the 'How to operate the menus' section in the instrument user's manual for a detailed description on how to move through the menus.



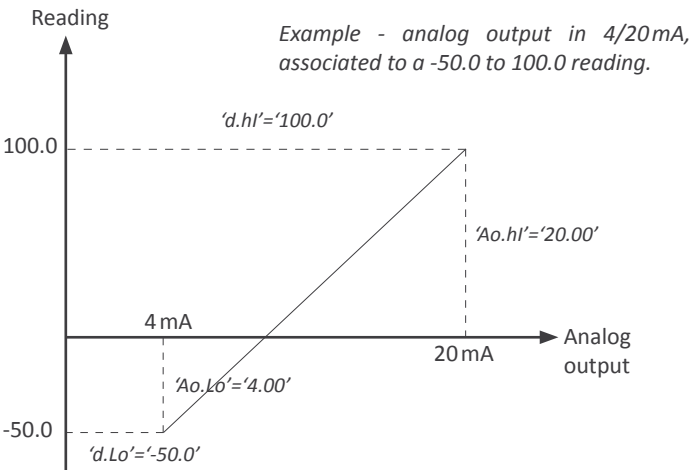
1.8.1 Initial set-up

To configure the module, select the output range to '4/20 mA' ('mA') or '0/10 Vdc' ('Vdc') inside the 'Mode' ('ModE') menu. Jumpers 'M' and 'V' must be selected according to the range selected (see section 1.6).

Scale the signal output at the 'Scaling' ('ScAL') menu. Signal output is proportional to the instrument reading. Enter the values that define the two points ('high' and 'low') of the 'signal-reading' slope :

- the lower slope point, defined by 'Display low' ('d.Lo') and 'Output low' ('Ao.Lo')
- the higher slope point, defined by 'Display high' ('d.hI') and 'Output high' ('Ao.hI')

Analog output values are shown with 'XX.XX' format, and acceptable values are '0.00' to '10.00' Vdc for voltage, and '0.00' to '20.00' mA for current. Scaling accepts also values with negative slope.



1.8.2 Menu 'On Error'

Inside the 'On Error' ('on.Er') menu, define the selected behavior for the signal output in case of incorrect reading (overranges, under-ranges, sensor break, ...). Select 'to_h' to switch signal output to the higher level. Select 'to_L' to switch signal output to the lower level. See section 1.7 for error codes.

1.8.3 Factory reset

At the 'Factory reset' ('FAcT') menu, select 'yes' to load the default factory configuration for the instrument (see section 1.12).

1.8.4 Firmware version

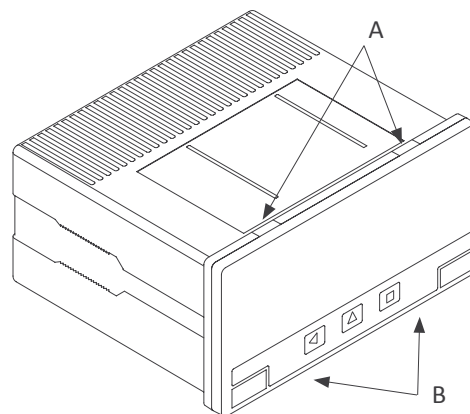
The 'Version' ('VEr') menu informs of the current firmware version installed in the module.

1.9 To access the instrument

You may need to access the inside of the instrument to add or replace internal modules. Use a flat screwdriver to unlock the upper clips marked with 'A'. Then unlock the lower clips marked with 'B' and remove the front cover. 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 cover by clipping first the upper clips 'A' and then the lower clips 'B'.

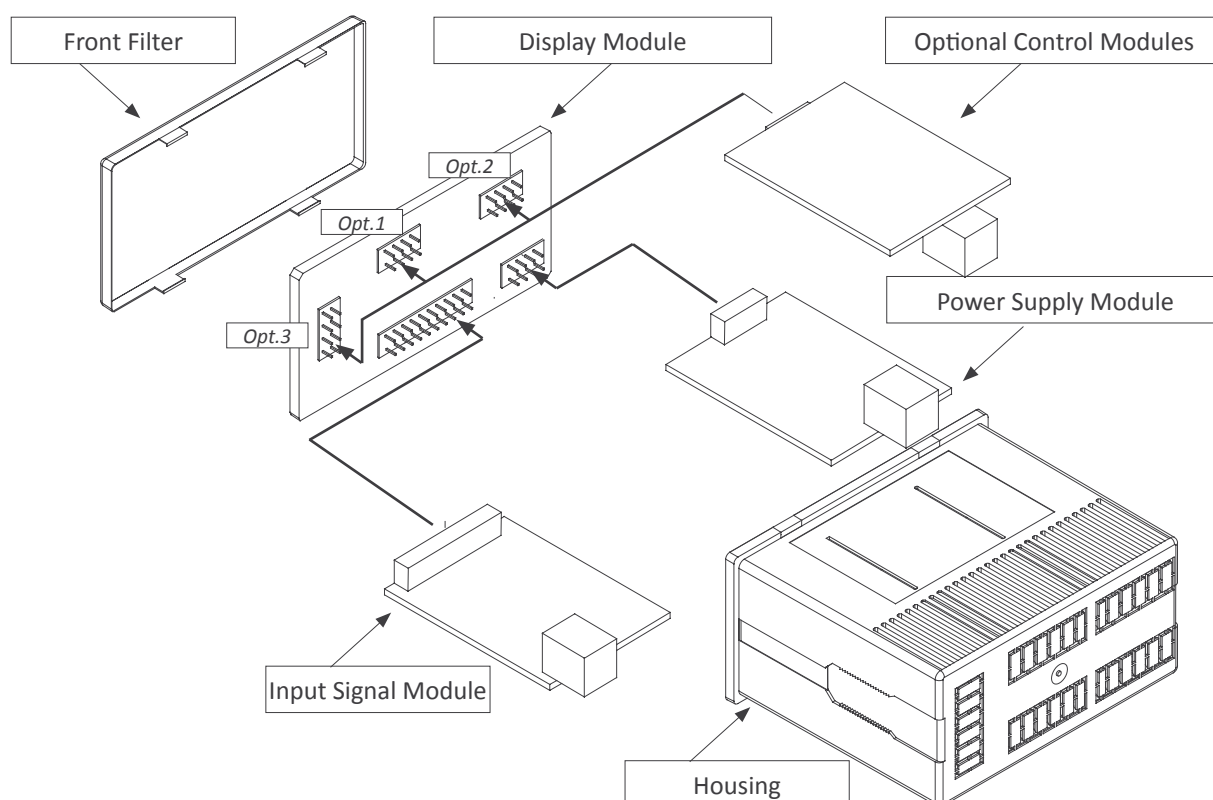
Important - If your instrument was delivered with the IP65 front seal option, accessing the inside of the instrument will permanently break the IP65 seal on the areas of clips 'A' and 'B'.



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.

1.10 Modular system

K Series panel meters are designed to create a modular system. This modular system allows for addition, replacement or substitution of any of the internal modules conforming the instrument. Below is a graphic explanation for the position of each module.



1.11 Precautions on installation



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



Instrument protected with double isolation. No earth connection required.



Instrument conforms to CE rules and regulations.

This instrument has been designed and verified conforming to the 61010-1 CE Security Regulation, for industrial applications.

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 of the specified protection level. Disconnect the instrument from power before starting any maintenance and / or installation action.

1.12 Factory configuration

Mode	mA
Scaling	0/9999 = 4/20 mA
On error	to high level ('to_h')

1.13 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 Module AO

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

Directive of electromagnetic compatibility 2004/108/CEE

Directive of low voltage 73/23/CEE

Security rules 61010-1

Emission rules

61000-6-4 Generic rules of emission

Immunity rules

61000-6-2 Generic rules of immunity

61000-4-2 By contact ±4 KV - Criteria B

By air ±8 KV - Criteria B

61000-4-3 Criteria A

61000-4-4 On signal lines : ±1 KV - Criteria B

61000-4-6 Criteria A

61000-4-8 30 A/m a 50 Hz - Criteria A

Barberà del Vallès July 2012
Daniel Juncà - Quality Manager

1.14 Warranty

This instrument is warranted against all manufacturing defects for a period of 24 MONTHS from the shipment date. This warranty does not apply in case of misuse, accident or manipulation by non-authorized personnel. In case of malfunction get in contact with your local provider to arrange for repair. Within the warranty period and after examination by the manufacturer, the unit will be repaired or substituted when found to be defective. The scope of this warranty is limited to the repair cost of the instrument, not being the manufacturer eligible for responsibility on additional damages or costs.

Notes

This image shows a full page of blank, lined paper. It features approximately 20 horizontal blue lines spaced evenly across the page, typical of notebook paper. The lines are thin and light blue, set against a plain white background. There is no handwriting or other markings on the page.



Panel meters
Standard 96x48mm



Panel meters
Miniature 48x24mm



Signal converters



Panel meters
Compact 72x36mm



Large format meters



Bar meters



Isolators



Low cost



'Customized'
instruments

FEMA

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