Nokeval

Manual

2012
2800-2012
910/920-2012
FD100A-2012

For process inputs

INTRODUCTION

2012 is an input card for measuring mA or V signal or a potentiometer. The card can be plugged into the 2000 panel meter series, 2800 field meter series, 910E/920E large panel meter series, or 575F/1000F/1100F/1800F large field display series.

The reading is displayed with six digits, if desired. Fixed trailing zeros are available. The card features a freely adjustable lowpass filter, hold function, and tare function. An external switch or relay contact can be used to trigger the hold and tare functions.

2012 supports several 2000 series auxiliary cards: an analog output card, a serial communications card, and two- or three-relay alarm cards.

If the same device is equipped with two 2012 input cards, the combination is called 2212. It is possible to calculate a simple mathematical operation among the channels.

About this manual

The next page shows a quick look at the connectors.

Every series (small/large panel/field) has a chapter of its own concerning installation and power supply connections and how to start the configuration.

If the configuration is performed using the display and buttons, refer to chapter User interface.

Then, every card type has a chapter of its own, giving jumper settings, connections, and configuration settings.

Finally there is a table of technical specifications.

Table of contents

Manufacturer

Nokeval Oy
Yrittäjäkatu 12
FIN-37100 Nokia

Tel +358 3 3424800
Fax +358 3 3422066
WWW http://www.nokeval.com

CONNECTIONS

2012 panel meter

| Slot A	Slot B	Slot C
6	6	6
5	5	5
4	4	4
3	3	3
2	2	2
1	1	1

Supply voltage

7	8	9

2800-2012 field meter

Slot C

Slot B

Slot A

7	8	9
-24V+

7	8	9
L N PE
230VAC
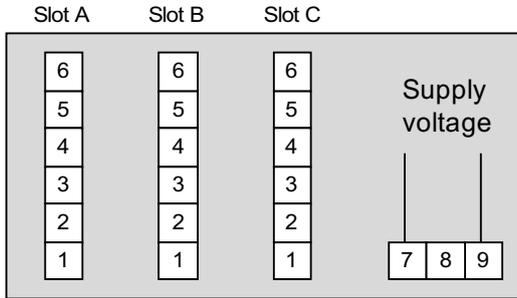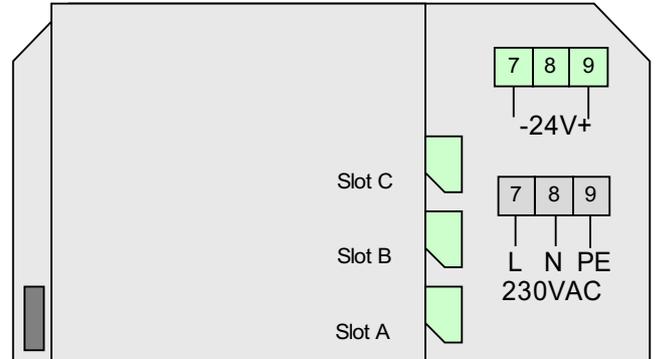
910E/920E-2012 large panel meter

Conf

Slot A

Slot B

Slot C

Supply voltage

1	+
2	-
3	
4	PE
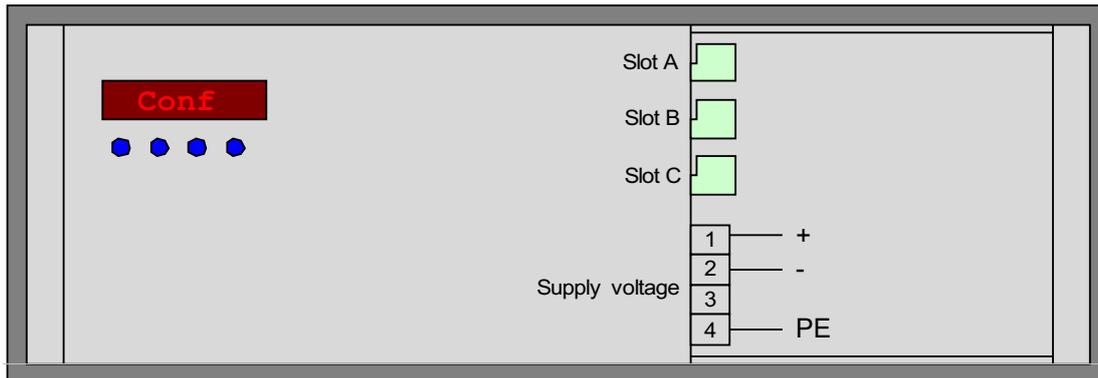
1000F/1100F/1800F-2012 large field meter

See installation chapter on page 11.

Input card (A)

2012

6	– ExtSw
5	+Pot
4	+V
3	Com
2	+mA
1	+24V

A

Output cards (B/C)

OUT

6	V
5	Com
4	mA
3	
2	
1	

B

RS

6	D1+	RS-485
5	D0-	
4	Com	
3	TxD	RS-232
2	Com	
1	RxD	

C

REL2

6	
5	1
4	
3	
2	2
1	

B/C
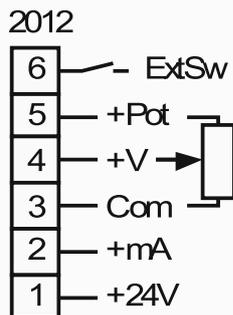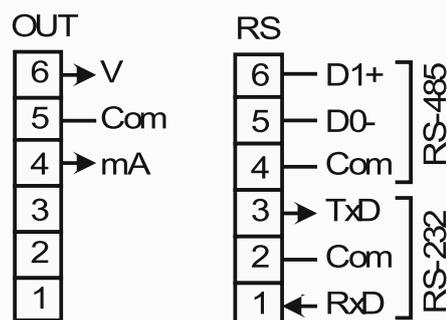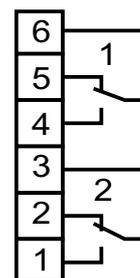
REL3

6	
5	1
4	
3	2
2	
1	3
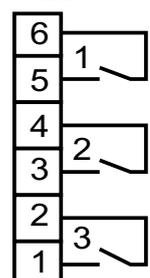
B/C

INSTALLING 2000

This chapter gives instructions how to install 1/8 DIN panel meter 2012. The field meter 2800-2012, large panel meter 910/920E-2012 and the large field displays xxxF-2012 have chapters of their own.

Opening the enclosure

The enclosure has to be opened only, if the jumper positions are changed or a card is added or removed.

The enclosure can be opened from either end. Opening from the front end is possible when the meter is not installed in a panel. Pull the front bezel on the middle.

To open from the rear end, unscrew the four screws.

The base card with other cards can be withdrawn after opening the case.

Mounting

The meter is installed in a panel opening according to the picture. Use the two holders supplied to fasten the meter.

Install guides on the corners helps centralizing the case.

Cutoff
43.5 (H) x 90.5 (W) mm
± 0,5 mm

Gasket (IP65)
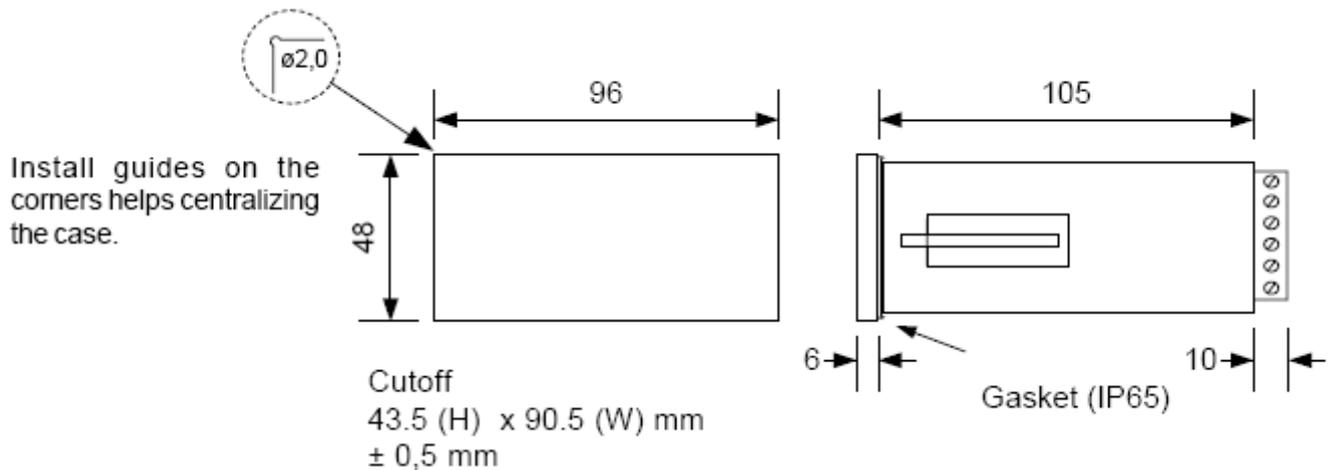
Connections

There is three slots for the cards, called A, B, and C. The connections of these cards depend on the installed card types. Every card type has a chapter of its own.
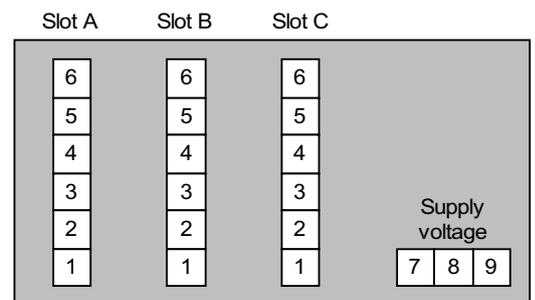
Supply voltage

The power supply is connected in a three-pole connector, that has terminals numbered 7, 8, and 9. The supply is brought to terminals 7 and 9. The polarity does not matter. The 24VDC model has green connector block, while the 230VAC model has a grey one.

+L		-N
7	8	9
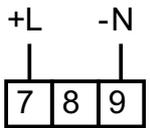
The 230VAC model is built with a reinforced insulation, so a protective earth connection is not needed.

The meter has internal pre-fuse. If an external is used, it should be at least 2AT for 24VDC model and 500mAT for 230VAC model.

Other cards

See the chapters of the card types.

Configuration

The panel meter can be configured with many ways:

- By using the front panel display and buttons. Using the buttons is described in chapter User interface.
- Via the RS-232 or RS-485 bus. Available only, if the device is equipped with a serial communications card. Use the free Mekuwin software.
- Via the POL connector on the input card in slot A. Available only, if the device is NOT equipped with a serial communications card. Suitable programming cables include POL-RS232 (for RS-232 port of a PC) and DCS772 (for USB port). Additionally an adapter POL-3PIN is needed. Use the free Mekuwin software. Caution: Do not operate the 230VAC model with no enclosure to avoid an electrick shock!

INSTALLING 2800

Mounting

First open the lid with the four plastic screws. The four mounting holes in the corners are exposed.
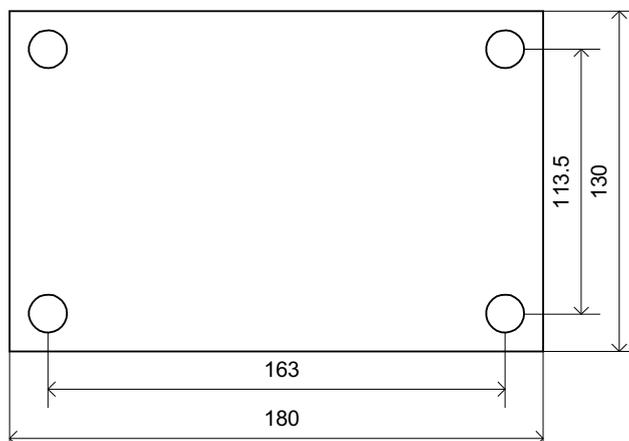
Connections

Cable glands

There is three PG11 cable glands in the lower wall of the enclosure.

Power supply
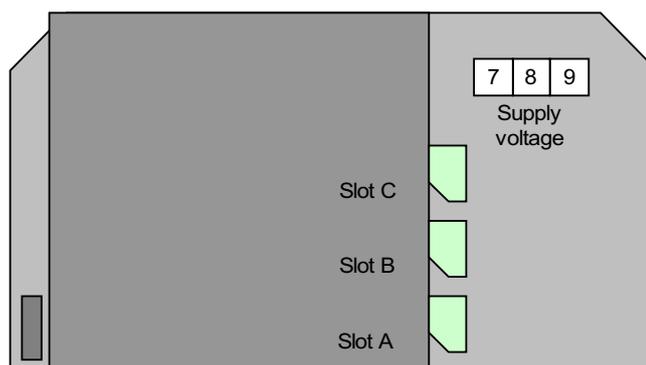
In the 24VDC model the power supply is connected in the base card terminals 7 and 9. The polarity does not matter. The connector is green.

In the 230VAC model the Live is connected in the base card terminal 7 and the neutral to terminal 8. The protective earth is connected in terminal 9. The connector is grey.
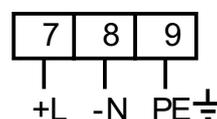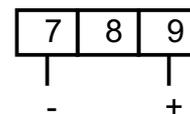
Cards

The card connections depend on the card types installed – refer to the chapters of the card types. The terminal 1 is closest to the bottom.

Configuration

There are several ways to configure the meter:

- By using the front panel display and buttons. Using the buttons is described in chapter User interface.
- Via the RS-232 or RS-485 bus. Available only, if the device is equipped with a serial communications card. Use the free Mekuwin software.
- Via the POL connector on the input card in slot A. Available only, if the device is NOT equipped with a serial communications card. Suitable programming cables include POL-RS232 (for RS-232 port of a PC) and DCS772 (for USB port). Additionally an adapter POL-3PIN is needed. Use the free Mekuwin software. Caution: Do not operate the 230VAC model with the enclosure open to avoid an electrick shock!

INSTALLING 910E/920E

Mounting

The large panel displays are installed in a rectangular opening in the panel using the two steel holders provided. Clip the holders in the groove and tighten the screw.
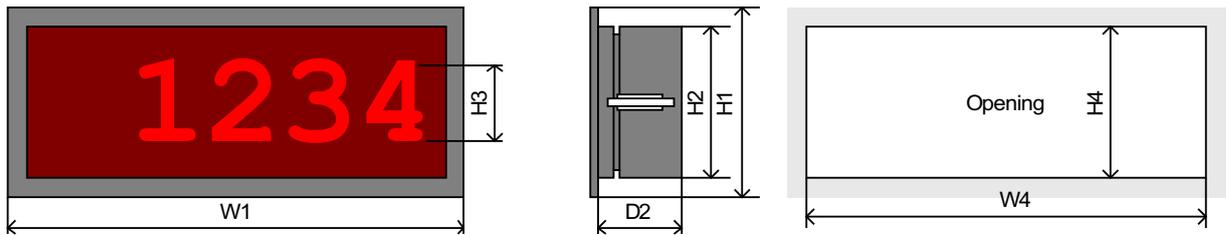

Dim	910E5	920E4	920E5
W1	303	417	507
H1	111	161	161
D2	80	80	80
H3	57	100	100
W4	291	408	498
H4	100	153	153

The opening dimensions are given for a tolerance of +2/-1 mm.

Connections

First detach the lid of the connector room on the backside of the unit. It can be recognized from the two mouseholes in the lower edge.

The connector blocks can be detached by pulling them off. In fact they must be detached to allow tightening the connector screws.
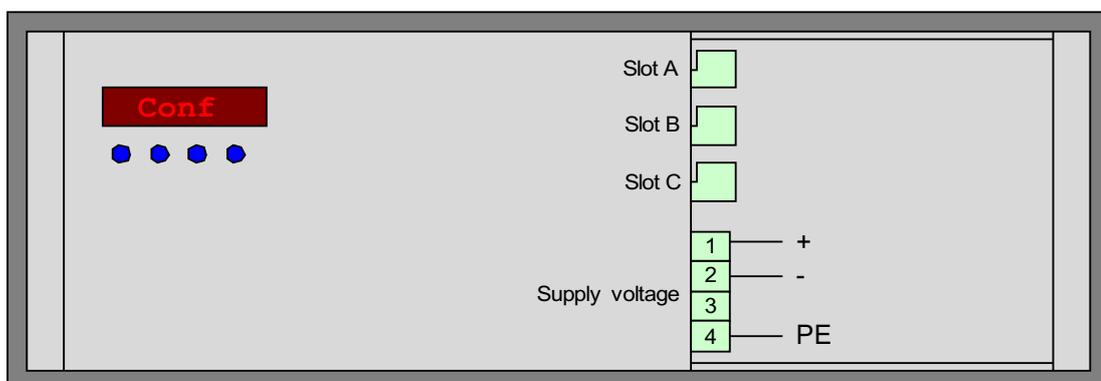
The power supply is brought to the lowest connector terminals 1 and 2. The polarity does not matter. The enclosure may be earthed using the terminal 4.

The card slot connections depend on the installed cards – refer to the chapters of the card types. The terminal 1 is the one nearest to the back panel.

Configuration

There are several ways to configure the large panel meter:

- By using the back panel display and buttons. Using the buttons is described in chapter User interface.
- Via the RS-232 or RS-485 bus. Available only, if the device is equipped with a serial communications card. Use the free Mekuwin software.
- Via the POL connector on the input card in slot A. Available only, if the device is NOT equipped with a serial communications card. Accessing the connector requires detaching the electronics unit. Suitable programming cables include POL-RS232 (for RS-232 port of a PC) and DCS772 (for USB port). Additionally an adapter POL-3PIN is needed. Use the free Mekuwin software.

INSTALLING
FD100/FD100A6

Mounting

External dimensions and mounting hole locations for FD100A, FD100A6

```
        500, 685
        455, 632                    100

145                         190

        482
```
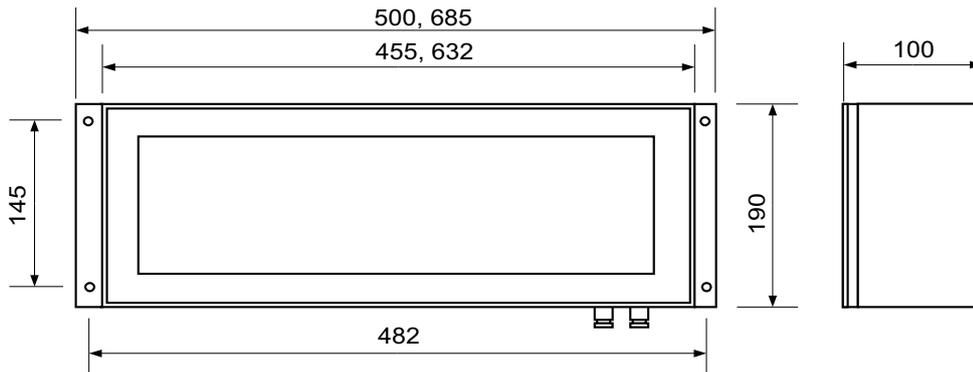
Opening the enclosure

To access the electrical connections and the small user interface used for configuring the unit, the steel case has to be opened. First unscrew all the screws surrounding the display, then lift off the black steel frame and the red plexiglass. Finally unscrew the screw that is located on the right hand side of the rightmost digit. Now the display assembly may be turned away on its hinges.

Connections

There is two PG11 cable glands on the lower wall of the enclosure allowing the cables to be brought in.

The large field displays are available for two supply voltage ranges, called "24VDC" and "230VAC". Moreover, the 230VAC model may be equipped with an auxiliary power supply or not. If the aux power supply is installed, it is completely wired on the factory, but it affects where the power supply cable is connected in. The aux power supply is used only on certain 1800F models.

24VDC model

Flat cable to the large digits   Small display and buttons   Two cable glands
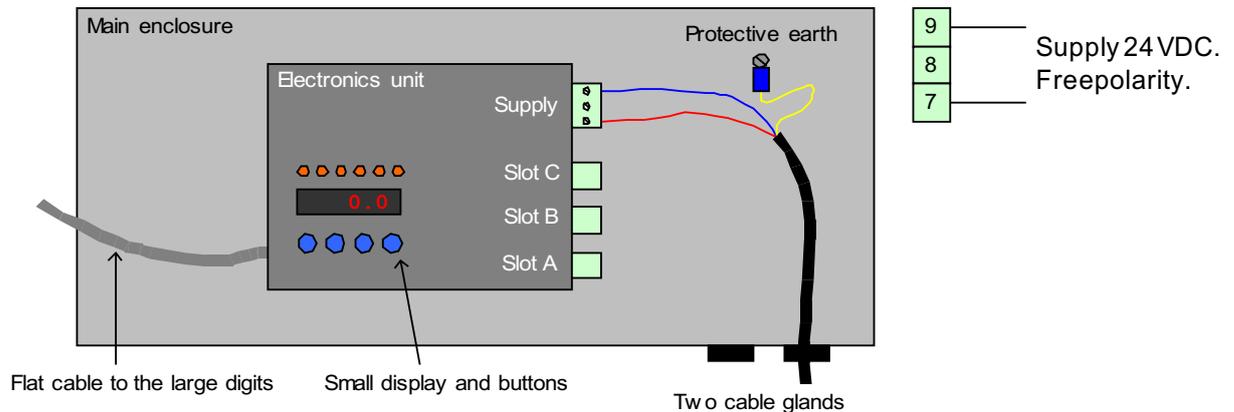
Bring the supply voltage to the connector indicated in the picture. A pre-fuse is not necessary, but if one is used, it should be at least 2 AT. The protective earth is not required for electrical safety, but will protect from EMI fields.

230VAC model with no auxiliary power supply
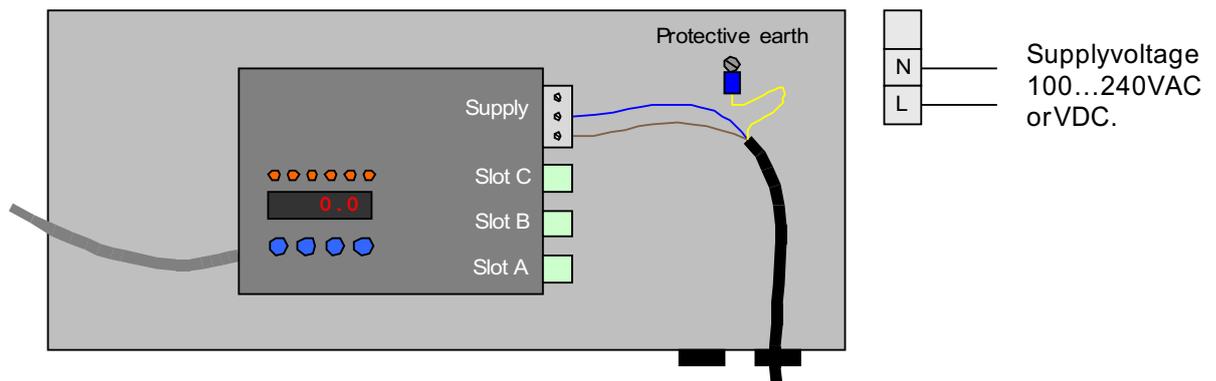
Bring the Live and Neutral wires to the electronics unit as in picture. Connect the Protective Earth wire to the M4 screw using the Faston connector provided - a Faston crimping tool is needed. A pre-fuse is not necessary, but if one is used, it should be at least 500mAT.

The power and signal wires must be fastened using cable ties or equivalent so that if one signal wire is detached, it can not touch any of the power supply wires, or vice versa.

Configuration

There are several ways to configure the large field display:

- By using the small display and buttons inside the main enclosure. Using the buttons is described in chapter User interface.
- Via the RS-232 or RS-485 bus. Available only, if the device is equipped with a serial communications card. Use the free Mekuwin software.
- Via the POL connector on the input card in slot A. Available only, if the device is NOT equipped with a serial communications card. Accessing the connector requires opening both the main enclosure and the electronics unit, which will expose dangerous voltages and must not be done if the supply voltage is higher than 24 V. Suitable programming cables include POL-RS232 (for RS-232 port of a PC) and DCS772 (for USB port). Additionally an adapter POL-3PIN is needed. Use the free Mekuwin software.

USER INTERFACE
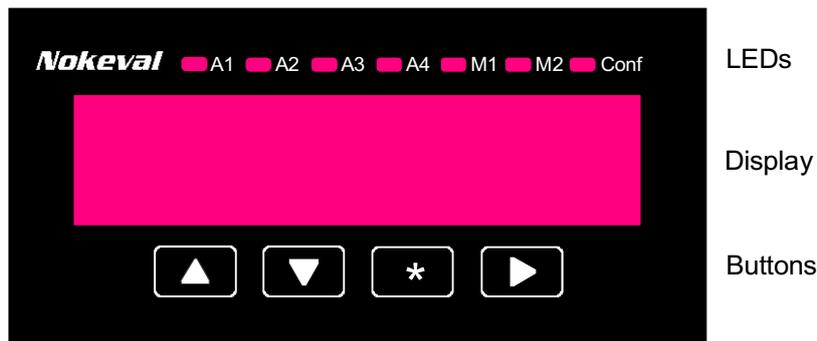
The panel meter front panel and the small display on large displays can be used to view the readings and to change configuration settings. The user interface has four states:

- Normal state – indicating readings.
- Operator menu – adusting the alarm levels.
- Configuration state – changing the configuration settings.
- Monitor state – indicating troubleshooting readings.

Normal state and the indicator LEDs

After switching the power on, the user interface is in normal state, indicating readings. There is three modes for the normal state, selected in the Master configuration menu, item Gen/Mode:

- Single: Indicates only one pre-selected channel using up to six digits. The channel is selected in the configuration menu Master/Gen/Ch.
- Step: The leftmost digit on the display indicates a channel number, and the four rightmost digits are indicating the reading of that channel. The channel can be changed manually with buttons ▲▼.
- Scan: Like Step but the displayed channel is automatically stepped once a second.

Indicator LEDs A1…A4 indicate the state of the alarms on the optional relay card. A1 and A2 follow the alarms on slot C. A3 and A4 follow the alarms on slot B. If the C slot is equipped with a three-relay card, the indicators A1 to A3 are used for it.

The alarms can be programmed to blink the display when active.

Indicator LED M2 is lit when an external contact connected in slot A is active.

Conf LED is lit when the user interface is in the configuration state.

✱ button may be used to perform taring if configured so on the input card menu, or for resetting the alarms if configured so on the relay card.

Operator menu

The operator menu allows quickly adjusting the alarm levels on the relay card installed in slot C without entering the configuration state.

The operator menu is entered from the normal state with the ▶ button. If a password has been set for the operator menu (Master/Gen/AlCode), it has to be entered now.

▶ button is used to advance from one level setting to another. While the button is kept pressed, the name of the level is displayed, e.g. AL2 = alarm level 2. After the last level, ▶ returns to the normal state.

When the level is displayed, it may be edited by pressing either ▲ or ▼. One digit of the display starts blinking and the level can be edited as described below in section Configuration state, editing floating point numbers. The editing is ended with the ✱ button.

Configuration state

Entering

In the normal state, press the ✱ and ▲ buttons together two seconds.

Select the slot to be configured using the ▲▼ buttons. The options are Master, Slot A, Slot B, and Slot C. Enter with the ▶ button. The contents of the menu depend on the card type installed, and is described in the chapter of that card type. The Master configurations affect the user interface and the math channel, and are described later in this chapter.

If a password has been set for the configuration menu, it has to be entered now. The display will show Cod.0 and waits for six button pushes. (If the password is forgotten, it may be reset by keeping ✱ and ▶ pressed while switching the power supply on.)

Navigating

The menu is a hierarchical structure. Within one menu you can move with the ▲▼ buttons. A submenu is entered with ▶ and exited with ✱.

Editing

Pressing the ▶ button shows the value of the setting and allows editing it.

Most data types are edited simply with ▲▼ buttons and exited with ✱.

Floating point numbers are edited using the buttons ▲▼▶. Select the digit to be edited or the decimal point with ▶ and edit it with ▲▼. The first digit can be edited to a minus sign.

Setting passwords: First enable the password by pressing ▲ - Set will be displayed. Then press ▶, and the display shows Cod.0. Enter a series of six button presses using freely the four buttons. Then re-enter the same series. If these matched, Set is displayed again and you may exit with ✱:llä. The password can not be ✱✱✱✱✱✱. The password is disabled by selecting ▼ Off instead of Set.

Lock and Free

Some items in the configuration and monitor menus accept Lock and Free commands. The purpose of these depend on the menu item.

The Lock command is given by pressing and holding the ▶ button and pressing the ▲. Before this, the item name must be in the display, not the value.

The Free command is given the same way but using ▼ instead of ▲.

Exiting

When all is done for this slot, exit from the menu with ✱ button. Select ▲▼ Save (keep the changes) or Undo (discard the changes) and press ✱. You will be in the slot selection

menu. Select another slot or exit with ✱ button.

Monitor state

Monitoring means viewing some internal values mainly for testing and troubleshooting.

The monitoring mode is entered by pressing ✱ and ▼ together. After that, a slot is selected with ▲▼ and entered with ▶. The monitoring item can be changed with ▲▼. The item name and the value are displayed alternating.

The last item in the monitor menu is **Diag**, allowing viewing self-diagnostics messages. Press ▶. If nothing happens, there is no active messages. If happens, use ▲▼ to see if there is more messages. Exit to the monitoring menu with ✱.

The monitoring state is exited with ✱.

Master configuration menu

```
Conf
  Gen ──────┐     Gen
  Math ──┐  └──── Mode
         │        Ch
         │        Bright
         │        CfCode
         │        AlCode
         │
         └──────  Math
                  From1
                  From2
                  Op
                  Dec
```
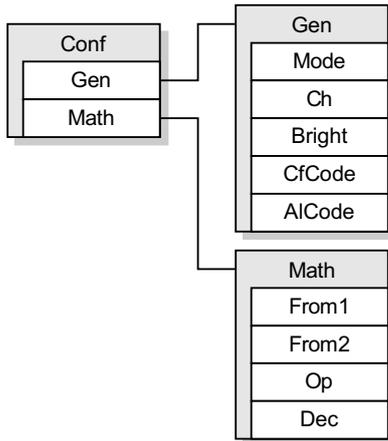
Gen/Mode

The display mode in the normal state. The options are described above in section Normal state and the indicator LEDs.

Gen/Ch

The channel to be displayed in the Single mode. The channels are:
- 1 = slot A reading
- 2 = slot B reading
- 7 = math channel

Gen/Bright

Display brightness 1…15. Default value 7. Does not affect the brightness of the large displays of models 910E/920E/575F/1000F/1100F/1800F.

Gen/CfCode

Password for the configurations. If this is set, the same password has to be entered when next time entering the configuration state.

Gen/AlCode

Password for the operator menu. The alarm levels may be quickly accessed from the normal state, but if this password is set, it must be entered first.

Math/From1

The channel to be used as the first operand of the mathematical operation.

Math/From2

The channel to be used as the second operand of the mathematical operation. Not used with the Sqrt function.

Math/Op

Mathematical operation. The result is placed on channel 7.

The operation can be one of the following:
- Off: No mathematical operation. Channel 7 is not included in the display scanning in mode Scan.
- Sum: Sum of the channels From1+From2.
- Avg: Average (From1+From2)/2.
- Diff: Difference From1-From2.
- Mul: Multiplication From1*From2.
- Div: Division From1/From2. Dividing by zero will give an undefined result.
- Min: Lesser of the two From1 or From2.
- Max: greater of the two.
- Sqrt: Square root from the channel selected with From1. A negative value will give negative results.

Tip: a square of the value can be calculated by selecting Mul operation and setting From1=From2.

Math/Dec

The number of decimals to be displayed on the math channel.

# Master monitor menu

Mainch

The channel being displayed.

Act

The state of the external contact and the front panel button ✶.

INPUT CARD 2012-IN

Jumpers

The jumpers are set in factory and there is no need to alter them. The correct positions are shown in the picture.
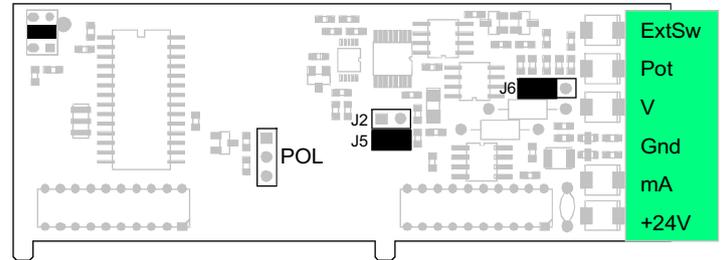
Connections

A voltage or a current signal can be connected in the input card but not both. A voltage signal is connected in terminals 4+ and 3-.

An active (=remotely powered) current signal is connected in terminals 2+ and 3-. On 2012-IN card, the current goes through a 50 ohm resistor and approx 30 ohm self-resetting semiconductor fuse.

The terminals 1+ and 3- provide a 24 VDC supply for a transmitter. A two-wire transmitter is connected in terminals 1+ and 2-.
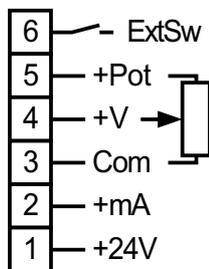
The potentiometer upper end is connected in terminal 5, feeding 2.5 V excitation. The lower end is connected in 3. The wiper is connected in terminal 4.

If using two 2012-IN cards, please note that they share the common ground (terminals 3 are internally together).

An external switch may be connected in terminals 6+ and 3-. This card will pull the terminal 6 voltage to approx +5 V via 10 kohm. The external contact (NPN or mechanical) may then pull this voltage to ground. The switch may be programmed to activate the hold function, tare the input, reset the alarms, or to bypass the lowpass filter.

Operation
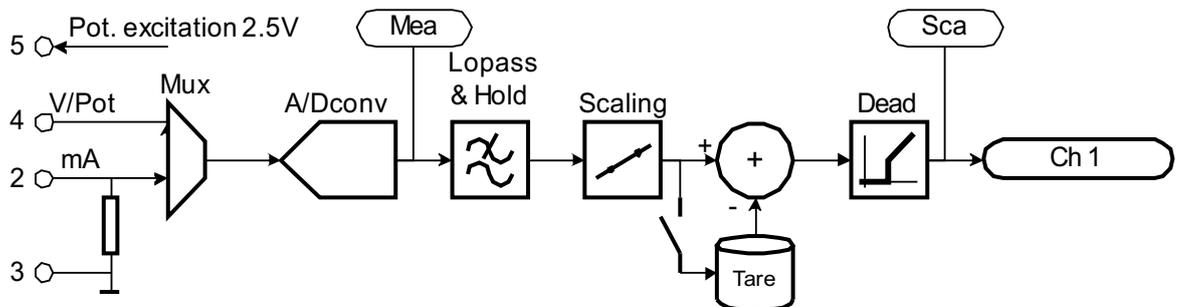
The microcontroller sets the multiplexer "Mux" to measure the V or mA input according to the configuration settings. The input is measured using a 24-bit analog-to-

digital converter. The factory-adjusted calibration values are used to convert the result to an accurate mA or V reading. This unprocessed reading can be seen in the monitor menu, item Mea.

If the digital lowpass filter is enabled, the reading is processed with it. Likewise if the Hold function is active, the reading is locked.

The reading is scaled using up to ten user-entered scaling points Mea/Sca to a scaled (engineering) reading. If the tare function is active, the current tare value is subtracted. The current value is copied to the tare value memory when a switch programmed as a tare switch is activated. The tare value is stored in an EEPROM memory and is retained even if the power supply is cut off.

The last element in the chain is Dead zone. It allows rounding very small readings to zero, to get a empty weigh to indicate zero reading despite of a small tare error.

The reading processed this way is observable in the monitor menu item Sca, and it is also stored to the channel table to be used on the display and analog and serial outputs and alarms. The card in slot A stores the reading to channel 1 and card in slot B to channel 2.

Configuration menu
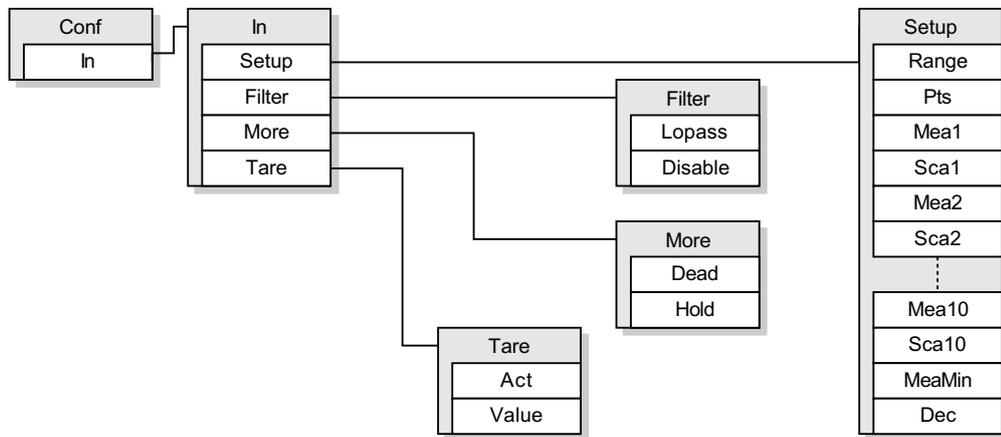
In/Setup/Range

Input signal type mA, V, or Pot.

In/Setup/Pts

Number of scaling/linearization points. Selectable 0 to 10.

If 0 points is selected, the reading is not scaled at all, but milliamps or volts are displayed as are. A potentiometer will give unscaled readings 0 to 100.

In/Setup/Mea and Sca

Scaling points. Mea and Sca form one scaling point: when the unscaled reading (mA/V) corresponds to Mea1, the scaled or engieering reading will be Sca1. When the input signal corresponds to Mea2, the scaled reading will be Sca2, etc. The number of these points is defined in Pts setting.

Between the points, linear interpolation is used. Outside the points, a linear extrapolation using the two nearest points is used.

If more than two points are used, the Mea settings must be in ascending order: Mea1 is smaller than Mea2 etc.

An example how to scale 4-20mA signal to be displayed 0-100::
Pts=2
Mea1 = 4 (mA)
Sca1 = 0 (scaled)
Mea2 = 20 (mA)
Sca2 = 100 (scaled)

If a Lock command is given to a Mea setting (Mekuwin: L button, user interface: see page 14), the current unscaled reading is copied to the value of this Mea setting. The corresponding desired scaled reading can then be manually entered to the associated

Sca setting. This way the scaling may be teached.

In/Setup/MeaMin

The smallest acceptable signal in milliamps or volts. If the signal goes below this, the reading is considered to indicate fault and dashes are displayed and all alarms following this reading are activated.

For example, with a 4-20mA input signal, it is advisable to set this to 2, so that if the current loop is broken, the alarms are activated.

In/Setup/Dec

The number of decimals to be displayed after the decimal point. If the selected number does not fit in the display, the decimals are automatically temporarily decreased.

If Dec is set negative, no decimals will be displayed, but the last digits are rounded to zero. E.g. if Dec=-1, the display will be rounded to the nearest 10. This affects the display only.

In/Filter/Lopass

Third order digital lowpass filter, that is used to reduce noise and fluctuation in the reading. Set the time constant in seconds – in that time the filter has passed through 63% of a step change. To disable, set to 0.

In/Filter/Disable

Lowpass filter bypass switch selection. The options are:
• Off: Not used.
• FP: Front panel ✱ button works as a bypass switch.
• ExtSw: An external contact connected in slot A works as a bypass switch.
• Both: Both of the above switches work.

When the selected switch is activated, the lowpass filter is switched off. Can be used, when the input signal is changed and the filtered reading is desired to jump to that.

In/More/Dead

Dead zone around zero. If the absolute value of the scaled reading is smaller than the Dead setting, the reading is rounded to zero. This can be used to get a zero reading in a weigh even if there is a small tare error.

If Dead is set to 0, only negative readings are forced to 0. If Dead is set negative (e.g. -1.0), the function is disabled.

In/More/Hold

Hold switch selection:
• Off: Not used.
• FP: Front panel ✱ button works as a hold switch.
• ExtSw: An external contact connected in slot A works as a hold switch.
• Both: Both of the above switches work.

While the hold switch is active, the reading is locked and keeps the same value.

In/Tare/Act

Tare switch selection:
• Off: Tare function disabled.
• Front panel ✱ button works as a tare switch.
• ExtSw: An external contact connected in slot A works as a tare switch.
• Both: Both of the above switches work.

When the tare switch is activated, the current scaled reading is captured and stored in the tare value memory. The tare value will then be subtracted from every reading.

The tare value is stored in an EEPROM memory and will be retained also when the meter is powered down.

The tare value is captured and stored only once when the switch is activated. Keeping the switch active will not cause successive tarings.

If this setting is set to Off, the tare value will not be subtracted from the reading anymore.

Monitor menu

Mea

The unscaled reading in milliamps/volts/percents depending on the input range.

If a Lock command is given to this item, the meter stops updating the Mea value and allows it to be changed manually. This way the operation of the scaling, analog outputs, alarms, etc may be tested with no need to feed in different physical signals. The normal operation is restored with a Free command.

Sca

The scaled reading, that has also gone through the lowpass filter, tare subtraction and dead zone function.

Diag

- EEPROM: Not used.
- ADC: The A/D converter is not working. The input card needs service.

OUTPUT CARD 2000-OUT

Connections

```
6 ──► V
5 ──── Com
4 ──► mA
3
2
1
```
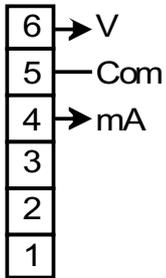
The analog output card provides one mA or V output signal. These can not b used at the same time.

The analog output card can be installed in slots B or C or both.

An active mA output is provided in terminals 4+ and 5-. Voltage output is in terminals 6+ and 5-.

Operation

The analog output is configured to follow any of the channels:

- 1 = slot A input
- 2 = slot B input
- 7 = math channel

The reading of the selected channel is calculated to milliamps or volts using two freely configurable scaling points.

If the channel is indicating fault (the input signal is below MeaMin), the analog output is steered to exceed the range by 20% or its electrical maximum 22mA or 11V.

Configuration menu

Out/Range

Output signal type mA or V.
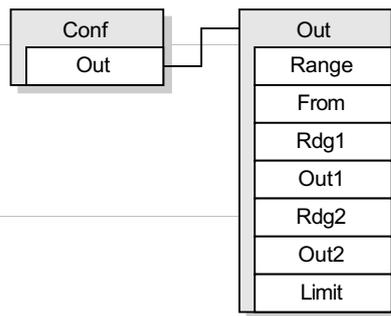
Out/From

What channel the analog output is following:

- 1 = slot A input
- 2 = slot B input
- 7 = math channel

Out/Rdg and Out

The scaling of the output. When the reading corresponds to Rdg1, the analog output will be Out1 mA or V. Likewise, when the reading corresponds to Rdg2, the output will be Out2. Between and outside these points, linear interpolation is used.

How to scale a reading 0-100 to 4-20mA output:

Range = mA
Rdg1 = 0
Out1 = 4 (mA)
Rdg2 = 100
Out2 = 20 (mA)

Out/Limit

Limiting the analog output between Out1 and Out2. E.g. if Out1=4 and Out2=20, the analog output will not go under 4 mA nor over 20 mA.

However, if the channel that the output follows indicates fault, the output will always exceed the range between Out1…Out2 by 20% (the output will be Out1+1.2*(Out2-Out1)); however it can't go above 22 mA or 11 V.

Monitor menu

Out

The analog output in mA or V. The analog signal will be electrically limited 0-11 V and 0-22 mA but this value does not obey that limit.

The analog output can be manually steered to test the external systems. Give a Lock command to this item, and enter desired values in mA or V. To return to the normal operation, give a Free command.

SERIAL CARD 2000-RS

Jumpers
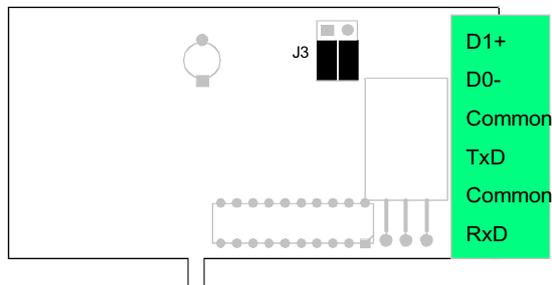
No termination, no fail-safe. Middle of the bus devices.

Terminated, no fail-safe. The last device on the bus.

Terminated and fail-safed. The last device on the bus if there is no other device providing the fail-safe

The serial communications card 2000-RS works most often with the factory set jumpers: no termination. But if the RS-485 bus is long (>50 m), the last device on the bus should be terminated.

If there is no devices giving the small voltage between the lines when no-one is transmitting, calling fail-safe, this device can be jumpered to do that. Most usually the master of the bus provides the fail-safe voltage.

Connections

An RS-232 or RS-485 can be connected, but not both.

This card can be installed in slot B or C, but only one card is allowed.
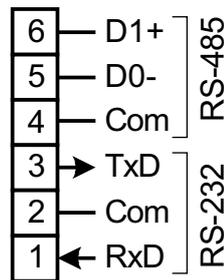
The RS-485 bus consists of two data lines and a common line. In the cable, the data lines should be a twisted pair. The more positive line at idle at terminal 6 is commonly called +, D1, A, or B. Correspondingly the negative line at terminal 5 is called -, D0, B, or A. The common wire is connected in terminal 4. The shield of the cable should be earthed at one point only.

Configuration menu

Mode

Protocol selection. Only SCL is available.
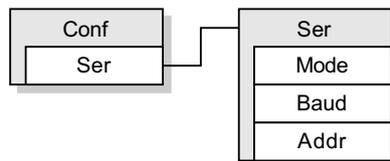
Baud

Baud rate 300, 600, 1200, 2400, 4800, 9600, or 19200 bit/s.

Addr

Serial bus address 0-123. If there are many devices on the same bus, every one must be set to a different address.

In addition to the selected address, this device will always respond in address 126. This is useful if the address of this device is not known – however there must not be other devices on the bus when using this.

Monitor menu

Count

Will be increased by one every time a valid serial bus command is processed. Will roll over to 0 after 255.

SCL protocol

A more detailed document of the Nokeval SCL protocol is available on Nokeval WWW pages.

This device accepts the following SCL commands:

TYPE ?

Returns the type and firmware version: "2012 V1.3" without the quotation marks.

MEA CH 1 ?

Returns channel 1 reading. The channels are:

- 1 = slot A input
- 2 = slot B input
- 7 = math channel

The response may consist of characters 0… 9, minus sign and a decimal point.

If the reading is invalid (e.g. the input signal is below MeaMin), consequent dashes are returned "------".

MEA SCAN 1 3

Returns the readings from channels 1 to 2 separated by a space.Palauttaa lukemat kanavilta 1-3 välilyönnillä erotettuna e.g. "101.000 0.00000 79800.".

MN xxxxx

Configuration commands used by Mekuwin software.

CARDID slot type

Card type programming. Only for factory use. Slot: A=1, B=2, C=3.

Card types: 2012-IN=33, 2000-OUT=16, 2000-RS=17, 2000-REL2=48, 2000-REL3=49.

CARDID slot ?

Card type query.

RELAY CARD 2000-RELX

2000-REL2 and 2000-REL3 are alarm relay cards. They have2 or 3 relays correspondingly. The card can be installed in slots B and C or both. If the device is to be equipped with one relay card, it should be installed in slot C.

Connections

Two relay card 2000-REL2

The picture shows the relay contacts in the normal or passive state.

If the other relay is connected to a safety voltage circuit, the other one must not be used for switching dangerous voltages.
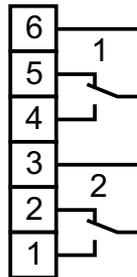
Three relay card 2000-REL3

The picture shows the relay contacts in the normal or passive state.

If one relay is connected to a safety voltage circuit, the other ones must not be used for switching dangerous voltages.
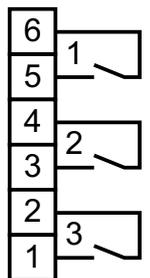
Configuration menu
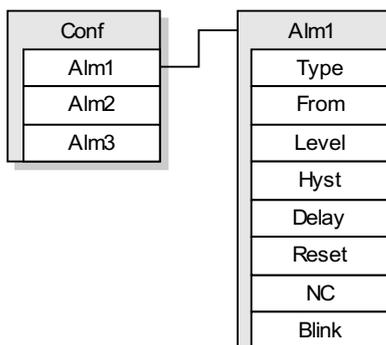
There is two or three identical submenus, corresponding to two or three relays.

Type

- Off: Alarm disabled.
- Lo: Alarm will activate when the reading goes below Level and deactivate when goes above Level+Hyst.
- Hi: Alarm will activate when the reading goes above Level and deactivate when goes below Level-Hyst.

From

What channel is this alarm watching. 1=slot A input, 7=math channel.

Level

Alarm level. See Type.

Hyst

The difference between alarm activation and deactivation thresholds. Always positive. See Type.

Delay

Only in firmware V1.0-1.2. Defines the time how long the alarm condition must be true before the alarm will actually activate. This is set in samples – one sample corresponds to 1/15 second. This is used to prevent short disturbances from triggering the alarm.

This applies to the alarm deactivation too, except when the alarm has been programmed to be manually reset.

ActDelay

Only in firmware 1.3 onwards. Defines the time how long the alarm condition must be continuously true before the alarm will actually activate. The time is given in seconds, the maximum value being 3495 seconds.

DeaDelay

Only in firmware 1.3 onwards. Like ActDelay, but affects the alarm deactivation. This is used only when Auto is selected in the Reset setting.

Reset

Alarm reset switch selection.

- Auto: No switch – the alarm will deactivate automatically.
- FP: The alarm is reset with the front panel ✱ button.
- ExtSw: The alarm is reset with an external contact connected in slot A.
- Both: The alarm may be reset by both ways.

The alarm can not be reset before the condition causing the alarm has been removed.

NC

Reverse operation of the relay "normally closed". If enabled (Yes), the relay coil will normally pull and release at alarm. Does not affect the front panel indicator LEDs.

Monitor menu

Alarms

The state of the alarms as a binary coded integer. 0=no alarms, 1=alarm1, 2=alarm2, 3=both, 4=alarm3 etc.

Blink

If enabled, the display will be blinked at 1 Hz rate when this alarm is active.

By giving a Lock command to this item, the meter stops updating this item and allows manually entering the relay state. This way the operation of the relays can be tested without needing to change the input signal. The normal operation is returned by a Free command.

SPECIFICATIONS

Input card 2012-IN

Galv isolation	From outputs and supply voltage. If two input cards, they share a common ground.
Resolution	Not observable (24 bits)
Sample rate	15 Hz
Overvolt cat	Not allowed to be connected in voltage that is more than 120 VDC or 50 VAC with respect to ground.

mA input

Resistance	Approx 80 ohm
Range	0…24 mA or wider
Calibr accuracy	± 8 µA
Non-linearity	± 3 µA
Thermal drift	± 100 ppm/°C

V input

Resistance	1.1 Mohm
Range	0…12 V or wider
Calibr accuracy	± 5 mV
Non-linearity	± 2 mV
Thermal drift	± 100 ppm/°C

Potentiometer input

Excitation	2.5 VDC
Resistance	100 ohm…10 kohm
Thermal drift	± 150 ppm/°C

Transmitter supply

Supply	24 V ±20% max 150 mA

Analog output 2000-OUT

Galv isolation	From input and supply voltage, but not from another analog output nor serial bus	Thermal drift	± 100 ppm/°C
		Max load	12 V (600 ohm)

mA output

		V output	
Range	0…20.8 mA typ	Range	0..10.5 V typ
Calibr accuracy	± 8 uA	Calibr accuracy	± 5 mV
Non-linearity	± 4 uA	Resolution	approx 3 mV (12 bits)
Resolution	approx 5 µA (12 bits)	Thermal drift	± 100 ppm/°C
		Max load	3 kohm

Serial communications 2000-RS

Ports	RS-232 or RS-485	Protocol	Nokeval SCL
Galv isolation	From input and supply voltage but not from analog output	Baud rates	300…19200 bit/s
		Response time	200 ms max

Alarm relays 2000-REL2/3

Relays	2000REL2: 2 pcs 2000REL3: 3 pcs	Snubber	An external one must be used when driving heavily inductive loads
Alarms	1 per relay		
Contacts	250 VAC 2 A resistive load		

Panel meter 2012

		Protection class	2 (reinforced insulation)

Supply voltage

		Environment	
230VAC model	85…260 VAC or VDC	Temperature	-10…60°C
24VDC model	12…32 VDC or 20…28 VAC	IP class	IP65 front panel when the gasket supplied is installed
Power	Max 12 W; typ 3 W if the transmitter supply not used and input card only		

Field meter 2800-2012

		Protection class	2 (reinforced insulation)

Supply voltage

		Environment	
230VAC model	85…260 VAC or VDC	Temperature	-10…60°C
24VDC model	12…32 VDC or 20…28 VAC	IP class	IP65
Power	Max 12 W		

Large panel meter 910E/920E-2012

Supply voltage

24VDC model	20…32 VDC
Power	Max 17 W
Protection class	3 (safety low voltage)

Environment

Temperature	-10…50°C
IP class	IP54

Large field meter 575F-2012

Supply voltage

230VAC model	85…260 VAC or VDC
24VDC model	20…32 VDC
Power	Max 17 W

Protection class 2 (reinforced insulation)

Environment

Temperature	-35…50°C
IP class	IP65

Large field meter 1000F-2012

Supply voltage

230VAC model	85…260 VAC or VDC
24VDC model	20…32 VDC
Power	Max 17 W

Protection class 1 (protective earth)

Environment

Temperature	-35…50°C
IP class	IP65

Large field meter 1100F-2012

Supply voltage

230VAC model	85…260 VAC or VDC
24VDC model	12…32 VDC
Power	Max 17 W

Protection class 1 (protective earth)

Environment

Temperature	-35…50°C
IP class	IP65

Large field meter 1800F-2012

Supply voltage

230VAC model	85…260 VAC or VDC
24VDC model	12…32 VDC
Power	Max 35 W

Protection class 1 (protective earth)

Environment

Temperature	-35…50°C
IP class	IP65