Nokeval

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Manual

2-wire panel meter 211/212

DESCRIPTION

211 is exceptionally versatile instrument combining two wire 4-20 mA transmitter and LED display accepting almost all common sensor inputs. It can be configured easily with front panel keys. The 16 bit A/D converter enables high accuracy. Linearity of A/D converter is 0.01 % and conversion accuracy of output signal is 0.1 %. Galvanic isolation is especially important with thermocouples, but potential differences with other measuring circuits can be avoided also with process input signals. Large sensor and other input variety and versatility reduce stocking costs significantly since 211 suits for most measuring applications.

Two semiconductor relays may be fitted (model 212), but they can not operate simultaneously. Normal use is one low and one high level alarm.

TECHNICAL SPECIFICATION

Input

Thermocouples:

Calibration accuracy	< 0.1 % of span or 1°C
CJ compensation	< 0.05 °C /°C
Sensor wire influence	< 1kΩ, negligible

RTD sensors Pt100, Pt500, Pt1000, Ni100

Range	-200....+700 °C (Pt100, Pt500) -200....+300 °C (Pt1000) -60.... +175 °C (Ni100)
3 or 4-wire connections	
Sensor current	approx 0.3 mA
Calibration accuracy	<0.15 °C @0 °C
Accuracy	< 0.1 °C (-100..200 °C) < 0.5 °C (300-700°C)
Max. wire resistance	30 ohm/wire

Resistance input 0-1000 ohm

mV input: -100...+100 mV

Accuracy	0.03% of span
Linearity	0.01% of span
Input impedance	>10 Mohm

Process inputs:
0..20 mA, 4..20 mA, -20..+20 mA
0..5 V, 0..10 V, -10..+10V

Input impedance:	Current: 5 Ω and voltage: 1 MΩ
Accuracy	0.03% of span
Linearity	0.01% of span

IR sensors	Exergen 140F-K and 440F-K
Range 140F-K (60°C)	-40..+350°C (linearized)
Range 440F-K (220°C)	-30..+600°C (linearized)
Emissivity correction	Selectable

Output

2-wire	4-20 mA
Straight and reversed	4-20 mA / 20-4 mA
Accuracy	0.1%
Output limiter	21 mA typ
Sensor break indication	3.8 or 21 mA
Minimum voltage	10.0V (211) or 12.5V (212)

Configuration

With front panel keys, or alternatively:

Connection	2-pole Nokeval POL connection
Serial data	9600 bps
Serial protocol	SCL-Meku 1, address 0, slot 0

General

Display	4 digits, red LED display
Galvanic isolation	2000 VDC/ 1 min.
Measuring rate	3…4 samples/s.
AD converter	16 bit
Output DAC	12 bit
Operating temperature	0..60 °C
Ambient storage	-20....+70 °C
Humidity (non-condensing)	0..95 %RH
Weight	200 g
Connectors	2.5 mm^2

Alarms (only for model 212)

Alarm relays (option)	2 solid state relays (SSR), max. 250 VAC, 150 mA
Alarm reset	Automatic or manual with front panel key
Alarm mode	High or low level alarm, NO or NC. Both relays can't operate simultaneously!
Hysteresis	Selectable 0..100 %

INSTALLING

Jumpers

There is no jumpers that need to be set. However, if there is no alarm card fitted (model 211), the two backmost pins on the alarm card connector must be shorted with a jumper; otherwise the device will not work. This jumper is factory fitted.

Retro-installing the alarm card

The alarm card can be added afterwards, to change model 211 to 212. To do this, pull the front panel off and take the circuit boards out of the case. Locate the five-pin header on the base card, and remove the jumper. Insert the 211rel2 card.

Sensor and output connections

See connector diagram below. Com=Common.

Configuration

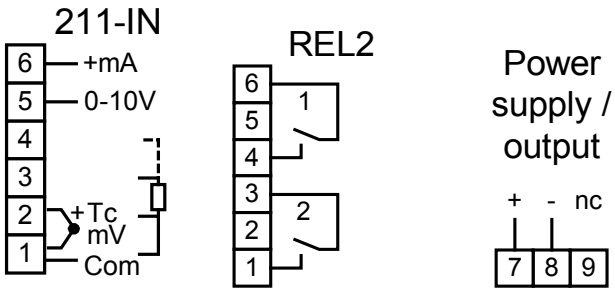
With front panel keys

This device can be fully configurated using the front panel keys. Using the keys is described in chapter User interface. The settings are explained in chapter Configuration menu.

With configuration software

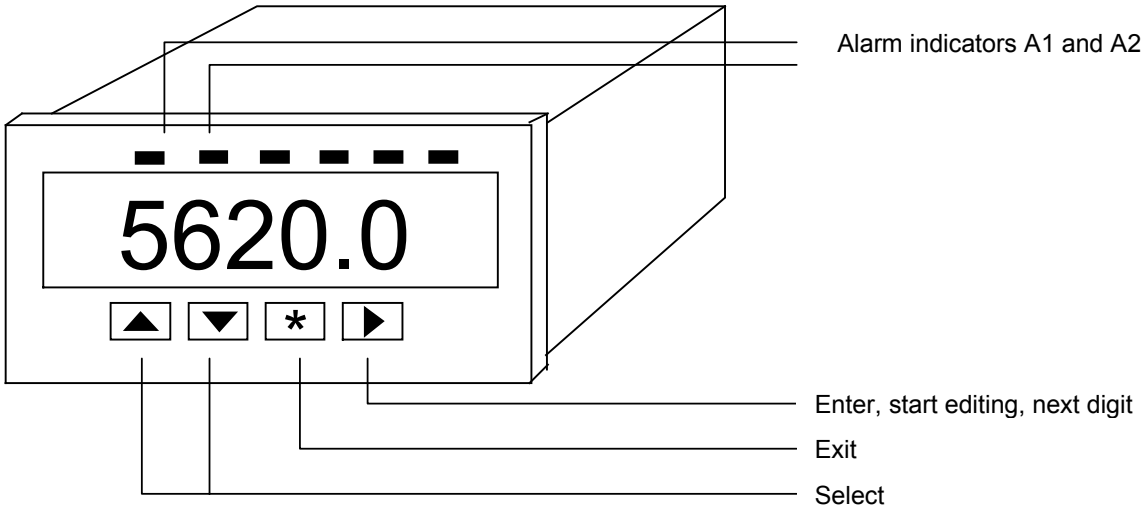
Using a configuration cable POL-RS232 and an adapter POL-2PIN for converting the 3.5 mm earphone plug to two pin header, Nokeval Mekuwin configuration software can be utilised for convenient configuration. This is especially useful when configuring large number of devices as the settings may be saved to a file and then retrieved. The settings are explained in chapter Configuration menu.

There is a pin header next to the power/output connector on the right hand side. Connect the adapter cable to this, so that the red wire (+) is on the leftmost pin. Start the software and select 9600 baud and the appropriate COM port. Any address will do.



USER INTERFACE

Front panel



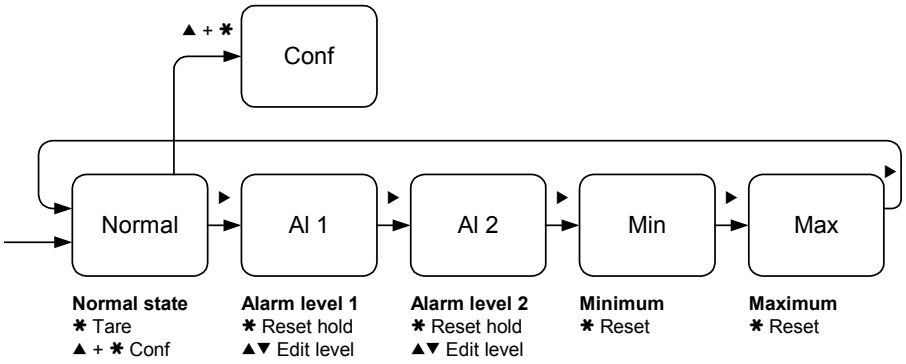
Normal state

In normal state, this device displays the current measurement value continuously functioning as an indicator. The A1 and A2 indicator LEDs indicate the current state of the alarms.

If tare function is enabled in the configuration menu, you can tare the unit by pressing ✱ key for one second. There is no means to de-tare, except switching the tare function off in the menu.

The device is in this state after power-up.

Operator menu



Alarm levels and minimum/maximum memory can be accessed without entering the configuration state. Use the ▶ key to select operator function (Alarm level 1 – Alarm level 2 – Minimum – Maximum – Normal); the blinking indicator LED indicates the current function.

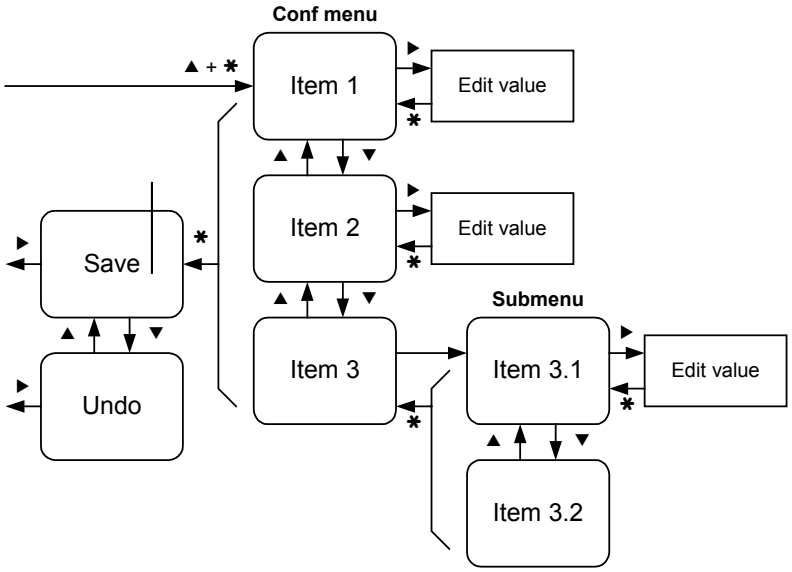
When an alarm LED is blinking, the alarm level can be changed. Press ▲ or ▼ until the first digit starts blinking, then edit as described in chapter Editing. To reset the alarm (when hold used), press ✱ for one second. Both alarms are reset separately.

When a minimum (M1) or maximum (M2) LED is blinking, the minimum/maximum memory can be reset by pressing ✱ for one second. Both minimum and maximum are reset separately.

If password is set (Alcode in configuration menu), alarm level cannot be changed nor functions reset without entering the correct password.

Configuration state

Press ▲ and ✱ simultaneously two seconds to enter configuration state. When entered, the Conf LED will light. If configuration password is set, you will need to enter it (Cod.0 displayed). In case the password is not known, switch the power off, hold ✱ and ▶ keys pressed and switch the power on again.



The main level of the configuration menu is shown. You can select among menu items using ▲▼ keys. To edit the setting, push ▶ to start editing, and ✱ to get back to the menu. How to edit, see chapter Editing.

The menu is organizated hierarchically. You can enter In, Out, Alm1, Alm2, and Lin submenus by selecting them with ▲▼ keys, and entering the submenu with ▶ key. See the menu chart.

When all settings are done, exit from the menu main level with ✱ key. Two options are shown: Save to keep the settings made, and Undo, to discard all changes. Select Save or Undo and push ▶.

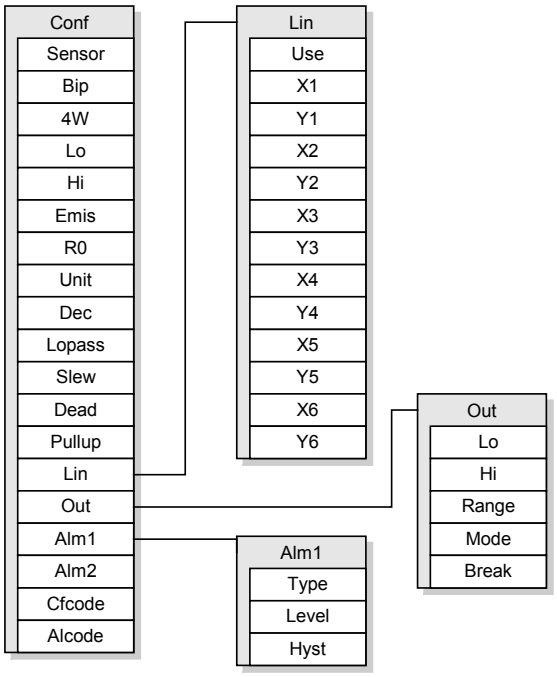
Editing

Most data types are edited with ▲▼ keys, finally exiting with ✱ key.

Floating point values, such as scaling and lopass filter, are edited with ▲▼▶ keys: select digit to edit (blinks) with ▶ and change it with ▲▼. When the decimal point is blinking, it can be moved with ▲▼. The first digit can be replaced with a minus sign.

To set a password, push ▲ to select Set (means password will be used), then push ▶ to enter the new password. Cod.0 is shown. The password is a sequence of six keypresses using all the four keys. Enter the same password twice; if they match, Set is shown again and you can exit with ✱. If they didn't match, Off is shown. Redo from start. To disable a password, push ▼ to select Off and exit with ✱.

CONFIGURATION MENU



To completely set up the device, read the section below concerning your sensor type, and section Other input settings. If using output, read section Output and so on.

Sensors

Thermocouple inputs

Select one of the various thermocouple sensors in the Sensor setting. E140 and E440 are for Exergen infrared thermocouples 140°F and 440°F.

Lo and Emis setting can be used for fine tuning the input. Lo (offset) value will be added to the measured temperature. Default value is 0.

Emis is for emissivity correction. Default value is 1. To amplify the temperature reading, select smaller emissivity setting (between 0 and 1). Using this is detailed in chapter Description of sensor types.

Select measurement unit: Unit = °C or °F.

If you are using a conventional thermocouple, set Pullup On, so that this device will reliably detect sensor breaks. With infrared thermocouples, the pullup can cause error in the sensor voltage and is not recommended.

Resistance thermometry devices

Any Pt (platinum) and Ni (nickel) RTD sensor can be used. Select Sensor=Pt or Ni.

Enter the nominal resistance (resistance at 0°C) of the sensor in the R0 setting, for example 100 for Pt100.

Set 4W=on if using four-wire connection, otherwise off.

Lo value will be added to the reading, enabling offset correction. Fine-tuning R0 will give slope correction.

Select measurement unit: Unit=°C or °F.
Set Pullup On to enable wire break detection. The sensor break will be detected in any case, but the pullup will monitor the wire resistance compensation wire too.

Process signal inputs

This device can accept 0-20mA, 4-20mA, 0-5V, and 0-10V process signal inputs. Select any of them in the Sensor setting.

The input is scaled using Lo and Hi values onto the display. The output is then scaled from this display (or engineering) value.

When the input signal is at its lowest nominal value (e.g. 4 mA), Lo value is displayed. Respectively, at the highest value, Hi is displayed.

Absolute inputs

Absolute input means bare mV, mA, V, or resistance measurement. Select input range mV (up to 100 mV), V (up to 10 V), mA (up to 20 mA), or ohm.

Lo and Hi values are used for input scaling. First the bare reading is multiplied with the Hi value and then the Lo value is added.

With sensor types mV, V, and mA, you can select unipolar or bipolar range. To be able to measure negative values (e.g. ±100 mV), set Bip=on.

With ohm input, set 4W=on if using four-wire connection, otherwise off.

Potentiometer input

A three-wire potentiometer is scaled using Lo and Hi values. When the wiper is at the minimum position, Lo value is displayed, and at maximum position, Hi value is displayed. If the whole stroke of the potentiometer is not used, Lo and Hi must

be calculated to compensate this. See chapter Description of sensor types for details.

A two-wire potentiometer is a varying resistance. Select Sensor=ohm. Scale as described in section Absolute inputs; see also chapter Description of sensor types.

Other input settings

Dec

The number of digits on the right hand side of the decimal point. Selectable between –2 and 3. If the number of digits won't fit in the display, the decimal count is automatically decreased temporarily.

A negative value means that there is no decimals and that the right most digits will always be zero. E.g. Dec=-2, the display is rounded to 0, 100, 200 etc.

Lopass

First order digital lowpass filter for input. Functions like a RC circuit damping variations in the reading. Set the time constant in seconds. Recommended value 1. To disable filtering, set to 0.

Slew

Slew rate limiter. Prevents the input reading from changing too rapidly. Defines how much the new reading can differ from the previous one. New readings are acquired about 3…4 times/second, so value of 1 limits the slew rate to about 3°C/s. To disable, set to 0.

Dead

Dead zone around zero. If the input reading is smaller than the Dead value, the display is rounded to zero. This is especially handy in weighing and flow measurement applications.

To prevent negative values only, set Dead=0. To disable the dead zone, set Dead=-1 or any negative value.

Lin submenu

Lin submenu is used for custom linearisation of the input. To enable the linearisation, set Use=1.

Enter six sample pairs. X values are unlinearised, scaled input values (°C, °F, mV or whatever), while Y values are the corresponding linearised display values. The X and Y values may be selected freely, but the X values must be in ascending order (the smallest first). Linear interpolation/extrapolation is used between/outside the points.

Out submenu

Out submenu is used for output signal settings.

Lo

Display/engineering value at which the output signal is at its lowest value (4 mA).

Hi

Display/engineering value at which the output signal is at its highest value (20 mA).
To achieve an inverted output ("20-4mA"), swap the Lo and Hi values.

Mode

Off = Output not used, fixed 8 mA. Display at the maximum intensity all the time.
Limit = Limited between 4 and 20 mA (no overranging).
Full = Can overrange from about 3.8 mA to about 21 mA.

Break

Output state at sensor/wire break.
Dscale = output driven to minimum value (3.8 or 4.0 depending on Mode).
Uscale = output driven to maximum value (20 or 21 depending on Mode).

Alarm submenus

There is two alarm submenus, Alm1 and Alm2, for two alarm relays. These are identical. If the alarm option is not fitted (model 211), the alarms can still be used for visual indication at the front panel.

Type

Alarm type: Lo, Hi, LoNc and HiNc. Lo means low level alarm and Hi high level alarm. Nc means inverse operation at the relay: the contacts open when the alarm activates.

Level

Alarm level in the display/engineering units.

Hyst

Alarm hysteresis. When the alarm has activated, the input reading must fall under the level (Hi alarm) or rise above the level (Lo alarm) by the Hyst value for the alarm to deactivate. Example: High level alarm at 100°C, Hyst=5. The alarm activates at 100 and deactivates at 95°C. Set the hysteresis in the display/engineering units, not percent.

Manual reset (hold): If the Hyst value is very large (e.g. 9999), the alarm will never deactivate, unless manually reset in the Operator menu; see chapter User interface.

Note: With a semiconductor relay card (212), there is not enough power for both of the relays to pull simultaneously. Do not configure the alarms to activate simultaneously. To avoid this, use alarm 1 for low level alarm and alarm 2 for high level alarm.

Passwords

Cfcode

Password for this menu; must be entered before next time accessing the configuration menu.

Alcode

Password for operator menu (quick editing the alarm values and resetting the minimum / maximum memory). See chapter User interface.