

*Nokeval*

No 051201

# User's Manual

**Panelmeter  
Model 2031**



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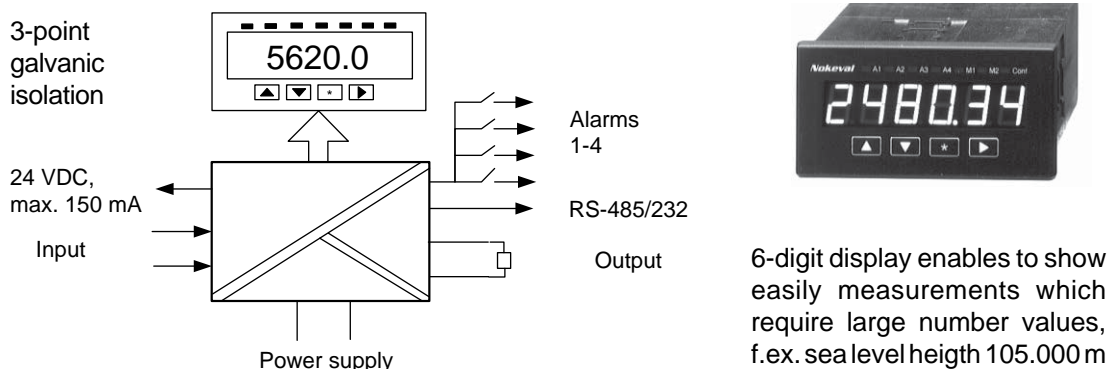


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# Universal input digital panelmeter 2031



## General Description

Panelmeter 2031 is extremely versatile instrument. Almost all sensor inputs are programmable like thermocouples, resistance inputs, process inputs, mV- and potentiometer inputs. Meter provides 24 VDC, 150 mA power for sensors.

Meter has three slots, one for inputs ( obligatory) and two additional slots for output, alarms or serial signal. By changing input card you can get another instrument like pulse meter (2051) or strain gage sensors (2041) etc. Changing of input card changes meters model number; each meter has its own data sheet and instruction manual.

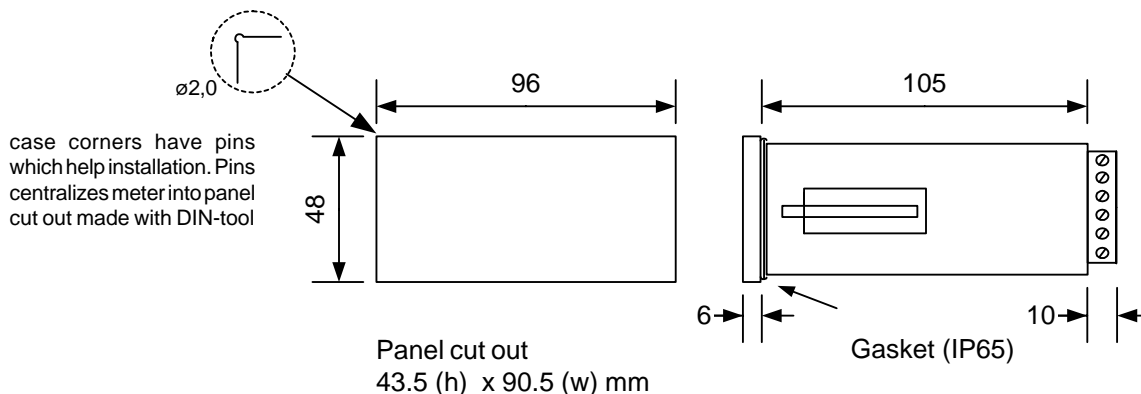
Meter program supports many additional card combinations. Furnishing the meter needs no calibration, only the sensor choices and corresponding settings shall be made by front panel keys.

Analog conversation is made by 16 bit AD-converter (resolution 1/64000) and scanning rate is 15 measurements/second. You can select display update between 3-15 times/second. In case of interference environment or by narrow spans display can be damped by digital filter. Autocalibration ensures calibration stability.

Separate secret codes for entering program stage and settings of alarms. Minimum and maximum display is as standard and optional hold of display by external contact.

Two alternative power supplies, line voltage 85..240 VAC or 12..32 VDC or 24 VAC. Both are isolated from inputs and outputs. Terminal connectors are colour coded in order to avoid erroneous connections. Front panel rating is IP65.

## Dimensions



# Technical specification

## Process inputs:

Linear	0..20 mA, 4..20 mA, 0..10 V -10..+10 V
Squared	0..20 mA, 4..20 mA
Display scaling	On whole display range, 999999
Input resistance	current inputs 50 Ω voltage inputs >1 MΩ
Accuracy	0.02% FS
Linearity	0.005% FS
Sensor supply	24 VDC, max. 150 mA

<b>RTD sensors:</b>	Pt100	-200...+700°C
	Pt1000	-200...+700°C
	Ni100	-50... +170°C
Connection:	3- and 4-wire	
Measuring current	0.3 mA	
Accuracy	0.05% FS	
Linearity error	<0.05°C (-200..700°C), Pt100	

## Thermocouples:

12 linearized thermocouples

TC	Whole range	Linearization error
E	-100.... 900°C	< 0.2°C -50... 900°C
J	-150.... 900°C	< 0.2°C -50... 900°C
K	-150.... 1350°C	< 0.4°C -40... 1300°C
L	-100.... 900°C	< 0.4°C -50... 900°C
T	-150... 400°C	< 0.2°C -150...400°C
N	0.... 1300°C	< 0.2°C 0.... 1300°C
R	0.... 1700°C	< 0.3°C 400... 1700°C
S	0.... 1700°C	< 0.3°C 300... 1700°C
C (W5)	0.... 2200°C	< 0.3°C 400... 2200°C
D (W3)	0.... 2200°C	< 0.3°C 500... 2200°C
B	400... 1700°C	< 0.3°C 400... 1700°C
G (W)	1000... 2200°C	< 0.4°C 1000. 1700°C

Accuracy	0.1 % of span
Compensation error	0.05°C/°C
Line resistance effect	<100 Ω, no effect
TC cut protection	Upscale

<b>mV-inputs:</b>	25, 55, 100, 1000, 2500 mV and 5V
Accuracy	0.01% of span >100 mV 0.02% < 100 mV
Input resistance effect	no effect <10 kΩ and <100mV no effect <1 MΩ and >100 mV

Note! User selectable scale multiplier for max valule

<b>Potentiometer:</b>	0.5 kΩ, 2 wire connection
Accuracy	0.05 % FS

<b>Output:</b>	0..20 mA, 4..20 mA or 0..10V
max. load	700 Ω
Accuracy	0.05 % FS
Scaling	freely adjustable

## Alarms:

Total	Max 4 alarm relays
2000-REL2	2 change over relays, max 230 V, 2A
2000-REL3	3 closing contacts max 230V, 2A
2000-I/O	4 I/O-ports max. 36 V, 100 mA
Hysteresis	0-100%
Reset	Automatic or manual
Contact	Closing or opening software selection
Alarm leds	Programmable functions

<b>Serial output:</b>	RS232 or RS485, (both in a same output card)
Functions	Only for reading measured values
Addresses	0-127
Number of units	31 units in same RS-loop
Baud rate	300, 600, 1200, 4800, 9600, 19200
Protocol	Nokeval SCL
Programming	Front panel keys (4)
Distancies	RS232, max 10-20 m RS485, max 1000 m

## Special functions:

Display hold	With optional card 2000-I/O, holds display value, output and alarms
Max/min memory	as a standard

## General specifications

Input filter	Digital, user selectable
A/D-converter	16 bits (64 000), uni-or bipolar
Temperature drift	0.0004 %/°C with voltage input
Led indicators	Leds 1..4 for alarms, min/max-Leds
Display	6-digit bright red LED digit height 14.5 mm
Power supply	85..240 VAC or 12..32 VDC/24VAC
Front protection	IP65, with gasket
Weight	240 g

## Ordering types

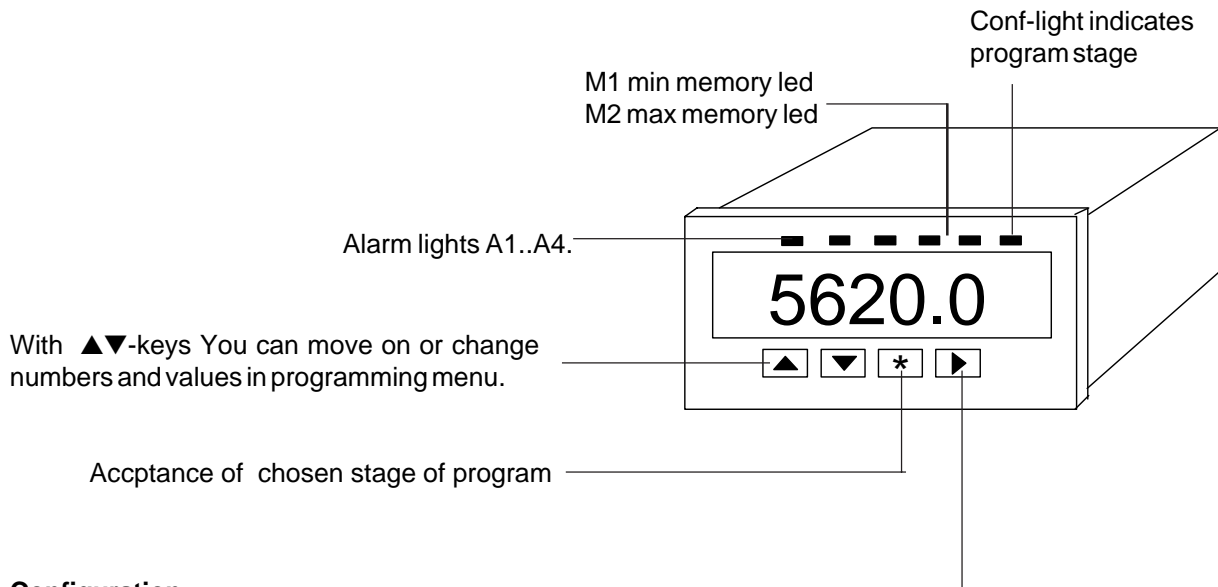
### 2031-REL2-24VDC

<b>Type</b>	2031
Alarm card	2000-REL2
Supply voltage	12..32 VDC, 24VAC
Last parameter	allways power 24 VDC or 230 VAC

Order types doesn't contain optional card symbol '2000'. e.g. 2000-REL2 is specified only REL2. Unit may have one input card and two optional cards.

Unit can be updated to other input types only by changing the input card and adding needed option cards. Optional cards are same for all 2000-series units.

# Front panel and keys



## Configuration

You can enter configuration stage by pressing two seconds ▲ and ★-keys at same time. In program stage f. ex. scaling of display, sensor selection and alarm mode are chosen.

See closer in chapter programming.

## Reset of configuration parameters

Forgotten secret code may be reset by connecting power supply and pressing ▲, ▼ and ▶ -keys at same time. Then you can enter configuration stage by keys ▲▲▲▲▲▲. Change secret code and exit by **SAVE**.

## Checking of alarm value

First pressing of ▶ key shows setpoint of alarm one (A1), correspondingly second pressing shows setpoint of alarm two (A2) etc. Alarm indication light blinks in display informing that alarm level is displayed (if you do not touch keys during 8 seconds display returns to normal state automatically).

## Preventing of entering alarms (secret code)

If you have set secret code for alarms you must feed it before you can change alarms (see chapter "settings of secret codes" Page 8).

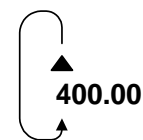
## Change of alarm value

See chapter "Alarm settings by front panel key" Page 8.

## Setting of alarm value

You can set alarm value by ▲▼-keys number by number. Setting starts from largest number from left to right. You may go to next number by ▶ -key. Exit by ★-key.

## Number setting



Numbers  
0...9 and , (decimal)

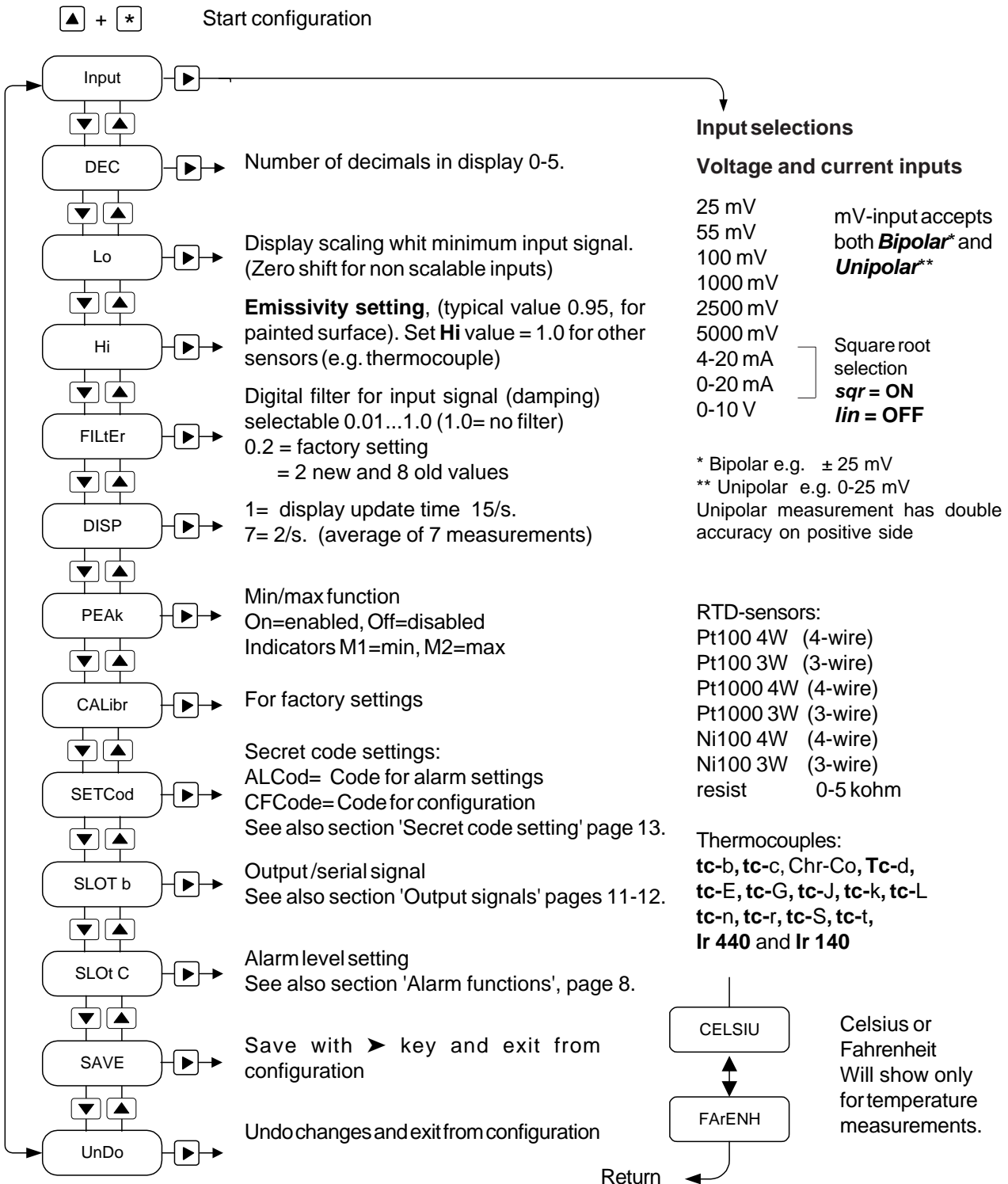
# Configuration

You can enter configuration stage by pressing 1 seconds ▲ and ★ keys at same time. By arrow keys you can move upwards and downwards in main menu. By pressing ► key you can enter configuration stage at wished point. From setting stage you can skip direct to save stage or to previous level with ★-key. You may set alarms in configuration or in display stage. Hysterisis and alarm mode can be set only in configuration stage. You can cancel changes by selecting text **UnDo** to

display and by pressing ► key. Next page describes in more details configuration functions.

### Starting:

You can enter configuration stage by pressing 1 seconds ★ and ▲ at same time. You enter change stage by ► key.



## Configuration parameters

You can enter configuration stage by pressing two seconds **▲** and **★** keys at same time. From setting stage you can skip direct to save stage or to previous level with **★**-key.

### Undo, Save (▶)

Exit from configuration stage without saving changes (*Undo*) or save and exit (*Save*).

### Input selection

Input(▶)	Display	Input type
	25 mV	
	55 mV	mV-input gives
	100 mV	possibility to select
	1000 mV	<b>Bipolar</b> or
	2500 mV	<b>Unipolar</b> input
	5000 mV	
	4-20 mA	mA-input can be
	0-20 mA	<b>Sqr = OFF</b> linear
	0-10 V	<b>Sqr = ON</b> squared
	IR-140	

0..10 V input setting works also -10..+10 V input range. Bipolar display  $\pm 99999$ , Unipolar works only on positive side but gives double resolution compared to bipolar.

### RTD sensors (Celsius or Fahrenheit-scaling)

Pt100 4W	(4-wire)
Pt100 3W	(3-wire)
Pt1000 4W	(4-wire)
Pt1000 3W	(3-wire)
Ni100 4W	(4-wire)
Ni100 3W	(3-wire)

### Potentiometer

resist	0-5 k $\Omega$	2-wire
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### Thermocouples (Celsius or Fahrenheit scaling)

tc-b	B-type
tc-c	C-type (former W5)
Chr-Co	Chropel-Coppel Chromel
Tc-d	D-type (former W3)
tc-E	E-type
tc-G	G-type (former W)
tc-J	J-type
tc-k	K-type
tc-L	L-type (former J/DIN)
tc-n	N-type
tc-r	R-type
tc-S	S-type
tc-t	T-type
Ir 140	factory use

### Dec (▶)

Number of decimals in display. Select 0...5 with **▲▼**-keys and accept with **★**-key.

### Lo, Hi (▶)

Display scaling for process inputs. You can set display by **Lo**-value input equal to 4 mA (0 mA or 0 V) and by

**Hi**-value equal to input 20 mA(10 V), f.ex. 4 mA=0.0 and 20 mA=100.0.

When display shows value you can change it by pressing **▶** or move direct to save stage by **★**-key. You may scale also part decimals, f.ex. 500,25, although amount of decimals are to be set separately.

In mV-ranges **Hi**-setting acts as multiplier, f.ex. range is 25 mV and **Hi**=3,50, display shows 87,5 (25 x 3,5).

**Lo** value changes zero level  $\pm$  setpoint by mV and temperature sensors. Typical use is eliminating sensor error.

### Filter (▶)

Display filtering. Filtering damps restless display by large number values.

Value setting between 1 (min) ...0.010 (max).

1.000 = no filtering

0.200 = normal filtering

e.g. Filter = 0.2. The filtered display value is composed summing 1/5 (20%) the latest measurement result and 4/5 (80%) the previous display value. Filter works such as RC-filter

### DISP(▶)

Display scannig rate 0..7; 0 = display is updated after each measurement (measurement rate of on thermocouples 4 times/second and on the other sensors 12 times/second), 7 = display is updated after every eighth measurement, averaging those eight results.

### PEAk(▶)

Min-/ Max- memory selection. On=in use, Off = not in use. Indication lights M1= min. M2= max.

### CALibr (▶)

Factory settings

### SEtCod (▶)

Secret code settings. See chapter 'Settings of secret codes' page 13.

### SLOt b (▶)

Settings of optional cards for slot B. See chapter 'Output signals' pages 11-12.

### SLOt C (▶)

Settings of optional cards for slot C (relay- and I/O-cards). See chapter ' Alarms' pages 8-9.

### SAVE (▶)

Save changes and exit with **SAVE** and press **▶**-key.

### Undo (▶)

Return to previous values with **Undo** and **▶**-key.

If configuration stage contains parameters, not mentioned in this manual, you can pass them by arrow keys. Additional parameters will be upgraded to manual periodically.

# Alarm functions

## General description

Panelmeter 2031 is provided by unexceptional many versatile alarm functions and therefore it has plenty of basic selections. **When basic selections are done in program stage, normal use by front panel keys is very simple.**

In commissioning you have to ensure the hardware setup before programming. You can find description of alarm card and its place on meter plate (def slot C).

### Alarm cards:

**REL 2 =** two relays with changeable contacts (grey connector colour). You may set two cards (4 relays). Second card to be mounted into slot B.

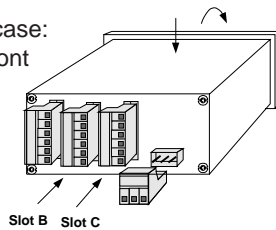
**REL 3 =** three relays with closing contacts. Only one card for slot C. Grey connectors.

**2000-I/O =** four I/O-ports (logic alarm, green connector). Only one card for slot C.

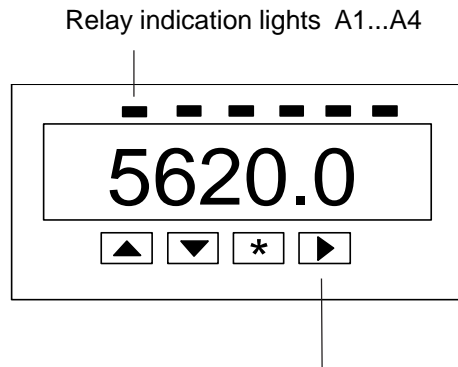
Grey connectors are designed for power 230 VAC, 2A and green connectors for 36 VDC, 100 mA.

Alarm type, hysteresis, etc. must be done in configuration stage.

Removing electronics from case: Press meter gently behind front plate and draw front frame upwards at upper edge.



## Alarm settings by front panel keys



### Checking of alarm value

Pressing **▶** once shows setpoint of alarm one (A1), correspondingly second pressing shows setpoint of alarm two (A2) etc. Alarm indication light blinks in display informing that alarm level is displayed (if you do not touch keys during 8 seconds the display returns to normal state automatically).

### Preventing of entering alarms (secret code)

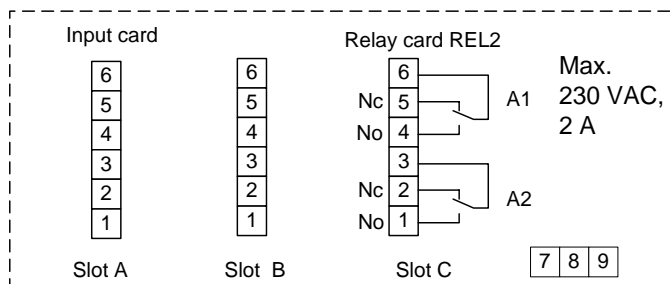
If you have set secret code for alarms you must feed it before you can change alarms (see chapter "settings of secret codes" Page 14).

### Changing alarm value

First pressing of **▶** key shows setpoint of alarm one (A1), second pressing shows setpoint of alarm two etc. When indication light (A1..A4) blinks you can change alarm level by pressing **▲** or **▼**-key. You can change setpoint of relay in question with keys **▲**, **▼**, **▶**. Accept change by **★**-key (if you do not touch keys during 8 seconds display returns to normal state with automatically and save with same made changes).

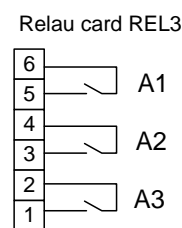
Alarm mode, hysteresis and other settings are done in configuration state.

## Alarm card connections



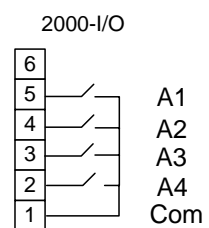
Optional cards in configuration menu are named as Slot C or B

Indicators A1-A4 in front panel



Max. 230 VAC, 2 A

4 logic outputs or inputs



Max. 36 V, 100 mA



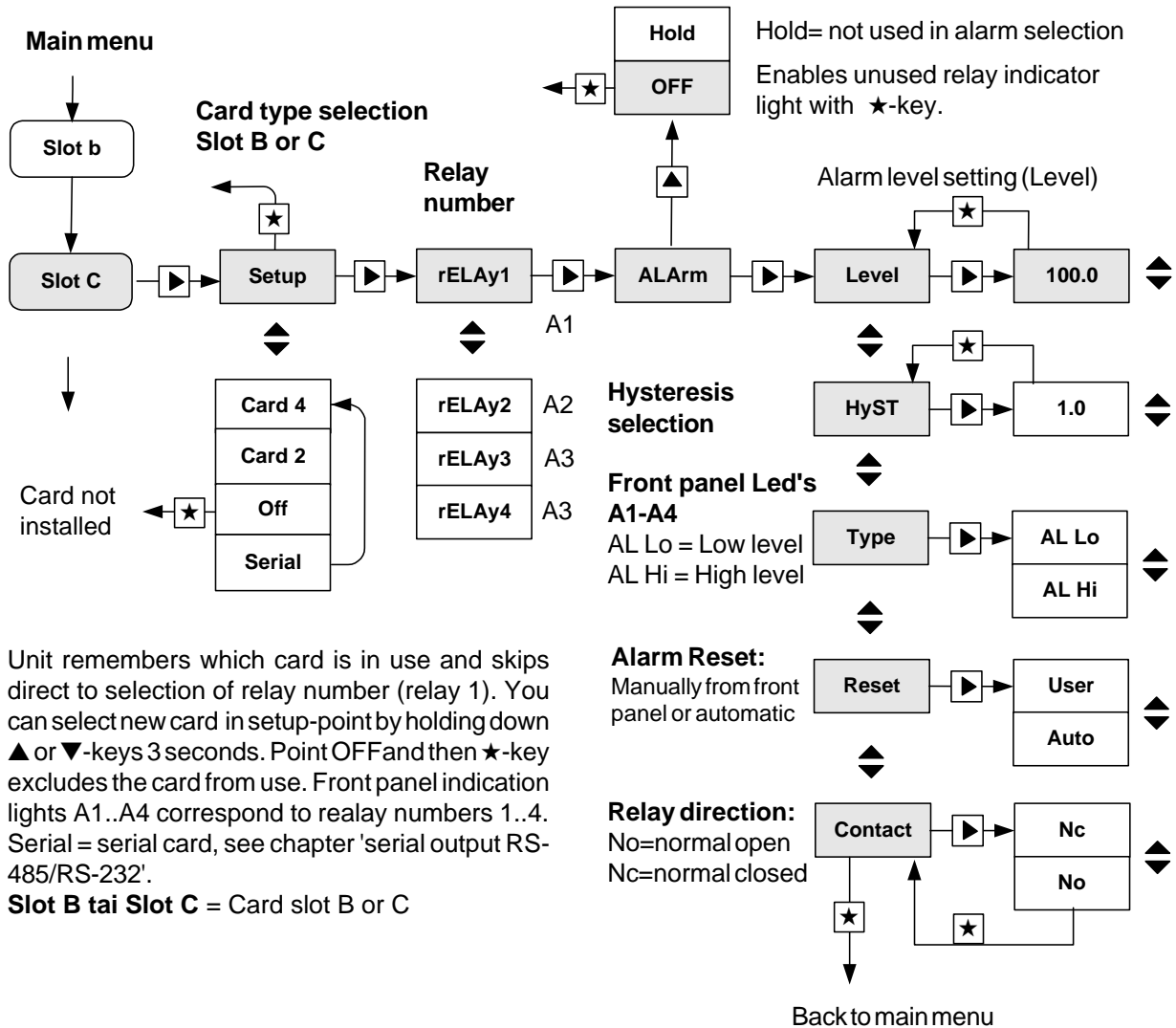
# Selection of alarm card and relay-function settings

Meter has unexceptional versatile alarm functions. In initial settings you can select first type of alarm card (2, 3 or 4 relays) and into which slot it will be placed. You have to set to each relay alarm level, hysteresis etc. **When initial settings have been made user can easily set alarm levels by front panel keys** (see chapter "alarm functions" Page 8). You can prevent entering to alarm change stage by secret code (see chapter "settings of secret codes", page 13). Alarm card must always be mounted to slot C. If you

need 2 alarm cards (2000-REL2) i.e. 4 changeable relays, second alarm card must mounted to slot B.

## Shifting in menu

You shift in menu to next level (to right) in programming stage by ►-key. By ★-key you return to previous level or to main menu. **Example below describes only settings of one relay** (relay numbers 1-4).



Unit remembers which card is in use and skips direct to selection of relay number (relay 1). You can select new card in setup-point by holding down ▲ or ▼-keys 3 seconds. Point OFF and then ★-key excludes the card from use. Front panel indication lights A1..A4 correspond to relay numbers 1..4. Serial = serial card, see chapter 'serial output RS-485/RS-232'.

**Slot B tai Slot C = Card slot B or C**

## Card type

**Card 2 = 2 alarm relays with changeable contacts, 2000-REL2.** Second card may be mounted also to slot B, if you need four alarms. Front panel indication lights: Relay 1 = A1, Relay2 = A2 . Relays of slot B steer indication lights A3 = relay3 and A4=relay4. If you cannot set four relays, Slot B has not alarm card but some other card.

**Card 4 = Card has 3 or 4 relays, 2000-REL3 = 3 relays, logic output 2000-I/O=4 alarms.** Front panel indications lights A1...A4 according to relays 1..4=A1..A4. Must always be mounted to slot C.

Next page shows 2 examples of alarm settings.

## Examples of alarm settings:

### Example 1.

Display 0..100.0°C and one high alarm (HI) 60°C. Alarm must get off when temperatur goes down to 58 °C. Display has been ordered with two alarm relays and with two changeable contacts (Relay card REL2). HI-level means closing relay indication lamp when temperature increases 60°C. Alarm will get off when temperature goes below 58°C and relay will open. 'Alarm-OFF' turns out unused front panel indication lights.

#### Programming:

Slot C-Setup-Card2-Relay1-Alarm-Level 60.0-Hyst -2.0-Type-AI Hi-Reset-Auto-Contact-No.  
Relay2-Alarm-OFF  
Relay3-Alarm-OFF  
Relay4-Alarm-OFF

### Example 2

Display range 0-600°C

1. High level alarm 260°C, opening contact (NC), automatic reset. Hysteresis 1.0°, Use relay 1.
2. Low level 150°C, closing contact (NO), automatic reset, Hysteresis 0.50°C, use relay 2
3. Low level 120°C, manual reset, opening (NC). Manula reset, use relay number 3.

#### Programming:

Slot C-Setup-Card4-Relay1-Alarm-Level 260-Hyst 1.0-Type AL Hi-Reset Auto-Contact Nc.  
**Relay2**-Alarm-Level 150.0-Hyst 0.5-Type-AI Lo-Reset Auto-Contact no  
**Relay3**-Alarm-Level 120.0-Hyst 1.0-Type-AI Lo-Reset User-Contact nc  
**Relay4**-Alarm-OFF

#### Alarm reset of relay 3:

Press front panels ►-key three times until indication light A3 turns on. You can reset alarm by \*-key. Other relays will reset when alarm turns out.

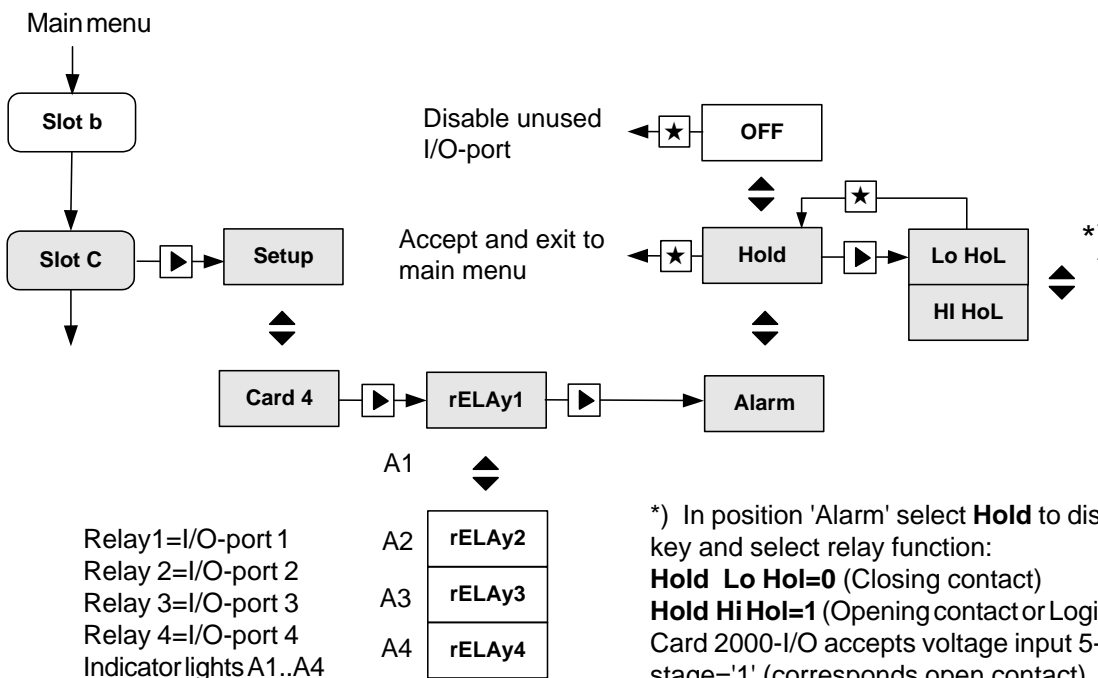
#### Description of Type-Reset-Contact-User

**Type** =selection low (Lo) or high alarm (Hi)  
**Reset-Auto** = Alarm to be reset when value is not at alarm level anymore  
**Reset-User** = Alarm to be reset by front panel  
**Contact-No** = Normally open contacts of relay  
**Contact-Nc** = Normally closed contacts of relay

## Display hold by external control (option)

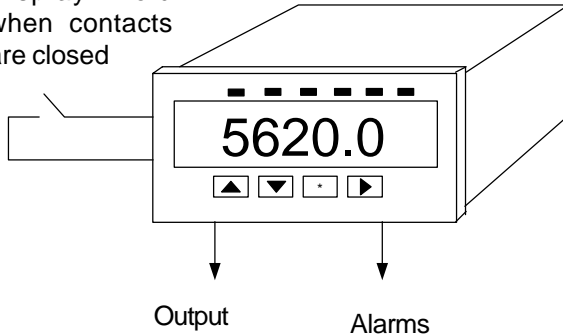
You may lock display by external contact or by logic control. You have to mount 2000-I/O card to slot C and hold control to channel1 (relay 1). Other I/O-lines may be used as alarm functions. Output, display or alarms

do not change when display is in hold stage. You can turn out the unnecessary indication lights of front panel by selecting OFF-stage for unused relays.

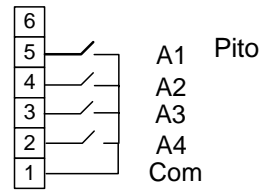


## Display hold by external contact

Display hold when contacts are closed



Card 2000-I/O



Slots B or C

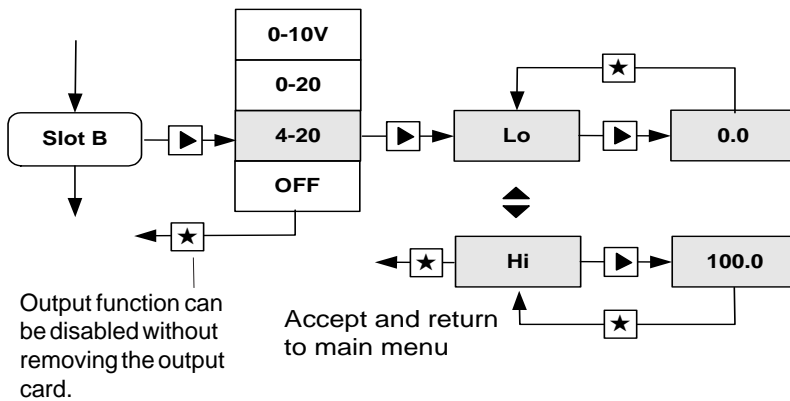
You can program hold function to input lines 1-4. Closing contact or logic control 5-24 V. Without control input is in measuring stage (stage 1). Closing contact locks display. You may program other I/O-ports for alarm functions.

## Output 0/4..20 mA (option)

Meter may be provided with isolated output, ranges 0/4..20 mA or 0..10 V, which are programmable. You can mount output card to slot B or C (default B). Calibration information is saved to card and no calibration is needed in commissioning or in

programming. You need not select card in programming stage because meter recognize the mounted card. Programming: select slot B in main menu. Press **▶**-key. Display shows 4-20. See below description.

Main menu



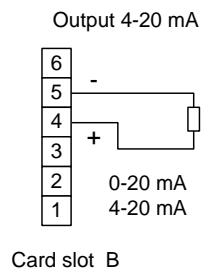
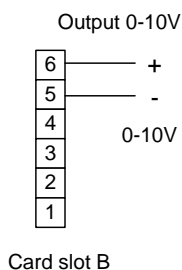
Select output scaling for 0 or 4 mA

Select output scaling for 10 V or 20 mA

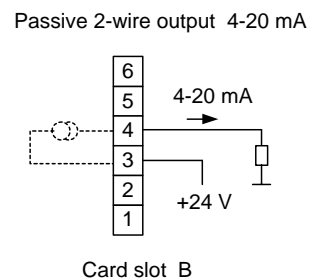
Output function can be disabled without removing the output card.

Accept and return to main menu

## Output connections



## Alternative current output (option)



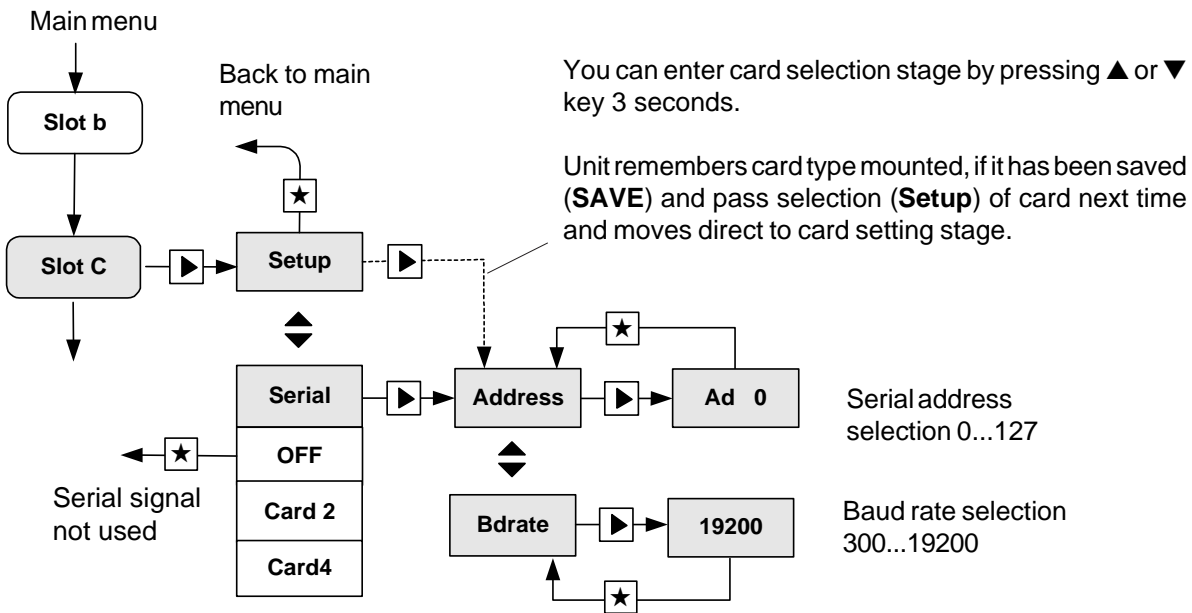
# Serial output RS485/RS232 (option)

Meter may be provided with optional serial output and you can read measurements by e.g. PC. Display programming can not be made via serial port. Additional card provides serial signal RS232 and RS485, only one of those can be selected.

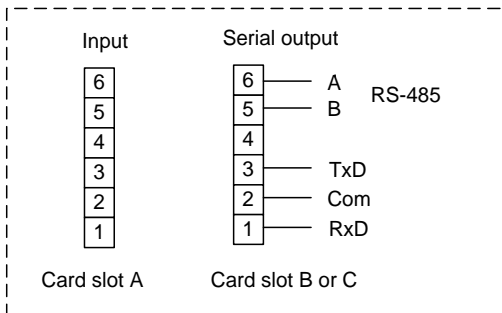
Serial signal is isolated from both input signal and power supply. Meters with RS485 can be max. 31 in same loop and longest distance 1000m. RS232 enables only connection of two devices and max. distance 10..20 m.

In programming stage you can first select card type (serial) mounted to slot B or C and then address and Baud rate. Baud rates are: 300, 1200, 2400, 4800, 9600, 19200 and addresses 0...127.

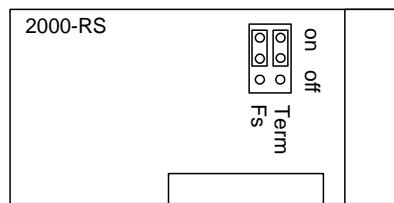
Accept selection and move forward by ►-key. You come back to previous level always by ★-key. Program remembers card type mounted, if it has been saved by save command when leaving program. In case you can not choose serial card, slot has automatically recognized card (plug and play).



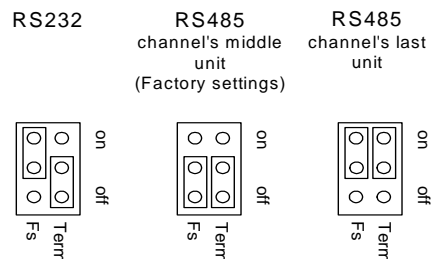
## Terminal connections:

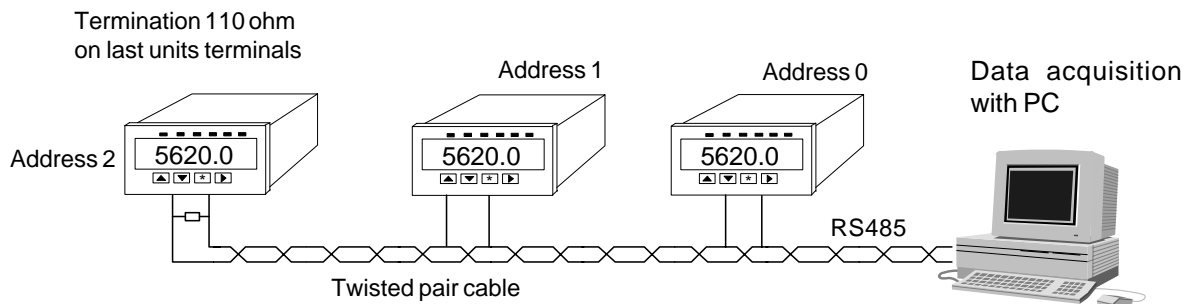


## Serial card



By serial signal RS485 last unit must be terminated by 110 ohm resistor. you can make termination at terminal connectors or by connecting jumper J1 to ON-position.





## Serial communication

Baudrate: 300, 1200, 2400, 4800, 9600 and 19 200  
 1 Start, 8 Data and 1 Stop bit, no parity.

### Serial protocol (SCL):

MESSAGES: When asking the measurement data from the panelmeter 2031 through the serial port, a command sequence which is in accordance with the SCL protocol is used for the inquiry:  
 (Only the measurement results can be asked from the panelmeter 2031)

**<ADDR+80h>COMMAND STRING<ETX><BCC>**

#### <ADDR>

The first byte character to be sent contains the ADDR (0..127) of the address of the destination device and at the same time functions as the start bit of the command. 80H (in a decimal 128) with which an uppermost bit is set as the number one is added to the address.

COMMAND STRING: When measurement data is requested, the actual command is: MEA CH 1 ? , in which 1 means the channel number. (there is only one channel in the panelmeter 2031 so the number is always 1).

#### <ETX>

<ETX> mean the end mark of the command, ASCII character 03h.

#### <BCC>

Finally the checksum is calculated using the XOR operation on the byte characters of the actual command including the ETX. In the example the ASCII codes have been presented in hexadecimal.

#### e.g.

One wants the measurement result from the display unit address 1. To the channel an inquiry is sent: MEA CH 1 ? (ASCII codes shown for <BCC> calculation)

```
M E A   C H   1   ? <ETX>  <BCC>
4Dx45x41x20x43x48x20x31x20x3F x03   = 6F
```

(Presented the XOR operation with a character x)  
 (ASCII code 20h corresponds to space character)

So the following bytes are sent to 2031:

```
81 4D 45 41 20 43 48 20 31 20 3F 03 6F
```

RETURN MESSAGE: The answer from the panelmeter 2031 is obtained in the following format:

**<ACK>RETURN MESSAGE<ETX><BCC>**

#### <ACK>

The first byte of the answer contains the start of the answer <ACK> (ASCII-code 06h) and the answer itself, endmark <ETX> (ASCII-03h) and the checksum of the answer which is calculated from all the byte characters of the answer including <ACK> and <ETX>. 2031 counts the checksum in which case the receiver does not need necessarily to care about it,

#### e.g.

e.g. When a measurement result is for example 21.3, it will be obtained from the panelmeter in the following form

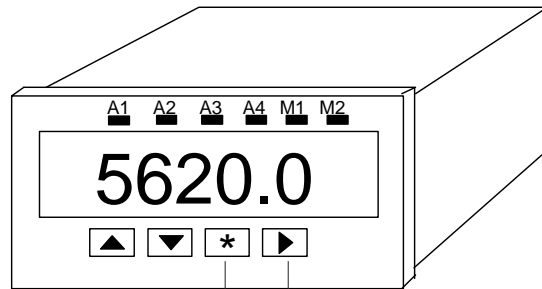
```
<ACK> 2   1   .   3 <ETX> <BCC>
Answer: 06  32  31 2E 33  03   1B
```

## Minimum and maximum value memory

Meter has min. and max. memory as standard. This function must be selected in programming stage, parameter **PEAK=ON**.

You can glance values by ►-key. When you press the ►-key indication lights, above display, turns on in following order:

1. A1 alarm level
  2. A2 alarm level
  3. A3 alarm level
  4. A4 alarm level
  5. **M1 Minimum value memory**
  6. **M2 Maximum value memory**
  7. Back to measuring stage
- A1-A4 lits if alarm card(s) is (are) fitted.



Memory can be viewed with ►-key

Memory can be reset with ★-key when indicator M1 or M2 lits.

### Reset mememory

You may reset memory when you press ★-key when display shows memory in question, either M1 or M2.

## Setting of secret codes (Programming stage/ alarms)

You set secret code by pressing six time keys (1-4) in wished order (lines goes forward in display). Setting must be repeated in same order before new setting is accepted.

Example: Press one after another keys ▲▲★►▲▲ and once more ▲▲★►▲▲. You may think the keys as numbers from left to right 1,2 3,4 in order to help

recording and remembering.

e.g. 1 2 3 4

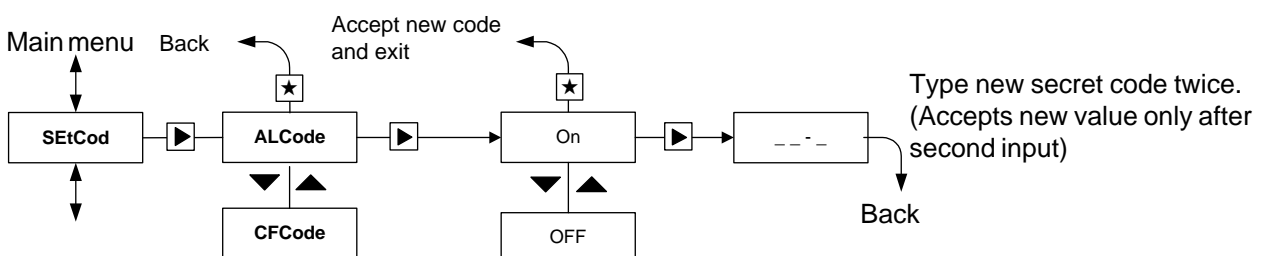
Input code ▲▲★►▲▲ and once more.

Example number value would be 113411.

In Main menu position **SEtCod** press ►-key and move on to selection stage.

**ALCode** = Secret code setting for alarms

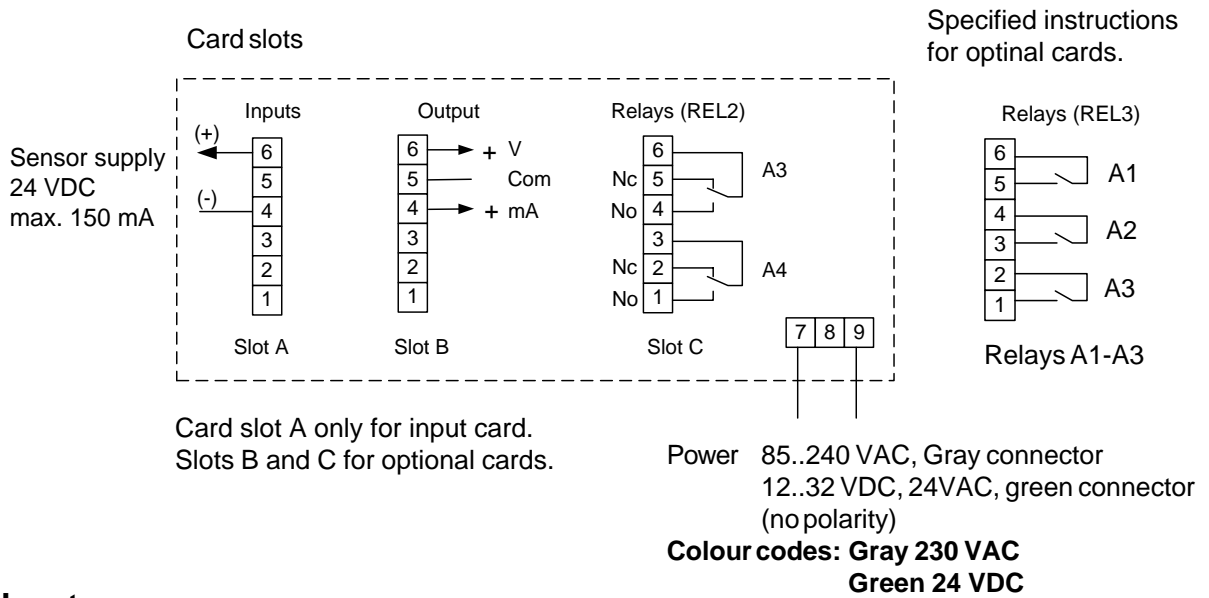
**CFCode** = Secret code setting for Programming



Select secret code mode:  
**CFCode** programming  
**ALCode** for alarms

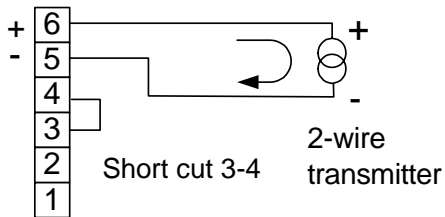
Secret code:  
 ON = enable  
 OFF = disable (default)

# Terminal connections

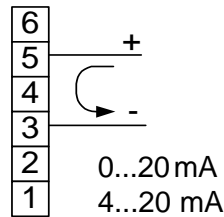


## Inputs:

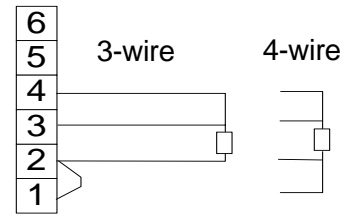
### 2-wire 4..20 mA



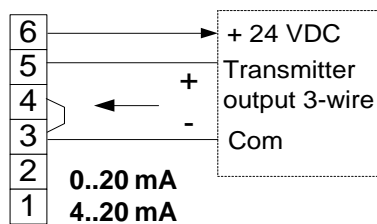
### Current input 0/4..20 mA (active transmitter)



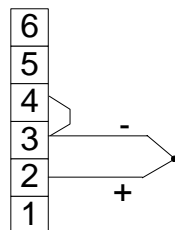
### Pt100 3- and 4-wire



### Sensor supply 24 VDC, max 150 mA

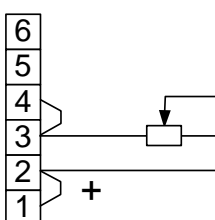


### Thermocouples and mV

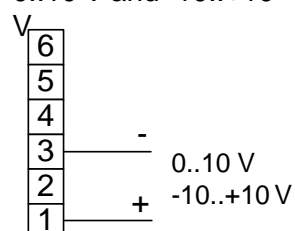


Input selection in configuration mode

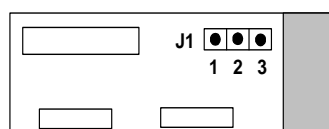
### Potentiometer 0..5 kΩ



### Voltage 0..10 V and -10..+10 V



0..10 V input requires shortcut jumper J1 to position 1-2, for other inputs shortcut 2-3.



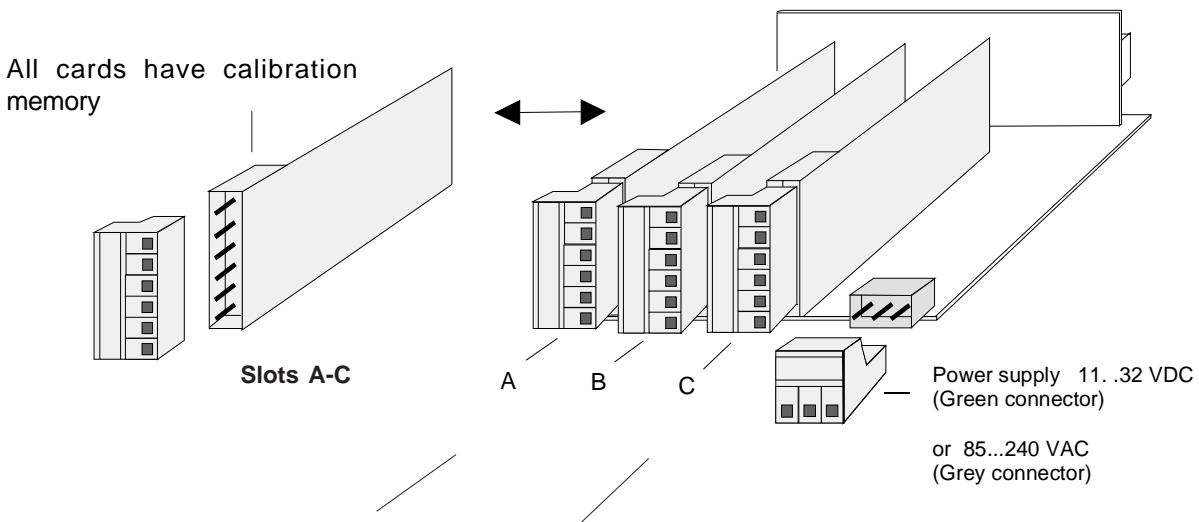
0..10 V input  
1 2 3  
Default (2-3)  
1 2 3

Input card 2021-MU

# Panelmeter 2000 construction

The 2000 series panelmeters are modular and easy to assemble. According to customers wishes. The basic construction consists of mother board with three slots, A, B and C. Slot A determines meter type and provides always input signal. Slot B and C are interchangeable. As factory delivery input signal is always installed into slot A, mA output into slot B and alarms into slot C. In case of f.ex 4 alarms and relay card with 2 change-over contact (2 + 2 relays) are used, you must place second

relay card into slot B. If you accept only closing or opening relay contacts, you need only one relay card with 4 relays placed into slot C. The slot B is now usable for other optional outputs. You can have different types of meters by only changing the input card in slot A. Data sheet of each type of meter dictates the possible combinations. Recalibration of card is not needed; only scaling and other settings must be set by front panel keys.



## Change of meter type:

Input card is placed always to slot A. By changing input card you can get an other type of meter. You can change meter with pulse input to meter with current input, thermocouple, strain gage etc.

## Additional slots:

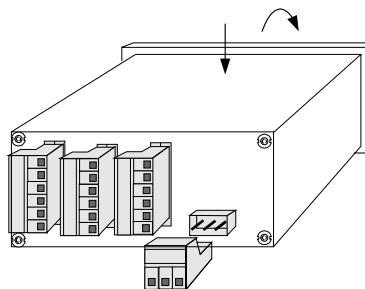
Additional cards provide output 4..20 mA, alarms, serial interface, BCD output etc. Meter data sheet dictates possible combinations. grey connectors allow line voltage 110..240 VAC (relay contacts).

## Power supply:

There are two different mother boards power supply 85..240 VAC and 12..32 VDC. VDC-mother board accepts 24 VAC. Connectors are colour coded.

## Removing meter from case:

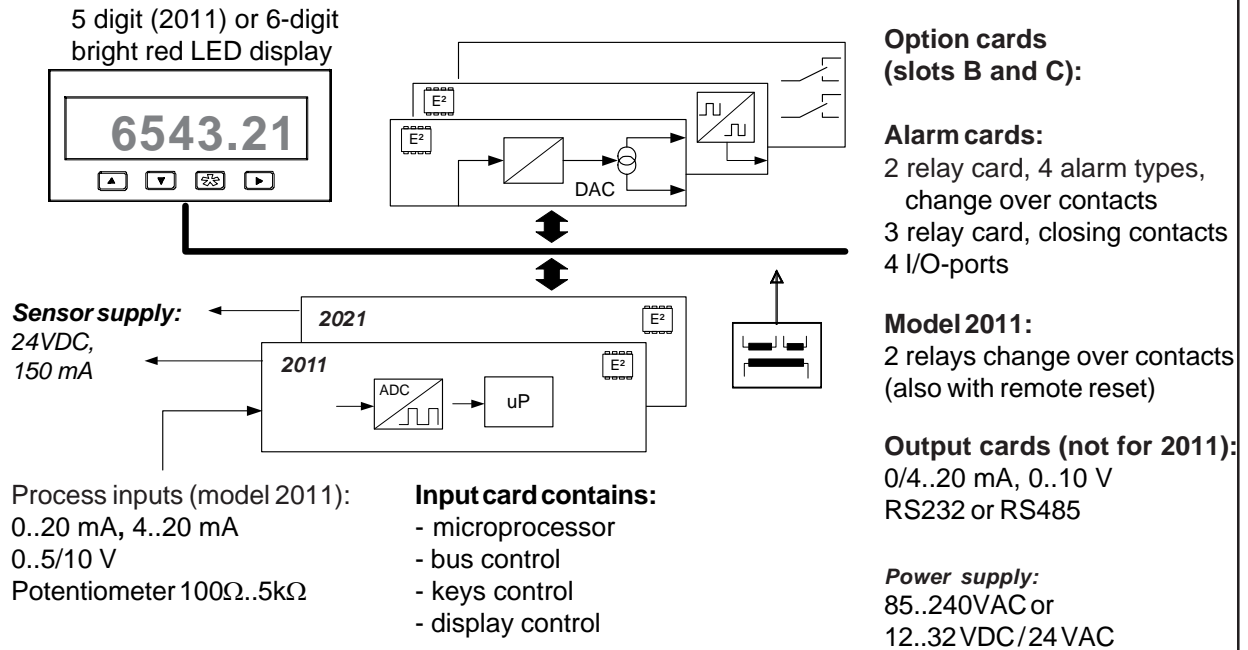
Loose connectors and front panel, draw meter out from front. You may remove mother board from rear by opening four screws in corners of case.



Press gently case behind front panel and draw frame outwards gripping upper part of frame.



## Modular indicator serie 2000



Model 2021 contains also process inputs but it can also measure RTD-sensors and thermocouples. 2021 has very accurate and fast A/D-converter (16 bit 1/64 000).

### 2000 series input and option cards:

<b>2011-IN</b>	Process input	<b>2000-BASE</b>	Base card with power supply
<b>2021-MU</b>	Multi input	<b>2000-REL2</b>	Alarm card, NO/NC
<b>2031-IR</b>	Infrared sensor input	<b>2000-REL3</b>	Alarm card, Closing contacts
<b>2041-STG</b>	Strain gage measurement	<b>2000-OUT</b>	Output card, U and I
<b>2051-Hz</b>	Scaleable frequency indicator	<b>2000-RS</b>	Serial output RS232 or RS485
<b>2061-CNT</b>	Counter input (max 5 kHz)	<b>2000-I/O</b>	4 pcs input /output ports (60 V / 100 mA)
<b>2066-TIM</b>	Timer function, s/min/h ext.		
<b>2071-RS</b>	Serial input RS232 / RS485		
<b>2081-BCD</b>	BCD-, Gray- binary code input (1-5 digits)		

Notes:

Notes:

**Manufacturer:**

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