

Nokeval

No 250803

Manual

Model 2800-2061
Scalable counter for
pulse sensors



Manufacturer:

Nokeval Oy

Yrittäjätie 12

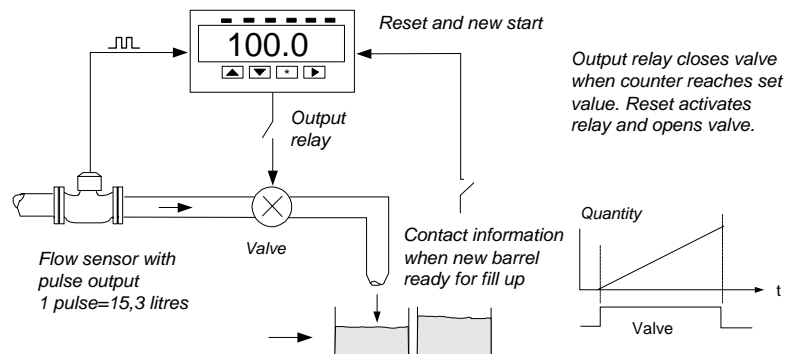
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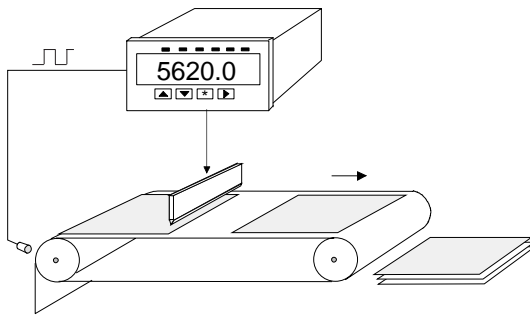
<http://www.nokeval.com>

Counter / batch controller 2800-2061 for pulse sensors



Picture on the right shows application of flow sensor with pulse output.
Below an application from piece goods automation.

Scaleable pulse input may be set to indicate real value on display, e.g. 1 pulse corresponds to 5,3 m³ on display or 1 pulse corresponds to 15,3 litres.



Description

The field display series 2800-2061 is designed for pulse counting and batch control in applications where a readability of 20 to 100 metres is required.

The incoming pulses are freely scaleable on display to correspond the wanted number value, e.g. 1 incoming pulse equals to 5,34 on display. Display memory stores the calculated value in memory for one week after power supply break.

The preset function makes it possible to use the counter as a batch controller as well. Counting can be done up- or downwards from the preset value. Alarm relays may control other devices. New counting can be started automatically or manually by external key.

Large field counters are part of a larger display series where by changing the input/output cards the display can be modified to other input values such as temperature, serial or frequency input. Two power supply possibilities, one for 85..240 VAC and the other for 24 VDC, both galvanically isolated from input/output. Readability of the displays is also good outdoors if exposure to direct sun light is prevented by using a sun cover. Case protection is IP65.

Technical specification:

Sensors: NPN, PNP, Namur, closing contact
Input voltage levels: 0 = < 1V, 1 = 5..32V
Sensor supply: 24 VDC \pm 5%, max. 150 mA
Input frequency range: 0..5 kHz
Decimal selection: 0,001..1
Display scaling: freely by configuration keys

Measuring method:

Counting of input pulses into counter. You can multiply the counter value by a desired number value. The result is shown on display.

Output:

Alarm relay will be activated when the set point is reached. Alternatively loop-function; display is reset at alarm value automatically and relay is activated for only 200 mS.

Serial output:

RS232 and RS485. Serial output only for measurement reading. Baud rate and address (RS485 selectable).

Relays:

You can set alarm value by button inside the case. Relay contacts max. 230 VAC, 0,5 A. Alternatively semiconductor relays 60 V / 0,5 A

Display memory:

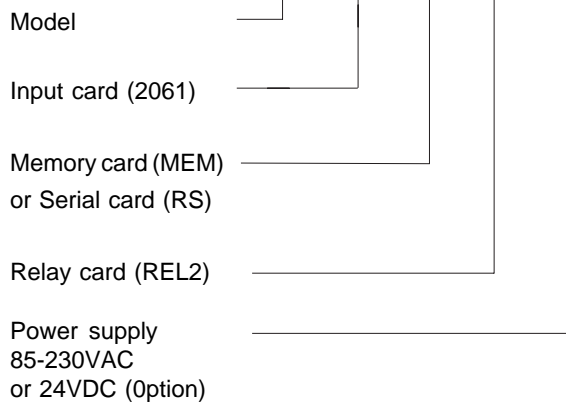
Add-on card 2000-MEM stores display for 1 week without power supply.

General

Power supply 85..240 VAC or 24VDC (12W)
 Display 6 digits, red LED
 Digit size 20 mm
 Enclosure Grey plastic
 Protection IP65

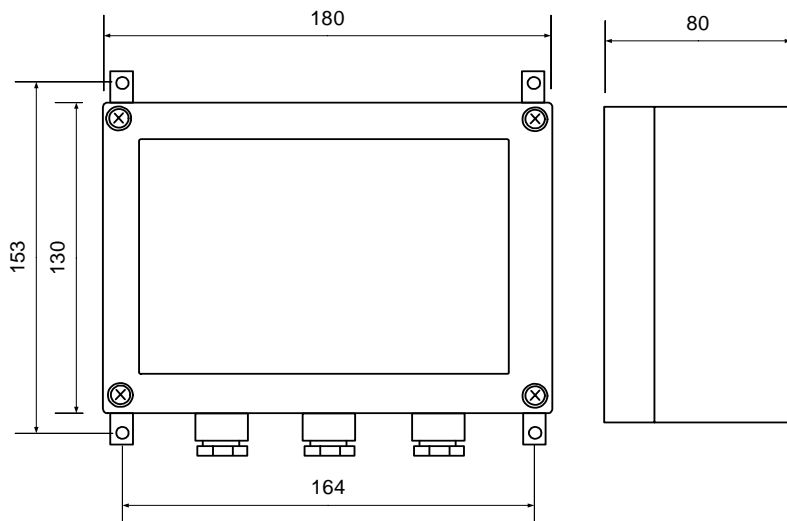
Type code:

Model 2800-2061-MEM-REL2-24VDC



The counter is also available for analog inputs 0/4-20 mA or 0-10 V, series 2800-2026

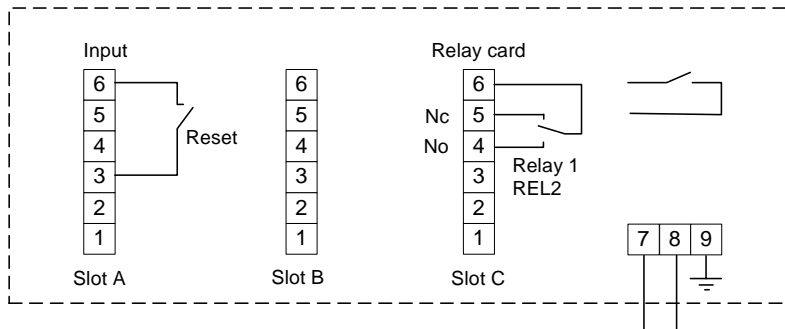
Dimensions:



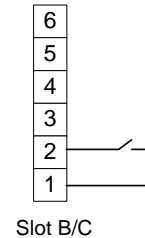
Wall mounting brackets at the corners of the case - easily removable.
 Glands 3 x PG11

Connections:

Input and output cards



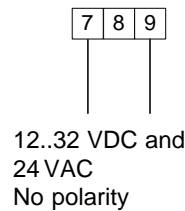
Up/down counting selection from external contact: Use option card 2000-I/O card



It is possible to connect external reset to the display. For this function attach closing contact connectors to input card (A) pins 3 and 6. Display can also be reset by pressing ▼ and ▲ simultaneously.

Powersupply

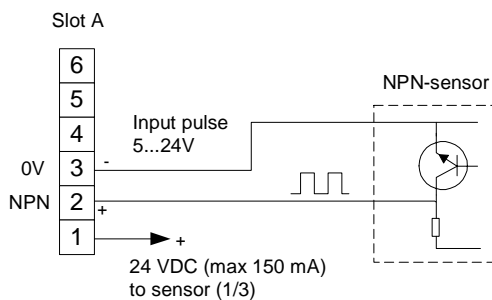
85..240 VAC



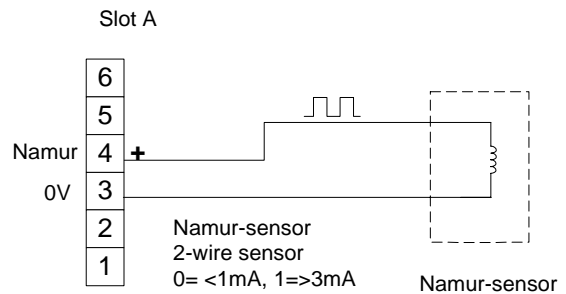
Alarm cards: Frequency of output relay is max. 1Hz. With bigger frequencies use the additional I/O-card, max. 40V, 50mA.

Expansion slot A is for input card and the expansion slots B and C is for optional cards.

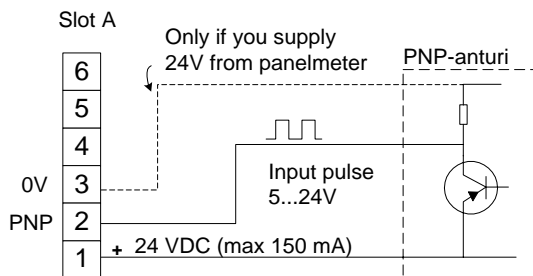
NPN-sensor



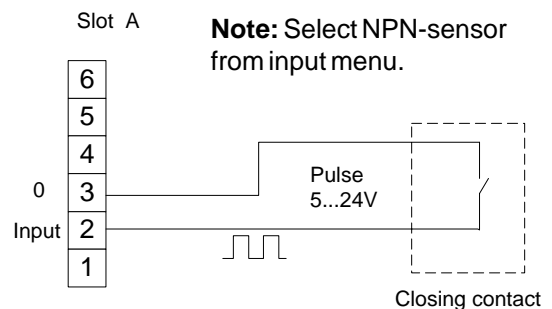
Namur-sensor



PNP-sensor



Contact input

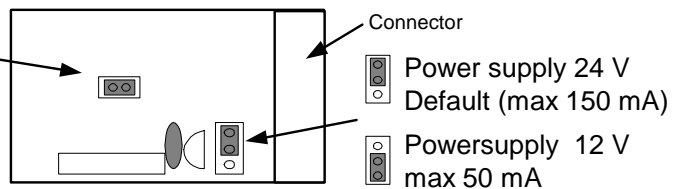


Note: Select NPN-sensor from input menu.

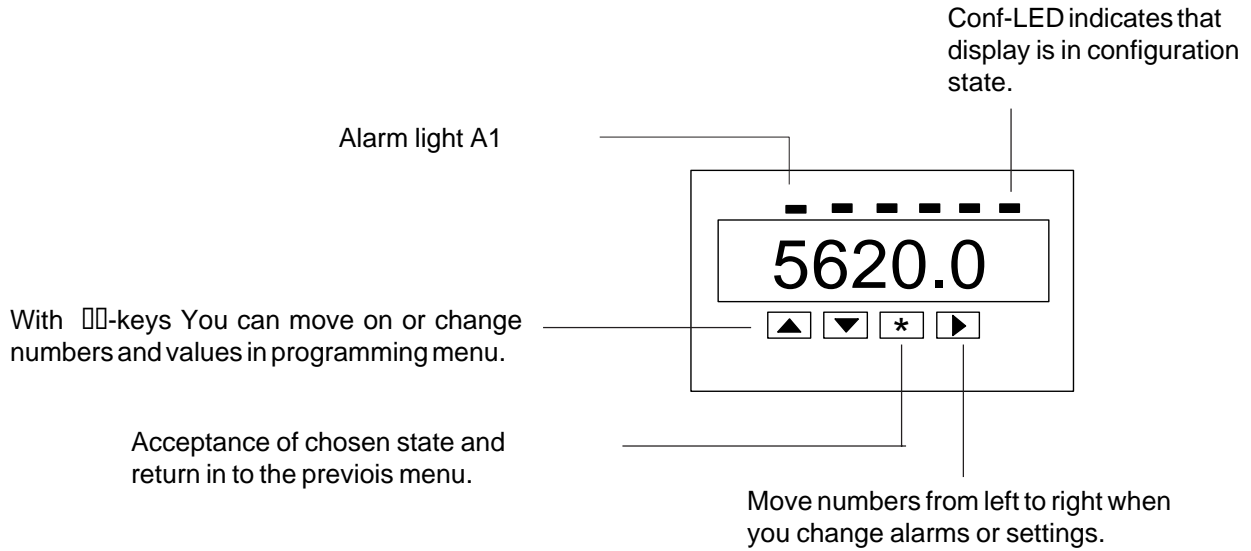
Input card jumper settings

Jumper setting for contact input. Max. input frequency 40 Hz.

Power supply selection to sensor:



Configuration keys



Programming state

The programming state is entered pressing simultaneously **★**- and **▲** -buttons for 2 seconds. In programming state it is possible to change many different values f.ex. scaling the display, change alarm values, select sensors etc.

Alarm setting

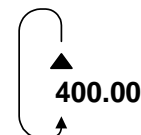
Alarm values can be changed and viewed in measuring state. Other functions must be done in configuration mode. Unit has one alarm level which can be viewed with **▶**-button. After **▶**-pressing the light A1-LED lids and display shows alarm1 level, A1-LED blinks to inform that unit is in alarm level state. Second **▶**-push returns display into measuring state. If buttons are not pressed within 8 seconds the unit returns automatically into measuring state and saves settings.

When A1 led blinks user can enter editing mode using **▲** or **▼**-buttons. Values can be changed as described above. Accept changes with **[]**-button.

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)

Programmmenu

Mainmenu	Menuvalue	Name	Description
▲▼ - moving up/down in menu, ► - change settings/move to a next level, ★ - accept/return back			
Pulse		Pulse multiplayer value	What value 1 pulse means in display. Value can include decimals.
Divide		Value of pulse divider	Used in special case when there is not possible to use multiplayer to set enough decimals. See example*.
Start		Value where counting starts	
Limit1		Alarm level 1	Counter value when the alarm 1 pulls.
Cont 1	No	Closing contact, alarm 1	Alarm 1 relay position setup.
	Nc	Opening contact, alarm 1	
Adjust	Start	Start value in quicksetup.	Starting value (Start) or counting alarm value (Limit1) can be change directly from display without entering inside menu.
	Limit1	Limit1 value in quicksetup	
Loop	On	Loop function in use	With function Loop (On) counter reset's to zero and start automatically new counting untill the alarm (Limit1) is achieved.
	Off	Loop function not in use	
Limit2		Alarm level 2	Countervalue when the alarm relay 2 pulls.
Follow	On	Alarm level 2 depends the alarm level 1.	Value of the alarm level 1 added to a alarm level 2, after the combined value alarm 2 pulls.
	Off	Alarm level 2 is absolut.	Alarm level 2 function is exactly like alarm level 1.
Cont 2	No	Closing contact, alarm 2	Alarm 2 realy position setup.
	Nc	Opening contact, alarm 2	
Divout		Value of divider	States how many puses needed to pull alarm.
REL2	Limit 2	Relay 2 = alarm relay, Relay 3 = divide out	Relay 2 and relay 3 setup, here you can switch relay2 and relay3 funtions among themselves.
	Divout	Relay 2 = divide out, Relay 3 = alarm 3	
Res bl	On	Esternal reset prohibited.	External resetcontact lock while counting. Reset can be done after the alarm level is achieved. Doesen't affect resetting from the front panel.
	Off	Esternal reset allowed.	
Check	On	Start / Limit value inspection.	When resetting counter, first pulse brings the value of what is selected in Adjust setting (Start or Limit1). Second reset pulse clears the counter value.
	Off	Inspection is not used.	
PO res	On		Relays in alarm state after the power up (untill reset).
	Off		Relays working normally after power up.
Direct	Up	Counting up	Selection of wich direction the counter start counting, up or down.
	Down	Counting down	
E Swit	Mode	OFF	No external contact in use.
		revers	Count direction selection.
		Step	External contact steps back to previous value.
	Slot	Slot B	I/O-card in slot B, external contact in line 4.
		Slot C	I/O-card in slot C, external contact in line 4.
	Slot c	NC	External switch contact selection, normally closed.
NO		External switch contact selection, normally open.	
Dec		Number of desimals	How many desimals are shown in display.
Int	0...15	Intensity of display.	Change the display intensity from 0 to 15.
Sensor	NPN (Contact)	Sensortype selection	Type of the pulse sensor. NOTE ! If closing contact is used, please select sensor to NPN.
	PNP		
	Namur		
	Pickup		
Baud r	300...19200	Baud rate	Baud rate for serial interface: 300...19200
Adres	Adre 0...127	Serialaddress	Serialdata address selection: 0...127
RS-485	Off	RS485 not in use	RS485 serialdata-card selection. NOTE ! if RS232 is used you doesn't need to make this selection.
	Slot B	RS485 used in slot B.	
Save	►	Save the changes to memory.	You can jump to Save and Undo selection in mainmenu using ★ -button. Selection is confirmed with ►-button.
Undo	►	Cancel selections.	

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.

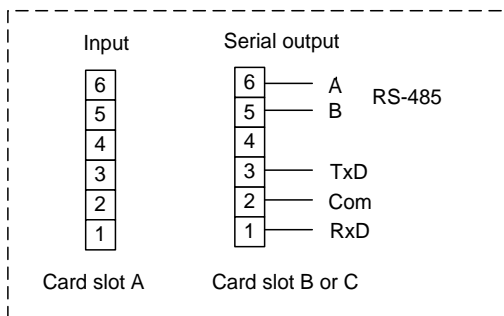
In programming stage you can first select card type (serial) mounted to slot B or C and then address and Baud rate. Baud rates are: 300, 1200, 2400, 4800, 9600, 19200 and addresses 0...127.

Accept selection and move forward by \rightarrow -key. You come back to previous level always by \leftarrow -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).

Serial signal configuration

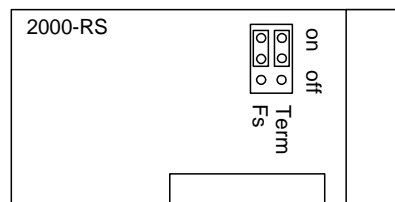
Mainmenu	Selection	Term	Description
♦ - move up/down to menu, ↗ - move to the adjustment level/next level, ↵ - accept selection/return to the previous level			
Baud r	300...19200	Baud rate	Baud rate selection: 300..19200
Address	Adresse 0...127	Serial address	Serial address selection: 0..127
RS-485	Off Slot B	Serial card RS485 not in use Serial card RS485 installed slot B	RS485 serial signal selection. Note ! if used to serial signal RS232, selection doesn't need to make.

Terminal connections:



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.

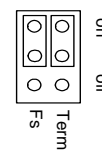
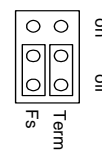
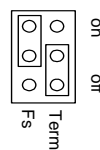
Serial card



RS232

RS485
channel's middle
unit
(Factory settings)

RS485
channel's last
unit



Termination resistor 110 ohm
on last units terminals

Address 2

Address 1

Address 0

Data acquisition
with PC

RS485

Twisted pair cable

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 2061 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 2061)

<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 2061 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 2061:
81 20 43 48 20 31 20 3F 03 6F

MESSAGE: The answer from the panelmeter is presented 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>. 2061 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

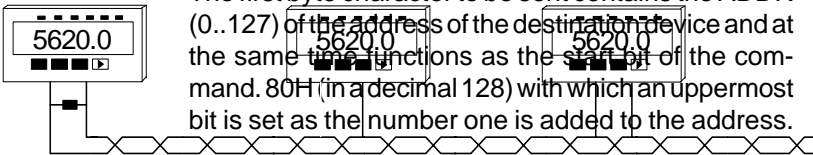


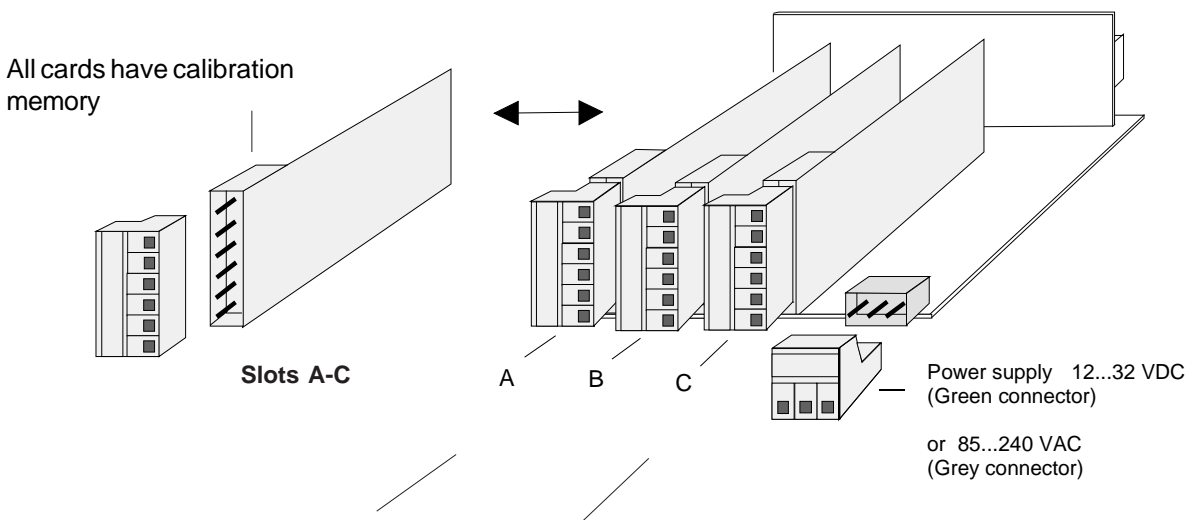
Figure 1: Data acquisition with PC

Construction of field display series

The field display series is 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.

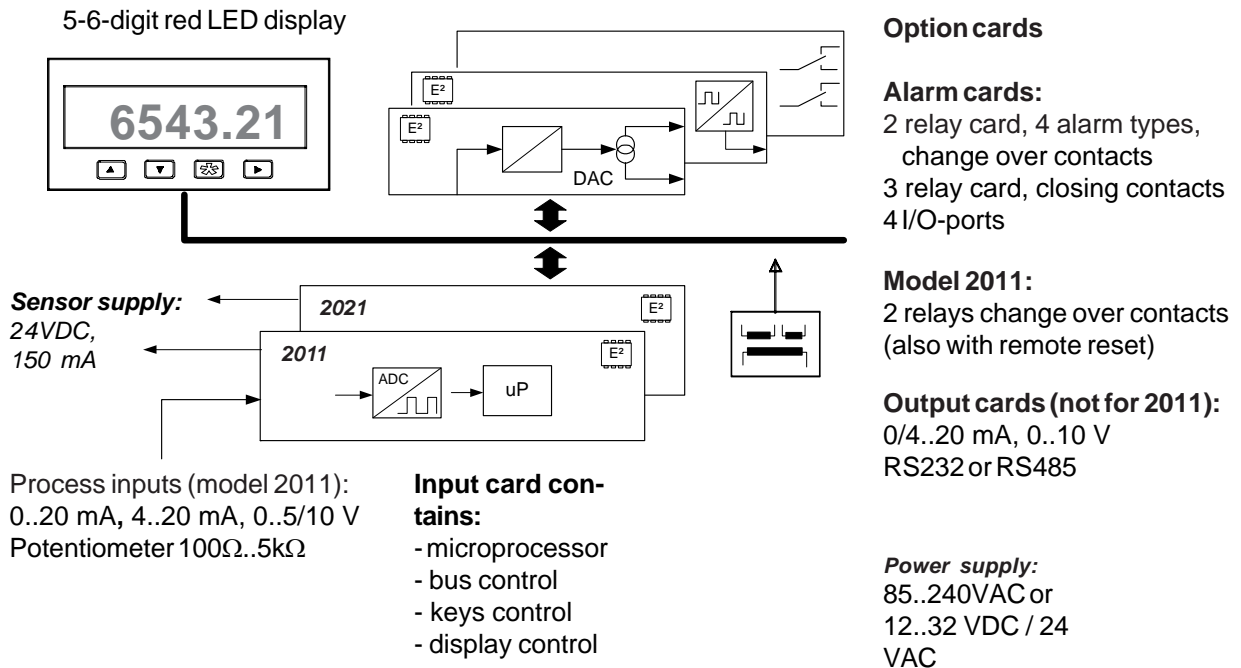
Additional slots:

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.

Modular field display series 2800



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:

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

Manufacturer:

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