

Manual

Scaleable frequency display

575F-2051, 575F-2251
1000F-2051, 1000F-2051
1800F-2051, 1800F-2251

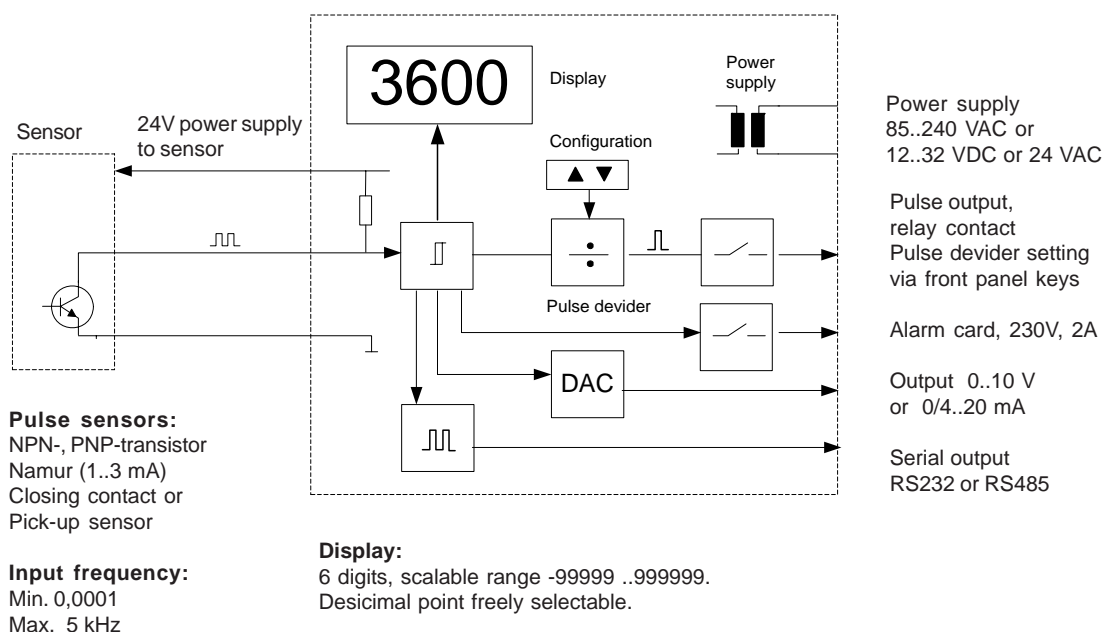


Manufacturer:

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Field display XX-2051



General description

Field display XX-2051 (XX-2251) is designed for pulse sensors like NPN, PNP, Namur, relay contact or pick-up sensors. Input frequency range is 0.0001 Hz..5 kHz.

Measuring method is counting of time interval between two incoming pulses. Display is updated after each incoming pulse. Input frequency is counted from rising or falling edge of input pulse and is programmable.

Mother card has two additional slots, one for output signal and one for relay card. Outputs, 0/

4..20 mA or 0..10V are isolated from input and power supply. Also serial output cards RS232 and RS485 is available. You may add output card afterwards and no calibration is needed.

Two alarms, both to set either HI or LO alarm steer optional alarm card with potential free contacts or transistor relays. One alarm relay may be set-up for pulse output f.ex. sending pulse for totalizer when internal counter set value is reached (maximum value 65 534). Meter front cover features rating IP65.

Specifications:

Input frequency:

0.00001..5 kHz

Scalable range:

-99999..999999

Decimal selection:

0.0001..1

Response time:

1-2 incoming pulses

Measuring method:

Periode of incoming pulses

Accuracy:

0.01 % of span

Sensor:

NPN-, PNP-transistor, Namur, Closing contact or Pick-up

Pulse voltage level. min 3 V and max. 32V

Pickup: >0,5V

Power supply to sensor:

24 VDC ± 5 %, max. 150 mA

Output(optional):

0..20 mA or 4..20 mA Max. load 1000 ohm.

Galvanic isolation (2500 V, 1min.)

Scaling by front panel keys.

Output card may be added later without calibration.

Alarms:

Into slot B or C.

Two alarm levels selectable by front panel keys

Relay contacts max. 230 VAC, 2A or semiconductor relays for output pulse >1 hz ,

max. 60V, 0,5 A

Pulse output:

Divider setting range 1..64000

Output pulse periode selectable 1..100 ms

Relay contact max.230V VAC, 2A or semiconductor relay for output >1 Hz, max 60 V, 05 A.

Serial output:

RS-232 or RS485,

Functions: Only for reading measured values

Addresses: 0-127

Baud rate: 300, 600, 1200, 4800, 9600, 19200

Protocol: Nokeval SCL

General:

6 digits

Digit size 14.5 mm

Red bright LED, brightness selectable

Power supply 85..240 VAC

or 24 VAC

Enclosure protection IP65

How to order:

2051-NPN-OUT-REL2-230VAC

2051 1 cahnnel

2251 2channel

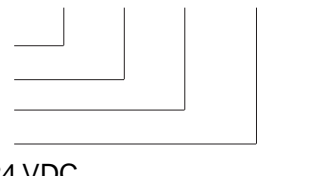
Model

Output

Relay card

Power supply

85..240VAC or 24 VDC



2051: two optional cards are available

2251: one optional card is available

Optional cards:

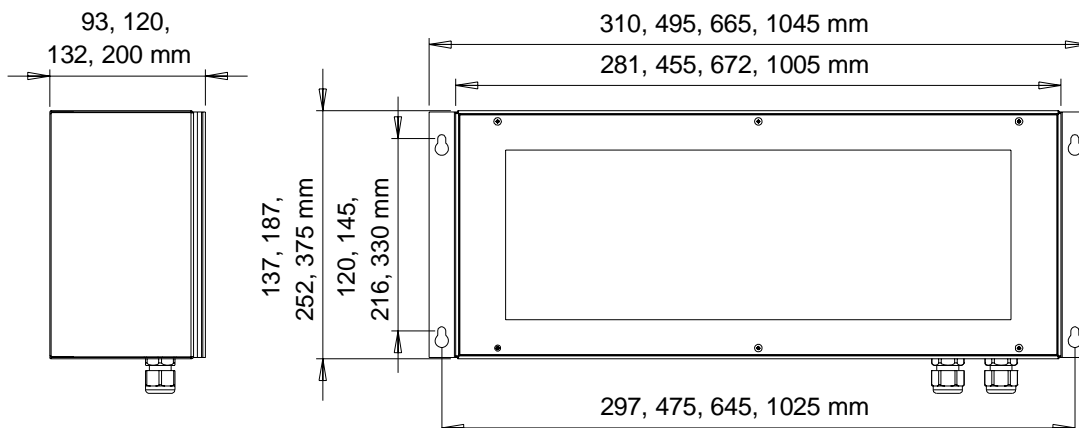
Output card 2000-OUT1

Serial output card 2000-RS (RS232/RS485)

Relay card (<1Hz) 2000-REL2

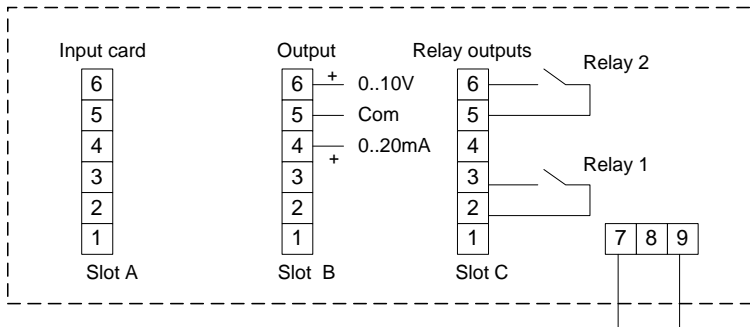
The label of meter shows combination of optional cards, if disparity occurs between label and manual.

Dimensions:



Connections:

Slots A-C



Slot A is always for input card
and slots B and C are for optional cards.

Power supply
85..240 VAC
(24 VDC/VAC optiona, no polarity!)

Factory settings:

Analog output is installed into slot B and relay outputs into slot C.

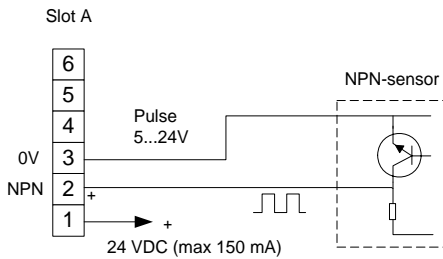
Relay card ratings:

potential free change-over contacts, max. 230 VAC, 2A (grey connector) or SSR-relay max. 60V, 0,5 A (green connector)

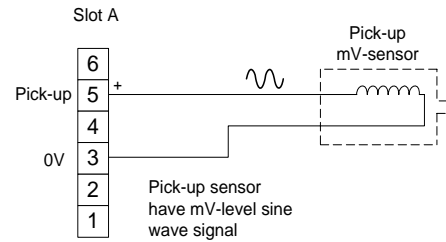
Note:

Check always the type of relay card and power supply before you apply power. If removable connector colour is different from indicated on this manual, the body colour of connector rules the type of card.

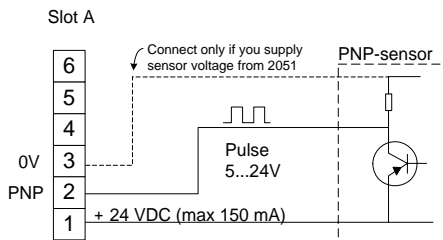
NPN-sensor



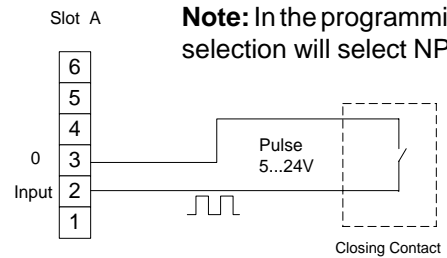
Pick-up sensor



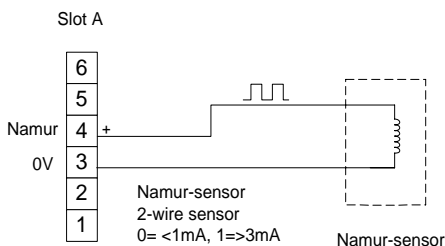
PNP-sensor



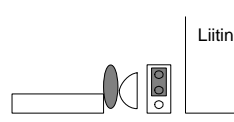
Closing contact



Namur-sensor



Sensor supply voltage selection from input card 2051



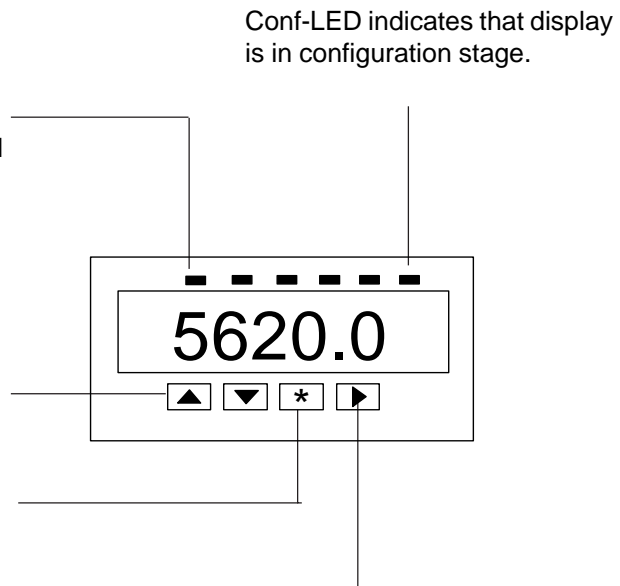
Sensor supply 24 V
Factory default

Sensor supply 12 V
max 50 mA

Configuration panel inside of enclosure

LED's A..A4 indicate alarm function. when alarm relays are placed in slot C, LED's A3 ja A4 are in use (default setting). When alarm relays are placed in slot B, LED's A1 and A2.

By up- and down-keys you can change display value or move up- and downwards in menu.



Opening configuration stage:

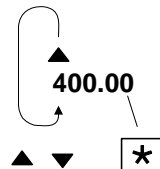
You can open config. stage by pressing 2 seconds x-key and down-key at the same time. In config. stage you can scale display and output signal and set pulse divider and alarms.

Move numbers from left to right when you change alarms or settings.

Setting of number values:

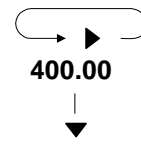
You set number by arrow-keys up- or downwards number by number. Setting starts from largest number from left to right. Move to next number by right-key. Set decimal point by down-key when display shows zero (0). Acceptance by x-key after selection of last number.

Number setting:



Numbers 0...9

You accept setting by x-key after selection of last number



Move to next number

You select comma by down-key when zero is selected in display

Display Filter (damping)

This function stabilises display value when wide measuring range is used. It is recommended if range is over 5000. Some times when working in sensors maximum limits, it may become unstable, this feature helps to stabilize it again. Filter is mathematical and therefore it doesn't affect to measuring accuracy.

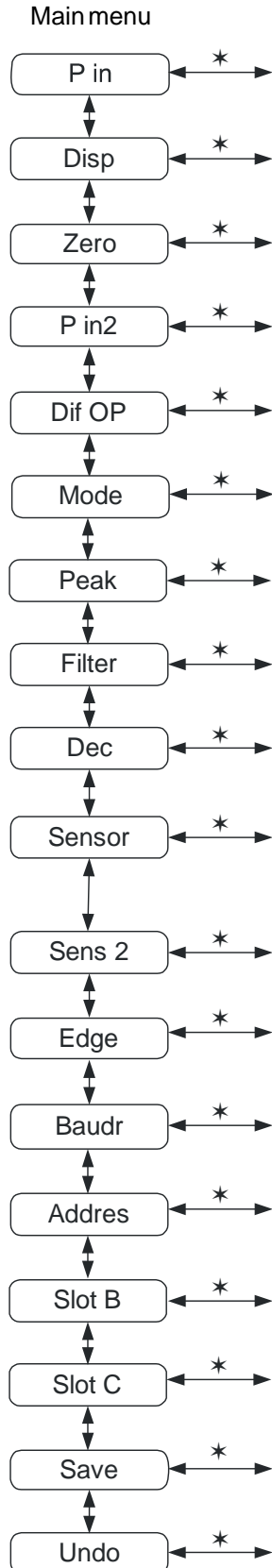
Filter value can be set between 1 (min) ..0.010 (max).

- 1.000 = no filter
- 0.200 = normal filter
- e.g. 0.2 = 1/5 of one new measurement and 4/5 of old measurement or
- 0,1 = (1/10) of new + 9/10 of old value (slower).

Configuration

In configuration stage you can select sensors, outputs, alarms and set scalings. You enter config.stage by pressing 2 seconds ★-key and ▲-key at the same time. Display shows text Fin. Move by arrow keys ▲ and ▼ in main manu. By I-key you move to setting

stage and also return to main menu. When you have done all settings move forward by down-key until display shows text Save and accept by ★-key. If you like to cancel settings move forward until display shows Undo and accept by ★-key.



Depends of Mode setting:

Mode = Freq: Maximum input frequency that is coming in (Hz) ,
(f.ex. 200 Hz)

Mode = Interv: Maximum pulse interval (seconds)

Setting for display that is shown when maximum input frequency or pulse interval is reached. (Same input scaling works with the input channel 2 on meter (xx -2051)

Offset setting for zero point.

Setting only in model 2251. Maximum input frequency (Hz) on channel 2 (B).

Setting only in model 2251. Is display showing difference or ratio.

Sub = channel A-B difference

Div = channel A/B ratio

Freq = Frequency meter

Interv = Pulse interval meter

If measured value is bigger than this setting, the display shows hypens. Effects only in interal mode.

Digital filter settings (damping).
Look specifically: Display digital filtering

Desimal number selection.

Selection of the sensor type: NPN, PNP, Namur ja Pickup
(Select NPN if used colsing contact and include jumper for removing the contact vibration: see connections page)

Setting only in model 2251. Sensor type selection on channel 2 (B): NPN, PNP, Namur ja Pickup. (Closing contact select NPN)

Input pulse counting:

Rising = rising edge of the pulse (default)

Fallin = falling edge of the pulse

Baudrate selection for serial connection:
300, 600, 1200, 2400, 4800, 9600 or 19200

Serial address selection: 0...127

External slots **Slot B** and **Slot C** is meant for optional- cards. (alarmrelay-, analog output- or serial output -cards).

On meter 2251 input card 2 is attached on **Slot B** and optional-cards to the **slot C**: Optinal card settings are displayed on the next page.

Saves the settings and leaves from programming state with ★-button.

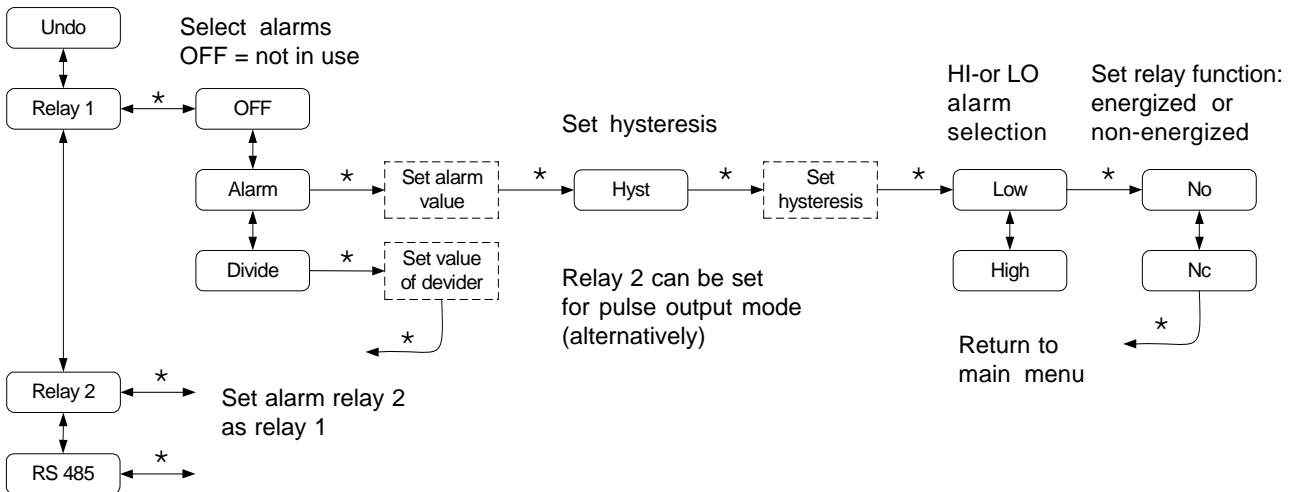
Chancels settings and leaves from programming state with ★-button.

Relay (alarm) and pulse output

Two alarms, both to be set either Hi or Lo alarm steer relays 1 and 2. Indicating LED's on front panel. Alternatively one relay may be set-up for pulse output where incoming pulses are divided with wished number (Divider=dMdE).

If divider value is one max. frequency of incoming pulses is 2 Hz (divider should be always >1) Largest divider value is 64000.

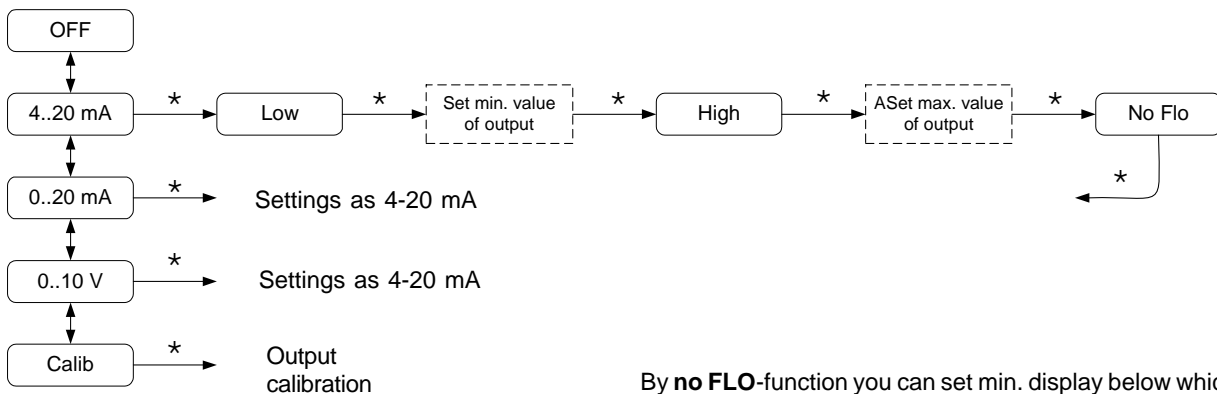
Slot B or C from main menu



Analog output

Slot B or C from main menu

Select first display corresponding min. value f.ex. 0.0=4 mA and then display corresponding max. value, f.ex. 100.0=20 mA. Calibration of output can be done in stage Calib. Output card is always delivered calibrated and no recalibrating is needed when installed to meter.



By **no FLO**-function you can set min. display below which output drops to zero (or to 4 mA). This method fastens updating of output when incoming pulses have stopped.

Serial output RS-485/RS-232 (option)

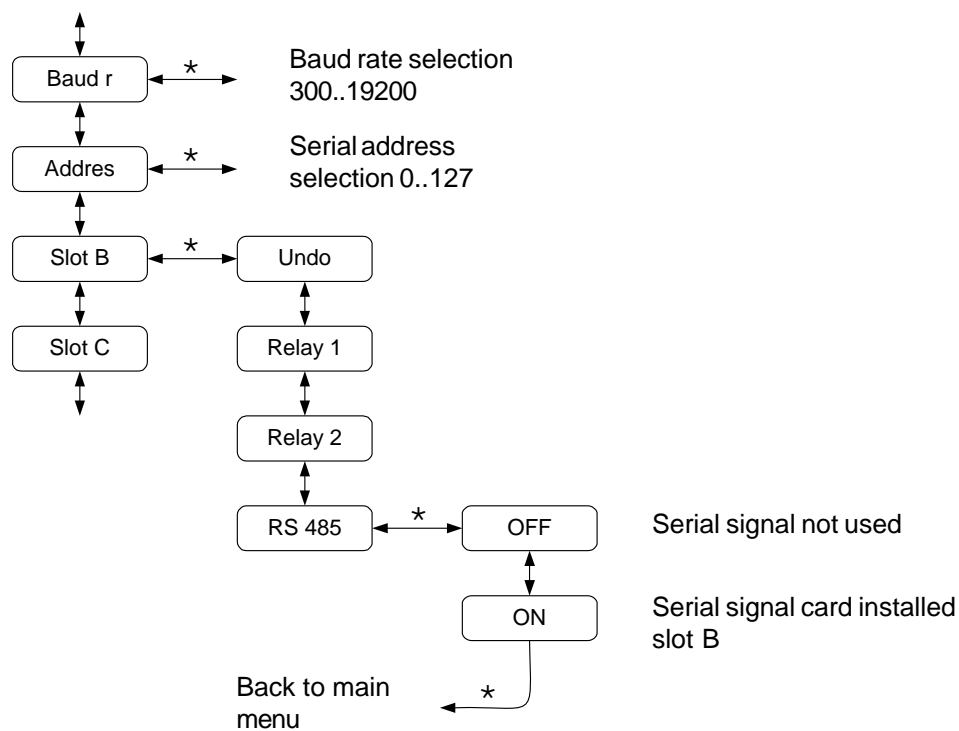
Meter may be provided with optional serial output and you can read measurements by e.g. PC. Display programming can not be made via serial port. Additional card provides serial signal RS-232 and RS-485, only one of those can be selected.

Serial signal is isolated from both input signal and power supply. Meters with RS-485 can be max. 31 in same loop and longest distance 1000m. RS-232 enables only connection of two devices and max. distance 10..20 m.

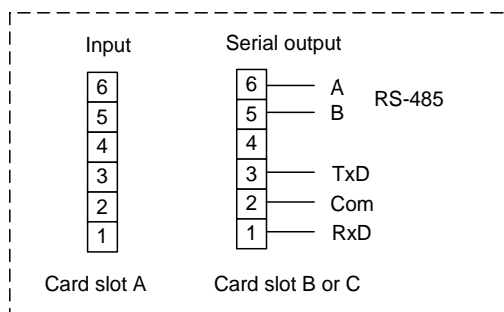
In programming stage you can first select card type (serial) mounted to slot B or C and then address and Baud rate. Baud rates are: 300, 1200, 2400, 4800, 9600, 19200 and addresses 0-127.

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).

Main menu

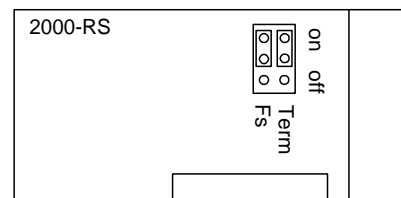


Terminal connections:



By serial signal RS-485 last unit must be terminated by 110 ohm resistor. you can make termination at terminal connectors or by connecting jumper J1 to ON-position.

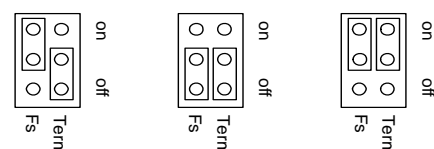
Serial card



RS232

RS485 channel's middle unit (Factory settings)

RS485 channel's last unit



Serial communication

Baudrate: 300, 1200, 2400, 4800, 9600 and 19200
1 Start, 8 Data and 1 Stop bit, no parity.

Serial protocol (SCL):

MESSAGES: When asking the measurement data from the panelmeter 2051 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 2051)

<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 2051 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 2051:

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

RETURN MESSAGE: The answer from the panelmeter 2051 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>. 2051 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

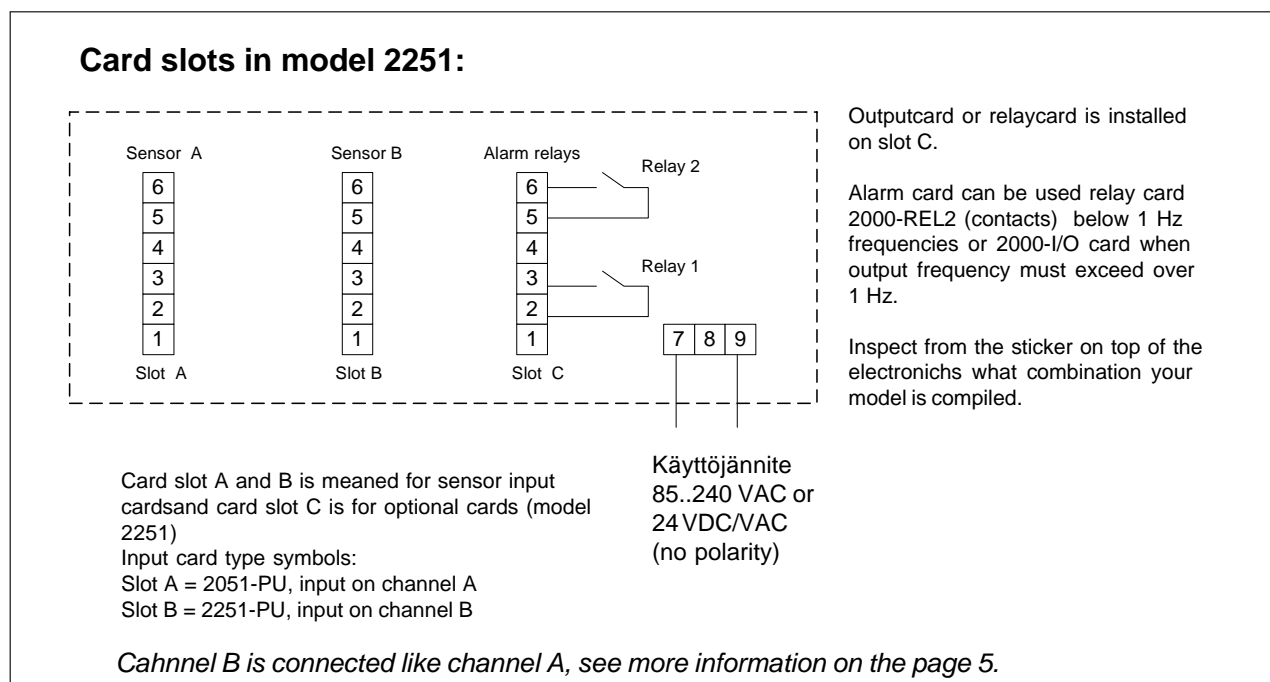
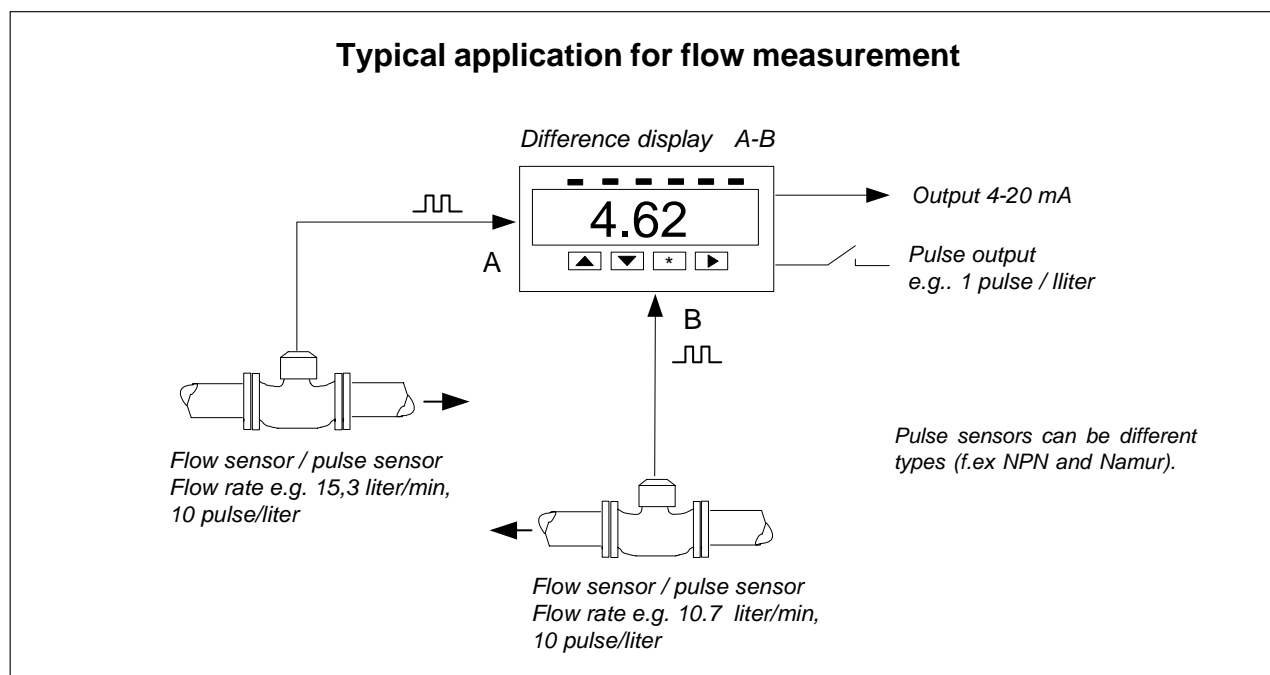
<ACK> 2 1 . 3 <ETX> <BCC>
Answer: 06 32 31 2E 33 03 1B

Frequency difference- or ratio display 2251

Panelmeter 2051 can be change to frequency difference display including second input card in to the meter on slot B (card 2251-PU). Inputchannel difference is shown in the display (A-B). Both channels can be scaled differently (Fin ja Fin2). Only one outputcard is possible to attach on this model: alarm-, analog output- or serial outputcard. One channel model can obtain two optional cards.

Settings for difference display, look at the main menu on page 6

- F in** Channel A inputfrequency / Hz *f.ex 200 Hz*
- F in2** Channel B inputfrequency / Hz *f.ex 100 Hz*
- Dif OP** Selection wich is shown in display, channel A and B difference or ratio (A/B).
- Disp** Scaling for input frequencies that are shown in the display
f.ex channel A 200 Hz correspond in display 5000, and the same time channel B 100 Hz correspond 5000 in the display.
- Sensor** Channel A sensor type selection
- Sens 2** Channel B sensor type selection



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