Nokeval

No 310505

Operators manual 538-8SC

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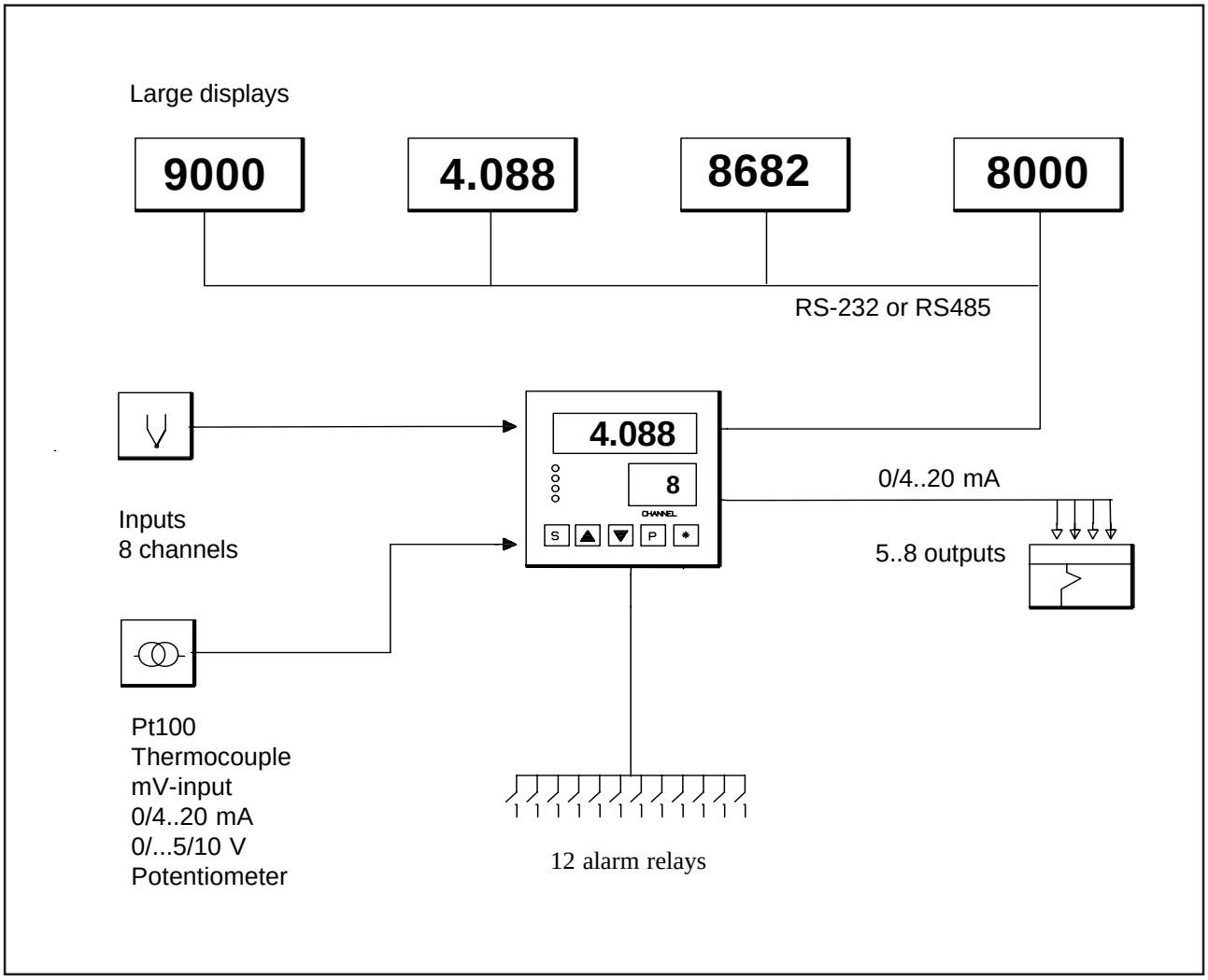
Multipoint indicator 538-8SC



Input Channels

538-8 indicator has 8 input channels. Each input channel may be configurated individually. f.ex. for mV, Pt100 or thermocouple input. Selection of input is done by panel keys and may be changed any time. Meter is provided by inbuilt selector for 0/4..20 mA and 0..10 V input signals (optional). Display scans normally from one channel to the other in few seconds. You can stop scanning any time or choose by arrow keys any channel to display. If the scanning is freezed measurements still continue on other channels. Input channels are differential, even current inputs.

Display for process signals

Display is scaleable for desired range individually for each channel. Each channel may have different scaling and decimal point. Also input signals are individual, f.ex. channel 1 accepts 4..20 mA and channel 2 input 0..20 mA.

Serial communication (option)

Serial port RS232 or RS485 is calvanic isolated from input circuits. Serial ports suits also for control of large displays.

Alarms

You can set separate alarm levels for each channel by front panel keys. Alarm may be selected either as common alarm and same alarm relay is steered by several channels, or only by 1 channel. Meter has 2 relays as standard for line voltage. 10 logical alarms are optional. Alarms are freely selectable for desired channels. Hysteresis is selectable 0..90 %. Front panel has signal ligts for alarms, which may be high or low alarms.

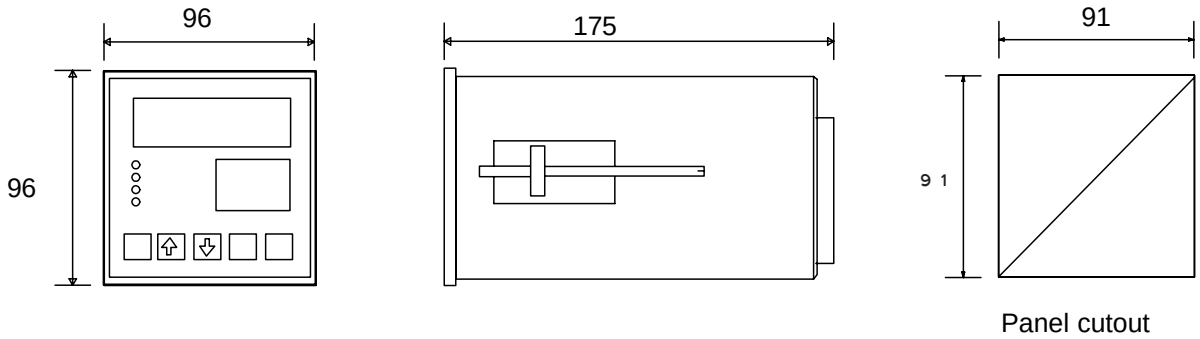
Output signal 0/4..20 mA (option)

Each channel may get individual output signal 0 or 4..20 mA (optional). Outputs are not fixed to some channels but they can be set to desired channels or even all to same channel. You may scale each output by front panel keys. Typical accurary of output is 0,05 % of scaled range.

Measurement technique

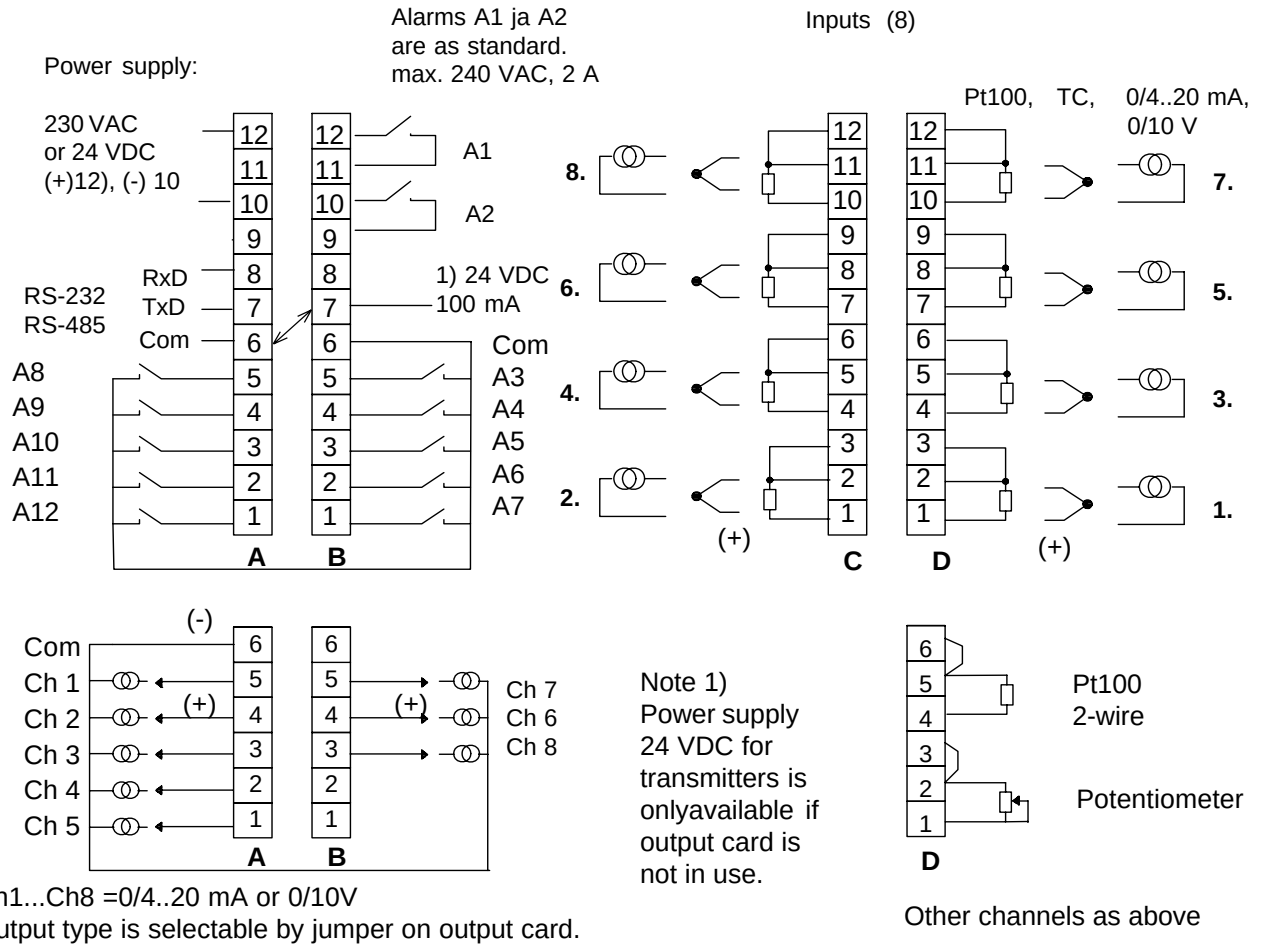
Input signals are measured by instrumentation amplifiers behind differential input channels. Autocalibration of both zero and range takes place continuosly. It eliminates temperature drifts and assures long term accuracy without recalibration. 538-8 has no potentiometers for adjustments.
15 bit A/D-conversion means a resolution of 1/32000. Decimal poin is floating.

Dimensions:



Panel cutout

Terminal connections:



Ch1...Ch8 =0/4..20 mA or 0/10V
Output type is selectable by jumper on output card.

Calvanic isolated outputs Ch1..Ch8 (option):
Current output card 0 or 4..20 mA is alternative to alarm card. Max load 600 Ω. Outputs have one common (-) lead (com). Internal power supply can supply 8 current 0/4-20 mA and voltage outputs 0...10V depend on jumper settings on page 18. You can have max. 5 outputs (terminal A), if logic alarm card is used (terminal B)

Serial port (option):
Serial port RS-232 is available in connectors A6(Com), A7(TxD) and A8(RxD). RS-485 in connectors A8 (-A) and A7 (+B). When RS-232 is connected to PC, pins 4, 6 and 8 must be short cutted (9-pin DIN-connector).

Logic alarms (A1..A10):
10 logic alarms on separate card. Other end of relays is connected to same lead (Com) Max. load 60 V, 0.5 A. You can have only 5 logic alarms if analog output card is used.

24 VDC power supply for 2-wire transmitters:
From connectors B7(+) and A6(-) is 24 VDC power supply for 2-wire transmitters available. It is an alternative to analog output card.

Pt100 sensor:
2- or 3-wire connection. Line resistance effect (3-wire) is very small up to 50 Ω, below 0,1 °C when wires have equal lenght. In 2-wire connection line resistance can be eliminated by zero transfer "loff" in configuration menu.

Thermocouples:
Thermocouples are freely programmable. Line resistance effect is negligible below 1 kΩ line resistance.

Current and voltage inputs:
Current and voltage input channels are selected by inbuilt jumpers. Input resistance is 50 Ω by current and respectively 1 MΩ by voltage input.

Potentiometers:
2-wire connection, max. 1 kΩ (optional 10 kΩ).

Technical specification:

Input channels:

Number of channels 8. Different input in different channels: mV, RTD's and thermocouples can be selected directly from front panel keys. Current inputs 0/4..20 mA and voltage 0..5 or 0..10 VDC are selected via short cut jumpers inside unit.

Pt100 sensor:

Connection	2- or 3-wire connections
Range	-200...+700 °C.
Resolution	0.1 % or 1 °C.
Accuracy	0.05 % or 0.2 °C 3-wire connection

Max difference between channels 0.1 °C
Max. line resistance 100 Ω
Line resistance effects < 0.005%/Ω.

Thermocouples:

K	-100..+1200°C
J, J/DIN	-100..800°C
T	-50..+350°C
E	-50..+350°C
R, S	0..+1700°C
Accuracy	1 °C ±1 digit. R, S 2 digits ±1 °C

Cold junction compensation < 0.05 °C/°C.
Sensor wires have no effect below 1000 Ω.

Analog inputs:

Input resistance	50 Ω.
Accuracy	0.02 %.

Input selectable by jumpers 0/4..20 mA or 0..10 V. Scaleable range -999...+9999, scaling with front panel keys. Different scaling on each channel.

mV-inputs:

Fixed ranges	20, 50, 500 and 1000 mV
Accuracy	0.05 %

0/1..5/10 V inputs (optional):

Scaleable ranges	0-1/5/10 and 1-5V.
Impedance	1 MΩ.
Accuracy	0.05 %.

Potentiometers:

Standard ranges	20..1000 Ω and 10 kΩ on request.
Connection	2-wire
Accuracy	0.05 %

Potentiometer positions can be teached on site.

Analog output (optional):

Max. load	600 Ω
Accuracy	0.05 %
Zero offset	0..±100%.

8 optional outputs. Output selectable by jumper 0/ 4..20 mA or 0..10 V. Each output channel scaleable. Updating time 0.2 s. Galvanic isolation as an option. Also reversed action.

Alarms:

2 relay alarms, 230 VAC, 3 A as standard and 10 optional alarms, 60 VAC, 0.5 A, on extra card. If mA-output is used, only 5 additional relays available. Hysteresis selectable 0..90 %. Additional alarms can not be used together with second RS232 card.

Serial port RS232/485 (optional):

Serial port RS232 or RS485 are available.

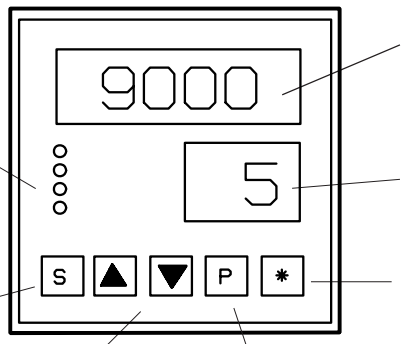
General features:

Display	Red, LED display
Number of digits	4 digits
Display height	14.5 mm
Configuration	by keys on instrument front
Ambient temp.	0..55 °C.
Terminal blocks	Removable connectors 1.5 mm^2
Power supply	230 VAC or 24 VDC
Effect demand	6 VA by AC and 3 VA by DC

Power supply for 2-wire transmitters.
Security access code for alarms and other one for configuration stage.

□□□□□ □□□□□:

LED lamps in the front panel indicates:
- Stop scanning (CH)
- Alarm 1
- Alarm 2
- Set point of alarms or configuration



Measured value, ± 9999.
Floating Decimal point.

Channel number in display

1. Enter-key accepts changing of settings.
2. Return to automatic scanning

S-key stops scanning of channels or indicates alarm setpoint. You can only see alarm value, but not change it by this key.

Arrow keys to change setting values and channel selection.

Alarm Checking:

Stop automatic scanning with S-key, light Ch lits. Select the desired channel with arrow -keys. If you push S-key once, **Alarm 1** light lits, push it twice and **Alarm 2** light lits. **Conf** indicator informs that the display shows alarm value. You can exit this mode by pushing *-key.

Alarm setting:

When automatic scannig is stopped **Alarm 1** or **Alarm 2** and **Conf** indicators lits, alarm value can be changed. Select the desired channel by arrow-keys, push **P**-key.
Decimal point of channel display indicates that you can change alarm values by arrow keys. When new setpoint is selceted push *-key twice. Unit is now in normal mode.

Acces to programming mode:

Hold P-key and push S-key at the same time. Dispaly shows text **Conf**.

Exit configuration:

When display shows text **Conf**, push P-key, text **donE** appears to display for 2 seconds.

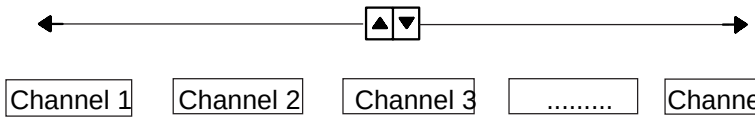
Manual reset for alarms:

Stop automatic scanning to desired channel, push S-key, alarm is now resetted. Resetting is individual for each channel.

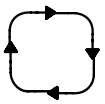
Eeprom reset:

Programmed information is stored in Eeprom memory. When starting new configuration it is recomended to reset the old information. Hold down S-key and connect the main power. Unit is now in common setup and texts **Conf** and **CO** are in display.
This procedure can also be used, if it seems that the unit doesn't work proberly. After reset all configurations must be done again.

Front panel functions:



Channel 1 | Channel 2 | Channel 3 | ..... | Channel 8



☐	Ch	Indication of channel freezing
☐	Alarm 1	Indication of alarm 1
☐	Alarm 2	Indication of alarm 2
☐	Conf	Display shows alarm value or configuration stage

S-key

S-key changes indication Ch, alarm 1 or Alarm 2 ON.
Conf-indication means that display shows alarm value.
By pressing S-key indications scan in arrow key direction.
Channel can be changed by arrow keys when channel is frozen (CH).

Display	Keys	Function
		Automatic scanning of channels
800.0 5	S	Stopping and selecting desired channel
	▲▼	Choose channel number by arrow keys
	*	Return to automatic scanning

Check alarm value

		Automatic scanning of channels
800.0 5	S	Stop channel by S-key
	▲▼	Choose channel
	S	Choose alarm 1 or 2. When alarm and configurations are ON, display shows alarm value.

Alarm value change

	P	Press S-key and display shows alarm value.
	▲▼	Change alarm value by arrow keys. Left digit starts to blink
P **0** 000 0 **0** 00 00 **0** 0 000 **0**	P	P-key transfers each digit one by one to blink
	*	Confirm setting by *-key or change setting by arrow keys.
	*	Exit from setting stage.

Configuration

Configuration is made by front panel keys. In initial setting stage you can decide how many channels, outputs or alarms will be used. After that you can move to channel setting stage.

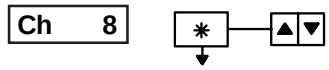
Display	Keys	
	P + S	Begin configuration pressing P-key and then S-key simultaneously. Entering is not accepted if channel is not stopped.
CONF 1		Display shows configuration readiness symbol CONF.

Initial settings

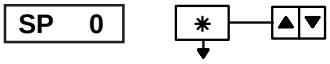
In initial setting stage you decide total number of inputs, outputs and alarm channels.

Choose by arrow keys CO to channel display (channel display scans 1...8, CO).

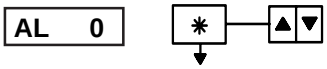
Brigthness conrol 0..15, 15 is brighest.



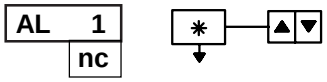
Choose total amount of input channels, 0...8.



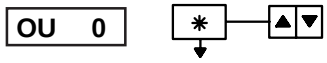
Special functions. (Factory settings.)



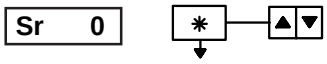
Choose total amount of alarms (0..12). 2 alarm relays as standard.



Select alarm relay (1..12) direction: **no** = Normal Open, **nc** = Normal Closed. Alarms 1-2 as a standard, relays 3-12 optional.

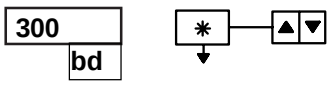


Choose total number of outputs (0/4..20 mA), 0..8.
Exit by choosing channel number. See page 11 "channel settings".

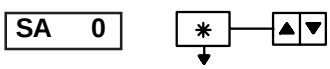


How many measurements will be displayed (max. 16 samples/s for one channel). When eight channels in use, 2 samples/s/channel.
You can damp the fast changing display by Sr-function
0=each measurement is displayed
1=every second meas. is displayed (1 sample/s if eight ch in use)
2=each third measurement is displayed
7=each eight measurement is displayed

Serial communication settings



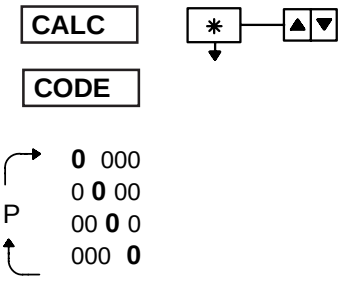
Baud rate selection: 300, 1200, 4800 and 9600. Select via arrow keys.



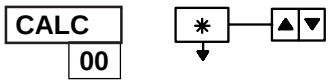
Serial address, select 0..15, default = 0.

Special functions. (Factory settings.) Must be 0.

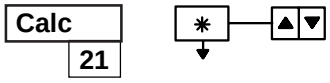
Security access code selection



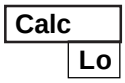
Setting security access code. Security code prevents entering into configuration or alarm stage. You may choose 1 or 2 secret codes. The one prevents entering into configuration stage, number 88 (choose as channel number) and the other into alarm setting stage, number 89. When you have symbol Code, set by down arrow key code number 1...9999. You can change blinking number. P-key transfers next number to blink. Save secret code carefully before exit from configuation stage. If you do not want to have secret code, then choose code number (0000). You can change security code as long as it is not saved by P-key. Cancel all settings, if error occurs, with S-key when display shows CONF.



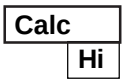
Exit Security mode by selecting 00 to channel display and press *-key.



Calibration of output channels 1...8. You can calibrate all output channels by selecting channel number and adjusting output to right value by arrow keys. Output channel numbers: Ch1 = 21....Ch8 = 28 for current outputs and Ch1=31...Ch8=38 for voltage outputs.
Connect 4½ digital meter to selected output channel before calibration and press *-key after channel selection.



Adjust 4.00 mA (or 1.0 V) to output by arrow keys and press *-key.



Ajust 20.00 mA (or 10.0V) to output by arrow keys and press *-key.
Select next output channel or exit by selecting 00.

All initial settings are done. You can begin channel setting or exit configuration.

Exit by selecting text **CO** to channel display (with arrow-keys) and push P-key. Text **Done** comes to display for 3 seconds. All settings are now stored to memory.

Channel setting

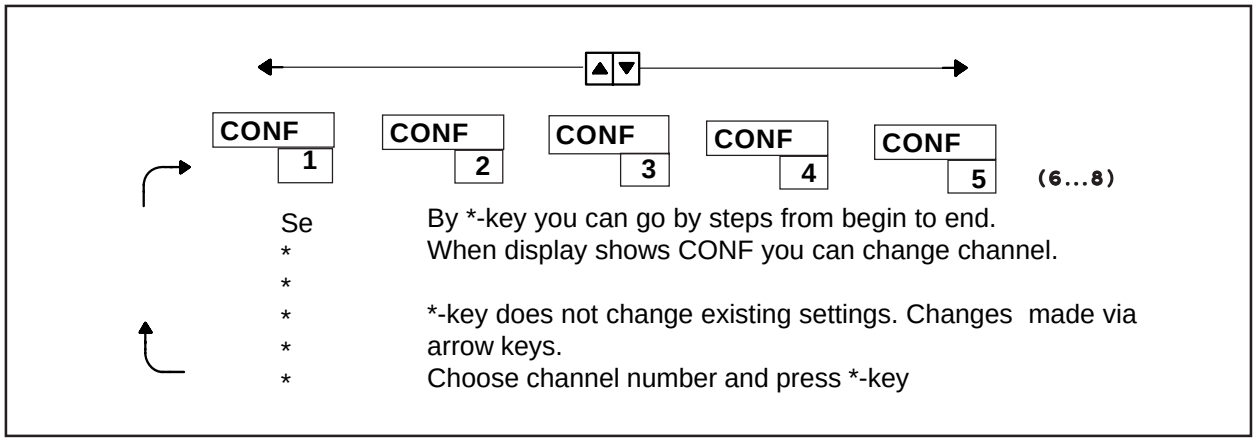
In channel setting all channels are configured separately. Select channel number you want to configure and press *-key. Specific instructions in section channel settings.

Important Note

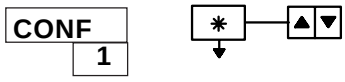
Because we continously develope our products and add new functions you may find symbols on the display not mentioned in the manual. This does not make any harm because you can simply pass those in configuration. The manuals will be, of course, updated at times.

Channel settings

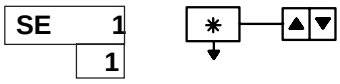
Each channel must be configurated separately. Symbol Conf in display means that channel in question is ready for configuration. Choose channel by arrow keys and press *-key.



Choose number of channel to be configurated



Choose number of channel to be configurated.



Sensor selection

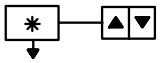
1	0..20 mA	Scaleable display (see jumper settings)
2	4..20 mA	Scaleable display (see jumper settings)
11	Pt100	3-wire
12	Pt100	4-wire
32	TC E	Thermocouple
33	TC J	Thermocouple ANSI FeCuNi
34	TC J DIN	Thermocouple DIN FeCuNi
35	TC K	Thermocouple
36	TC N	Thermocouple
37	TC R	Thermocouple
38	TC S	Thermocouple
39	TC T	Thermocouple
40	TC W	Thermocouple
41	TC W3	Thermocouple
42	TC W5	Thermocouple
51	0...10 V	Scaleable display
52	0...5 V	Scaleable display
53	1...5 V	Scaleable display
54	0...1 V	Scaleable display
61	Potentiometer	max. 0-1000 Ω
62	Potentiometer	max. 0-500 Ω
63	Potentiometer	max. 0-50 Ω
64	Potentiometer	max. 0-25 Ω
71	1000 mV	
72	500 mV	
73	50 mV	
74	25 mV	

81 Pressure VDO 0..5 bar 3-wire
82 Pressure VDO 0..5 bar
83 Pressure VDO 25 bar 3-wire
84 Pressure VDO 25 bar
85 Temperature VDO 150°C 3-wire
86 Temperature VDO 150°C
87 Temperature VDO 200°C 3-wire
88 Temperature VDO 200°C

FU

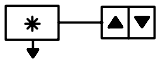
Selections of optional functions. Initial value FU=0.

En 1
1



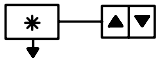
Selection whether channel will be displayed or not, in automatic scanning. En =1 (displays), 0=no external display .

Ed 1



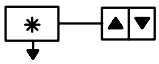
External display selection (0 = not used). Set 1 if extenal display is used.

DE 1
1



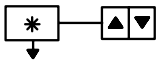
Choose decimals, 0..3. Floating decimal point when display increases.

LO
HI



Display scaling for current input 0/4..20 mA. Change display by arrow keys when display shows Lo =min. value and HI = max value.

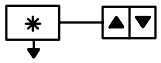
LoFF
1



Change of zero level (offset). Initial value zero (0). You can change measuring signal i.e. to increase or degrease it. F.ex. Loff=-1.0 means that measured signal decreased by -1.0 before it is displayed.

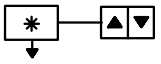
Selecting and scaling of output signals (see also page 18)

OC 1



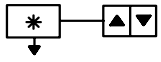
Output 0=none, 1=0..20 mA, 2=4..20 mA 3=0...5V, 4=1...5V, 5=0...10V.

OL 0



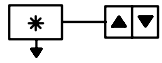
Choose output channel 1..8 0=no output

LO



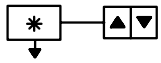
Select min. scale value for 0/4 mA (for example 0).

HI



Select max. scale value for 20 mA. (for example 1000).

AC

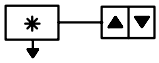


Alarm settings, Alarm level 1

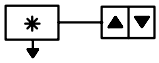
Choose function for alarm level 1

0. No alarm
1. Low alarm ON-OFF function
2. High alarm ON-OFF fuction
3. Low alarm Manual reset (by channel)
4. High alarm Manual reset (by channel)
5. Low alarm Deviation in channels 2..5 to set point of channel 1
6 High alarm Deviation in channels 2...5 to set point of channel 1

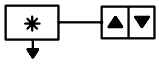
Modes 5 and 6: Alarm level follows set point of channel 1.

AL 

Choose alarm relay 1..12. Alarm relays 3..12 on separate card (also page 14).

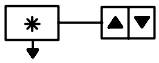
ALAR 

Presetting of alarm value. Press arrow key. When left number blinks you can change it by arrow key. P-key transfers next number to right to blink and to be set. You can repeat setting until you press *-key.

HYS 

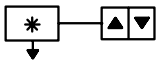
Hysteresis 0...upwards.

Alarm level 2, Select function for alarm level 2

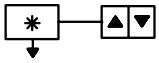
AC 

0. No alarm
1. Low alarm — ON-OFF function
2. High alarm — ON-OFF fuction
3. Low alarm — Manual reset (by channel)
4. High alarm — Manual reset (by channel)
5. Low alarm — Deviation in channels 2..5 to set point of channel 1
6 High alarm — Deviation in channels 2...5 to set point of channel 1

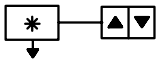
Points 5 and 6: Alarm level follows set point of channel 1.

AL 

Choose alarm relay 1..12. Alarm relays 3..12 on separate card (also page 14).

ALAR 

Presetting of alarm value. Press arrow key. When left number blinks you can change it by arrow key. P-key transfers next number to right to blink and to be set. You can repeat setting until you press *-key.

HYS 

Hysteresis 0...upwards.

CONF

Choose new channel or exit from configuration stage.

Exit from configuration stage.

CONF **P**

Select next channel or save settings by P-key

DONE

When saving, display shows symbol DONE.
Saving of settings takes 3 seconds time.

LOAD **S**

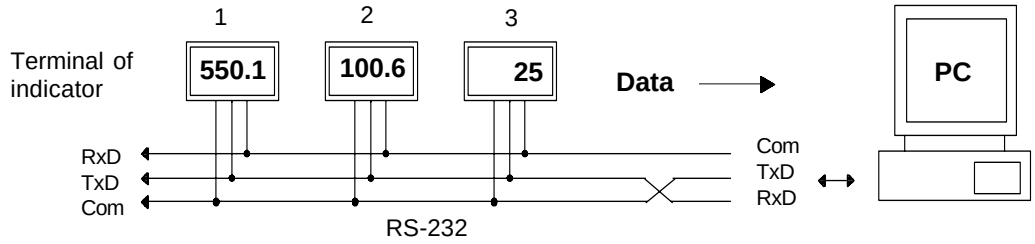
Exit without saving new parameters with S-key.

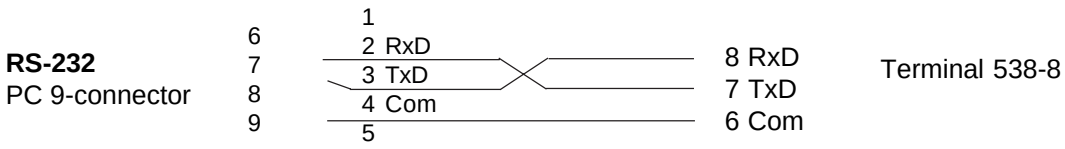
After LOAD and DONE symbols, 538-8 returns to measuring stage and performs according to given settings.

Serial data RS-232 and RS-485

You may fit serial card to multi point indicator 538-8. It is interchangeable and alternative to mA- output card. Calculated measurement can be sent to serial bus immediately or, alternatively, when asked, after having first sent address and channel number of indicator. Function mode is selectable in configuration stage. Programming can be made also using serial port and menu based PC-program. Six indicators (48 measuring channels) may be connected parallel to same serial port. Serial signal RS232 is suitable for short distances. RS-485 signal or 20 mA current loop is available for long distances. Serial cards RS-232, RS-485 and current loop card are interchangeable.

Parallel connection of indicators **Data collector asks for measurements**

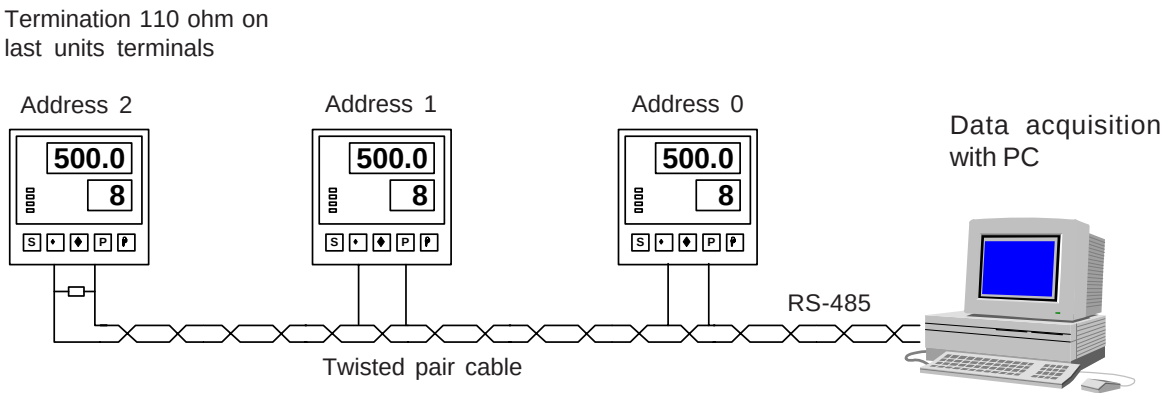




RS-485 connection

PC 9-pin connector — 538-8 indicator
pins 1,4 — - A = 8 RxD
pins 2,3 — + B = 7 TxD
Shortcut pins:
1--4 and 2--3.

25-pin connector — 538-8 indicator
pins 10, 11 — - A = 8 RxD
pins 22, 23 — + B = 7 TxD
Shortcut pins:
10--11 and 22--23.



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 538-8 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 538-8)

<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 538-8 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 2021:
81 4D 45 41 20 43 48 20 31 20 3F 03 6F

RETURN MESSAGE: The answer from the panelmeter 538-8 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>. 538-8 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

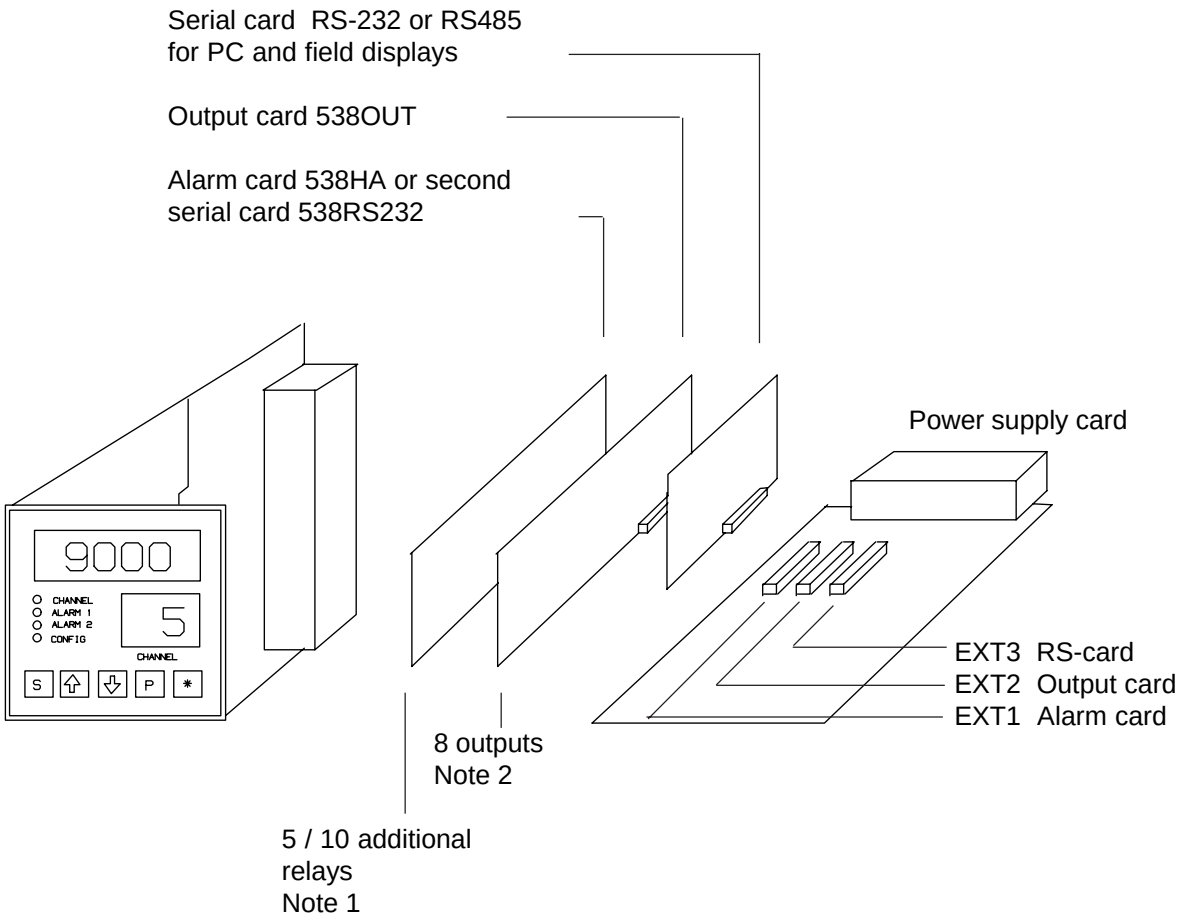
Adding of optional cards:

Outputs, logic alarms and second serial port (RS232 or RS485) are added by using separate cards. Adding is very simple. Remove power supply board (see picture) by loosing three screws and add the card. Adding of cards requires no calibration. Performance is defined only by front panel keys and device is ready to function.

Mounting of optional card:

1. Remove device from the case by opening fastening screw on rear plate. Remove front frame and push instrument gently from its case.

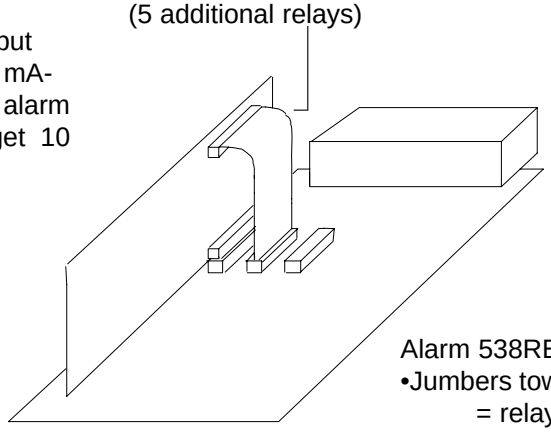
2. Open three fastening screws of board and add desired optional card into its connectors.



Note 1.
Additional 10 logic alarms.
Alarm card has 10 relays available if mA-output card is not used (only 5 relays are possible if mA-output card is used). Connect flat cable from alarm card to output card connectors and you can get 10 additional relay alarms to terminal board.
If serial RS232 for printer is used, alarm card is not available.

Note 2.
Additional 8 outputs 0/4..20 mA.
Connect flat cable from output card to alarm card connectors and you can get 3 additionaloutputs 0/4..20 mA to terminal board. (Output cards includes 5 outputs as standard).

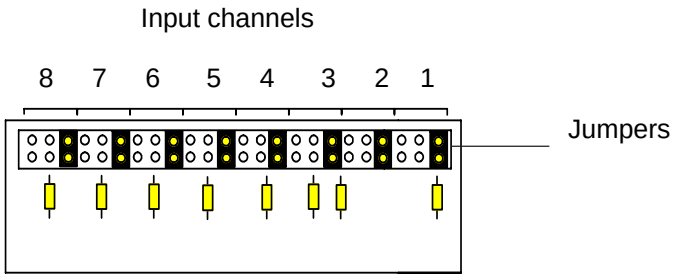
Connect flat cable to output card connectors
(5 additional relays)



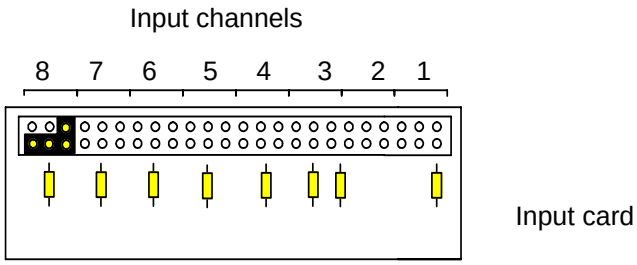
Alarm 538REL card jumbers:
- Jumbers towards relays
  = relay output
- Jumbers outowards relays
  = digital output (logic)
  5V/50 mA

Jumper settings for inputs

Jumper settings for mV, Thermocouple and Pt100 inputs

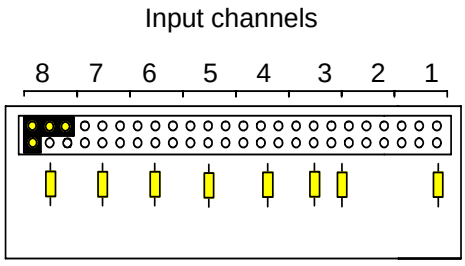


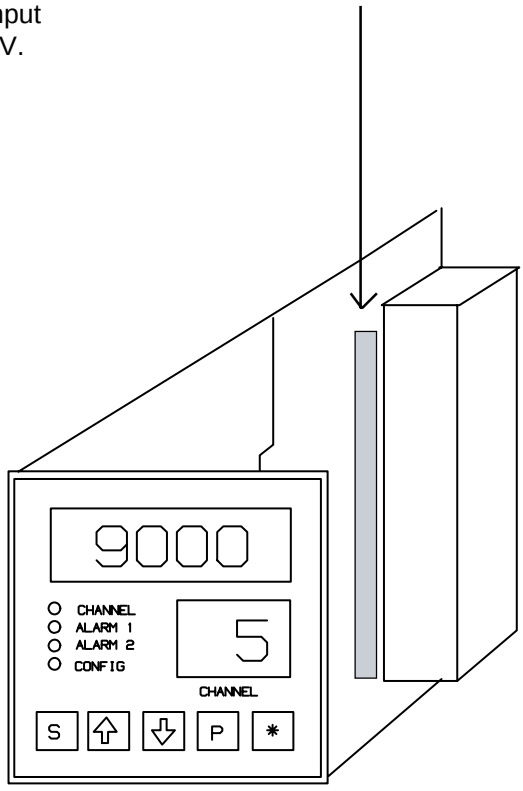
Jumper settings for 0/4..20 mA inputs:



Jumper settings for 0/10 V inputs:

Do not apply current or voltage signal to input before you have selected jumpers. All channels may be locked if input signals are over 5 V.

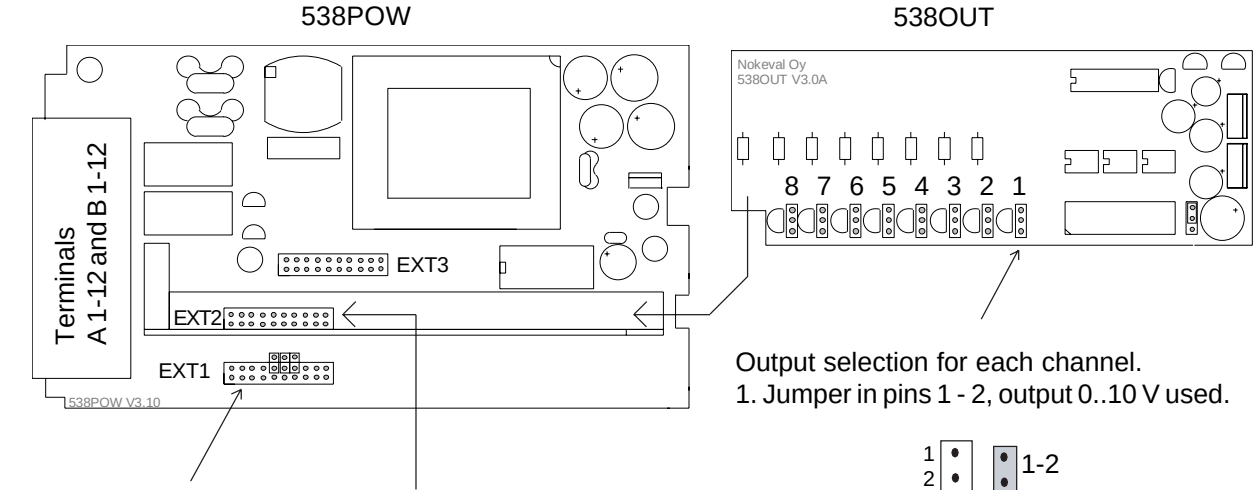




Installing output card 538OUT

It is possible to connect output card for eight outputs 0/ 4..20 mA or 0..10 V. Current output low level 0/4 mA is selected in programming stage by front panel keys. Output card 538OUT is installed EXT2 slot (middle).

After installation jumper settings must be done as shown below. Alarm card and second serial card cannot be used at the same time with 8 outputs.



Install three jumpers to arrow pointed place when output channels 6...8 are in use.

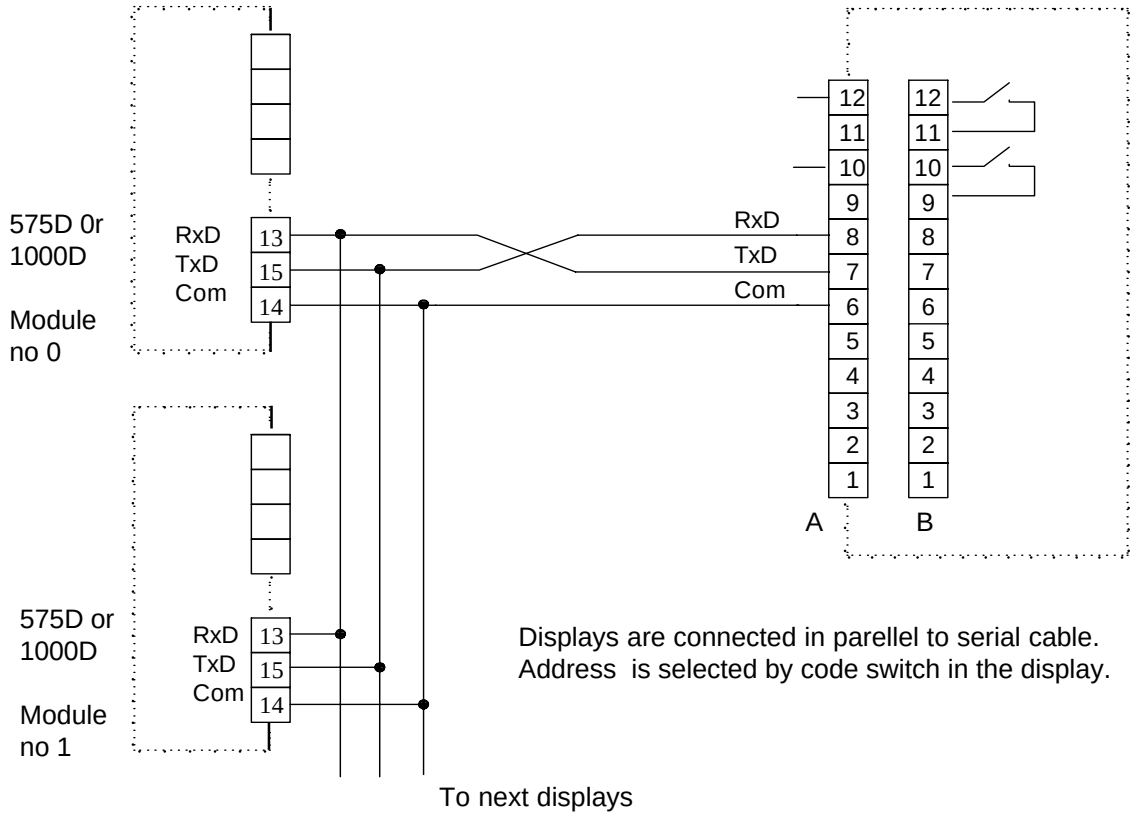
Installed card to connector EXT2

Output selection for each channel.
1. Jumper in pins 1 - 2, output 0..10 V used.

2. Jumper in pins 2 - 3, output 0/4..20 mA in use. Current output low level 0/4 mA is selected in programming stage by front panel keys. Each channel must be configured separately.

Large displays via RS-232:

538-8



Setting values

Date. _____

Device:_____ Program version_____ Serial no. _____

Output card ☐ Alarm card ☐ Serial card RS-232 ☐ RS-485 ☐

Input channel: Alarm relay	Sensor	Display	Output	Alarm	mode
1	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____
5	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
6	_____	_____	_____	_____	_____
7					
8					

Other information:

_____

_____

_____

_____

_____

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