

**Nokeval**

No 010200

# Operators Manual 538-10



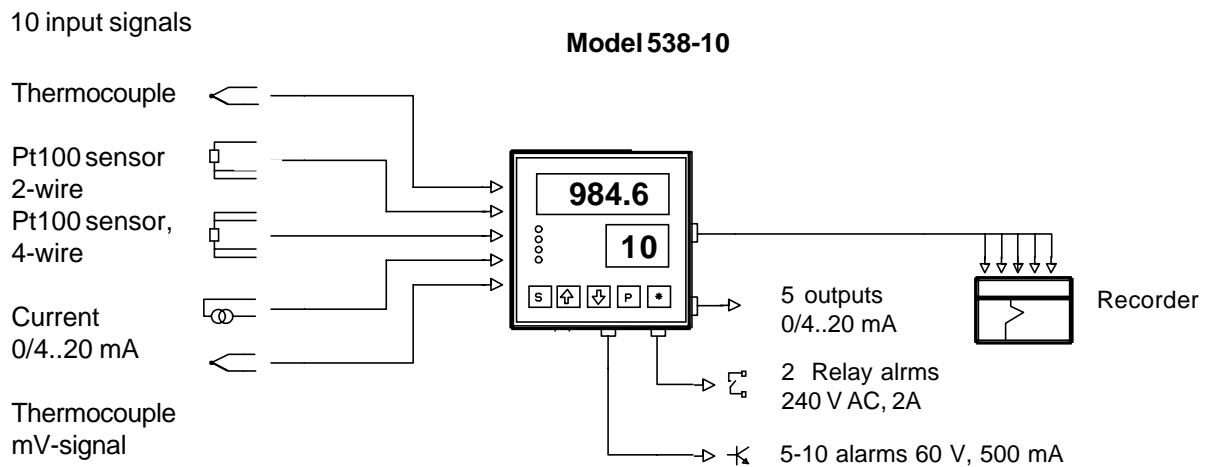
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# Multipoint indicator 538-10



Different types of input signals can be connected to any channel at the same time.

## General description

The Nokeval multipoint indicator 538-10 is designed for applications, where display, output signals and alarms are desired for several measurements simultaneously. Each input channel can be individually configured for various input signals. For example, the first channel may accept thermocouple input, the second one 4-20 mA, channels 9 and 10 Pt100 and etc.

The 538 provides 12 alarms, 2 relay alarms as standard and 10 logig alarms on an extra card. They may all set to one channel, or according to any other option.

The number of inputs and outputs can be increased by adding supplementary field modules. Designed for performance and reliability, the 538-10, once configured, is easy to install and quick to operate.

The automatic decimal point placement expands the display by showing the small values with decimal point throughout the 0..9999 display of the meter.

This function is enabled by the 16 bit A/D converter, with a resolution of 1/64000.

The autocalibration takes place once a second, which eliminates temperature drifts and long term changes of the zero level and the measuring range. No potentiometers are used for adjustments.

The modular design and the remarkable, inbuilt flexibility enables the 538-10 to be programmed for variety of different tasks. It can be customized with software that meets the particular and individual needs of each specific application.

Serial communications allow the 538-10 to be integrated into a larger system, with capability of driving expansion I/O modules. In addition, several instruments can be connected in a network. This kind of versatility can not normally be found in low-cost instrumentation.

## SPECIFICATIONS

### Pt100 sensor

Range 200...+700 °C. Resolution 0,1 or 1 °C. Accuracy 0,1 %  $\pm 1$  digit in 4 wire connection and 0,2 °C  $\pm 1$  digit in 2-wire connection. The max. difference between channels 0,1 °C.

### Thermocouples

K, J, J/DIN, T, E, R and S. Accuracy 1 C  $\pm 1$  digit. Types R,S 2 C  $\pm 1$  digit. Sensor wires have no effect below 1000  $\Omega$ .

### Input 0/4...20 mA

Scalable range -999...+9999. Automatic decimal point placement. Input resistance 15  $\Omega$ . Accuracy 0.02% of range.

### Voltage inputs

Range -300...+300.0 mV. Resolution 0.01 in range 0..99,99 mV. Floating decimal point selects the max. accuracy of display in other ranges. Accuracy 0.02% of range.

### Output 0/4...20 mA

The zero point and range is scaleable over the whole display range.

Each channel has its own range settings on the front panel. Accuracy 0,05% of the display range +accuracy of input signal. Channel updating rate 0,1 s. Optional galvanic isolation between input and output.

### Alarms

Alarms selectable to any channel or all to one channel or one common relay alarm for all channels. Adjustable hysteresis. 2 inbuilt alarm relays, 230 VAC, 3 A. 5 / 10 logic alarms (open collector) on separate card 60 V 500 mA. Logic alarms can not be used simultaneously with second RS output.

### General features

4-digit, red LED display. Digit height 14,5 mm. Keypad on front panel. Settings via front panel or PC. Case dimensions 96x96x162 mm.

Panel cut out 91x91 mm.

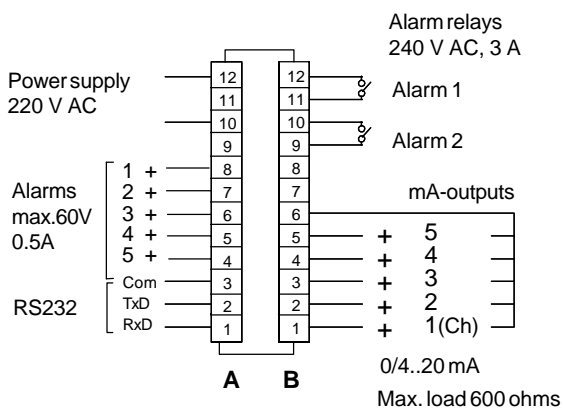
Removable connectors, 1,5 mm<sup>2</sup>.

Line voltage 220 V/110 VAC, 50/ 60 Hz.

Weight 1,5 kg.

## Connections

## Model 538-10



See Alarm Card connection on page 13

10 thermocouple inputs  
or 2 Pt100 inputs and 8 thermocouples.  
0/4...20 mA inputs only for channels 1..5

## Front panel:

LED lamps in the front panel indicates:

- Stop scanning (CH)
- Alarm 1
- Alarm 2
- Set point of alarms or configuration

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

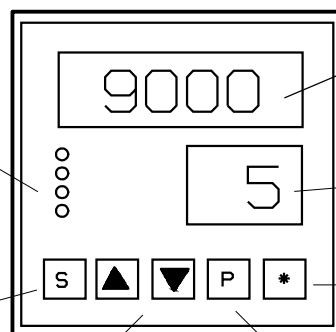
Arrow keys to change setting values and channel selection.

### Checking alarms:

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 scanning 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 selcted push \*-key twice. Unit is now in normal mode.



Measured value,  $\pm 9999$ .  
Floating Decimal point.

Channel number indicating

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

### 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:

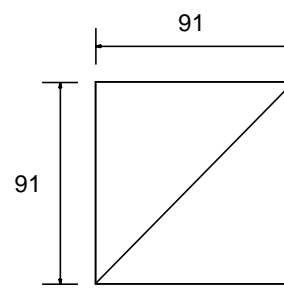
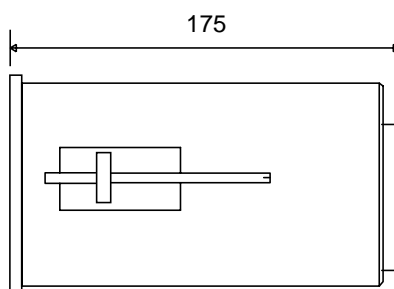
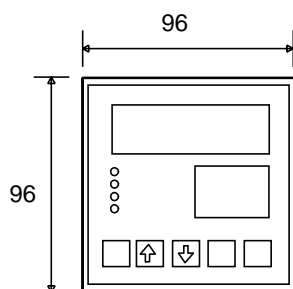
Stop automatic scanning to desired channel, push P-key, alarm is now resetted. Resetting is individual for each channel.

### 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.

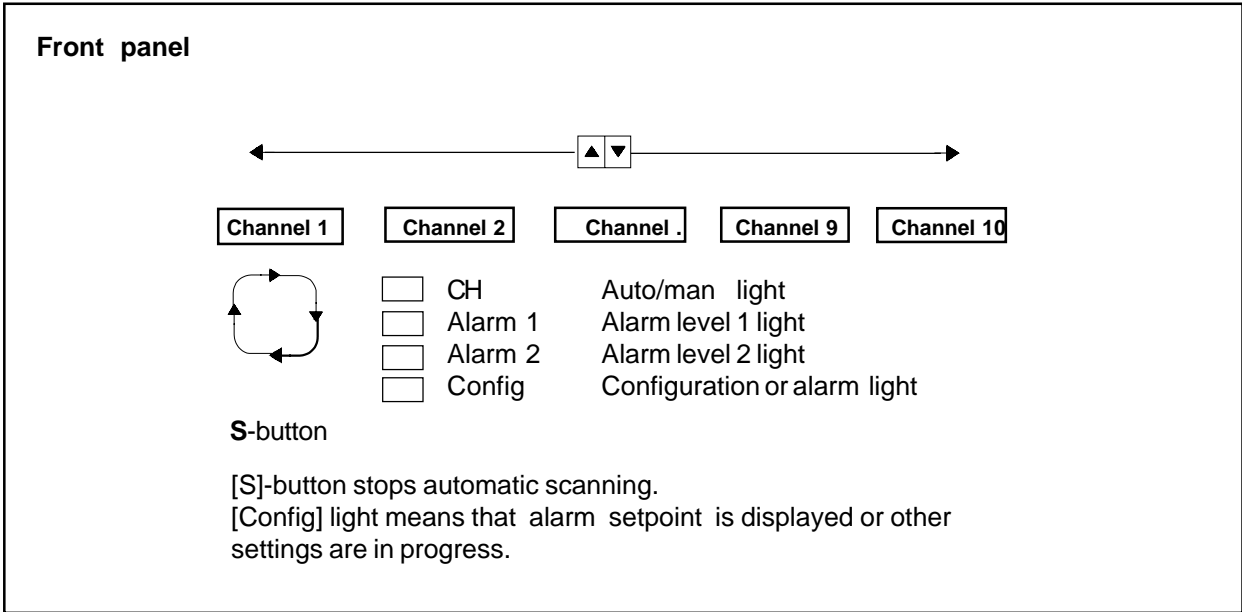
This procedure can also be used, if it seems that the unit doesn't work proberly. After reset all configurations must be done again.

## Dimensions

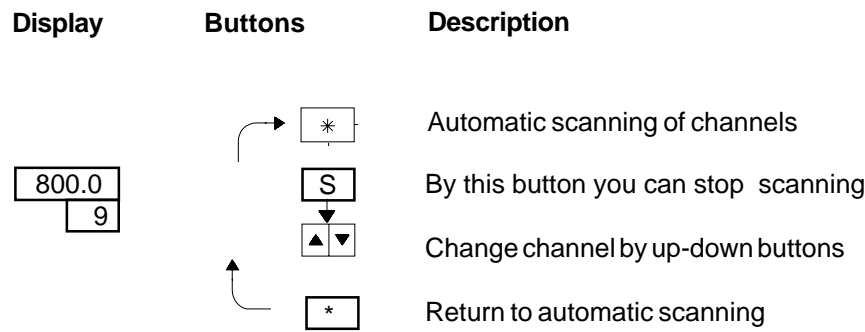


Panel cut-out 91 x 91 mm

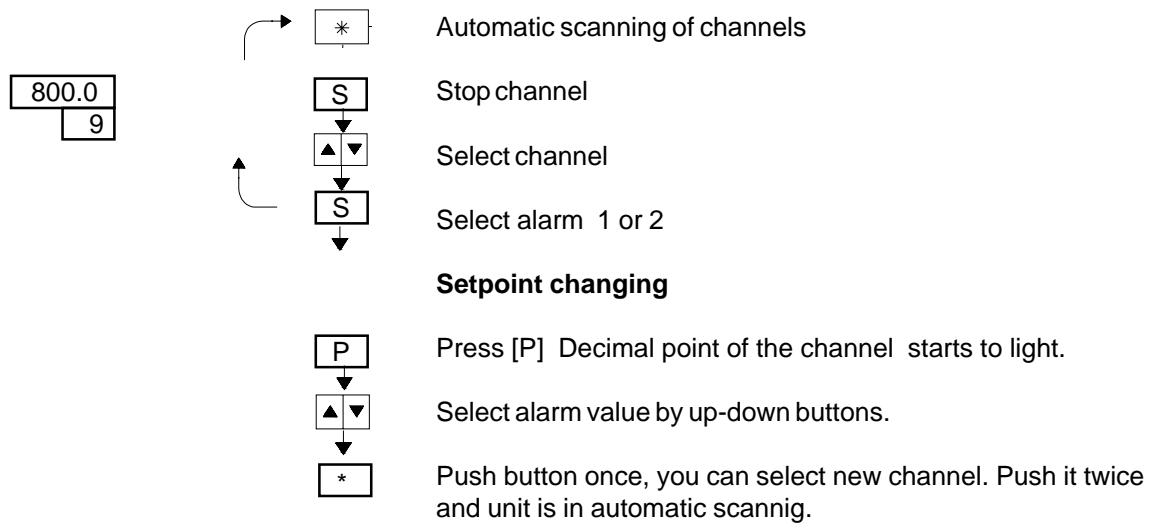
# Front panel



## Selection of channel



## Alarm settings



# Programming from the front panel

## Common settings

Display

CONF

1

Buttons

P

 + 

S

Press [P] and then [S] at the same time until the screen displays [CONF]

CONF means that you are ready to start programming.

## Common settings

You can select the number of input/output channels used, or special functions between channels etc.

→

CONFIG

CO

\*

▲▼

↓

Select text CO to the channel screen by up-down buttons.

CH

10

\*

▲▼

↓

Select total number of input channels (1..10)

SP

0

\*

▲▼

↓

Special options.(For future use)

AL

0

\*

▲▼

↓

Select number of alarms (0...12)

OU

0

\*

▲▼

↓

Select number of outputs (0...5)

Cr

0

\*

▲▼

↓

Special settings. (Factory use only).

←

Calc

0

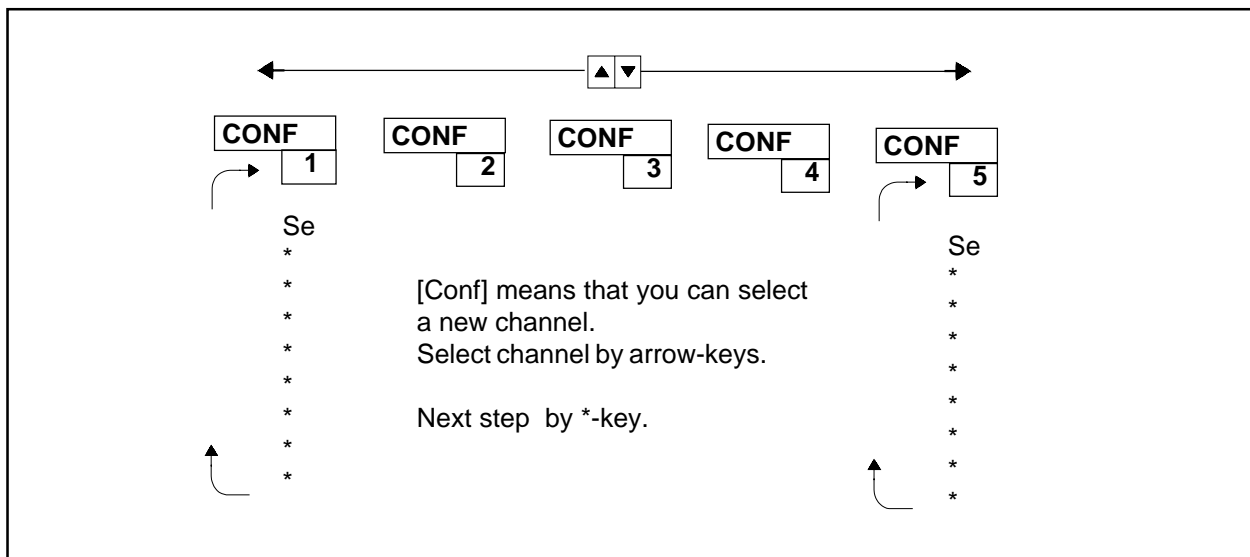
\*

▲▼

↓

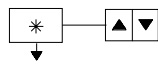
Special settings. (Factory use only).

## Channel settings



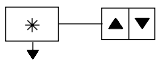
### Select channel number and press [\*]

CONFIG  
1



Select channel by up-down buttons.

SE 1



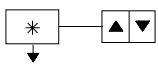
Select type of input signal

0:	None	7:	TC	J/DIN
1:	0..20 mA	8:	TC	K
2:	4..20mA	9:	TC	R
3:	Pt100 3-wire*	10:	TC	S
4:	Pt100 4-wire*	11:	TC	T
5:	TC E	12:	mV	
6:	TC J	13:	0/20 mA sqr	
		14:	4/20 mA sqr	

\* Pt100 signals only for channels 9 and 10.

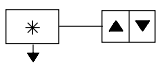
Channels 9 and 10 doesn't accept square root inputs 13 and 14.

En 1



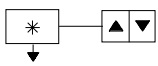
Select whether channel is delayed or not, in automatic scanning.  
1 = Channel displayed, 0 = Not displayed.

Ed 1



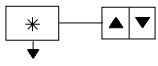
External display (via RS232) 1=external display, 0=none

DE 1



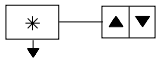
Select decimals, 0...3. Floating decimal point.

Lo 00



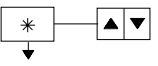
Select low-end of display, f.ex 0.0 (= 0 or 4 mA input).

Hi 00



Select high-end of display f.ex 100.0 (= 20 mA input)  
(only if sensor SE=1 or 2 is selected).

Loff



Offset changing, f.ex. -1.0 degrees below measured value  
Press \*-key and set value.



## Output Scaling

<b>OC</b> 1		Select type of output. 0=none, 1=0..20 mA, 2= 4..20 mA.
<b>OL</b> 0		Select output line, 1..5. 0=no outputs.
<b>LO</b> 1		Select zero level for output ( display= 4 mA output)
<b>Hi</b>		Select max. value ( display= 20 mA output)
<b>AC</b>		Alarms Select alarm type <b>(Alarm 1)</b>

- 0: None
- 1: Low alarm                      On-off alarm
- 2: High alarm                     On-off alarm
- 3: Low alarm                      Manual reset
- 4: High alarm                     Manual reset

<b>AL</b>		Number of alarms used. Alarms 1..2 are selectable without additional card.
<b>ALAR</b>		Alarm setpoint value. You can set alarm level now or later.
<b>HYS</b>		Select hysteresis 0...100 %.
<b>AC</b>		Select alarm type <b>(Alarm 2)</b>

- 0: None
- 1: Low alarm                      On-off alarm
- 2: High alarm                     On-off alarm
- 3: Low alarm                      Manual reset
- 4: High alarm                     Manual reset

<b>AL</b>		Number of alarms used. Alarms 1..2 are selectable without additional card.
<b>ALAR</b>		Alarm setpoint value. You can set alarm level now or later.
<b>HYS</b>		Select hysteresis 0...100 %.
<b>CONF</b>		Pres *-key to exit configuration or select new channel by arrow keys.

## End of configuration

<b>CONF</b>	<b>P</b>	<b>Save and exit</b>
<b>DONE</b>		Display will show the text <b>done</b> a few seconds after exit.
		<b>If you are not sure that settings are correct, you can store old settings by [S] and exit.</b>
<b>LOAD</b>	<b>S</b>	Exit without saving new values. Earlier settings are stored. Display will show the text <b>load</b> .
		After text <b>DONE</b> , normal measuring continues.

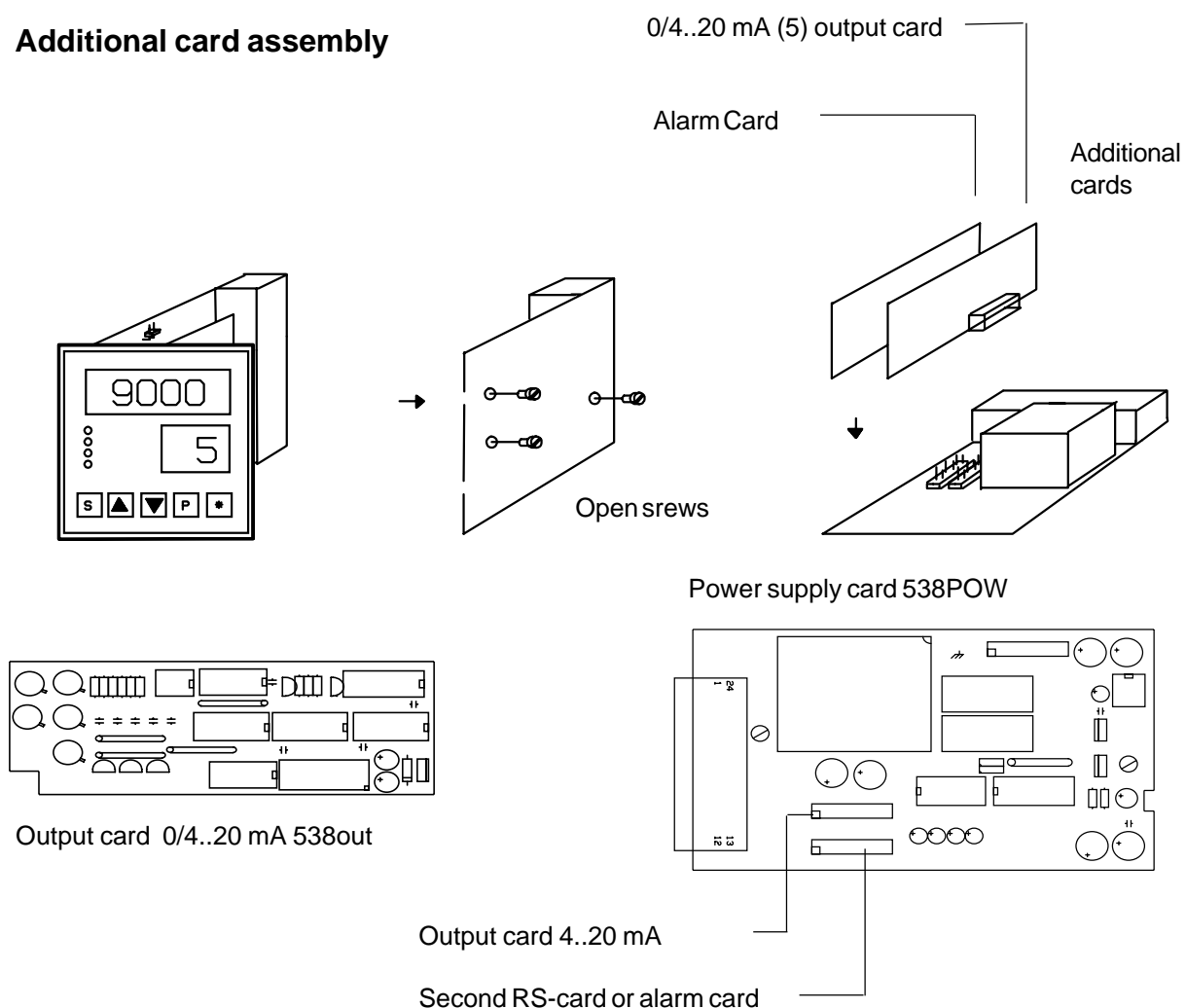
## Adding extra cards:

Output signals, logic alarms and second serial communication (RS232) needs extra card. Loose only the 3 screws and mount the desired card instead. The mounting of cards does not provide any calibration. The settings will be done only by front panel keys and 538 is ready for use.

## Procedure:

1. Remove electronics from the case. Loose fastening screws on the rear cover and remove the front panel.
2. Loose three screws as shown in picture. Remove flat cable.
3. Add the desired card to connector as shown in the picture. Mount output card to connector near to transformer and RS-card or logic card to the other connector.

### Additional card assembly



**Note!** Power must be off when device case is open!

# Calibration:

## Model 538-10

**Model 538-10 is an autocalibrating instrument and no conventional recalibration is necessary.**

However, if you change processor card or analog part, recalibration must be done.

Reference values to be stored in memory:

Reference value shall be given to each measuring sensor. Accuracy of 538-10 is depending on the accuracy of this reference value.

Reference values:

Voltage measurement 50.000 mV (channel no 1)

Pt100 sensor 0.0 °C (channels no 9 and 10)

Thermocouple type K 20.0 °C (channel no 3)

Current input 20.00 mA (channels no 1...5)

You can now connect the sensors and set the given ref. values except current input. Place the jumper according to picture 1 and 538 is ready for calibration. Display shows text CAL. Choose sensors by arrow keys, CAL (50.000 mV), CUR (Pt100), SEN (20.00 mA), COLD (thermocouple), DAC (output signal 0..20.00 mA), Voltage signal 50.000 mV must be calibrated first.

Accept calibration by pressing \*-key, select the next one and continue until all calibrations has been made.

### Calibration procedure:

**1.** Remove electronics from case. Connect the sensors as shown in picture no 1. Let 538 to stabilize to room temperature, about 30 min, before calibration.

warm up (cold calibration). The display shows 1..2 °C below or above real value during warm up time (about 1/2 hour).

**2.** Connect jumper to connector L1, see next page picture. Display shows text CAL.

**6.** Connect current signal 20.00 mA to channels 1..5 and close DIP-switches on the rear cover. Choose by arrow-keys text SEN and press \*-key. Display shows CAL.

**3.** Feed 50.000 mV into channel 1. The accuracy of calibrator should be better than 0.01 % (5 1/2 digit). Press \*-key when display shows text CAL: Apply 50.000 mV to input and press \*-key, when you see 50 in the display. Apply 0.0 mV and press \*-key when you see 0 in the display. The text CAL returns to the display when voltage calibration is done.

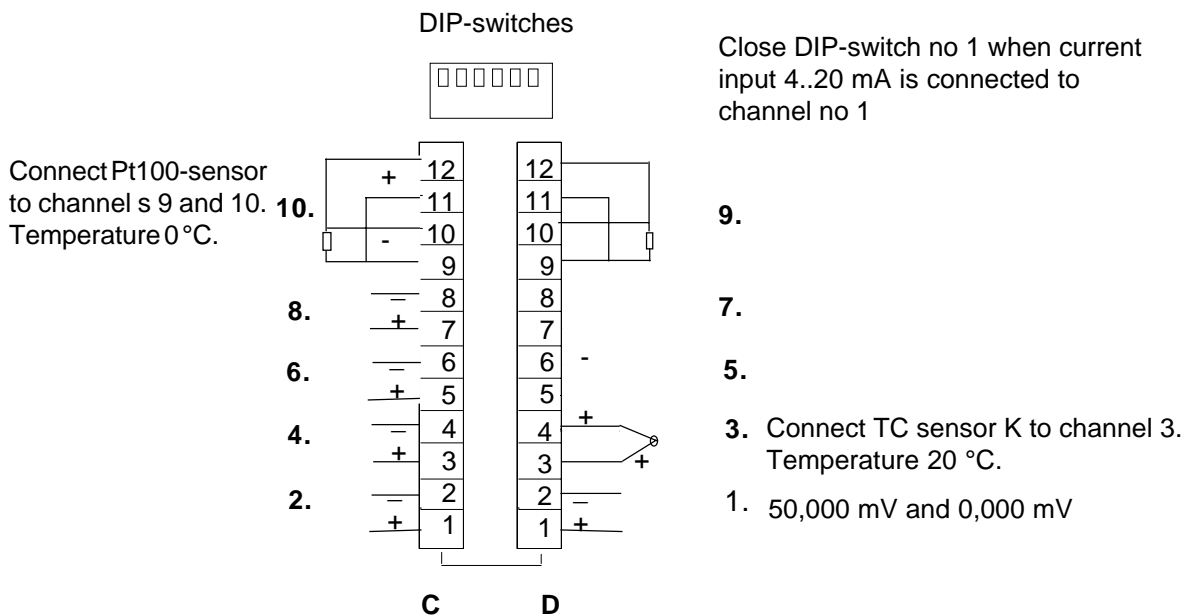
**7.** Calibration of output signal. Connect calibrating meter to output channel 1 (0..20 mA). Choose display to show DAC and press \*-key. Displays shows text LO. Press \*-key. Adjust by arrow-keys value 0.00 mA or 4.00 mA to output. Press \*-key and display shows text SPA. Press \*-key. Adjust by arrow-keys value 20.00 mA to output.

**4.** Connect Pt100-calibrator to channel 9 using 4-wire connection. Feed 0.0 °C (100 ohm) to input. Choose by \*-key text CUR. Press \*-key and display shows text A. Press \*-key and display shows text b. Connect the calibrator to channel 10 and Press \*-key. Display shows now text CAL.

All the points 1..7 may be repeated, if necessary. However, voltage calibration (50 mV) must be done first.

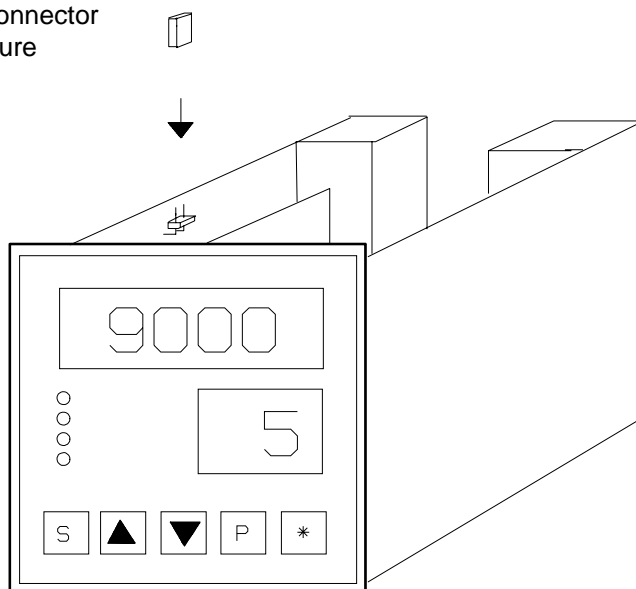
**5.** Connect TC-calibrator to channel 3. Use compensating cable type K. Feed 20.0 °C to input. Choose by arrow-key text COLD. Press \*-key until display shows CAL. Calibrate before terminals are

Calibration values will be saved in memory when you remove jumper from connector 1. Displays shows now text DONE. Display may be errorous during some seconds before new calibration coefficients correct values in the displays.



**Picture no 1. Connections and channels for calibration of mV, TC and Pt100 sensors (538-10)**

Put the jumper to connector L1 as shown in picture

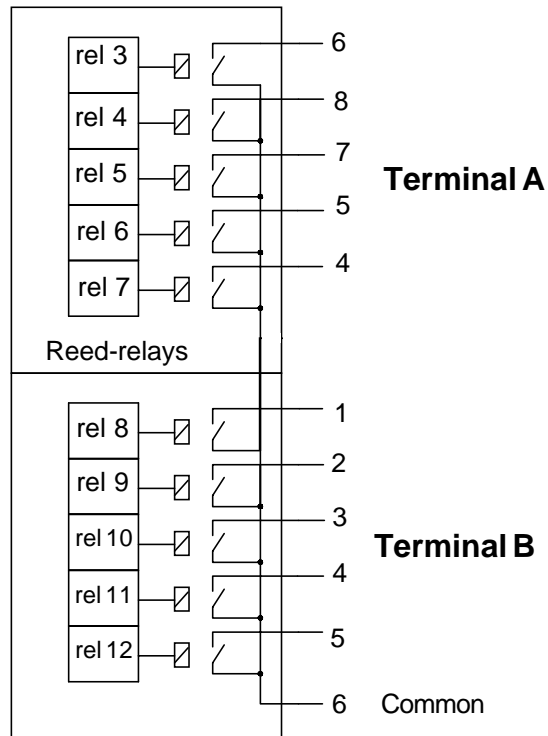


**Picture no 2. How to make 538-10 ready for calibration**

## Alarm Card 538REL

Relays 3 to 7 in  
Card 538REL/5

Relays 8 to 12 in  
Card 538REL/10

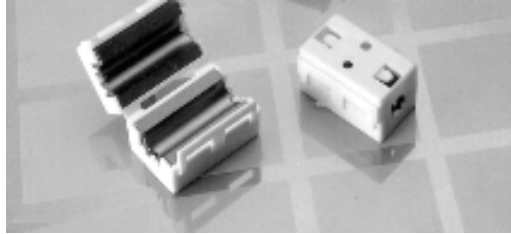


Relays: reed-relay, max 60 V, 0.5 ADC/AC.

### Important Note

Because we continuously develop our products and add new functions, you may find on the display symbols 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.

## Ferrite core eliminates peaks from the power supply lines.



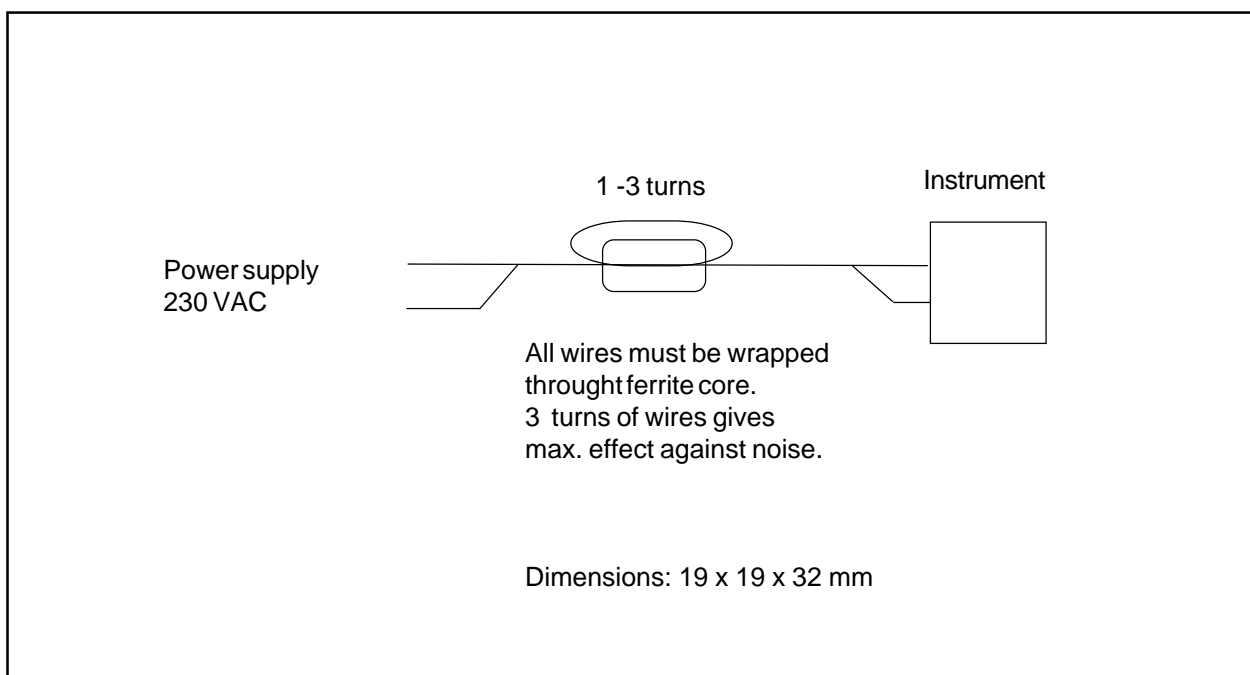
A range of easy to fit line filters provides a simple solution to the problems of radiated noise emissions generated by electronic equipment.

### Installing:

The filter is installed simply by clipping it around the power cable. Ferrite core is locked by compressing it tightly with no need to disconnect the cable or to remove connectors.

### Features:

- \* High performance EMC components dramatically reduces electromagnetic noise.
- \* High-performance ferrites with againsts high frequency noise.
- \* Easy installation for cable
- \* Can be added as first-aid, on -the-spot noise, when interferences occur.



**Notes:**

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