

Panel Meter AP 11

Technical documentation U-19



AP11 - 37 - Counter

APOELMOS
measurement & control
www.apoelmos.cz



ISO 9001

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AP11-37 Counter is 5 digit programmable panel meter for measuring in time dependent current signal. Device is controlled with digital signal processor with A/D transducer. Counter is operated with key-board placed on front panel or with control software that is used for setting of all parameters and archiving measured values. Panel meter has to be provided with communication line, variants of communication lines are in ordering code. Control software is included in standard delivery. Counter is equipped with three-colour display allowing for a quick check of limits within measured value oscillates. Visually interesting element is auxiliary horizontal bargraph. AP11 Counter inputs are assembled for unified outputs from sensors of technological processes

(0/4-20 mA, 0/2-10 V). There is an variant with analogue output that can be galvanic separated in panel meter ordering code. With multi-stage types of panel meters analogue output can be assigned to any input by a program, eventually to sum. Any of the communication line variants can be used for communication of panel meter with PC. Communication lines RS232 or RS485 (can be galvanic separated) are in ordering code. Combination of two communication lines RS232 and RS485 can be used for above standard applications. Communication enables not only setting of parameters and data archiving, but regarding the possibility of addressing of individual panel meters it can be also used for interconnection of bigger number of panel meters and controlling of complete technological lines.

Ordering code

This technical documentation refers to the following chart of ordering codes

fig.1

AP 11 - XX - X - X - X - X - X - XXX							
							Input
37							1 x current signal input 0/4 - 20 mA
							1 x pulse signal input
							Contact output
	0						empty
	1						2 x relay (switching contacts 250 VAC, 2A)
	2						4 x relay (switching contacts 250 VAC, 2A)
							Analogue output
		0					empty
		1					current/voltage without galvanic separ
		2					current/voltage with galvanic separ. GS
							Communication
			0				empty
			1				RS232
			3				RS485 with GS
			6				RS485 with GS + RS232
							Power supply
				1			80 - 253 VAC
				2			18 - 36 V AC/DC
							Display
					4		three colour
							Software
						001	Counter
						xxx	special requirement

Example of order code

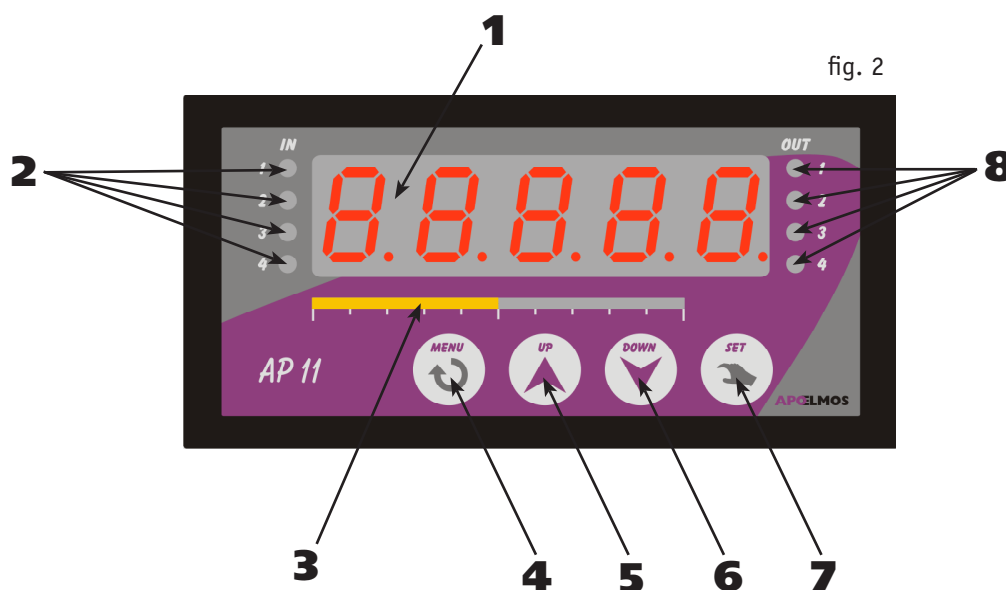
AP 11 - 37 - 2 - 2 - 3 - 1 - 4 - 001

Input signals, accuracy				
Type	Input signal	meas.range	Accuracy of measurement (% of scale)	Code
Process	1x current signal (AI)	1x 0/4-20mA	± 0,25%	37
Pulse	1x pulse signal (CI)	0-10KHz		37
	Comparator level	LOW 3,9 V/2,4 V	± 0,5 V	
		HIGH 7,5 V/6 V		

Power supply	
Power supply voltage	80 - 253 VAC, 50 Hz 18 - 36 VDC / 18 - 36 VAC, 50 Hz
Consumption	max. 12 VA
Display	
Display	-9999 ~ 0 ~ 99999 (5-digit LED)
Height of digits	14 mm
Decimal point	Adjustable with program
Bargraph	30 LED
Resolution	According to position of decimal point
Auxiliary power supply	
	> 18 VDC @ 25 mA for feeding of sensors Max. load of auxiliary power supply 40 mA
Outputs	
Contact	2x relay (switching contact 250 VAC, 2A or 30 VDC, 2A) or 4x relay (switching contact 250 VAC, 2A or 30 VDC, 2A)
Analogue	13.5 bit D/A transducer without galvanic separation or with galvanic separation current 0 (4) – 20 mA, loading resistance max. 400 Ω voltage 0 – 10 V, loading resistance min. 10 kΩ
Communication	
RS485	without galvanic separation or with galvanic separation, two way communication
RS232	without galvanic separation

Mechanical properties	
Type	AP11 panel meter
Dimensions	96 x 48 x 119 mm
Opening in panel	90,5 x 43,5 (openings in corners $\varnothing$ 3 mm with pitch 89,5 x 42,5 mm)
Keyboard	4 keys, foil
Weight	400 g
Operating conditions	
Working conditions	0 - 60 °C
Temperature coefficient	25 ppm/°C
Stabilizing time	Within 5 min after activation
Shielding	IP 54 (front panel) IP 20 (terminal board)
Calibration	at 25 °C and 40% relative humidity
Data back-up	electrically (EEPROM), bat.CR2032SLF (RAM)
Auxiliary input	Voltage free contact, digital inputs
Connection	
Connector terminal board	
Max. section of conductor	2.5 mm ² for power supply and contact outputs 1 mm ² for other connectors
Safety class	I
Electromagnetic compatibility ČSN EN 61326	
Seismic resistibility ČSN IEC 980: 1993, čl. 6	
Electric safety ČSN EN 61010-1: 2003	

Front panel



1 - Display

Five-digit display for indication of measured value. With parameter programming display show clear reports.

2 - Input „IN” indicators

No. of of selected input (functions IN-1,IN-2,SUM1,SUM2)is indicated with respective indicator. Individual inputs are selected with keys „UP” and „DOWN”.

3 - Bargraph

Bargraph relates to measured value that is determined with pre-set range of STR and END.

E.g. if start of range (STR) is 0 and end (END) 200 and measured value shall be on level 100, bargraph shall indicate half of the scale. Bargraphs is formed with column of LED diodes.

4 - Key „MENU”

Key „MENU” is used for entering configuration menu and setting mode.

5 - Key „UP”

Key „UP” is used for browsing parameters and setting of numeric data when programming. Pushing and keeping down of the key speeds up browsing and setting procedure.

6 - Key „DOWN”

Key „DOWN” is used for browsing parameters and setting of numeric data when programming. Pushing and keeping down of the key speeds up browsing and setting procedure.

7 - Key „SET”

Key „SET” is used for setting data, programming termination, data uploading into EEPROM and return to operating mode.

8 - Output „OUT” indicators

Indicators OUT 1 to OUT 4 indicates state of individual outputs in the following manner: indicator flashing – output switched, indicator is not flashing – output is off.

DIMENSIONS OF Panel meter AND ASSEMBLY OPENING

Dimensions for power supply 80 - 253 VAC, 50 Hz (fig. 3a)

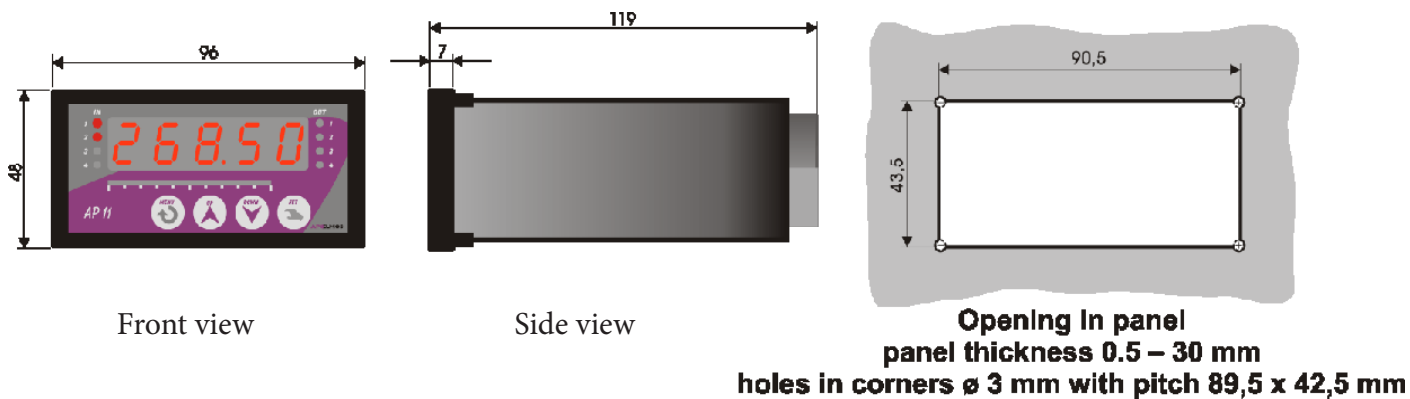


fig. 3a

Dimensions for power supply 18 - 36 VDC / 18 - 36 VAC, 50 Hz (fig. 3b)

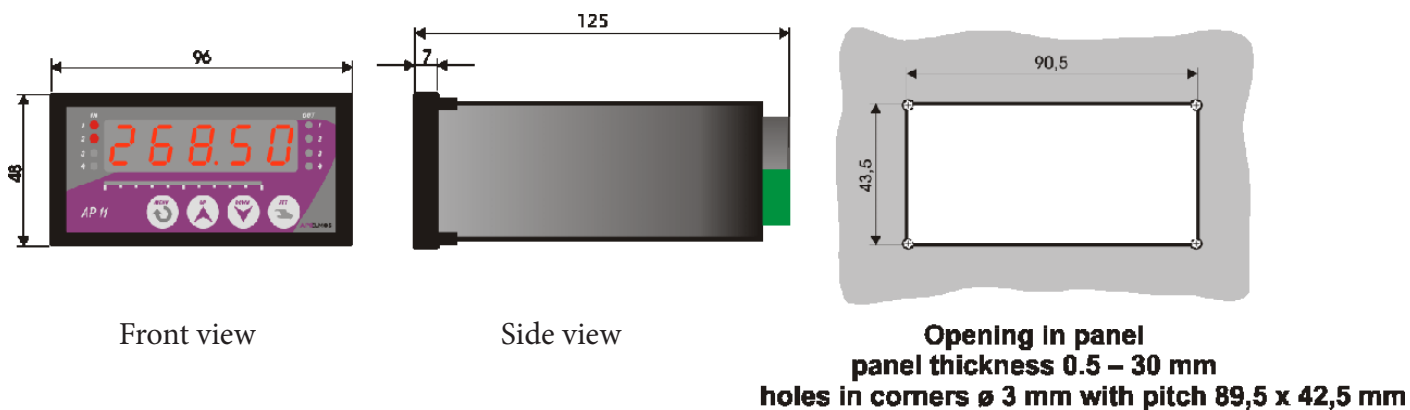


fig. 3b

Description of back panel

4.1

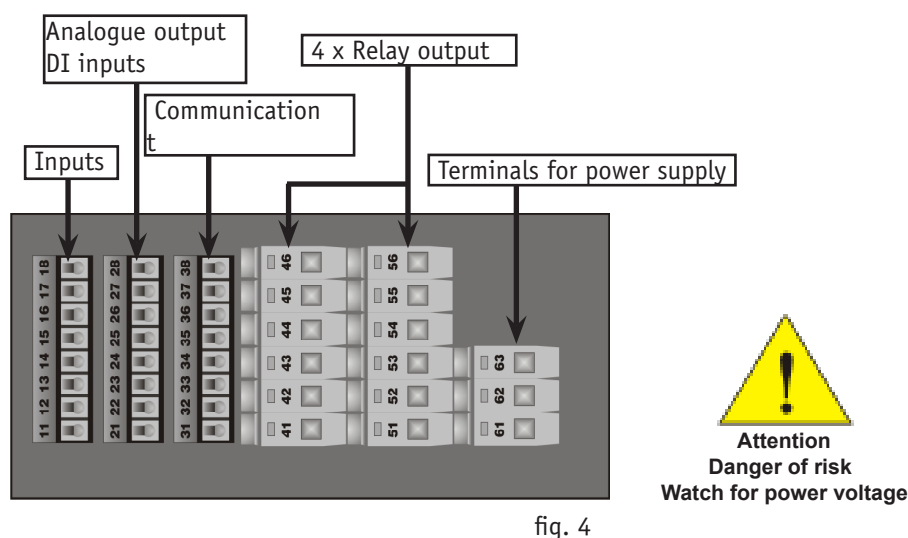


fig. 4

Instructions for installation into panel and connecting

4.2

Fix panel meter into panel with two clamps (included in delivery).

Connect conductors into screw connectors on the back panel of regulator. Connectors are designed as separately detachable constructions blocks as follows:

- connectors 11 to 18 – process and pulse inputs
- connectors 21 to 28 – analogue output
- connectors 31 to 38 – communication
- connectors 41 to 46 – relay output
- connectors 51 to 56 – relay output
- connectors 61 to 63 – power supply

Pull each block with connectors out from panel meter (locking force has to be surpassed) in backward direction. Then connect conductors to released blocks with connectors and then insert blocks back to apparatus.

Max. cross section of conductors on relay connectors and power supply is 2,5 mm², on other connectors 1 mm².

Reducing of interference influence

4.2.1

Following rules should be observed with designing of the system:

- a) All power supply conductors and power lines has to be led separately from signal lines (e.g. thermocouple, communication). Min. gap between these types of lines shouldn't be less than 30 cm.
- b) If signal line crosses power line they should intersect in right angle.
- c) Lead the lines out of the potential source of interference.
- d) Don't install relay and contactors too close to panel meter.
- e) Use twisted and screened conductor for signal line.

4.3

Connecting of power supply

**Caution!**

Danger: Don't connect panel meter to power supply until all inputs are connected. Wrong connection of panel meter can cause injury!

Panel meter connection

During connecting of panel meter main switch or safety circuit breaker has to be:

- part of building installation
- in the close vicinity of equipment
- easy to reach for operating personnel
- marked as equipment disconnecting element

If the equipment is used in different manner than specified by producer, protection provided with equipment can be disturbed.

Recommended safety fuse for power supply 230 V je 1 A / 250 VAC

Recommended safety fuse for power supply 24 V je T 3,15 A / 250 V

4.3.1

Connection of power supply conductors in terminal board

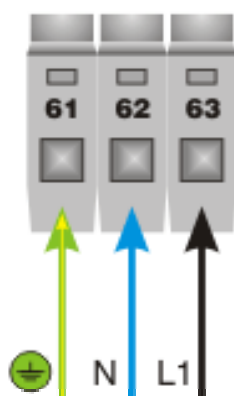
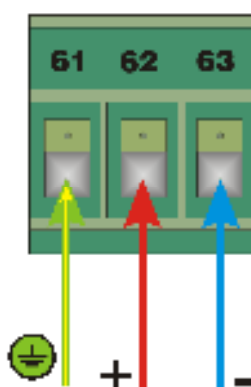
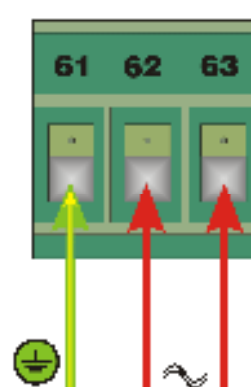
Alternating feeding voltage 80 - 253 VAC, 50 Hz**Feeding voltage 18 - 36 VDC****Feeding voltage 18 - 36 VAC**

fig. 5

Connecting of input signals

Following diagrams show possibilities of sensors and process signal connections.
Select input signal in function menu **SENS** (see chapter sensor type setup - **SENS**)

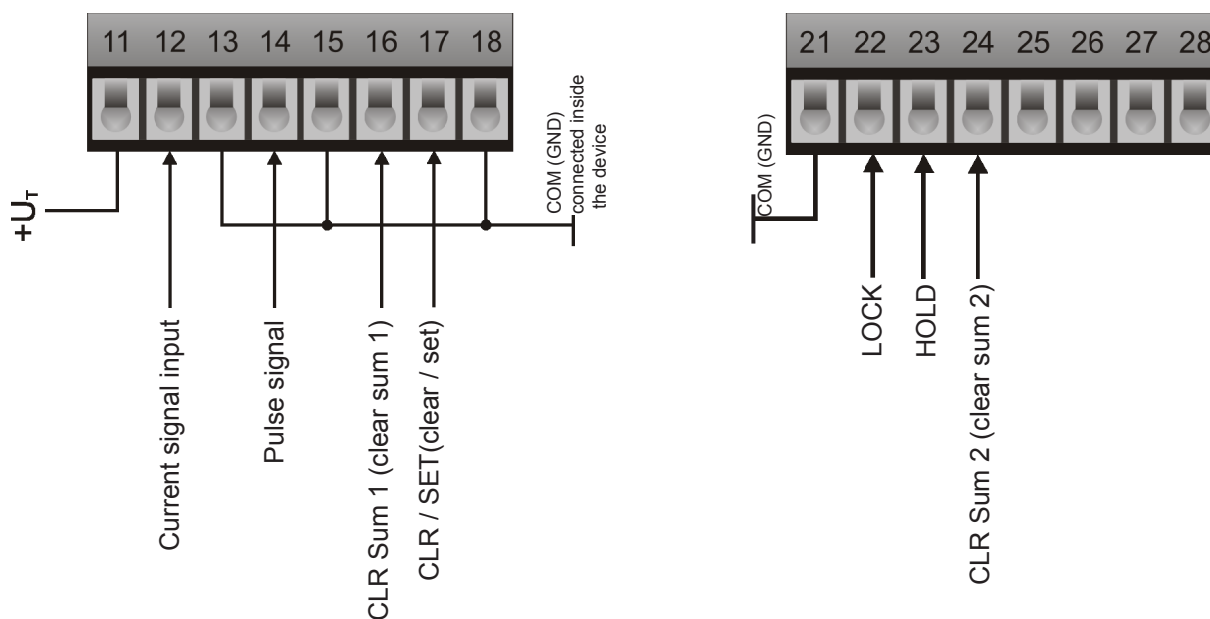
Variants of input signals

Type of input signal	Symbol on display	Schematic
SENS		6,9
DIGITAL INPUT (DI)		
CURRENT SIGNAL(AI)		
4-20mA Passive current transducer	4-20	7,8
0/4-20mA Active current signal	0-20 4-20	
Pulse signal (CI)	TOTAL/RATE	10,11,12

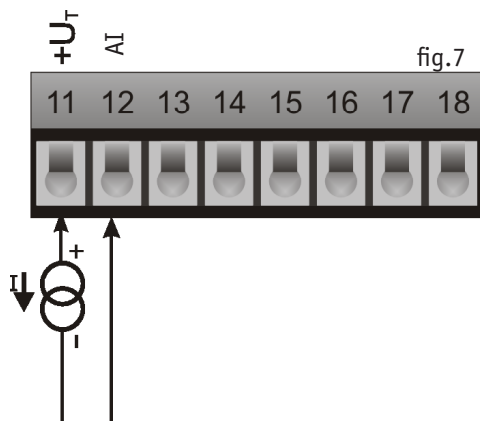


Requirement of right measuring is necessary to set type of signal input in menu **SENS** during device configuration.

figure.6

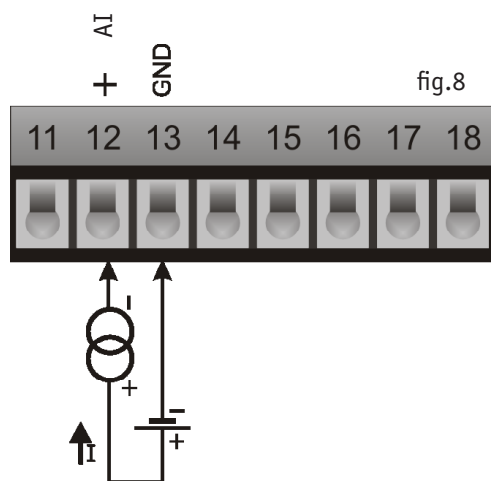


4.4.1 Current signal 4 - 20 mA (passive double-conductor transducer)



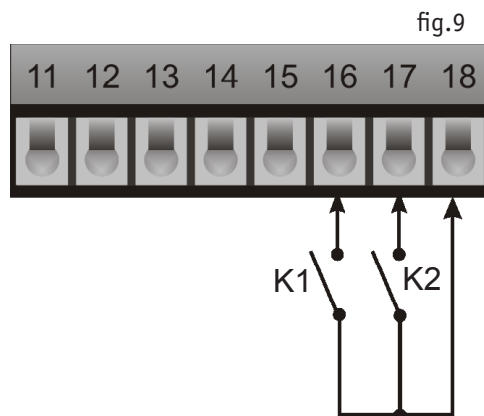
Connect double-conductor transducer to connectors 11, 12, as shown in schematics where connector no. 11 is power supply. Press MENU key and enter device configuration menu, browse with keys UP and DOWN to the function of sensor selection **SENS**. With repeated press get to submenu for selection of sensor type **TYP**. Press the menu key again and enter submenu, where with keys UP and DOWN set 4 - 20 mA for 4 - 20 double-conductor passive transducer and press key SET to confirm the selection. Then set range of measurement. Start of range is definable in submenu SENS with function **STRS**, and ending of the range with function **ENDS** (SET key confirms the menu icons setting). Leaving the device config menu by pressing SET key will save all settings to device EEPROM.

4.4.2 Current signal 0/4 - 20 mA (active current signal)



Connect active current signal **0/4 - 20 mA** to connectors 12, 13, as shown in figure 8 where connector no. 13 is minus pole. Press MENU key and enter device configuration menu, browse with keys UP and DOWN to the function of sensor selection **SENS**. With repeated press get to submenu for selection of sensor type **TYP**. Press the menu key again and enter submenu, where with keys UP and DOWN set 4 - 20 mA for 4 - 20 double-conductor passive transducer and press key SET to confirm the selection. Then set range of measurement. Start of range is definable in submenu SENS with function **STRS**, and ending of the range with function **ENDS** (SET key confirms the menu icons setting). Leaving the device config menu by pressing SET key will save all settings to device EEPROM.

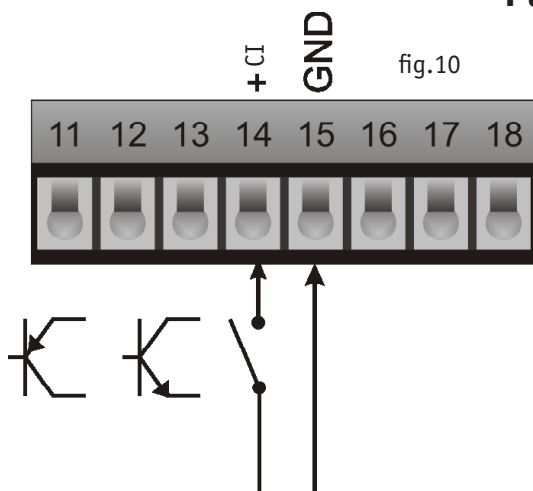
4.4.3 Auxiliary digital inputs



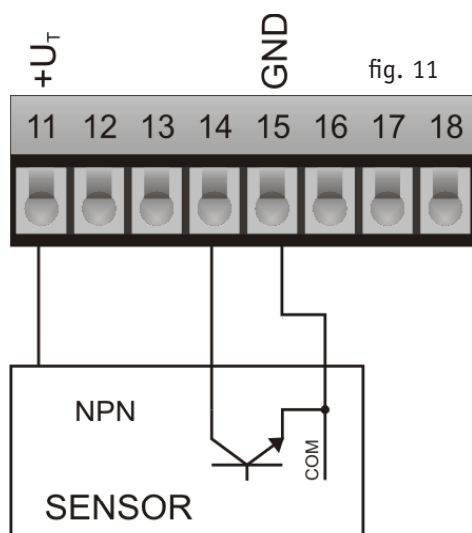
K1 - contact resets SUM 1
K2 - contact for resetting / setting measured value
more on page 35

Pulse signal input CI (max. 10 kHz)

4.4.4



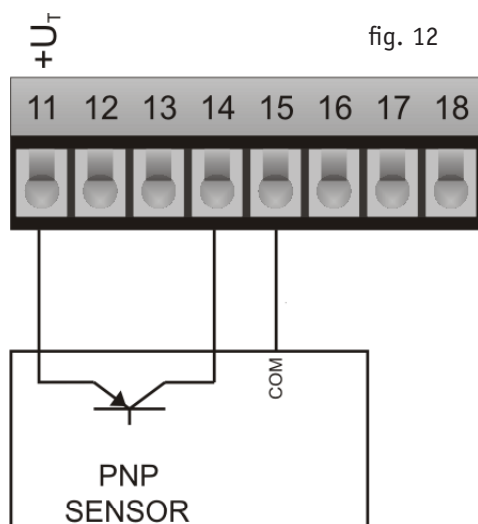
Connect pulse signal input to connectors 14 and 15 via schematics, where connector 15 is minus and 14 is pulse signal. In menu item **CONF** set the function of pulse input to **TOTAL / RATE** (counter / frequency-meter), **INPUT** to NPN and the level of the input comparator **TRIG** to LOW.



Example connection of sensor with NPN output level. In menu item **CONF** set the function of pulse input to **TOTAL / RATE** (counter / frequency-meter), **INPUT** to NPN and the level of the input comparator **TRIG** to LOW.



Attention of maximum sensor consumption



Example connection of sensor with PNP output level. In menu item **CONF** set the function of pulse input to **TOTAL / RATE** (counter / frequency-meter), **INPUT** to PNP and the level of the input comparator **TRIG** to LOW.

5.1

Connection of analogue output



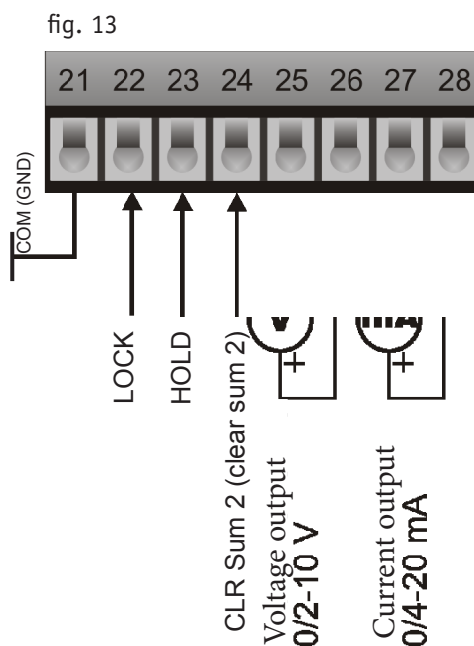
Analogue output is connected to connectors 21 - 28 (fig. 13).

Press key MENU , make output setup and enter into configuration menu. Press keys UP and DOWN to get to DAC0 option. Press menu key again to enter into setup level. Press keys UP and DOWN to select required type of analogue output 0-20, 4-20, 20-0, 20-4. Press key MENU to confirm selected parameter.

In panel meter is necessary to select type of analogue output in menu DAC0 -> AOUT and setup parameters in DAC0 -> ASTR and AEND

Features of analogue output

Type of analogue output	Symbol on display
Current	
0-20 mA	0-20
4-20 mA	4-20
20-0 mA	20-0
20-4 mA	20-4
Voltage	
0-10 V	0-20
2-10 V	4-20
10-0 V	20-0
10-2 V	20-4



Options of analogue output connections with or without galvanic separation are shown on fig. 13. Type of output signal is selected in menu with parameter DAC0 and in its submenu by function AOUT.

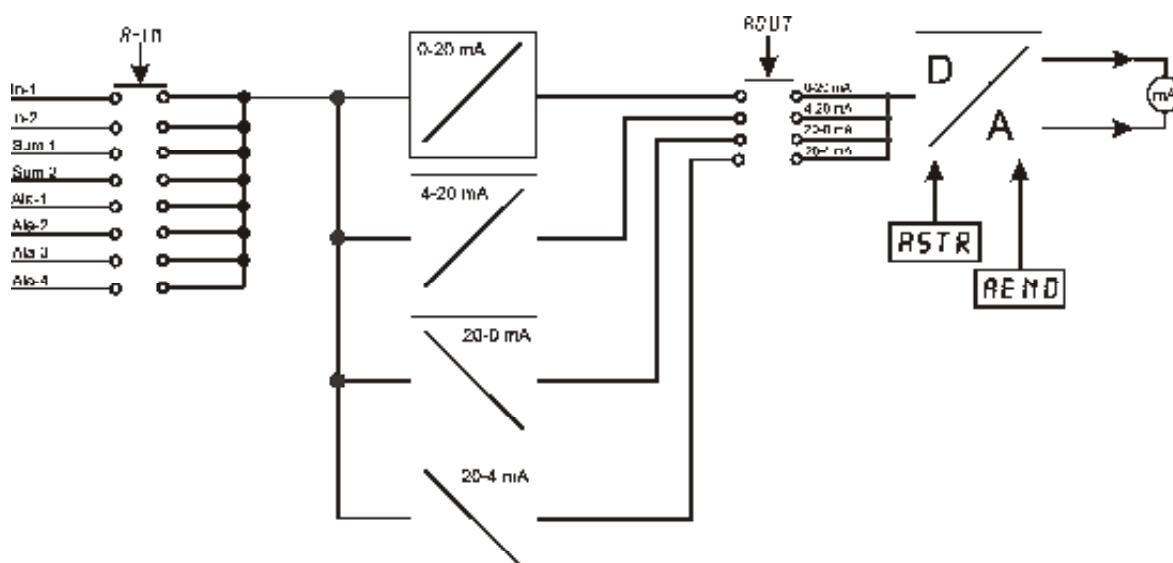
Block diagram of analogue output function

5.2

Principle of analogue output is shown on block diagrams Fig. 14 and 15. Diagrams of voltage and current output are separated for better orientation. In real connection are inputs and setup AOUT, ASTR and END common. For correct function of panel meter set range of analogue output ASTR (start of range), AEND (end of range), that relates to input signal – see configuration of start and end of analogue output.

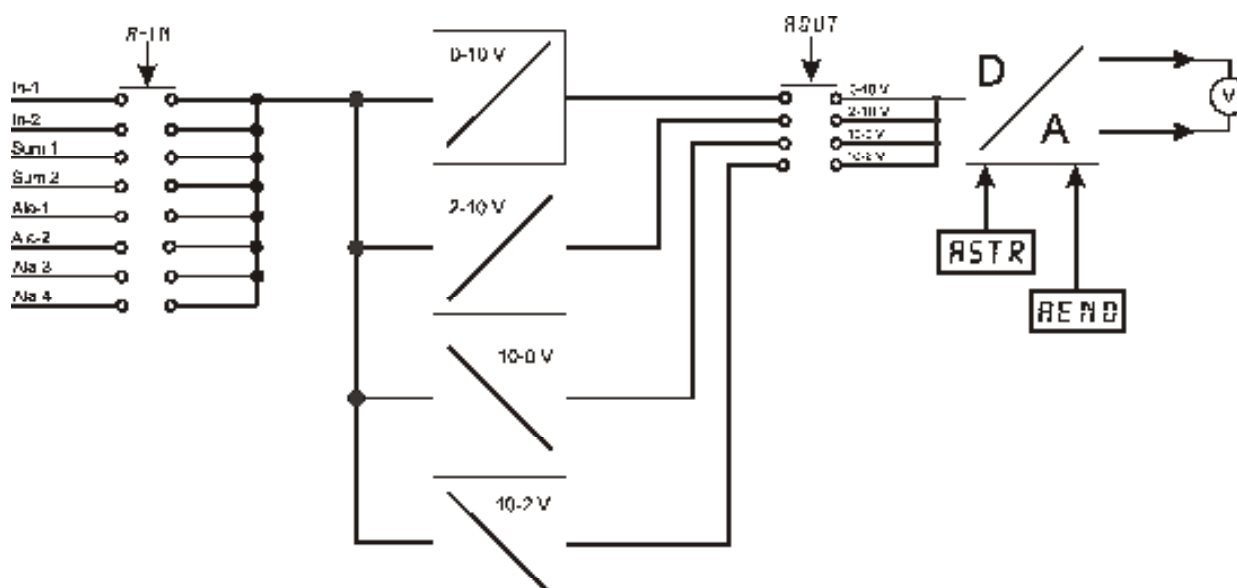
Current output

fig. 14



Voltage output

fig. 15



Panel meter AP11-37 can be equipped with communication line with protocol MODBUS, that is selected with order of panel meter according to ordering code. Following options of communication lines are available: RS232, RS485 with galvanic separation or both simultaneously.

Diagram of communication lines RS232 and RS485 connections

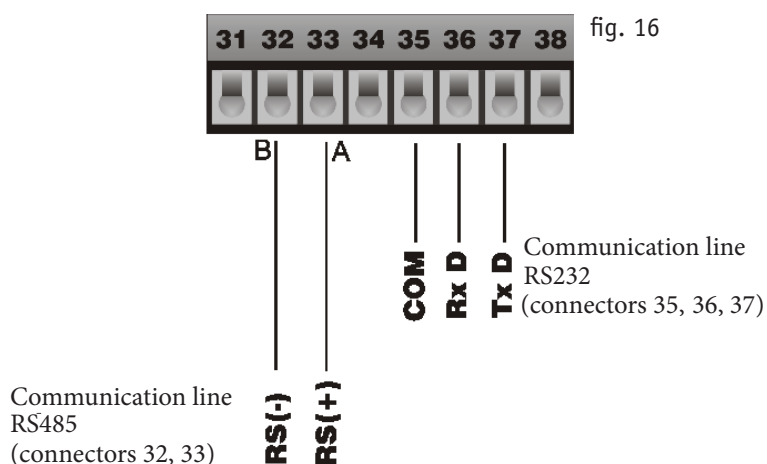
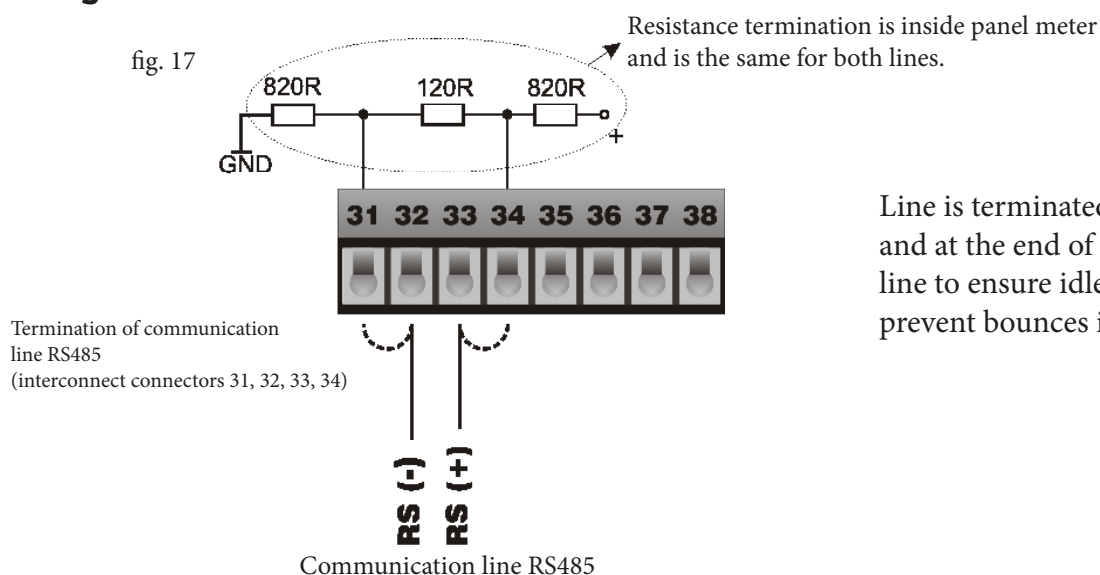


Diagram of communication line RS485 connection



Line is terminated at the beginning and at the end of communication line to ensure idle conditions and to prevent bounces in line.

Diagram of communication line RS232 connection to PC (connector Canon 9 pin)

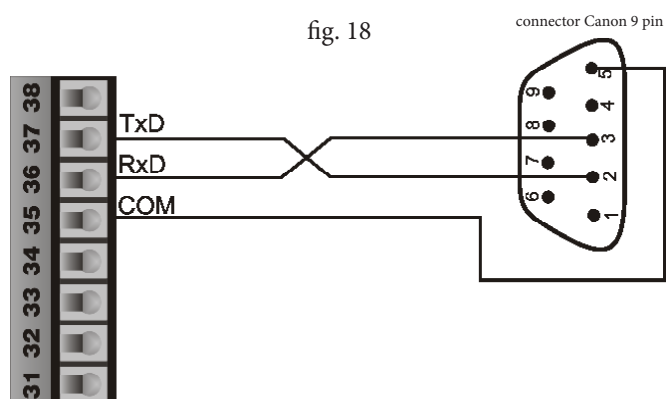
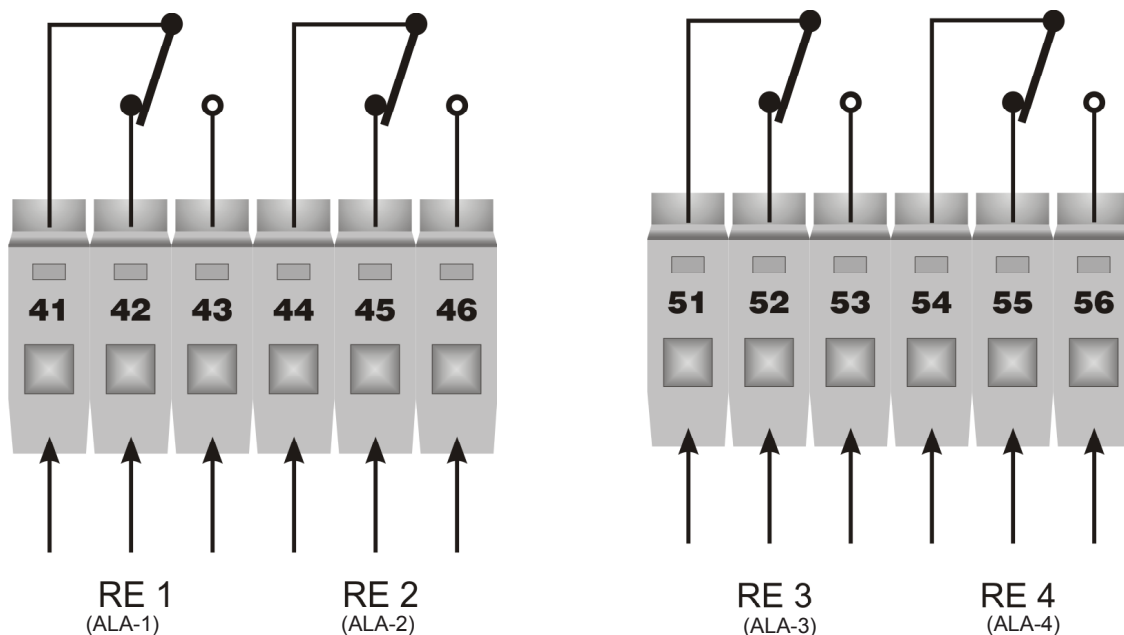


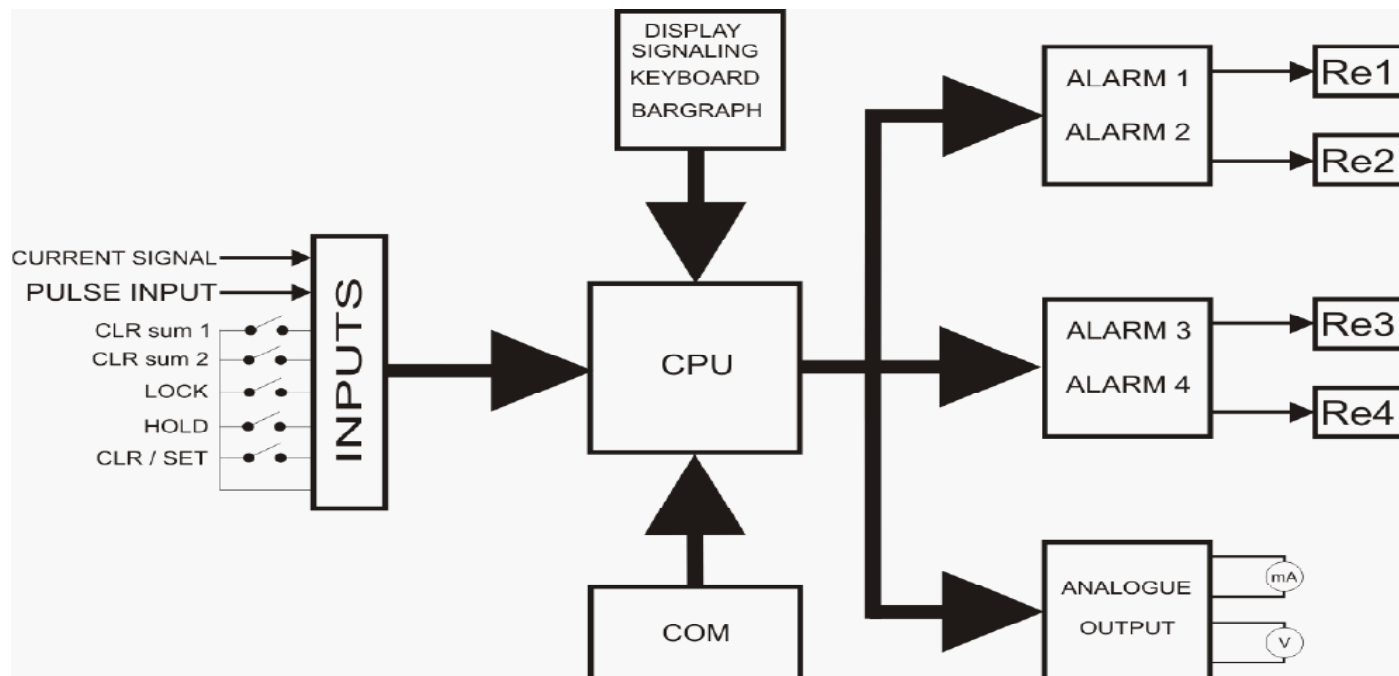
Figure 19 shows options of connections of output relay contacts. Max. load of relay contacts is 250 VAC, 2 A or 30 VDC, 2A. It is advisable to connect antijamming RC cells (e.g. 220 ohm and 0,1 μ F) to respective contacts to increase reliability and to reduce jamming. State of output relays 1,2,3,4 (if present) select in menu of AP11-37 . The state of relays setup in submenu parameters ALA1 to ALA4.

fig. 19



BLOCK DIAGRAM OF AP11-37 COUNTER

fig.20



8.2

Panel meter switch on

Main switch is not included in panel meter therefore it activates immediately after connection to power supply. LOAD briefly appears on panel meter display. During this time initialization and test of inner parameters is performed. After completion of test panel meter switches to working mode.

**Caution**

If LED diode IN 1 flashes panel meter needs to be recalibrated.

8.3

Panel meter reset

Unplug panel meter from power supply. Keep key **SET** pressed and connect the panel meter to power supply. Keep the key pressed until sign **RESET** appears on display.



Default parameters are restored after reset!

Display setting

8.4

AP 11 Counter is equipped with three-colour display(standard) with possibility to set permanent colour changes or changes with relation to the amount of measured value. You will appreciate this function namely with instant visual check of limits, within which measured value oscillates. E.g. if measured value oscillates within the correct range it flashes in green (G). If the value is lower it flashes in yellow (Y). If maximum allowed limit is exceeded it flashes in red (R). Display colours in dependence on measured value can be modified as needed. Colour and display parameters can be set in regulator menu (key MENU) and scrolling to parameter dis-1 to dis-2.

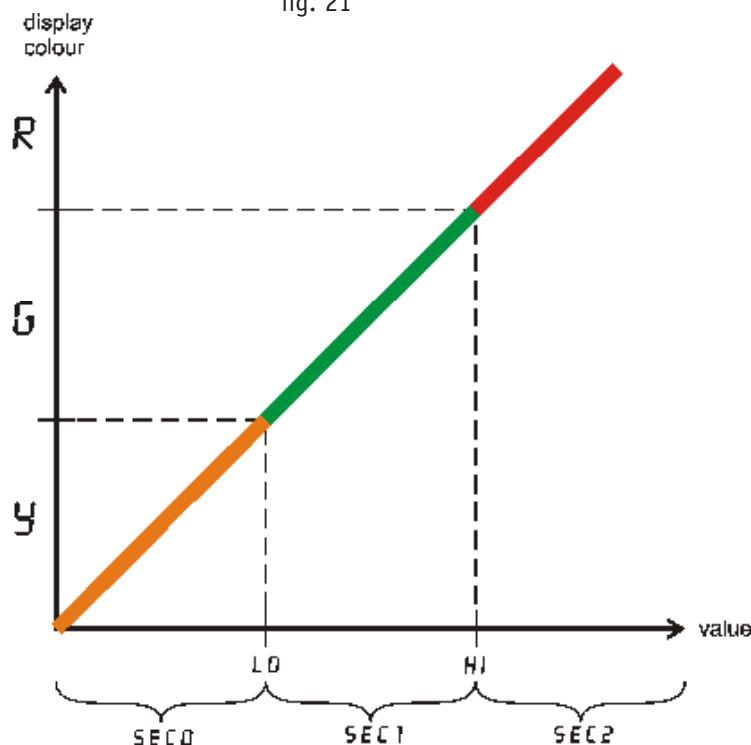
Fig. 21 schematically shows principle of colour change in dependence on measured value.

In regulator Menu it is necessary to set to which sector (SEC-0, SEC-1 and SEC-2) the particular colour is assigned (R, G, Y). Then it is necessary to set limits within which the measured value should oscillate. Bottom limit is defined with parameter LO and top limit with HI. With this setting we suppose that required value is located in sector 1 (SEC-1) and if it oscillates within set limits, display flashes in green. If the value falls below LO (sector 0) it starts flashing in yellow and on contrary if measured value rises on the top limit HI display starts flashing in red. Colours assigned to individual sectors SEC-0, SEC-1, SEC-2 can be changed in regulator menu as needed. If you want to change display colour permanently without any relation to measured value set the same colour to all parameters SEC0, SEC1, SEC2 .

With requirement for two colour display set only one of two limit parameters LO or HI separating two neighbouring sectors and set for one sector e.g. red colour (R) and for remaining two sectors green (G).

example:

fig. 21



In menu for display properties setting DIS-1, intensity of display light can be set. Scroll to parameter LIGHT in menu. In setting mode display light intensity can be set to 25%, 50%, 75% and 100% with keys UP and DOWN. Change of display light intensity is common for all inputs.



Change of display colour according to measured value is always related to selected input!

Bargraph

Bargraph is related to input value, which is determined by parameter B-IN.

It roughly indicates amount of measured value within limits set by a user. Thanks to these properties of bargraph it is possible to find out immediately the limits of measured value oscillation.

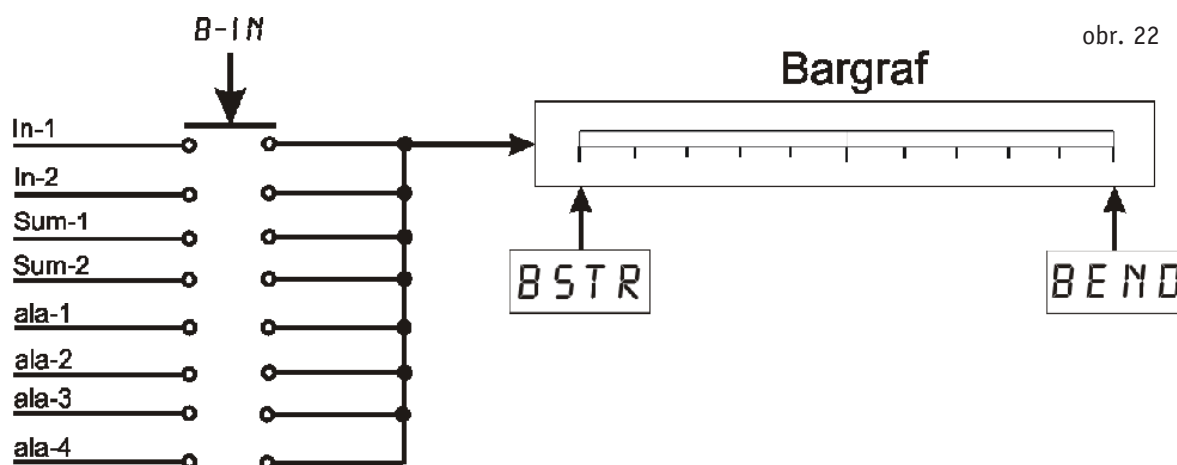
Press key MENU to enter into configuration menu, find function for option of bargraph *B A R G R A F*. Press key MENU to enter into submenu where confirm parameter BSTR for option the start of bargraph range with pressing key MENU.

Set required value with keys UP and DOWN. Press SET key to confirm changes. To set the end of bargraph range find in submenu *B A R G R A F* parameter BEND. Setting procedure is identical with BSTR. Choose as the last item for which input are required values set. Find in submenu parameter B-IN. Press key MENU to enter into setting mode and set required input *I N - 1*, *I N - 2*, *S U M - 1*, *S U M - 2*, *A L A - 1* to *A L A - 4*. Press key SET to confirm the setting.

E.g. the start of range (BSTR) is 0 and the end (BEND) 200 and measured value shall be on level 100, bargraph

shall indicate to the half of the scale. Bargraph is formed with column 30. of LED diodes.

Setting parameter *B - I N* to *A L A - 1* to *A L A - 4*, bargraph takes configuration parameters from menu ALA1/ALA2/ALA3/ALA4 ie. *B - E N D* is derived from required value *S P*. Starting range of bargraph *B - S - T R* is in this case 0.



Functions of limit switches

8.6

Figure 23. shows connection of inputs to limit switches (ALA1 to ALA4)

fig. 23

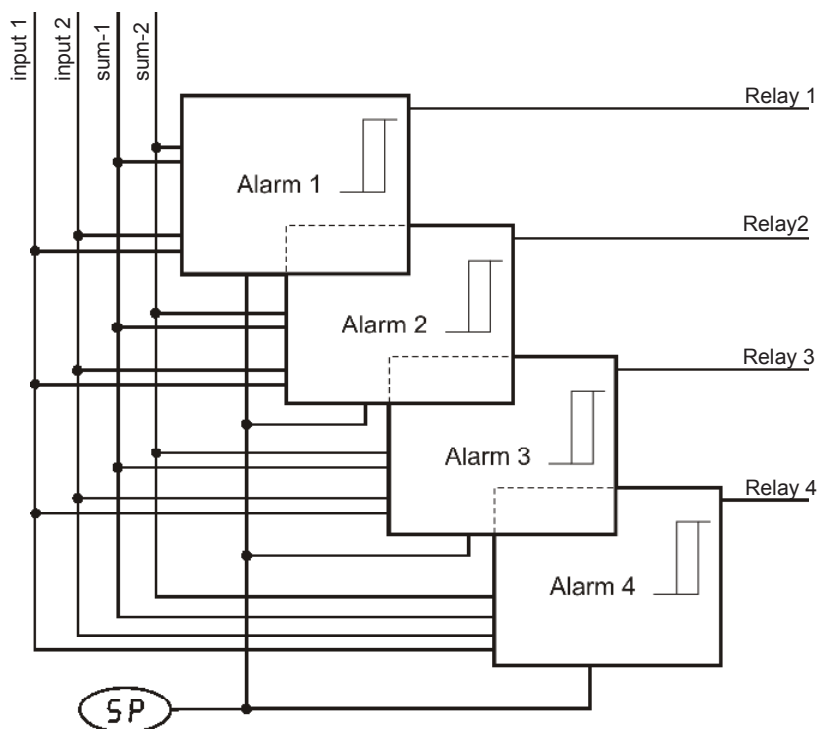
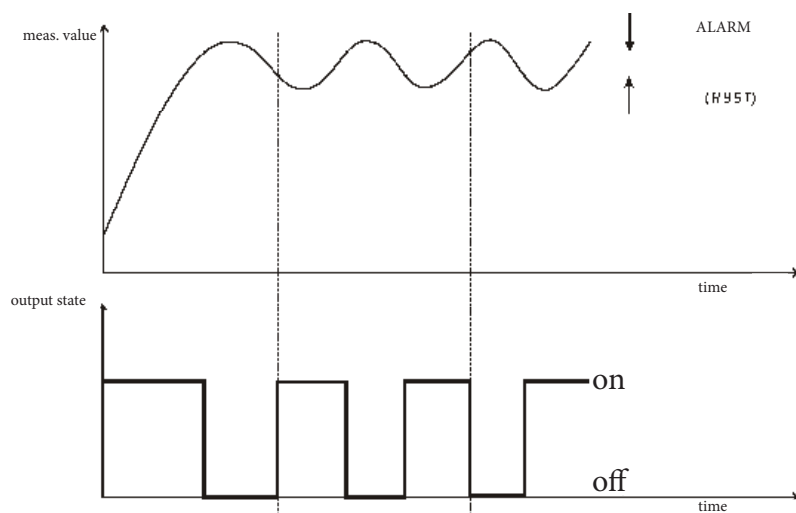


fig.24



8.6.1

Functional characteristics of limit switch

Any input value that can be compared with value for limit switch can be selected for signalling of emergency condition. Value for limit switch can be selected in menu item

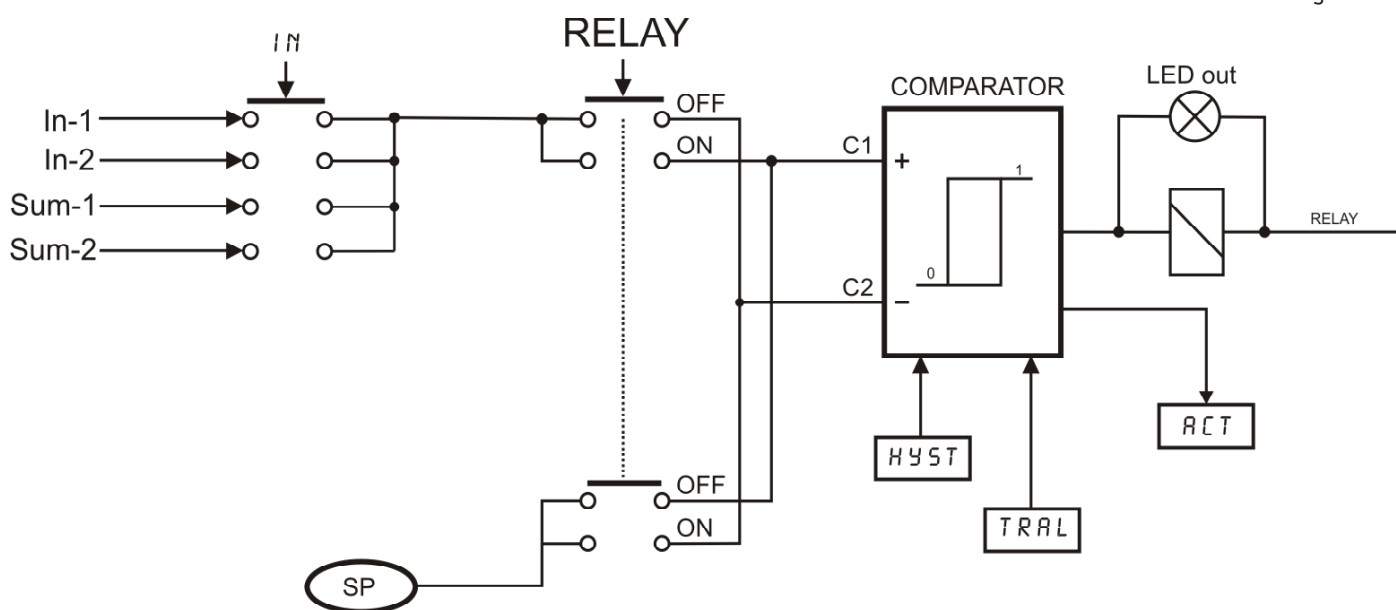
ALA1 to ALA4->RELE Set state of output relay (whether it should switch on or off after exceeding of required value).

Vanishing of alarm conditions, of limit switch alarm is delayed by hysteresis set in ALA1 to ALA4->HYST

Function name	Configuration menu	Meaning
State of relay	<i>R E L E</i>	Setup of output relay positing at exceeding of limit switch values. OFF switches off with exceeding the value. ON switches on.
Value of limit switch	<i>S P</i>	Setup of limit switch alarm value.
Input value	<i>I N</i>	Selection of INPUT for limit switches(<i>I N- 1</i> , <i>I N- 2</i> , <i>S U M- 1</i> , <i>S U M- 2</i>)
Output signalling	<i>T R A L</i>	Alarm for limit switch can be temporary TRAL (x) = NO or permanent TRAL (x) = YES or TRAL=TIME a) Temporary limit switch alarm goes off after elapsing of alarm conditions. b) Permanent limit switch alarm is on even after elapsing of alarm conditions. Alarm can be switched off after elapsing of alarm conditions with scrolling into config.menu in icon CLR. Permanent alarm is also switched after power supply failure. c)Time period of switched output
Hysteresis	<i>H Y S T</i>	Setup of switching hysteresis of output relays.
EVENT/ACTION	<i>A C T</i>	- <i>N O</i> --no event <i>C L- S 1</i> -reset SUM1 <i>A D- S 1</i> -adding to SUM1(+meas.value) <i>S U- S 1</i> -subbtraction from SUM1(-meas.value) <i>C L- S 1</i> -reset SUM 2 <i>A D- S 2</i> -adding to SUM1 (+1) <i>S U- S 2</i> -subtraction from SUM2(-1) <i>C L- I N</i> -clearing measured value Events take action only if alarm conditions are met. Repeated events occur only if alarm is over
Time limit switch value	<i>T I M E</i>	Setting of switching time period for output relay (TRAL set to TIME)

Limit switch schematics

fig. 25



Setting of limit switches for individual inputs is in configuration menu of AP11-37 realized parameters ALA-1 to ALA4. For setting first press key MENU and enter panel meter configuration menu scroll to alarm functions ALA-1 to ALA-4 with repeated pressing of MENU, enter submenu and scroll to parameter in. Press key MENU and get to the other submenu, where define inputs according to diagram (in-1, in-2, Sum-1, Sum-2). Setting of ALA1-to ALA4 are similar.

Example: Setting of ALA-1. Enter to config menu by pressing MENU key, then scroll by using UP and DOWN keys to ALA-1. Press MENU again to enter submenu of ALA-1. First set the parameter SP, value when alarm occurs. Press MENU key and by pressing UP or DOWN set the requested value. Confirm setting by pressing SET key. Next parameter to be set is HYST (hysteresis). Press MENU key and by pressing UP or DOWN set the requested value. Confirm setting by pressing SET key. Next function is IN parameter. It defines for what input will be alarm used. By pressing MENU key values IN-1, IN-2 or SUM-1, SUM-2 can be set. Confirm setting by pressing SET key. Next step is setting of state of output relay contacts when alarm values are exceeded. Scroll to RELE function, press MENU key and enter setting mode. With keys UP and DOWN select either ON (switches when the value is exceeded), or OFF (switches off when the value is exceeded), confirm the setting with pressing SET.

Next is TRAL function. This function determines whether limit switch should automatically switch off (function TRAL of respective input is in state no) after vanishing of alarm conditions, or if limit switch remains permanently switched/switched off after exceeding alarm conditions and it can be switched off only after alarm conditions subside by scrolling to menu item CLR (function TRAL of respective input is in state yes).

Permanent alarm is also switched after failure of power supply voltage. In configuration menu scroll to TRAL function, press MENU key and enter setting mode and assign state ON or OF or TIME (period of switched relay) to respective input. Confirm the setting by pressing SET. Parameter ACT defines action/event which runs after alarm values are exceeded (for more see chapter 9).

9.1 Functions of buttons in setting mode



Key „MENU“ is used to enter configuration menu and setting mode.



Key „UP“ is used to scroll and set the value in configuration mode.

Keep the key pressed for approx. 3 s to speed up scrolling and setting.



Key „DOWN“ is used to scroll and set the value in configuration mode.

Keep the key pressed for approx. 3 s to speed up scrolling and setting.



Press „SET“ key to confirm the setting, finish configuration, enter data to EEPROM and to return to working mode.

Caution:

Beware of TIME OUT function.

If any key is not pressed in configuration mode during the period of 1 minute regulator switches by means of TIME OUT function to working mode without saving of selected parameters!



9.2 Working mode

LED IN-1 - Displays measured value of current signal input

LED IN-2 - Displays measured value of pulse signal input

LED IN-3 - Displays sum 1

LED IN-4 - Displays sum 2

If any measured value exceeds range of display, appropriate LED starts flashing. By pressing SET key display shows value which has exceeded. The amount of exceeds is shown after pressing lightning SET key .

Keys UP and DOWN are used to scroll between measured values in working mode of device.

Resetting Sum in working mode is possible with external contact (see chapter 4.4 - Auxiliary digital inputs)

EXAMPLE OF SETTING PARAMETER IN CONFIGURATION MENU .

Press MENU key to enter configuration menu. Scroll to required function (CONF) with keys UP and DOWN . Press MENU to enter submenu of required function. Set required parameter using keys UP and DOWN . Press MENU key again to get to parameter setting mode. Set required value or parameters with UP and DOWN keys. Press SET to return to submenu of required function. Press key SET again to return to configuration menu. Press SET key again to return to working mode of AP11 Counter and to save selected parameters.

Configuration mode

9.3

Simplified block diagram of counter menu

9.3.1

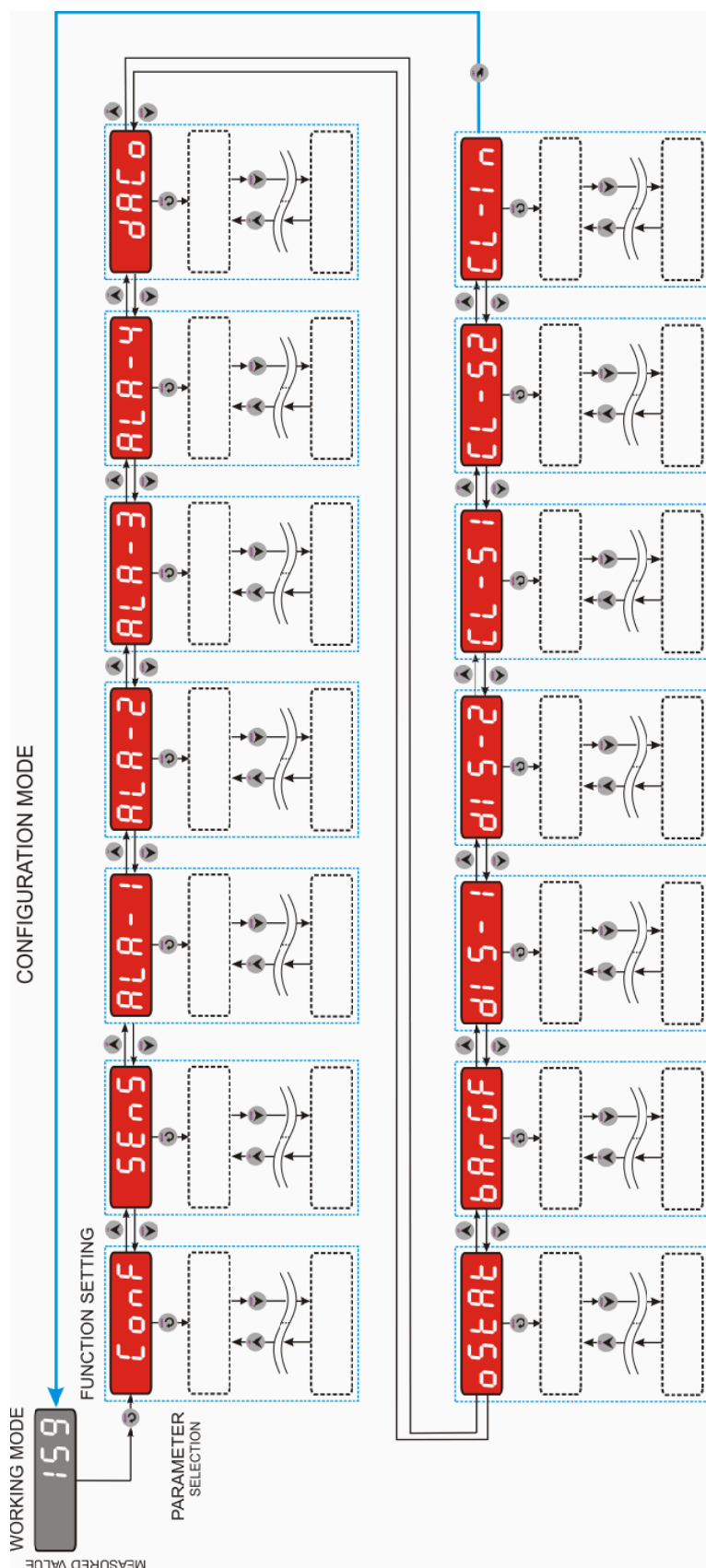


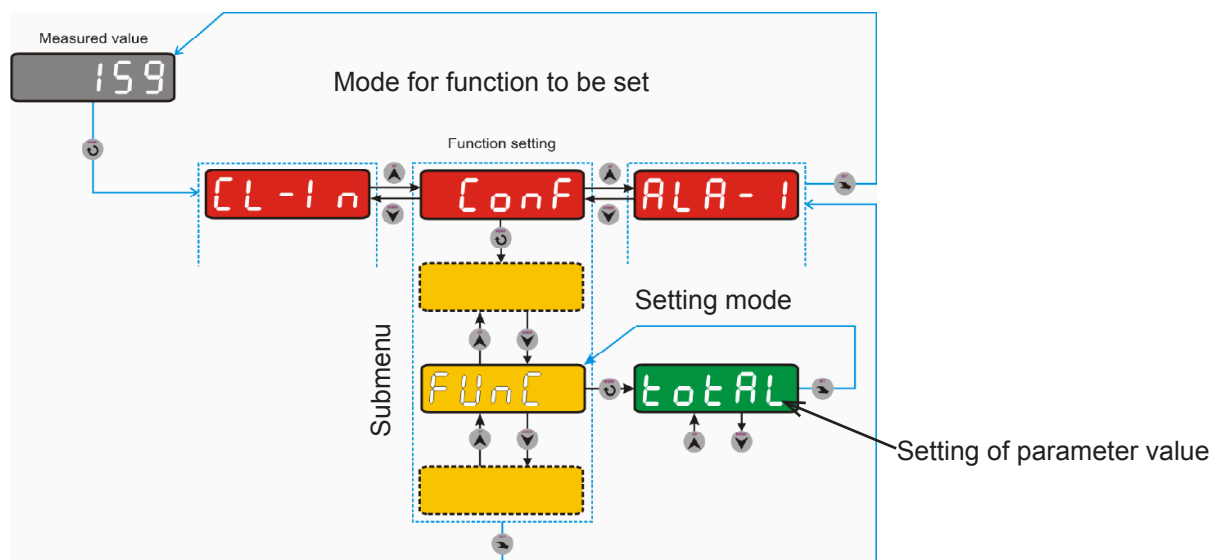
fig. 26

If alarm relays aren't connected (relay 1,2,3,4) menu items ALA1 to ALA4 aren't displayed.
If one-colour display is present menu item DIS-1 (DIS-2) doesn't appear.
Menu item CL-IN is active only when FUNC is set to TOTAL.

9.3.2

Configuration of pulse input CONF

Display of measured value in work-mode of AP11 Counter



Setting of pulse input CONF

SCALE - Scale parameter

FUNC - Function of device

Options:

TOTAL Counter
RATE Frequency-meter

TRIG - Input comparator levels

Options:

LOW Low level
HIGH High level

INPUT - Type of input signal

Option:

NPN
PNP

FACT - Scale factor

Option:

NUL Multiplication
DIV Divide

EDGE - Trigger edge

Option:

DOWN
UP

OFFS - Offset of scale

DP - Pulse input decimal point setting

FILTER - Filter for Pulse input

Filter setting against oscillation on Pulse input. Filter value multiplied 0,05 ms (50 μ s) is pulse length, which is necessary to equip the pulse input. Increase the value will reduce maximum possible frequency on input

Example:

Filter 10 reduces frequency on input above 1 kHz, minimum pulse length is 0,5 ms.

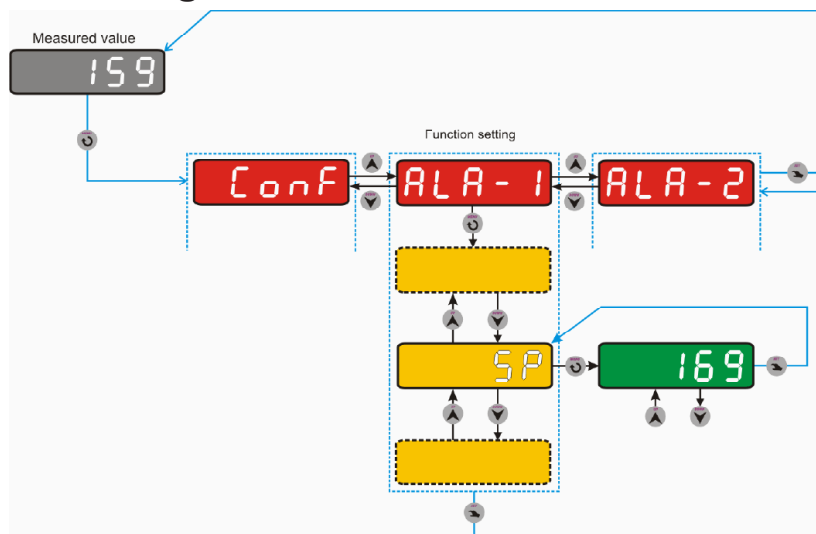
Filter 100 reduces frequency on input above 100Hz, minimum pulse length is 5 ms.

Filter 1000 reduces frequency on input above 10Hz, minimum pulse length is 50 ms.

Filter 10000 reduces frequency on input above 1 Hz, minimum pulse length is 0,5 s.

FILTER setting is connected with setting in *CONFIG*->*EDGE*. Counting of low or high level edge. If value is set on *LOW*, then *FILTER* is applied to low level of the signal on pulse input->pulse length on low level must be longer then *FILTER* setting. If value is set on *HIGH*, then *FILTER* is applied to high level of the signal on pulse input

Configuration of limit switches - ALA-1 to ALA-4



Parameters of functions ALA-1 to ALA-4

SP - setting of alarm value

HYST - setting of alarm hysteresis

RELE - state of output relay when limit switch value is achieved

Options:

OFF relay switches off when set value for limit switch is exceeded

ON relay switches on when set value for limit switch is exceeded

IN Setting of inputs possibilities alarm

Options:

IN-1 -Measured value of current signal input

IN-2 -Measured value of pulse signal input

SUM-1 -Sum 1

SUM-2 -Sum 2

TRAL - state of relay contacts after alarm conditions subside

Options:

NO temporary switching of limit switch – after limit switch alarm conditions subside, limit switch returns to original state

YES permanent switching of limit switch – after limit switch alarm conditions subside, limit switch remains permanently switched. It can be switched off only after subsiding of alarm conditions and disconnecting of regulator from supply voltage

TIME time switching of limit switch – after limit switch alarm time conditions subside, limit switch returns to original state

TIME- Setting time-switch period of alarm relay (TRAL set on TIME)

ACT- events set for alarm

Options:

- **NO** -no event

CL-S1-reset SUM1

AD-S1 -adding to SUM1(+meas.value)

SU-S1 -subtraction from SUM1(-meas.value)

CL-S1-reset SUM 2

AD-S2-adding to SUM1 (+1)

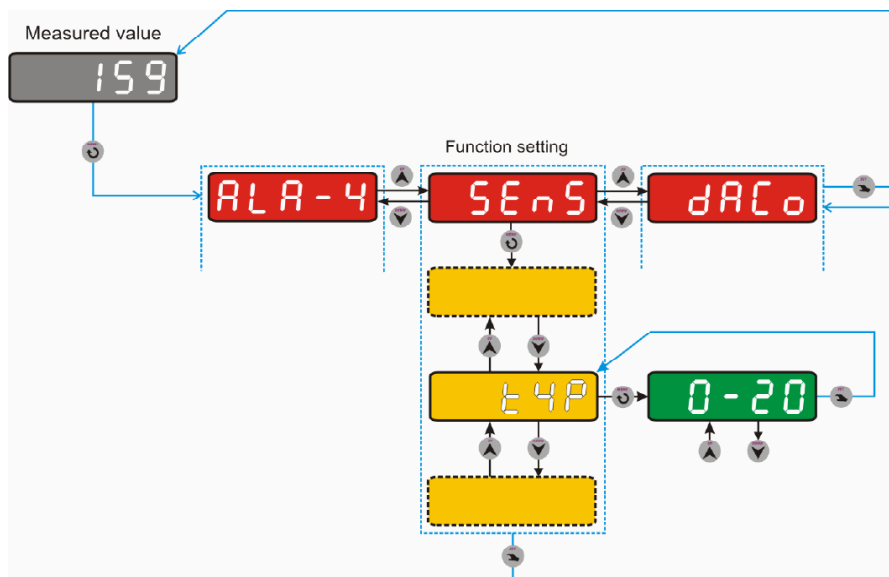
SU-S2 -subtraction from SUM2(-1)

CL-IN-clearing measured value

CLR - disabling permanent alarm state. Displayed only if **TRAL** -> **YES**

If relays (relays 1,2,3,4) are not connected, alarm MENU is not displayed.

Configuration of current input SENS



Parametry funkce SENS

Typ - Setting of input sensor type

Options:

0-20 0 - 20 mA

4-20 4 - 20 mA

- NO - without sensor (option - NO - disables input. After device startup IN1 is not displayed)

DP setting of decimal point position – refers to most numerical input parameters.

Options:

00000. units are displayed

0000.0 tenths are displayed

000.00 hundredths are displayed

00.000 thousandths are displayed

STR - Setting of start of input value measurement range The function sets start of range of input value measurement.

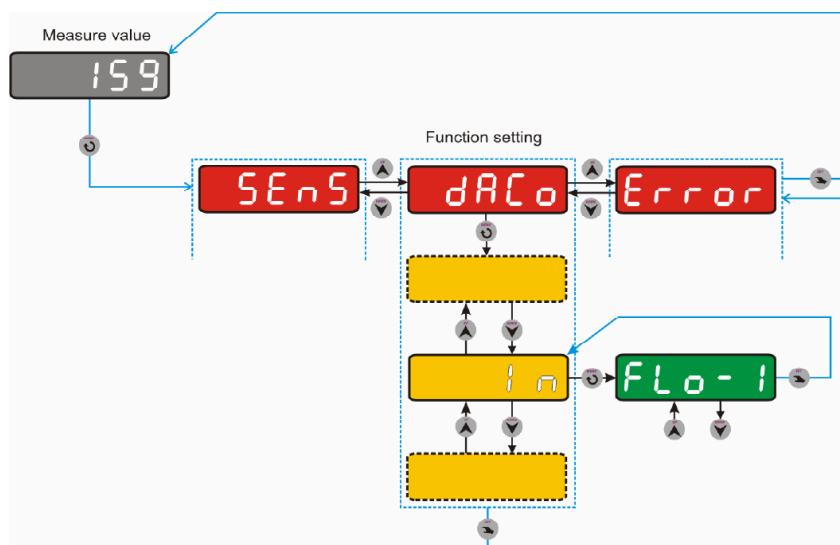
END - Setting of ending of input value measurement range
The function sets the ending of range of input value measurement.

OFFS - Setting of measured input value offset

Generally it is possible to compensate any inaccuracy of measurement with offset. If it is not necessary to set any offset or compensation, set value to 0.

Configuration of analogue output DACO

9.3.5



Function DACO parameters

IN	Setting of input possibilities to analogue output Options: IN-1 -Measured value of current input signal IN-2 -Measured value of pulse input signal SUM-1 -Sum 1 SUM-2 -Sum 2 ALA-1 -Range and input variables are determinable in ALA-1 ALA-2 -Range and input variables are determinable in ALA-2 ALA-3 -Range and input variables are determinable in ALA-3 ALA-4 -Range and input variables are determinable in ALA-4
OUT	Type of analogue output Options: 0-20 0 to 20 mA 4-20 4 to 20 mA 20-0 20 to 0 mA 20-4 20 to 4 mA
STR	Start of analogue output range
END	End of analogue output range

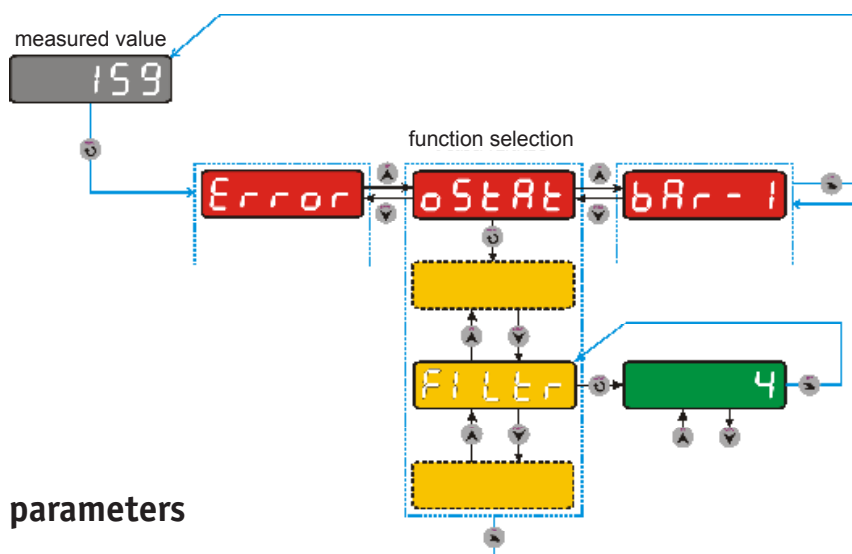
STR and END menu items are used only when IN-1, IN-2 a SUM-1, SUM-2 are set in DACO->IN. Other items ALA1-ALA4 are using other range setting (determined as shown in description above) param. STR and END doesn't appear in menu DACO.

If analogue output is not connected, menu DACO is not displayed.

Example: AP11 counter with single relay module and analogue output :menu item DACO->IN will contain only options: IN-1, IN-2, SUM-1, SUM-2, ALA-1, ALA-2

9.3.6

Configuration of OSTAT parameter



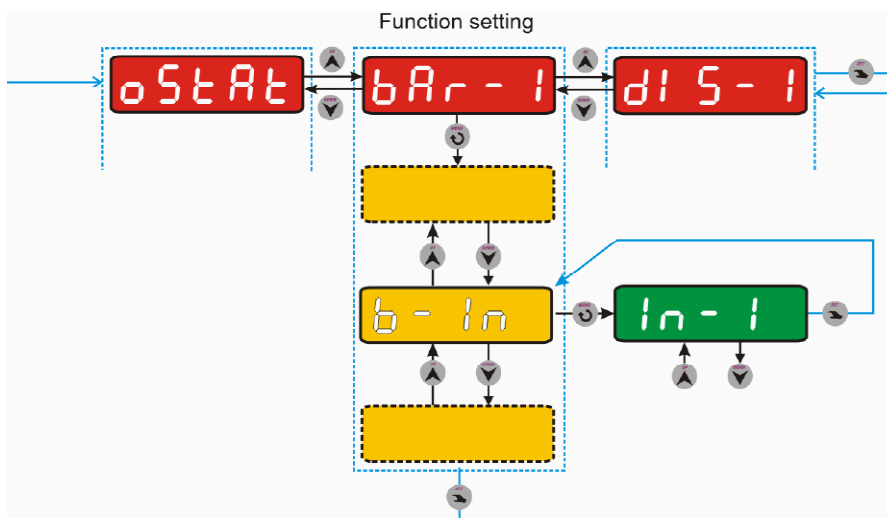
Function OSTAT parameters

- FILTER** Configuration of current signal input filter
Increase of filter value slows down panel meter response to change of input value, on contrary reduction of filter value accelerates response to change of input value.
Filter affects displaying of measured value
- PASS** Setting of access password
Setting of access password can prevent unauthorized interference in regulation parameters. Password PASS enables access to set all panel meter parameters. Default password is 0. In this case regulator operates as if no password was set and access into setting mode is not restricted. If any numerical password is set, parameters can be configured only after this password is entered. For changing the password you have to enter old access password first. In case you forget the old password enter code **555** instead, to get to new password setting mode. Regulator requires password only once in configuration menu. If you enter correct password you have free access to all parameters in configuration mode.
- LEVEL** Configuration of user menu and access to parameters
Options:
MEN-1 Menu reduced, allows to set parameters ALA1 to ALA4, SUM and measured value can be reseted
MEN-2 This option allows only resetting SUM and Measured value in menu
MEN-3 - Menu is locked

interconnect terminals 21 and 22 on rear panel of AP11 Counter to make MEN-1/ MEN-2/MEN-3 settings active

- ADDR** Setting of panel meter address (active only when communication connected)

Configuration of bargraph - BARGF

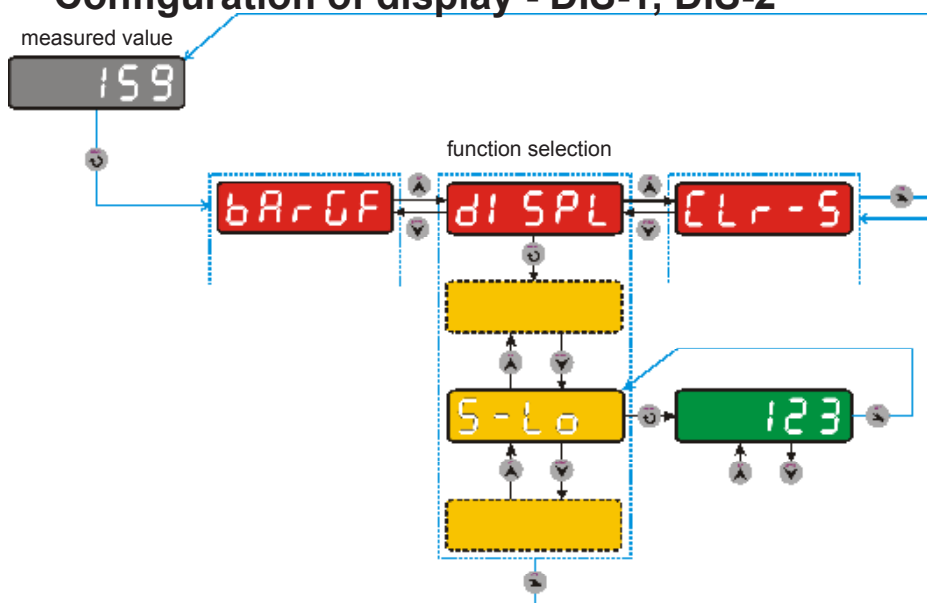


Function BARGF parameters

B-IN	Setting of input possibilities to bargraph Options: <i>IN-1</i> -Measured value of current input signal <i>IN-2</i> -Measured value of pulse input signal <i>SUM-1</i> -Sum 1 <i>SUM-2</i> -Sum 2 <i>ALA-1</i> -Range and input variables are determinable in ALA-1 <i>ALA-2</i> -Range and input variables are determinable in ALA-2 <i>ALA-3</i> -Range and input variables are determinable in ALA-3 <i>ALA-4</i> -Range and input variables are determinable in ALA-4
STR	Setting of bargraph range start This parameter is used for setting the bottom limit of bargraph range. When measured value drops to bottom limit of set range, all bargraph LEDs stop flashing.
END	Setting of bargraph range end. This parameter is used for setting the top limit of bargraph range. When measured value reaches top limit of set range, all bargraph LEDs start flashing.

9.2.8

Configuration of display - DIS-1, DIS-2



Function DIS-1 parameters

S-L0	Setting of bottom limit value when display changes its colour
S-HI	Setting of top limit value when display changes its colour
SEC-0	Setting of colour for sector 0
SEC-1	Setting of colour for sector 1
SEC-2	Setting of colour for sector 2

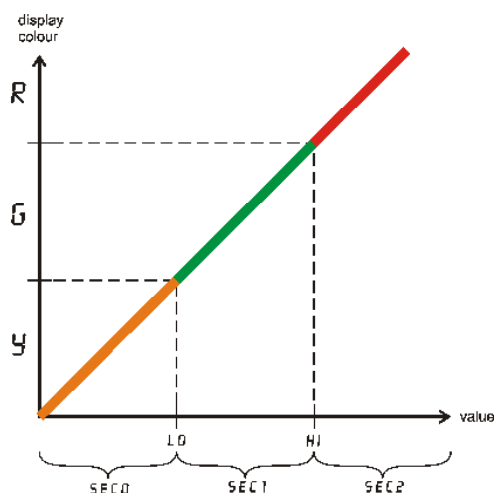
Options:

- G - green
- R - red
- Y - yellow

LIGHT Setting of display brightness (25%, 50%, 75%, 100%)

RESET Setting of displayed input after start of device IN-1/IN-2

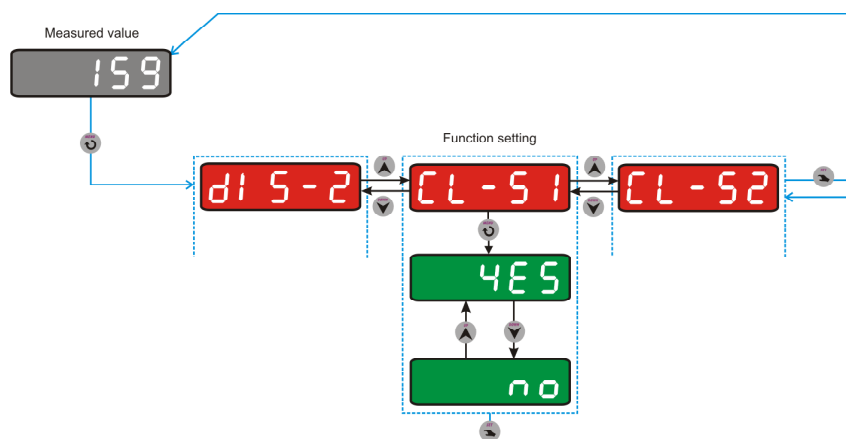
Menu item **DIS-1** is related to **IN-1**(current signal). **DIS-2** is related to **IN-2**(pulse signal).
Menu items **LIGHT** and **RESET** are shared for both inputs.



For detail description of setting refer to page 21, chapter „Display setting“.

Reset of sum CL-S1 (CL-S2)

9.3.9

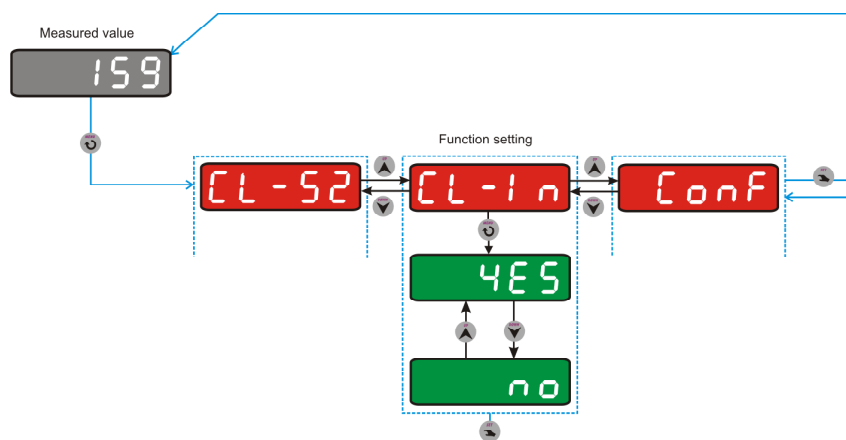


Parametres of function CLS-1 (CL-S2)

CL-S1 - Reset of sum 1 (sum 2)

Reset of measured value CL-IN

9.3.10



Parametres of function CL-IN

CL-IN - Reset of measured value

Item is available only if menu item CONF -> FUNC is set to TOTAL (counter).

After resetting measured value **SUM 1** will increase of measured value of counter and **SUM 2** increases by one.

Limit values of parameters

Parameters	Function	Limit values	Default value	Operation set
SP	Required value	-999 to 9999	0	
HYST	Hysteresis	-999 to 9999	1	
INRL	Input selection	IN-1, IN-2, SUM-1, SUM-2	IN-1	
RELE	State of output relay	ON, OFF	OFF	
TRAL	Signalling of output	ON, OFF, TIME	OFF	
TIME	Switching time of output	0,5 - 600	0,5	
ACT	Event set for alarm	-no-, CL-S1,AD-S1, SU-S1,CL-S2,AD-S2,-SU-S2,CL-IN	-no-	
FUNC	Input function	TOTAL, RATE	TOTAL	
TRIG	Input comparator	LOW, HIGH	LOW	
INPUT	Input signal	NPN, PNP	NPN	
FACT	Scale factor	NUL, DIV	NUL	
EDGE	Trigger edge	UP, DOWN	DOWN	
SCALE	Scale	-9999 to 99999	1	
OFFS	Offset-scale	-9999 to 99999	0	
DP	Impulsive input decimal point	0., 0.0, 0.00, 0.000	0.0	
FILT	Impulsive input filter	0 to 10 000	100	
SEN/TYP	Sensor type	4-20, 0-20	4-20	
DP	Current signal decimal point	0., 0.0, 0.00, 0.000	0.0	
STRS	Current signal range (start)	-999 to 9999	0.0	
ENDS	Current signal range (end)	-999 to 9999	100.0	
OFFS	Offset	-999 to 9999	0	
A-IN	Setting of input to AOUT	IN-1, IN-2, SUM-1, SUM-2, ALA-1 to ALA-4	IN-1	
AOUT	Type of analogue output	0-20, 4-20, 20-0, 20-4	0-20	
ASTR	Start of analogue range	-999 to 9999	0.0	
AREND	End of analogue range	-999 to 9999	100.0	
BSTR	Start of bargraph range	-999 to 9999	0	
BEND	End of bargraph range	-999 to 9999	100	
B-IN	Setting of input to bargraph	IN-1, IN-2, SUM-1, SUM-2, ALA-1 to ALA-4	IN-1	
S-LO	Setting of bottom limit	-999 to 9999	0	
S-HI	Setting of top limit	-999 to 9999	100	
SECO	Setting of colour for sector 0	-G-, -R-, -Y-	-Y-	
SEC1	Setting of colour for sector 1	-G-, -R-, -Y-	-G-	
SEC2	Setting of colour for sector 2	-G-, -R-, -Y-	-R-	
LIGHT	Setting of display brightness	25, 50, 75, 100	75	
FILT	Input signal filter	0 to 32	0	
PASS	Access password	-999 to 1000	0	
LEVEL	Setting of user menu/access to param.	MEN-1, MEN-2, MEN-3	MEN-1	
ADR	Setting of panel meter address	1 to 126	1	

Application software

Software PAP is intended for setting of AP21 controller parameters and monitoring of measured values.
Software available on www.apoelmos.cz.

Software / Hardware requirements and installation:

-> TD-U-19-19 (PAP Software)

Communication protocol

-> TD-U-19-20 (Communication protocol)

We,

A.P.O. - ELMOS v.o.s., Pražská 90, 509 01 Nová Paka, Česká republika
IČO: 60111615

declare under our sole responsibility that the below specified product meets requirements of technical directives and regulations, under specified conditions is safe to use and we adopted all measures to guarantee the compliance of all products of below specified type introduced on market with technical documentation and requirements of relating government and European directives.

Product: Panel meter AP 11

Type: AP 11

Manufacturer: A.P.O. - ELMOS v.o.s.
Pražská 90
509 01 Nová Paka
The Czech Republic

The product is intended for measuring and regulation temperature or analog signals.

Assessment of product compliance was performed within the frame of assessment of production quality system by authorised person (no. AO 201, Electro-technical Testing Institute, Pod lisem 129, Prague 8 – Troja) and monitoring of proper maintaining of the system.

Above mentioned product is in compliance with the following standards:

ČSN EN 61010-1 ed.2:2011 including amendment	EN 61010-1:2010 including amendment
ČSN EN 61326-1:2013 including amendment	EN 61326-1:2013 including amendment

and government directives (European directives)

NV 17/2003 Sb. including amendment	2006/95/EC including amendment
NV 616/2006 Sb. including amendment	2004/108/EC including amendment
NV 481/2012 Sb. including amendment	2011/65/EU including amendment

Sample was examined by accredited testing laboratory no. 1103, VOP-026 Šternberk, s.p., division VTÚPV Vyškov, that issued for the product Protocol of safety type test no. 6450-20/2006 dated 28/3/2006, Protocol of EMC test no. 6440-68/2006 dated 2/3/2006 and no. 6440-129/2006 dated 20/3/2006.

The last two digits of the year when the product was certified with mark CE: 08

Place of issue: Nová Paka
Date of issue : 22.7.2014

Name: Ing. Libor Lukeš
Position: company director

APCELMOS

A.P.O. - ELMOS v.o.s.
Pražská 90, 509 01 Nová Paka
DIČ: CZ60111615

Stamp:

Signature: 

Product: Panel meter AP 11

Specification acc. to code:

AP 11	-	37	-		-		-		-		-	
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Serial number:

18-1911-08888

Hereby we confirm that above mentioned product is complete, complies with technical conditions and is fully inspected and tested.

GUARANTEE CONDITIONS

Manufacturer is responsible for the product to have properties specified by technical standards for stipulated period of time, to be complete and without any defects. Manufacturer is also liable for the defects found by customer within guarantee period and that are timely claimed. The basic condition to be entitled to claim any defect is that the panel meter is used in the manner specified by technical documentation. Guarantee period is 36 months since the date of purchase. Complaint can be claimed on material defects or product malfunction. Guarantee repairs are performed in accordance with internal regulations of A.P.O.-ELMOS in company's workshop. Faulty product has to be properly protected not to be damage during transport. Guarantee expires if any modifications are performed on product or guarantee tags are broken and if the product was damaged mechanically or by improper use.

Guarantee and after guarantee service is provided exclusively by A.P.O. – ELMOS.

Date of purchase: Signature:

