USER'S MANUAL
Series MPCT301 P6

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1.0 OVERVIEW

The MPCT301 P6 model has 5 main programmable functions: RPM meter, frequency meter, hourly production meter, timer, and uni-directional pulse counter.
Each one of these five functions is independent and they can't be used at the same time.
Main characteristics are:

- count memory at the switching off (you can exclude this function from the menu).
- six digits for counting.
- NPN or PNP inputs (open collector or passive pull-up) or not amplified proximity (configured by jumpers or terminal connections)
- up to three exchange relay alarm outputs (5A switch) (option)
- programmable multiplying and dividing factor from 1 to 65535 (pulse counter, frequency meter, RPM meter and hourly production meter)
- programmable pre-set (pulse counter and timer only)
- up/down count (pulse counter and timer only)
- visualisation of the partial or total counting (counter only)
- timer (hold and reset) or chronometer (start, stop, reset) functioning
- working-break functioning (timer)
- analogue output (if requested)
- serial outputs (if requested)

1.1 TECHNICAL FEATURES

Table 1

Inputs	uni-directional npn/pnp encoder 3 wire npn/pnp amplified proximity 2 wire not amplified proximity mechanical switch IBT (option)
Transducer Supply	16 Vdc / 50 mA not reg. 5V / 50 mA (on request)
Digits numbers	999999
Frequency max. (RPM)	10 KHz
Frequency min. (RPM)	0.001 Hz
Min. width pulse	100 μs
Notches number	1 to 9999
Divider	1 to 65535
Multiplier	1 to 65535
RPn meter max error	0,01 %

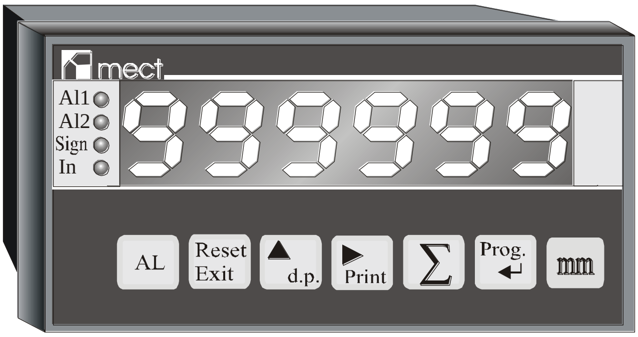
Timer max error	0.01 %
Alarm output	exchange relay 250 Vac / 5 A
Supply	90 ÷ 250 Vac / Vdc 20 ÷ 30 Vac / Vdc
Power absorption	5W
Dimensions	48 x 96 x 75 mm
Piercing template	44.5 mm (height) x 92.5 mm (width)

1.2 DISPLAY MESSAGES

Table 2

r.01.00	Software version
-OFL-	overflow
-UFL-	underflow
Er4	Division by zero (programming menu item wrong)
ErP 1	error in programming parameter: dEnO = 0
ErP 2	error in programming parameter: n.riF = 0
ErP 3	error in programming parameter: FSO = ISO
ErP 4	error in programming parameter: IS = FS
ErP 5	error in programming parameter: FS < IS
ErP 7	error in programming parameter: the Preset item is not compatible with the alarms set point

1.3 WIRING DIAGRAMS

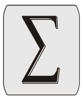


DESCRIPTION OF THE FRONT COMMANDS

Led AL1: alarm 1 status indication
Led AL2: alarm 2 status indication
Led Sign: no managed
Led In: total counting indication

Key 

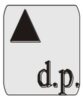
: access at the programming functions

Key 

: it visualises the total counting (it can be disabled by the menu). Stop counting if timer.

Key 

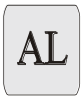
: readout print (it can be disabled by the menu). Used for set up.

Key 

: it sets up decimal point (it can be disabled by the menu). Used for set up. Start counting if timer.

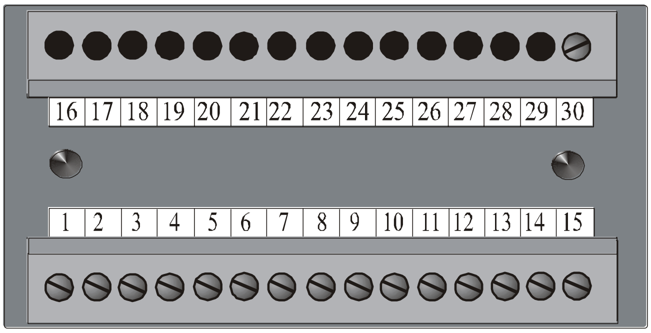
Key 

: Clear count (can be disabled by the menu) / fast exit in menu

Key 

: it visualises alarm set point (it can be disabled by the menu)

BASIC TERMINAL BOARD DESCRIPTION



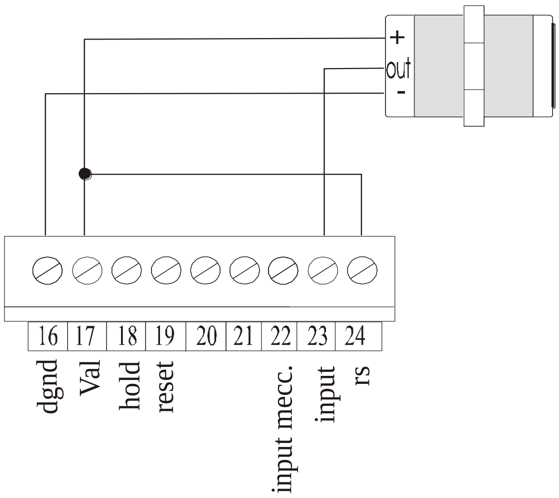
Terminals 1-2-3	- exchange relay output (AL3: 1 = Com, 2 = NC, 3 = NO)
Terminals 4-5-6	- exchange relay output (AL2: 4 = Com, 5 = NC, 6 = NO)
Terminals 7-8-9	- exchange relay output (AL1: 7 = Com, 8 = NC, 9 = NO)
Terminals 13 and 15	- possible power supplies: 24 (20-30Vac/Vdc – no polarity), 220 (90-260Vac). Check the label of the instrument to find out the power supply voltage to be supplied.
Terminal 16	- ground
Terminal 17	- transducer power supply (16Vdc). On request 5V.
Terminal 18	- “hold” or “stop” for timer (if the serial outputs are requested, it is possible to shape the terminal for the readout transmission: see “Serial output” paragraph) In counter and/or timer functioning it can be configurated to select Up-Down counting. See “terminals 18 and 19 configuration” paragraph
Terminal 19	- external reset (if the serial outputs are requested, it is possible to shape the terminal for the readout transmission: see “Serial output” paragraph) In counter and/or timer

functioning it can be configurated to select Up-Down counting. See “terminals 18 and 19 configuration” paragraph

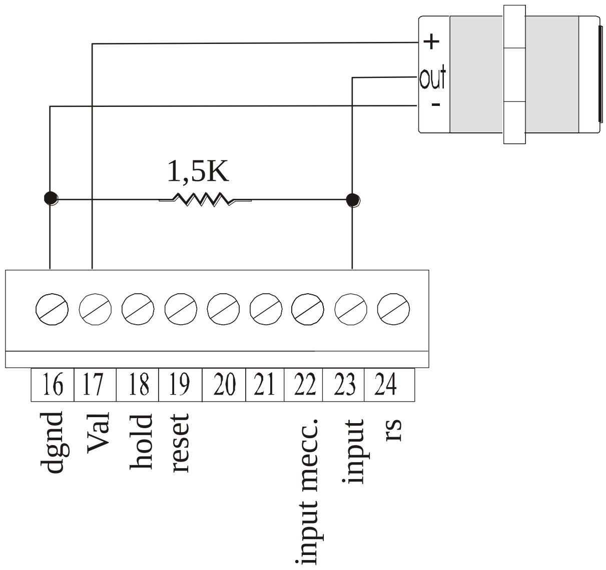
Terminal 20	- “start” for timer in chronometer function
Terminal 22	- link for mechanical contact input
Terminal 23	- counting input
Terminal 24	- pull-up resistor for counting input
Terminals 25-26-27	- serial outputs
Terminals 28-29-30	- analogue outputs

1.4 WIRING SCHEMATICS FOR COUNTER, REVOLUTION COUNTER AND HOURLY PRODUCTION

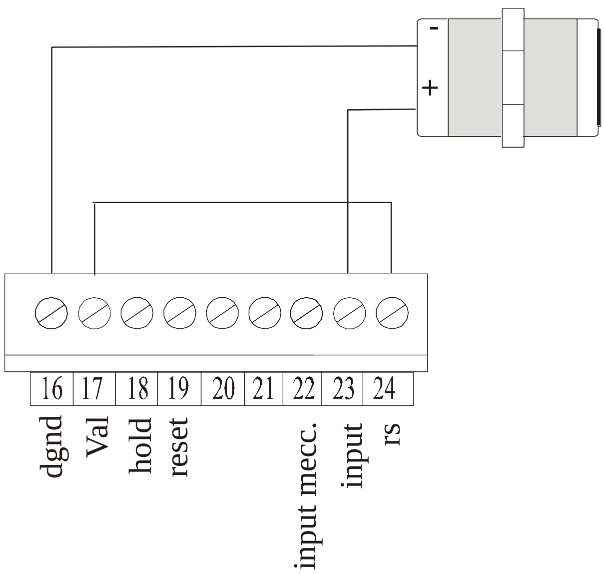
NPN Prox connection



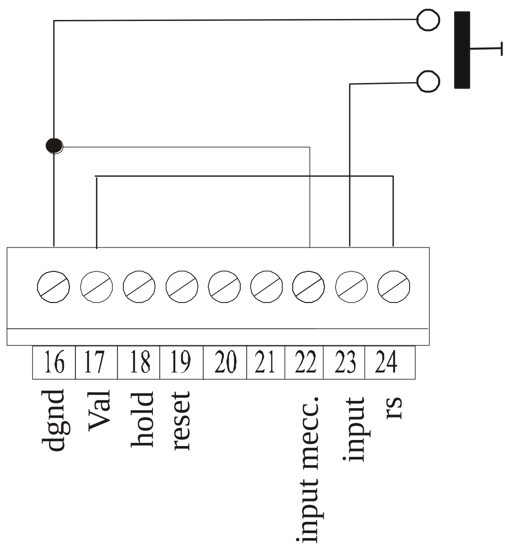
PNP Prox connection



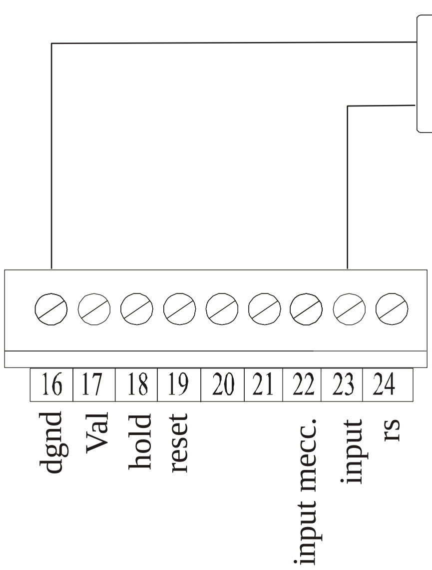
Not amplified MAF 35 sensor connection (maf 35)



MECHANICAL contact connection



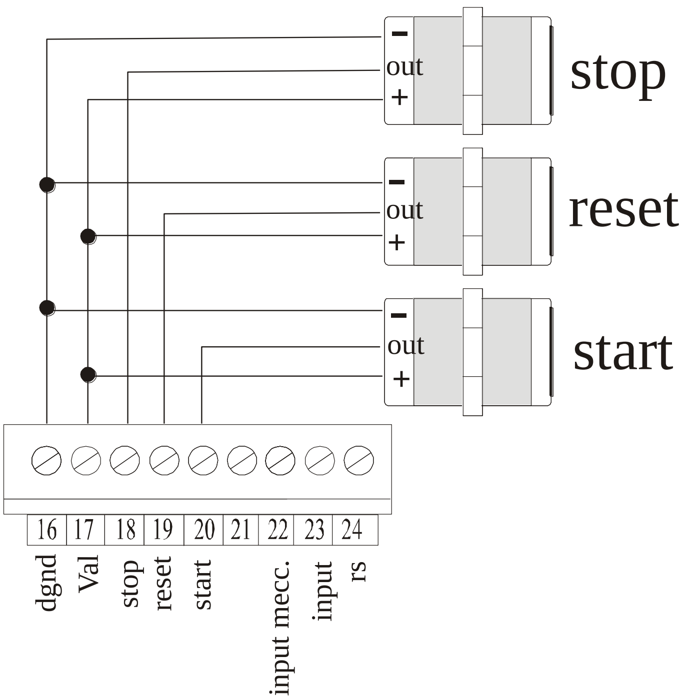
Magnetic pick-up (IBT option) connection



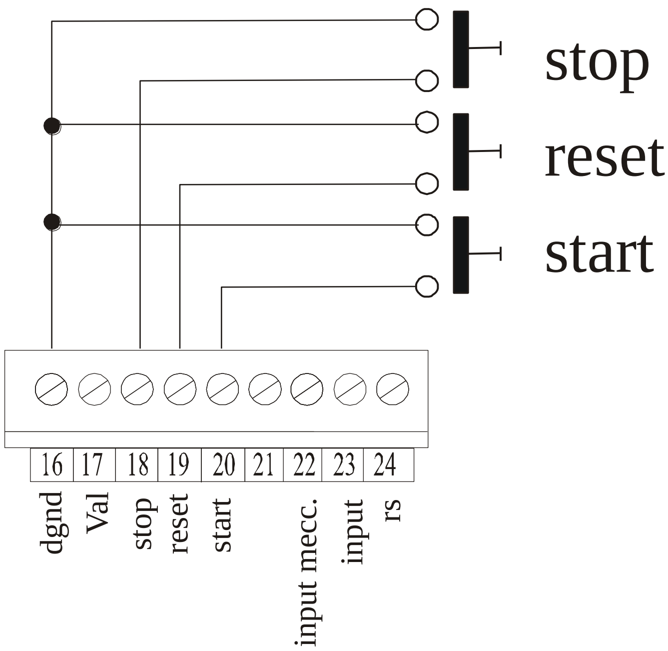
For frequency generator connection use 23 and 16 terminals (gnd)

1.5 WIRING SCHEMATICS FOR TIMER

NPN or PNP prox connection (see paragraph "PRINTED CIRCUIT BOARD (PCB) CONFIGURATION")



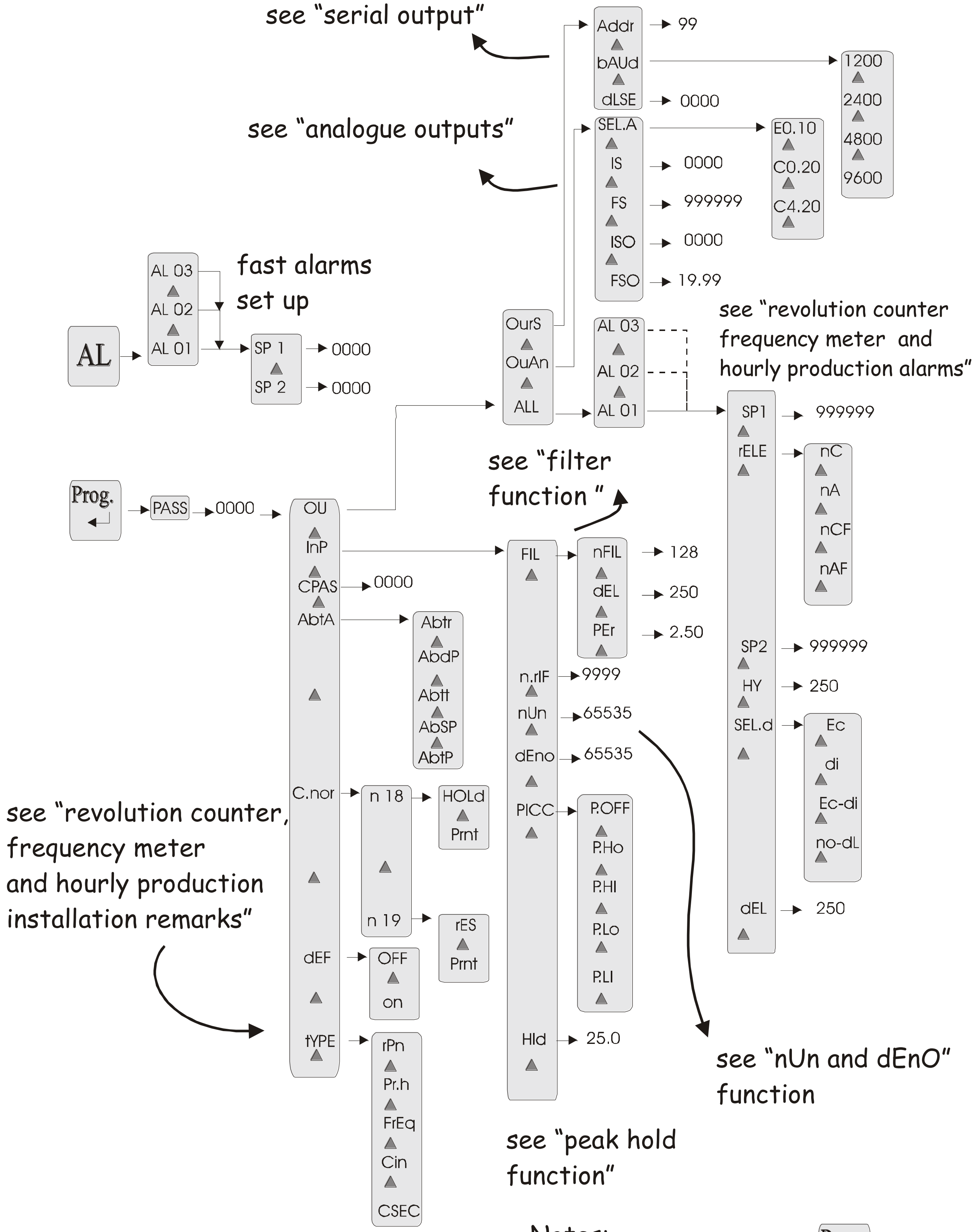
Switch connection



1.6 PROGRAMMING TIPS

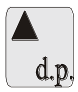
- Press Prog. key to get into the programming menu.
- Press Prog. key to search the item to program.
- If the set up needs a number to write, use the ▲ d.p. key to increase the digit which blinks and ▶ Print key to move the blinking digit and confirm with Prog.
- If the set up needs the selection of an item, use ▲ d.p. key and confirm with Prog.
- To exit the menu, press Reset Exit : the modified parameters will be stored.

1.7 RPM, FREQ. OR PR.H INSTRUMENT MENU FLOW

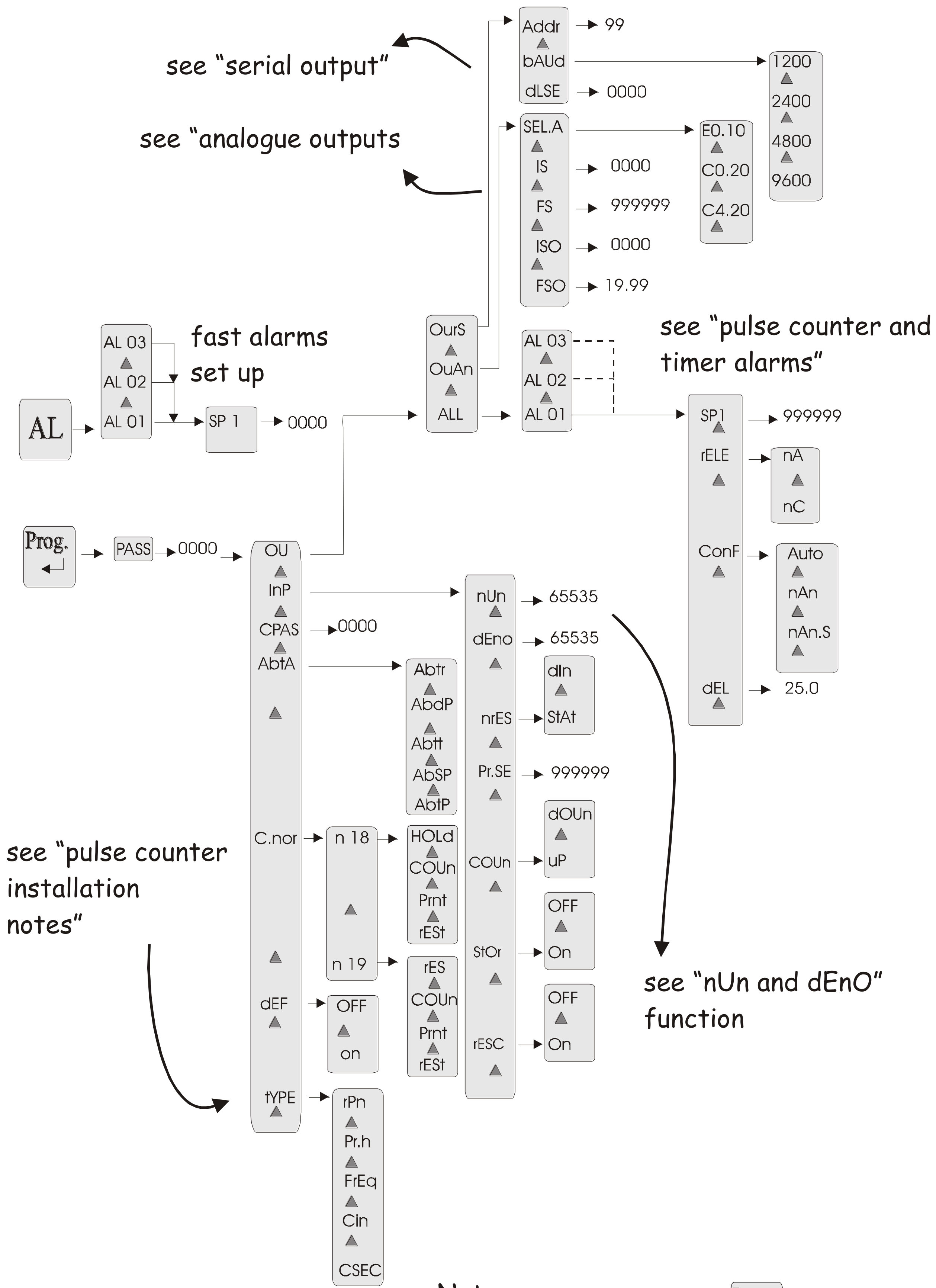


Notes:

The → symbol means: 

The ▲ symbol means: 

1.8 COUNTER INSTRUMENT MENU FLOW

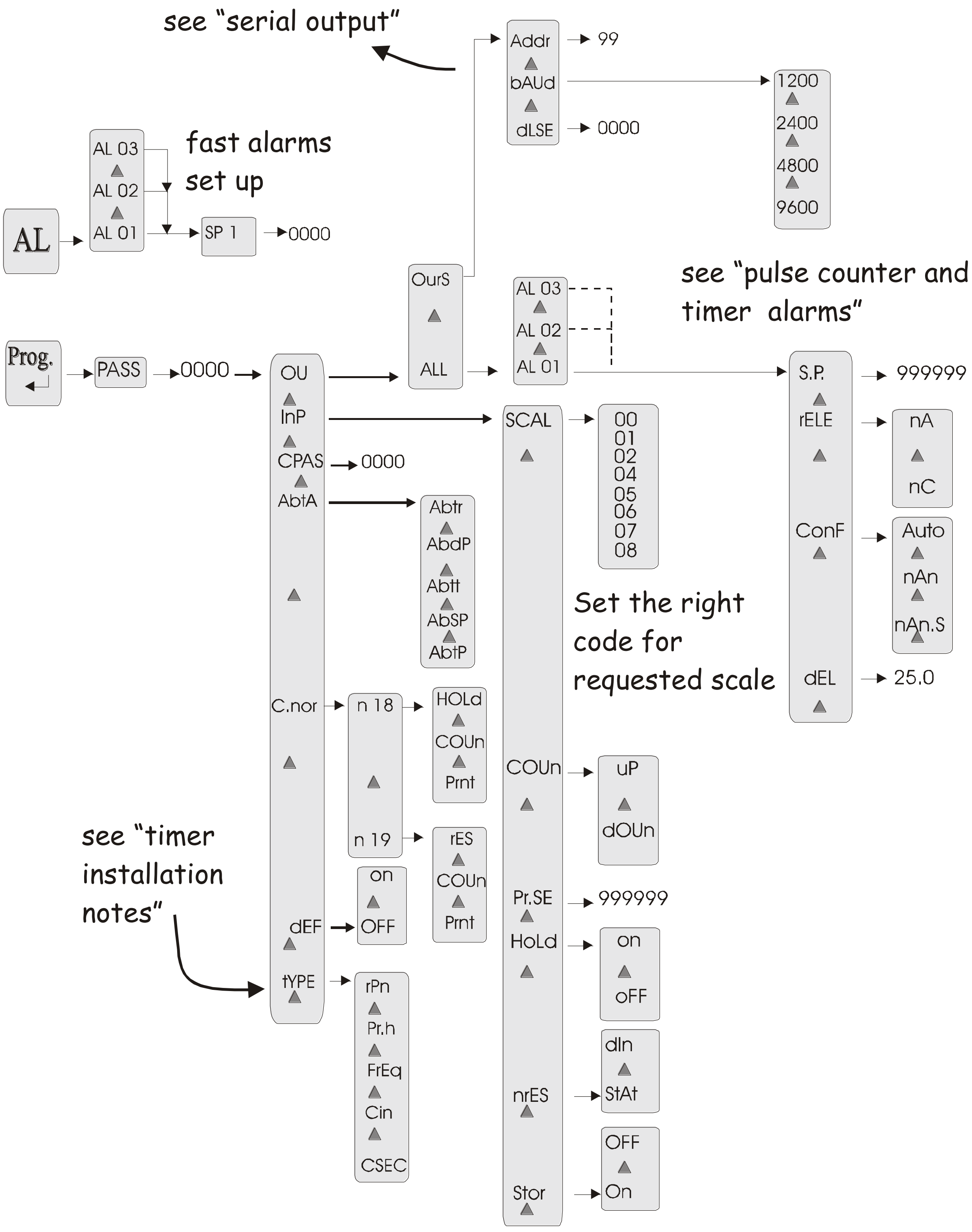


Notes:

The → symbol means: Prog. ↵

The ▲ symbol means: ▲ d.p.

1.9 TIMER INSTRUMENT MENU FLOW



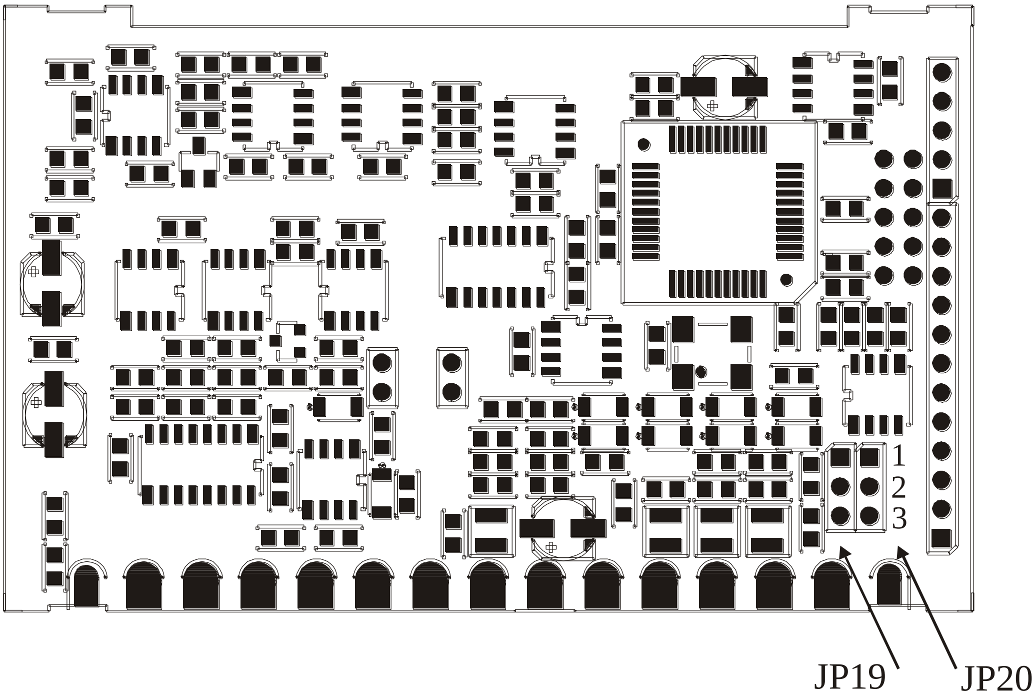
Notes:

The → symbol means: Prog.

The ▲ symbol means: ▲ d.p.

1.10 PRINTED CIRCUIT BOARD (PCB) CONFIGURATION

Open the instrument to configure the “Hold”, “Reset” and “Start” (NPN or PNP) inputs. To open the instrument use a screw-driver to lever on the long part of the keyboard and on the side hooks and extract the instrument from the front.
The “Hold/Stop”, “Reset” and “Start” inputs are in NPN or MECHANICAL contact configuration (JP19 e JP20 in 3-2 position).
To set up the “Reset”, “Hold/Stop” and “Start” inputs as PNP version, move the JP19 and JP20 jumpers in 1-2 position.



2.0 REVOLUTION COUNTER, FREQUENCY METER AND HOURLY PRODUCTION INSTALLATION REMARKS

2.1 INSTALLATION PROCEDURE

1) Make connections as indicated at pages: 7, 8, 9 and 10
HOLD terminal connections:
when it works, it stops the visualization and the acquisition of new input signals.
To modify the “hold” input for a PNP input look paragraph “PCB configuration”.
If the instrument is requested with serial outputs, the hold terminal can be configured for the readout transmission: see “Serial output” paragraph.
2) Switch the unit on.
3) Program the functions based on the indications in the following table:

Table 3

n°seq.	Press Key	Appears on the display	Remarks
1	Prog. ↵	PASS	Touch the “prog.” key to get into the programming menu
2	Prog. ↵	0 000	In this phase the instrument asks for the “password” number to protect the data programmation. (see “Password function”)
3		Ou	
4	▲	InP	
5	▲	CPAS	
6	▲	AbtA	
7	▲	dEF	
8	▲	tYPE	TYPE INSTRUMENT
9	prog. ↵	rPn	rPn = rpm meter Pr.h = hourly production meter FrEq = frequency meter CSEC = timer CIn = counter Select by “▲“key “rPn” to program revolution counter, or “FrEq” to program frequency meter or “Pr.h” to program hourly production. (Confirm by “prog. ↵”)
10		tYPE	
11	Reset Exit		

4) Program the functions of the following table to set notches number (n.rIF), multiplaying or division Factors (uUn or dEnO) and the decimal point with front key.
5) Set up, if requested, the peak function; for this function in detail see “peak-hold function” paragraph.
6) Set up, if necessary, a digital filter (menu item “nFIL”, dEL and PEr). For these functions in detail see “filter function” paragraph.
7) For default parameters see "default parameters" paragraph
8) Set alarms (if requested)
9) Set analogue outputs (if requested)
10) Set serial outputs (if requested)
11) Set, if desired, the programming menu access code (password function)
12) The unit is now ready to be used.

Table 4

n°seq.	Press Key	Appears on the display	Remarks
1	Prog. ↵	PASS	Touch the “prog.” key to get into the programming menu
2	Prog. ↵	0 000	In this phase the instrument asks for the “password” number to protect the data programmation (see “Password function”)
3		Ou	
4	▲	InP	
5	prog. ↵	FIL	DIGITAL FILTER PROGRAMMING (look paragraph)
6	▲	n.rIF	NOTCHES NUMBER
7	prog. ↵	00001	set number of notches requested (1÷9999) **(press “prog. ↵” to confirm)
8		n.rIF	
9	▲	nUn	MULTIPLAYING FACTOR
10	prog. ↵	0.0000	Set multiplying factor value (1÷65535). This number will be the numerator of the correction constant (see “nUn and dEno function”) ** (press “prog. ↵” to confirm)
11		nUn	
12	▲	dEno	DIVISION FACTOR
13	prog. ↵	00001	Set division factor value (1÷65535). This number will be the denominator of the correction constant (see “nUn and dEno function”) **(press “prog. ↵” to confirm)
14		dEno	
15	▲	PICC	PEAK SET-UP
16	prog. ↵	P.OFF	P.OFF = Peak excluded P.h.O = Maximum peak with time P.h.I = Maximum infinite peak P.L.O. = Minimum peak with time P.L.I = Minimum infinite peak Touch “▲” key until there appears the req. item (confirm to “prog. ↵”)
17		PICC	
18	▲	.HLd	TIME OF READING RETENTION
19	prog. ↵	25.0	write retention time (0 ÷ 25.0 sec) if PhO or

n°seq.	Press Key	Appears on the display	Remarks
			PLO is req. ** (confirm to “prog. ↵”)
20		.HLd	
21	Reset Exit	measure	To exit from programming menu

** see para. “SET-UPS” to change the set value.

2.2 "nUn" and “dEno” FUNCTION

There are two menu items that allow to modify the displayed value by a constant factor. The “nUn” item allows to program a multiply factor in the range 1 ÷ 65535, and the “dEno” item allows to program a divide factor in the range 1 ÷ 65535.
The constant factor will be:

$$\text{readout on the display} = \frac{\text{nUn}}{\text{dEno}} * X$$

Where:
X = “rPn measured” if the instrument is set up in revolution counter
X = “Pr.h measured” if the instrument is set up in hourly production
X = “pulses read at the input” if the instrument is set up in pulse counter

For a reading without correction factor is sufficient to set up nUn = dEno, instead to add corrective costant is necessary to set up “nUn” and “dEno” to get the desired value.
The visualization in RPN and Pr.h are linked by the following relations:

$$\text{RPM (rPn)} = \frac{60 * \text{Hz}}{\text{n.riF}} * \frac{\text{nUn}}{\text{dEno}}$$

$$\text{Pr.h} = \frac{3600 * \text{Hz}}{\text{n.riF}} * \frac{\text{nUn}}{\text{dEno}}$$

(Hz = frequency at the instrument input)

2.3 EXPLICATIVE EXAMPLES

- *Make following settings on “rev. counter” instrument.*

The parameter to be measured is the speed, in mt/sec., of toothed belt by reading the rotating speed of the driving shaft. Four notches can be identified on the shaft and the belt advances by 0.55 mt for one revolution of the shaft.

To get the requested visualisation, you have to multiply the reading revolution/minute (RPM) by 0.55. To visualize the revolution/minute reading you must set up in the menu item “n.riF” = 4 (notches for revolution). To correct the visualisation by a 0.55 factor, you have to set up “nUn” = 55 and “dEno” = 100. Infact we know this relation:

$$\text{reading} = \text{RPM} * \frac{\text{nUn}}{\text{dEno}} = \text{RPM} * \frac{55}{100} = \text{RPM} * 0.55$$

The unit can be programmed whit:
selection “rPn”
n. rIF = 4
nUn = 55
dEno = 100

- *Make following setting on “hourly production” instrument.*

The parameter to be measured is the hourly production of a toothed belt moving bottles. Each toothed represent a row of ten bottles.

To get the requested visualisation, you have to multiply 10 with the hourly production meter reading (Pr.h). To visualize the hourly production meter reading you must set up in the menu item “n.riF” = 1 (notches for revolution). To correct the visualisation by a 10 increasing factor, you have to set up “nUn” = 10 and “dEno” = 1. Infact we know this relation:

$$\text{reading} = \text{Pr.h} * \frac{\text{nUn}}{\text{dEno}} = \text{Pr.h} * \frac{10}{1} = \text{Pr.h} * 10$$

The unit can be programmed with:
selection “Pr.h”
n. rIF = 1
nUn = 10
dEno = 1

2.4 DEFAULT PARAMETERS (dEF)

Some wrong values in menu programming function can cause the “ERR” item to appear. To reset to factory default parameters you can use the “dEF” function, which sets up all the programmation parameters at the factory value, eliminating all the error situation (look the following table).
BE CAREFUL: all previous programmed values will be lost.

Table 5

n° seq.	touch key	Appears on the display	NOTES
1	prog. ↵	PASS	Press "prog." key to get into the programming menu
2	prog. ↵	0 000	Digit the personal password ** (confirm with "prog. ↵")
3		Ou	
4	▲	InP	
5	▲	C.PAS	
6	▲	AbtA	
7	▲	dEF	DEFAULT PARAMETERS
8	prog. ↵	OFF	Touch the "▲" key until the written "ON" appears ** (confirm with "prog. ↵") The instrument exits from the programming menu and it follows the default parameters.
9		measure	

2.5 FRONT KEYS ENABLING

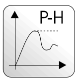
The keys used on the front of the instrument for the direct sets up (reset, decimal point, alarm and total counting) can be disabled from the programming menu. Follow the next table.

Table 6

n° seq.	touch key	Appears on the display	NOTES
1	prog. ↵	PASS	Touch the "prog. ↵" key to get into the programming menu
2	prog. ↵	0 0000	Digit the personal Password. Press "prog. ↵" to confirm. (see "Password function")
3		OU	
4	▲	InP	
5	▲	C.PAS	
6	▲	AbtA	KEYS ENABLING
7	prog. ↵	Abtr	"Reset" KEY ENABLING
8	prog. ↵	On	On = enabled, OFF= disabled Press "▲" key till when the desired function appears on the display **(press "prog. ↵" to confirm)
9		Abtr	

n° seq.	touch key	Appears on the display	NOTES
10	▲	AbdP	"d.p." KEY ENABLING (decimal point)
11	prog. ↵	On	On = enabled, OFF= disabled Press "▲" key till when the desired function appears on the display **(press "prog. ↵" to confirm)
12		AbdP	
13	▲	Abtt	"Σ" KEY ENABLING
14	prog. ↵	On	On = enabled, OFF= disabled Press "▲" key till when the desired function appears on the display **(press "prog. ↵" to confirm)
15		Abtt	
16	▲	AbSP	"AL" KEY ENABLING (alarms)
17	prog. ↵	On	On = enabled, OFF= disabled Press "▲" key till when the desired function appears on the display **(press "prog. ↵" to confirm)
18		AbSP	
19	▲	AbtP	"Print" KEY ENABLING
20	prog. ↵	On	On = enabled, OFF= disabled Press "▲" key till when the desired function appears on the display **(press "prog. ↵" to confirm)
21		AbtP	
22	Reset Exit	Readout	To get out from the menu

** see "SET-UP" paragraph to change the set value.



3.0 PEAK-HOLD (PICC) FUNCTION

By using the "PICC" function it is possible to memorize the highest (P.h.) or the lowest (P.L.) readings leaving them continuously on the display (P.h.I. - P.L.I.) or just for a pre-set time limit from 0 ÷ 19.9 sec using the "hld" function (P.h.O. - P.L.O.) . This function, if unwanted, can be excluded from the programming or by short-circuiting hold terminals with the "GND".

If the instrument is requested with serial output and the hold terminal is configured for the readout transmission, the reset peak function can't be done (see "Serial output" paragraph).

The following two examples describe the main operating methods of the “PICC” function, while for the complete programming please refer to TAB 3.

- EXAMPLE 1

Programme with the function "PICC" the "P.h.0." item.
and in the "HLd" function the time "10.0" sec.

The instrument thus programmed, will follow the entry signal only in the variations that increase the reading value, while, for decreasing readings, the instrument maintains the fixed display for 10 seconds, after which the correct value will appear. Of course during this 10 second period the instrument detects an increase in the reading value, the display becomes updated and the time zeroed. (See fig 1).

The “PICC” function can be excluded by short-circuiting the terminals 16 and 18.

- EXAMPLE 2

Programme with the function "PICC" the "P.h.I." item.

The instrument behaves exactly in the same way as the one described before with the variation that the time is not programmable but fixed up to an infinite value. Also in this case the cancellation of the peak memorisation and the exclusion of that function can be undertaken by short-circuiting terminals 16 and 18.

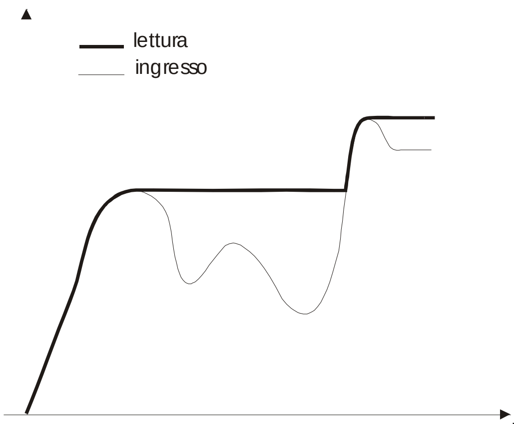


Fig. 1

4.0 “FILTER” FUNCTION

The MPCT301 P6 instruments provide the following filtering mode:

1. **n.FIL** : number of averages of the converted value (it acts within the window called “dEL”)
2. **dEL** : window within which the averages are taken (the number of averages taken is as programmed at item “n.FIL”). At the displayed number, a window (dEL) is calculated, all numbers courted within this window are averaged, whereas those exceeding the window immediately update the display.

3. **PEr** : time in seconds by which the last averaged value is shown.

When the converted value exceeds the set window value programmed in the dEL item, the dwell time (Per) gets started. If after the dwell time (Per) the converted value falls again within the set windows value, the old value is not considered for the average, otherwise the display is immediately updated.

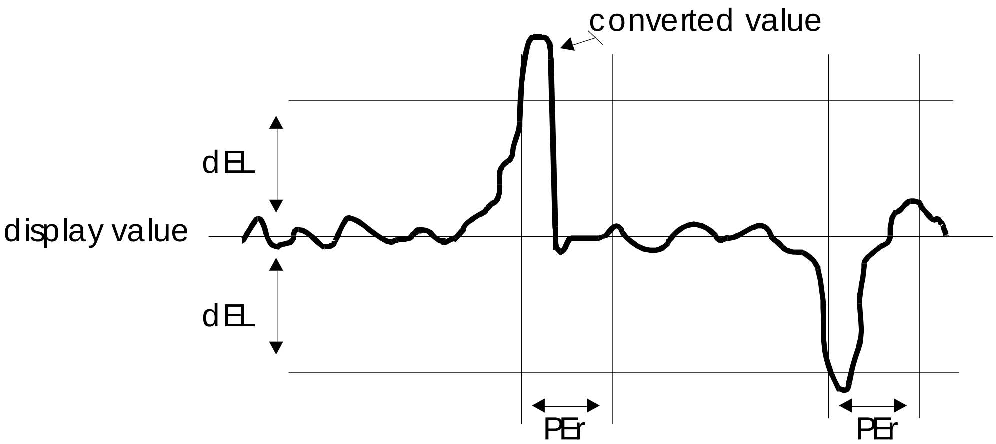


Fig. 2

To program these items follow the instructions in the following table.

Table 7

n° seq.	**touch key**	**Appears on the display**	**NOTES**
1	prog. ↵	PASS	Touch the “prog. ↵” key to get into the programming menu
2	prog. ↵	0 000	Digit personal password code (look “Password function”)
3	prog. ↵	Ou	
4	▲	InP	
5	prog. ↵	FIL	FILTER PROGRAMMING
6	prog. ↵	n.FIL	NUMBER OF AVERAGES
7	prog. ↵	128	Press key “▲“ until the display shows the number of averages required (0 = no filter). **(confirm with “prog. ↵”)
8		n.FIL	
9	▲	dEL	FILTERING WINDOW
10	prog. ↵	250	Set the number of digits within the filter is activated. **(confirm with “prog. ↵”)
11		dEL	
12	▲	PEr	Dwell time
13	prog. ↵	2.50	write dwell time (0.01÷2.50 sec) ** (confirm with “prog. ↵”)

n° seq.	touch key	Appears on the display	NOTES
14		PEr	
15	Reset Exit	measure	Procedure to exit programming mode

** see “SET UP” paragraph to change the set value.

5.0 REVOLUTION COUNTER, FREQUENCY METER AND HOURLY PRODUCTION ALARMS

The MPCT301 P6 instrument can be requested with 3 exchange relay. If the instrument has to work as revolution counter, frequency meter or hourly production, each alarm has the following programmation:

1) Hysteresis from 1 to 250 digits
2) Delay time from 0 to 250 seconds, with the following configurations:
   - activation delay
   - de-activation delay
   - activation and de-activation delay
3) Activation at max or min level
4) Window activation; max or min level can be set

Programming of the above functions is described here below in more detail.

a) **SP1** **:** Setting of alarm threshold in the range 0÷999999
In the case of windowed threshold “SP1” selects the first
commutation (see fig.3)

b) **SP2**: Setting of the second commutation point of the window threshold (see fig.4).

c) **HY:** Setting of hysteresis value, centred on the set-point (previously programmed) in the range 0 ÷ +/- 250 digits.

HYSTERESIS: number of digits between triggering and de-triggering the alarm threshold.

It can operate in two ways:

- Simple triggering threshold see fig.3
- Window triggering threshold see fig.4

d) **dEL :** Setting of the threshold commutation delay time. It can be set in the range 0 to 25.0 seconds. Alarms 1 and 2 indicate triggering of the delay time by the appropriate led blinking.

e) **SEL.d**: (type of delay) setting the type of delay programmed at item “dEL”.

- EC: the time set up comes in before the output activation
- dI: the time set up comes in before the output de-activation
- EC.dI: both EC and dI
- nO dL: time is disabled

f) **RELE :**Selecting the threshold operating mode, which can be normal or window type**.**

For normal operation mode (SP1), the following items should be programmed within the “rele” function.

- nA: normally open
- nC: normally closed

For window mode operation, the two commutation points should be programmed (SP1 and SP2) and within the “delay” function one the following two should selected:

- nAF: normally open (closed within the selected window)
- nCF: normally closed (open within the selected window).

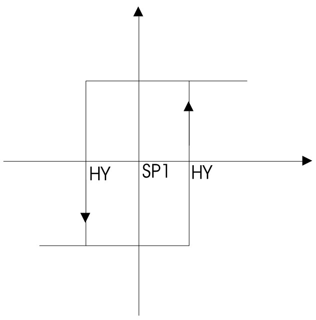


Fig. 3

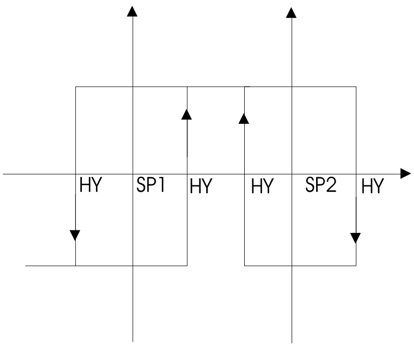


Fig. 4

5.1 ALARM SETTING

Alarm values can be set in two different ways: by front panel keys or by standard menu. In the first case it is possible to get into at the Set 1 and 2 of the alarms 1, 2 and 3 set up very quickly, in the second case it is possible to reach the alarm sets (for normal or windowed functioning) and all the parameters of the instrument. The first step is to get into the complete menu and to configure the alarms as requested.

Each alarm can be programmed as a minimum level alarm, maximum level alarm or windowed alarm (normally open or normally closed).

See the following table to program the alarms.

- Minimum or maximum alarm. Select “nA” item from “rELE” menu for a maximum alarm, or “nC” for a minimum alarm. In this case the threshold level is SP1.
- Windowed alarm. Select “nAF” from relay menu for a maximum windowed alarm, or “nCF” for a minimum windowed alarm. In this case the first threshold level is SP1, the second is SP2.

Table 8

n° seq.	**Touch key**	**Appears on the display**	**REMARKS**
1	prog. ↲	PASS	Touch the “prog. ↲” key to get into the

n° seq.	Touch key	Appears on the display	REMARKS
			programming menu
2	prog. ↵	0 000	Digit the password code **(press “prog. ↵” to confirm)
3		Ou	
4	prog. ↵	ALL	ALARM 1 PARAMETERS
5	prog. ↵	AL 01	ALARM 1 SET UP
6	prog. ↵	SP.1	Setting the minimum or maximum set-point value or the first triggering value for windowed alarm
7	prog.	0 00000	Set up the SP1 value **(Confirm by “prog. ↵”)
8		S.P.1	
9	▲	rELE	AL1 CONTACT CONFIGURATION
10	prog. ↵	n.A.	n.A. = threshold normally open n.C. = threshold normally closed n.A.F.= normally open window threshold n.C.F. = normally closed window threshold Select the desired item by key " ▲ " and confirm with “prog. ↵”
11		rELE	
12	▲	SP.2	SETTING the second triggering. Second threshold set up to use only if windowed alarm is requested
13	prog.	0 00000	Set up the SP2 value **(Confirm by “prog.”)
14		SP.2	
15	▲	HY	HYSTERESIS SET-UP ALARM 1
16	prog. ↵	00 250	Set up a number between 0 and 250 digit. ** (press “prog. ↵” to confirm)
17		HY	
18	▲	SEL.d	TIME CONFIGURATION AL1
19	prog. ↵	Ec	Ec = delay activation dI = delay deactivation Ec-dI = delay activation + de-activation nO dL = no delay Select the desired item by key " ▲ " and confirm with “prog. ↵”
20		SEL.d	
21	▲	dEL	TIME SET-UP AL1
22	prog. ↵	00 250	Set up a number between 0 and 250 sec. ** (press “prog. ↵” to confirm)

n° seq.	Touch key	Appears on the display	REMARKS
23	▶	AL01	
24	▲	AL02	ALARM 2 PARAMETERS (as alarm 1)
25	▲	AL03	ALARM 3 PARAMETERS (as alarm 1)
26	Reset Exit	measure	Procedure to exit programming mode

** see para “SETTING” to change the set value.

After the alarm parameters has been programmed, it is possible to change rapidly the set point values by means of simplified menu.

Table 9

n° seq.	Touch key	appears on the display	NOTES
1	AL	AL 1	Press the “AL” key to reach the alarm Set-Point ite
2	FS ↵	SP 1	First set-point of the alarm 1
3	FS ↵	0 0000	Input the value of alarm 1 ** (confirm with “FS ↵”
4		SP 1	
5	▲	SP 2	Second set-point of alarm1, if request window alarms
6	▶	AL 1	
7	▲	AL 2	Alarm 2
8	FS ↵	SP 1	First set-point of the alarm 2
9	FS ↵	0 0000	Input the value of alarm 2 ** (confirm with “FS ↵”)
10		SP 1	
11	▲	SP 2	Second set-point of alarm 2, if request window alarms
12	Exit Reset	Read out	

** to modify the value see the procedure illustrated in the paragraph “SET-UPS” .

6.0 PULSE COUNTER INSTALLATION NOTES

6.1 INSTALLATION PROCEDURE

1 Make connections as indicated at pages: 7, 8, 9 and 10.
Two terminal connections are possible, with the following meanings:
RESET - When short circuited to ground (DGND), the instrument is reset. (The reset can be selected at the menu on static or dinamic mode). By “reset” key it is possible to choose UP-DOWN counting or total counting reset (see paragraph “terminal 18 and 19 configuration”).

HOLD - When short circuited to ground (DGND), display value is memorized. By “hold” key it is possible to choose UP-DOWN counting or total counting reset (see paragraph “terminal 18 and 19 configuration”).

If the serial outputs are requested, the hold and reset terminals can be configured for the readout transmission: see “Serial output” paragraph.

To modify the “reset” and “hold” inputs in PNP version, see PCB configuration paragraph.

2 Switch the unit on.

3 Program the functions based on the indications in the following table:

Table 10

n°seq.	Press Key	Appears on the display	Remarks
1	Prog. ↵	PASS	Touch the “Prog. ↵” key to get into the programming menu
2	Prog. ↵	0 000	In this phase the instrument asks for the “password” number to protect the data programmation. (see “Password function”)
3		Ou	
4	▲	InP	
5	▲	CPAS	
6	▲	AbtA	
7	▲	dEF	
8	▲	tYPE	TYPE INSTRUMENT
9	prog. ↵	CIn	rPn = rpm meter Pr.h = hourly production meter FrEq = frequency meter CSEC = timer CIn = counter Select by “▲“key “CIn” to program pulse counter and confirm by “prog. ↵”
10		tYPE	
11	Reset Exit		

4 Program the functions of the following table to set multiplaying or division factors (uUn or dEnO), to define terminal reset functioning, type of counting (Up or Down), the decimal point with front key, the preset and the count memory at the switching off.

5 Set up the type of functioning by the “hold” item. With the “on” selection, the instrument works as timer (comands hold and reset from the terminal board),

with “oFF” selection, the instrument works as chronometer (comands start, stop and reset from the terminal board).

6 Define the reset key on the front panel by “rES” item and the reset terminal function by the “nrES” item. The “reset” key on the front panel zeroes the display. If you don’t want this function, you can exclude it by the menu. The reset contact in the terminal board can work in a static mode (till when the contact is linked the instrument is zeroed) or in a dinamic way (immediate zeroing).

7 For default parameters see "default parameters" paragraph

8 Set alarms (if requested)

9 Set analogue outputs (if requested)

10 Set up the serial outputs (if requested)

11 Set, if desired, the programming menu access code (password function)

12 The unit is now ready to be used.

Table 11

n° seq.	**Touch key**	**Appears on the display**	**REMARKS**
1	prog. ↵	PASS	Touch the “prog. ↵” key to get into the programming menu
2	prog. ↵	0 0000	Digit the password code ** (press “prog. ↵” to confirm)
3		Ou	
4	▲	InP	
5	▲	nUn	MULTIPLYING FACTOR
6	prog. ↵	10000	Digit a number in the 1 to 65535 range. This is the numerator of the correction constant. ** (Press “prog. ↵” to confirm)
7		nUn	
8	▲	dEnO	DIVISION FACTOR
9	prog. ↵	00001	Digit a number in the 1 to 65535 range. This is the denominator of the correction constant. ** (Press “prog. ↵” to confirm)
10		dEnO	
11	▲	nrES	RESET TERMINAL BOARD CONFIGURATION
12	prog. ↵	StAt	StAt = the instrument keeps staying at zero till when the terminal is short-circuited. dIn = the instrument immediately goes to zero when the terminal is short-circuited Press key "▲ " until the required function appears on the display and confirm with “prog. ↵”

n° seq.	Touch key	Appears on the display	REMARKS
13		nrES	
14	⏶	Pr.SE	PRE-SET PROGRAMMING
15	prog. ↵	000000	Input the desired pre-set value, in the 0 to 999999 range. ** (Press prog. ↵ to confirm)
16		Pr.SE	
17	⏶	CoUn	COUNT DEFINITION
18	prog. ↵	uP	Press key "⏶ " until the required function is displayed: up = upcount, doun = downcount. ** (Press “prog. ↵” to confirm)
19		CoUn	
20	⏶	StOr	COUNTING STORE AT THE SWITCHING OFF
21	prog. ↵	On	Press key "⏶ " until the required function is displayed: on = store counting oFF = don’t store counting ** (Press “prog. ↵” to confirm)
22		StOr	
23	⏶	rESC	TOTAL COUNTING ZEROING
24	prog. ↵	OFF	Press key "⏶ " until the required function is displayed: on = total counting is reset oFF = total counting is not reset ** (Press “prog. ↵” to confirm)
25		rESC	
26	Reset Exit	measure	Procedure to exit the programming mode

** see para. “SET UPS” to change the set value.

6.2 UP-DOWN FUNCTION

The Up/Down counting function (valid on pulse counter and timer functions), can be selected by the menu “COUn” item or by “hold” and “reset” terminal board if they are abled to select the counting direction (if you use the terminal board, you can’t use the “COUn” menu item). To use the terminal board program the instrument as the “terminals 18 and 19 configuration” paragraph.

When there is not link between the terminal board and the GND, the counting is UP.

If the terminal board is configurated as NPN, it has to be a low level to make start the Down counting. If it is configurated as PNP, the terminal board has to be at an high level (see PCB configuration).

6.3 TERMINALS 18 AND 19 CONFIGURATION

Terminals 18 and 19 are normally used for the “hold” and the “display clear” functions, but with the “Cnor” menu item it is possible to configure the 2 terminals for other purposes. See the following table:

Table 12

seq. n.	**Press key**	**appears on display**	**NOTES**
1	prog. ↵	PASS	Press the “prog. ↵” key to get into the programming menu
2	prog. ↵	0 0000	Input the personal password number ** (confirm with “prog. ↵”)
3		Ou	
4	▲	InP	
5	▲	C.PAS.	
6	▲	AbtA	ENABLING KEYS
7	▲	CnOr	TERMINAL CONFIGURATION
8	prog. ↵	n 18	TERMINAL 18 CONFIGURATION
9	prog. ↵	HOLd	HOLd = hold terminal function COUn = Up/Down control (counter and timer only) Prnt = read out transmission trigger (if serial output is present) rESt = total counting reset (counter only) Press key "▲ " until the required function appears on the display and confirm with “prog. ↵”
10		n 18	
11	▲	n 19	TERMINAL 19 CONFIGURATION
12	prog. ↵	rES	rES = reset terminal function COUn = Up/Down control (counter and timer only) Prnt = read out transmission trigger (if serial output is present) rESt = total counting reset (counter only) Press key "▲ " until the required function appears on the display and confirm with “prog. ↵”
13		n 19	
14	Reset Exit	Read out	Procedure to exit to programming environment

7.0 PULSE COUNTER AND TIMER ALARMS

Alarm values can be set in two different ways: by front panel keys or by standard menu. In the first case it is possible to immediately get in at the 1, 2 and 3 alarms set up, the second one (MENU) drives you through all parameters of the instrument.
The first step to do is to get in the complete menu and to set up the alarms as requested.

7.1 "UP" COUNT MODE ALARMS

The MPCT301 P6 instruments can be requested with 3 exchange alarm relay. Each alarm can be programmed in the following ways:
MANUAL MODE (nAn): when the counting reaches the programmed numeric value in the "SP" item, it changes the relay and the counting keeps going till when it is not made a "reset" which zeroes the visualisation and the alarm output.
MANUAL MODE WITH STOP COUNTING (nAn S.): when the counting reaches the programmed numeric value in the "SP" item, it changes the relay and the counting is stopped till when it is not made a "reset" which zeroes the visualisation and the alarm output.
AUTOMATIC MODE (AUto): when the counting reaches the programmed numeric value in the "SP" item, it changes the relay for a determinate time, set in the "dEL" item, and the counting is zeroed with the eventual alarms which were working.
To program the alarms you must follow the next table.

7.2 "DOWN" COUNT MODE ALARMS

In the down count mode, the alarms act as follows:
MANUAL MODE (nAn): after a reset, the count starts from the value set at the menu item "PrESE". When the counting reaches the programmed numeric value in the "SP" item, it changes the relay and the counting keeps going till when it reaches the zero. Reaching zero, the count stops until a reset is performed, to start again the count from the "PrESE" value.
MANUAL MODE WITH STOP COUNTING (nAnS.): after a reset, the count starts from the value set at the menu item "PrESE". When the counting reaches the programmed numeric value in the "SP" item, it changes the relay and the counting is stopped till when it is not made a "reset" which zeroes the visualisation at the selected value in the "PrESE" item.
AUTOMATIC MODE (AUto): when the counting reaches the programmed numeric value in the "SP" item, it changes the relay for a determinate time, set in the "dEL" item, it resets the visualisation at the "PrESE" value and starts the cycle again.
To program the alarms you must follow the indication on the following table.

Table 13

n° seq.	Touch key	appears on the display	REMARKS
1	prog. ↲	PASS	Touch the “prog. ↲” key to get into the programming menu
2	prog. ↲	0 0000	Input the personal password code ** (Press “prog. ↲” to confirm)
3	prog. ↲	Ou	
4	prog. ↲	ALL	ALARM PARAMETER
5	prog. ↲	AL01	ALARM 1 PARAMETERS
6	prog. ↲	S.P	Alarm 1 threshold setting
7	prog. ↲	0 00000	Set the required threshold value. ** (Press “prog. ↲” to confirm)
8		S.P.	
9	▲	rELE	OUTPUT RELAY CONFIGURATION
10	prog. ↲	nA	Touch the "▲" key until the desired configuration is displayed: nA = relay normally open; nC = relay normally closed. **(Press “prog. ↲” to confirm)
11		rELE	
12	▲	COnF	ALARM CYCLE CONFIGURATION
13	prog. ↲	AUto	Auto = automatic cycle nAn = manual cycle nAn S. = manual cycle with stop counting Select by "▲" key and confirm with “prog. ↲”
14		COnF	
15	▲	dEL	Automatic cycle TIME SETTING
16	prog. ↲	00 25.0	Digit a value from 0 to 25.0 seconds. ** (Press “prog. ↲” to confirm)
17		dEL	
18	▶	AL01	
19	▲	AL02	ALARM 2 PARAMETERS
20	prog. ↲	S.P	for the alarms two and three also, follow the indication for alarm 1.
21	Reset Exit	“measure”	Procedure to exit the programming mode

** see para. “SET UPS” to change the set value.

After the alarm parameters has been programmed, it is possible to change rapidly the set point values by means of simplified menu.

Table 14

n° seq.	Touch key	appears on display	NOTES
1	AL	AL 1	Press the “AL” key to reach the alarm Set-Point item
2	FS ↵	SP 1	First set-point of the alarm 1
3	FS ↵	0 0000	Input the value of alarm 1 ** (confirm with “FS ↵”)
4		SP 1	
5	▶	AL 1	
6	▲	AL 2	Alarm 2
7	FS ↵	SP 1	First set-point of the alarm 2
8	FS ↵	0 0000	Input the value of alarm 2 ** (confirm with “FS ↵”)
9		SP 1	
10	Reset Exit	Read out	

** to modify the value see the procedure illustrated in the paragraph “SET-UPS” .

8.0 TIMER INSTALLATION NOTES

8.1 INSTALLATION PROCEDURE:

1 Make connections as indicated at pages: 7, 8, 9 and 10

Terminal connections:

to use PNP sensors it’s necessary to modify an internal configuration of the instrument (as described in the “PCB configuration” paragraph).

The 3 inputs are used in the “chronometer” mode (start, stop and reset), and in “timer” mode is sufficient to use the input connected at the “hold” terminal and to program the “hold” item at “on”. By “hold” and “reset” terminal board it is possible to choose the Up-Down counting (see “Up-Down function”).

If the instrument is requested with the serial outputs the hold terminal can be configured for the readout transmission: see “Serial output” paragraph.

2 Switch the unit on.

3 Program the functions based on the indications in the following table:

Table 15

n°seq.	Press Key	Appears on the display	Remarks
1	Prog. ↵	PASS	Touch the “prog.” key to get into the programming menu
2	Prog. ↵	0 000	In this phase the instrument asks for the “password” number to protect the data programmation. (see “Password function”)

n°seq.	Press Key	Appears on the display	Remarks
3		Ou	
4	▲	InP	
5	▲	CPAS	
6	▲	AbtA	
7	▲	dEF	
8	▲	tYPE	TYPE INSTRUMENT
9	prog. ↵	CSEC	rPn = rpm meter Pr.h = hourly production meter FrEq = frequency meter CSEC = timer CIn = counter Select by “▲“key “CSEC” to program timer and confirm by “prog. ↵”
10		tYPE	
11	Reset Exit		

4. Program the functions of the following table to set the measuring scale (hours, minutes, seconds), type of functioning (timer or chronometer), the reset terminal board functioning, the counting type (Up or Down), the preset and count memory at the switching off.
5. Set up the type of functioning by the “hold” item. With the “on” selection, the instrument works as timer (comands hold and reset from the terminal board), with “oFF” selection, the instrument works as chronometer (comands start, stop and reset from the terminal board).
6. Define the reset key on the front panel by the “rES” item and the reset function from the terminal board by the “nrES” item. The “reset” key on the front panel works for the zeroing function of the diplay. If you don’t want this function, you can exclude it through the programmation of the keyboard. The “reset” contact in the terminal board can work in a static way (till when the contact is pressed, the instrument is at 0), or in a dinamyc way (immediate zeroing).
7. For default parameters see "default parameters" paragraph
8. Set alarms (if requested)
9. Follow the instruction to use the serial outputs (if requested)
10. Set, if desired, the programming menu access code (password function)
11. The unit is now ready to be used.

Table 16

n° seq.	Touch key	Appears on the display	NOTES
1	prog. ↵	PASS	Touch the “prog. ↵” key to get into the

n° seq.	Touch key	Appears on the display	NOTES
			programming menu
2	prog. ↵	0 000	Input the personal password code ** (Press “prog. ↵” to confirm)
3		Ou	
4	▲	InP	
5	prog. ↵	SCAL	SELECTION MEASURING SCALE
6	prog. ↵	000000	Set up the relative number for the desired scale: To use scale 9999.99 sec write the number “0” To use scale 99999.9 sec write the number “1” To use scale 999999 sec write the number “2” To use scale 999999 min write the number “6” To use scale 999999 h write the number “8” To use scale 9999 min 59 sec write the number “3” To use scale 9999 h 59 min write the number “7” To use scale 99 h 59 min 59 sec write the number “4” To use scale 23 h 59 min 59 sec write the number “5” ** (Press “prog. ↵” to confirm)
7		SCAL	
8	▲	CoUn	TYPE OF COUNTING SELECTION
9	prog. ↵	uP	Press key "▲" till when on the display appears the desired counting and confirm with “prog.” (“uP” for increasing counting and “doun” for decreasing counting)
10		CoUn	
11	▲	Pr.SE	PRESET FOR DOWN COUNTING
12	prog. ↵	100000	Write the number of the requested preset ** (Press “prog. ↵” to confirm)
13		Pr.SE	
14	▲	HOLd	CHRONOMETER/TIMER SELECTION
15	prog. ↵	on	Selection the type of functioning: timer or chronometer. Press key "▲" till when on the display appears the desired functioning and confirm with “prog. ↵”: “on” = timer functioning (hold and reset from the terminal board) “oFF” = chronometer functioning (start, stop and

n° seq.	Touch key	Appears on the display	NOTES
			reset from the terminal board)
16		HOLd	
17	▲	nrES	RESET TERMINAL BOARD CONFIGURATION
18	prog. ↵	StAt	StAt = the instrument keeps staying at zero till when the terminal is short-circuited. dIn = the instrument immediately goes to zero when the terminal is short-circuited Press key " ▲ " until the required function appears on the display and confirm with “prog. ↵”
19		nrES	
20	▲	StOr	COUNTING MEMORIZING AT THE SWITCHING OFF
21	prog. ↵	On	Press key "▲" till when on the display appears th desired function: on = counting stored oFF = counting not stored ** (Press “prog. ↵” to confirm)
22		StOr	
23	Reset Exit	measure	Procedure to exit the programming mode

** see para. “SET UPS” to change the set value.

9.0 ANALOGUE OUTPUTS (option)

The MPCT301 P6 instrument can be ordered with a voltmeter or ammeter standard analogue output (“OAP” option).

The analogue output can work as revolution counter, hourly production and pulse counter.

The flexibility of use and complete programmability make this output an important interface with analogue computer inputs, recorders or repeaters with analogue input . In particular you can choose, by programming the requested output (0÷10V, 0÷20mA, 4÷20mA), the calibration values linked to the required observations. The instrument can supply a maximum voltage of 10V and a current of 20mA, there being no limit to the intermediate values.

<u>To configure the analogue output the user will have to set up the two reading values (IS and FS) and the corresponding output values (ISO and FSO). It is necessary to take account of the fact that for reading values smaller or greater than those programmed the analogue output will not rise above the values set by the programming parameters ISO and FSO output values.</u>

For greater clarity please check with the paragraph “Notes on the analogue output set-up”.

The analogue outputs follow instantaneously the display reading, consequently the are locked when hold is entered on the terminal board and they take account of the numbers zeroed in the terminal board by the function “Display reset”.

9.1 TECHNICAL CHARACTERISTICS

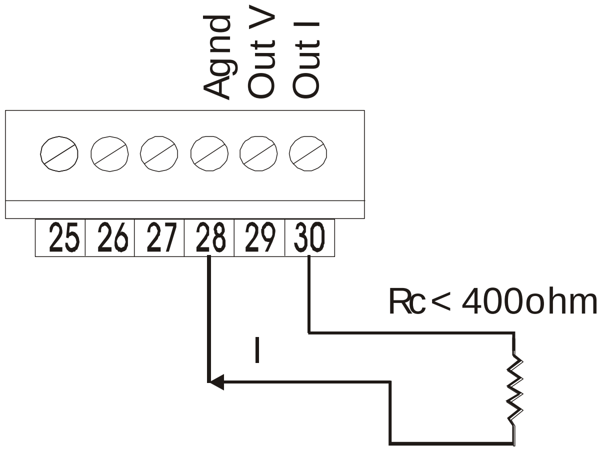
Table 17

Analogue Output	0÷10 V - 0÷ 20 mA - 4÷20 mA
Max. impedance for current output	400 Ω
Min. impedance for voltage output	1 KΩ
Max. voltage supplied	10 V
Max. current supplied	20 mA
Resolution	12 bit

9.2 INSTALLATION OF ANALOGUE OUTPUT

To use correctly the analogue output it is necessary to follow carefully these instructions:

1- Follow the connections in FIG A for the voltmeter output or the connections on FIG B for the ammeter output.



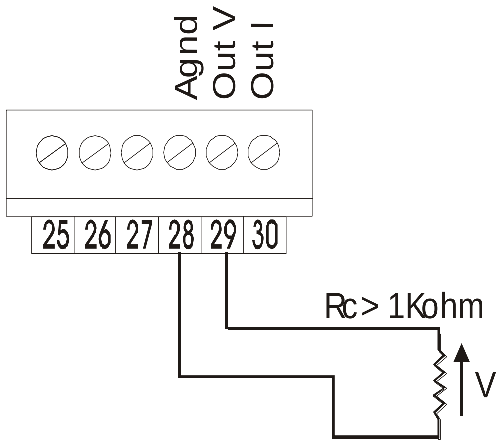


Fig B

Ammeter output Voltmeter output

2- Follow the programming procedure on following table and then check with the examples that follow.

For programming it is necessary to take account of:

ISO (beginning of output scale) is the value of the analogue output coinciding with the observed digit at the beginning of the initial reading scale (IS). Digit at the input “IS” the display reading value which you want to coincide with initial value of the analogue output (ISO). The programming parameter “ISO” is programmed depending on the type of output chosen. Consequently we can obtain:

- ISO = 00.000 V if voltage output
- ISO = 00.000 mA if ammeter output (for output 4÷20 mA no programming is necessary).

FSO (end of the output scale) is the value of the analogue output which coincides with the programmed number at the item FS. Digit at the “FS” item the display reading value which you want to make to coincide with the final value of the analogue output (FSO).
The menu item “FSO” must be programmed on the basis of the type of output chosen. Therefore we obtain.:

- FSO = 10.000 V if voltage output
- FSO = 19.999 mA if ammeter output (for an output at 4 ÷20 mA no programming is necessary).

Table 18

n seq.	Press key	Appears on the display	NOTE
1	prog. ↵	PASS	Press the “prog. ↵” key to get into the programming menu
2	prog. ↵	0 0000	Input the personal Password number if already programmed see “password Function” ** (confirm with “prog. ↵”)
3		Ou	
4	prog. ↵	ALL	
5	▲	Ou.An	
6	prog. ↵	SEL.A	ANALOGUE OUTPUT SELECTION
7	prog. ↵	E0.10	E0.10 = voltage output 0÷10 V C0.20 = current output 0÷20 mA C4.20 = current output 4÷20 mA Select the requested item with “▲ “ key and confirm with “prog.” key
8		SEL.A	
9	▲	I.S.	BEGINNING OF READING SCALE
10	prog. ↵	0 00000	write the reading value which coincides with ISO ** (confirm with “prog.”)
11		I.S.	
12	▲	F.S.	END OF READING SCALE
13	prog. ↵	1 00000	write the reading value which coincides with FSO ** (confirm with “prog.”)

n seq.	Press key	Appears on the display	NOTE
14		F.S.	
15	▲	I.S.O.	BEGINNING OF ANALOGUE OUTPUT SCALE
16	prog. ↵	000.00	write the output value which coincides with the reading programmed in “IS”. ** (confirm with “prog.”)
17		I.S.O.	
18	▲	F.S.O.	END OF ANALOGUE OUTPUT SCALE
19	prog. ↵	010.00	write the output value which coincides with the programmed reading at “FS”. ** (confirm with “prog↵.”)
20		F.S.O.	
21	Reset Exit	Read out	Procedure for exiting programming area

** to modify the number set-up see the procedure illustrated in the paragraph “SET-UPS”.

9.3 NOTES ON THE SET UP OF ANALOGUE OUTPUTS

- Program instrument with the following calibration:

READING: 100 AMMETER OUTPUT: 5 mA ;
READING: 10000 AMMETER OUTPUT: +15 mA;

The instrument parameters should be programmed as follows.

PARAMETERS "OU AN":

SEL. A = C0.20
IS = 100
FS = 10000
ISO = 5.00 *
FSO = 15.00 *

* with display below “100” the analogue output is fixed to 5 mA; with display above “10000” the analogue output is fixed to 15 mA.

- Program instrument with the following calibration:

READING: 100 AMMETER OUTPUT: 4 mA ;
READING: 10000 AMMETER OUTPUT: 20 mA ;

The instrument parameters should be programmed as follows.

PARAMETERS “OU AN.”

SEL.A = C 4.20
IS = 100
FS = 10000
ISO = not necessary to program
FSO = not necessary to program

* with display below “100” the analogue output is fixed to 4 mA; with display above “10000” the analogue output is fixed to 20mA.

- Program instrument with the following calibration:

READING: 100 VOLTMETER OUTPUT: 2 V
READING: 1000 VOLTMETER OUTPUT: 6 V

The instrument parameters should be programmed as follows.

PARAMETERS "OU AN.":
SEL.A = E0.10
IS = 100
FS = 10000
ISO = 2.00 *
FSO = 6.00 *

- with display below “100” the analogue output is fixed to 2V; with display above “10000” the analogue output is fixed to 6V.

10.0 SERIAL OUTPUT (option)

"MPCT301 P6" series models can communicate with an host computer along a standard or opto-isolated RS232, RS422, RS485 half duplex serial line.

Unidirectional serial output

"MPCT301 P6" series instrument with unidirectional standard or optoisolated RS232 output send out the readout value when the Print key is pressed or 18 or 19 terminal is activated (see paragraph “Terminal 18 and 19 configuration”). Serial output features are listed in the table below, and the wiring diagram is shown in fig C. The output format is as follows:

30	30	31	34	37	32	OD	OA
H.T.	T.T.	T.	H	tens	unity	LF	CR

Bi-directional serial output

It is possible to program or read the most of the keyboard function of one or more instruments linked with each other (31 max) by this line transmission. All messages are sent and received by means of an ASCII protocol.

Table 19

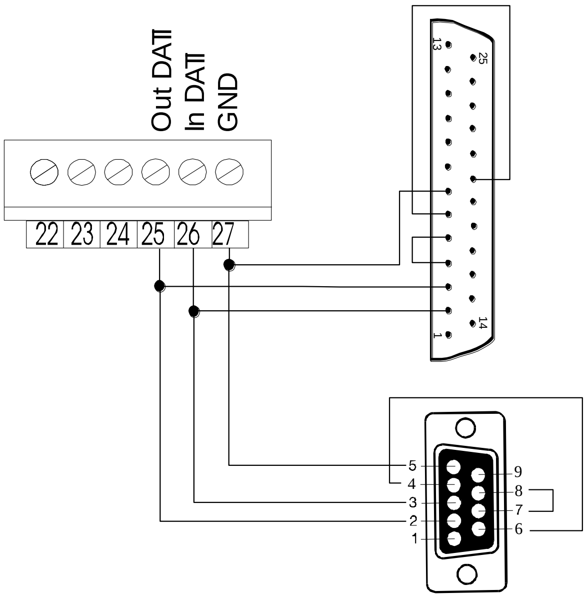
SERIAL CHARACTERISTICS	
baud rate	9600 4800 2400 1200 (programmable)
start bit	1 bit
Length	8 bit
Stop	1 bit
Parity	no

To use the "MPCT301 P6" instrument with RS485 or RS422 serial output see wiring diagram “D”, with RS232 serial output see figure “C”. Program the menu items: BAUD-RATE to setup transfer speed, the address and the answer delay to avoid line conflicts (only for RS485 half duplex).
To setup the instrument see the table:

Table 20

seq. n	Press key	appears on display	NOTES
1	prog. ↵	PASS	Press the “prog. ↵” key to get into the programming menu
2	prog. ↵	0 0000	Input the personal password number ** (confirm with “prog. ↵”)
3		Ou	
4	prog. ↵	ALL	
5	▲	Ou.An	
6	▲	Ou.rS	
7	prog. ↵	bAUd	BAUD RATE
8	prog. ↵	9600	Press the " ▲ " key until appears the baud-rate ** (confirm with “prog. ↵”)
9		bAUd	
10	▲	Addr	INSTRUMENT ADDRESS
11	prog. ↵	001	Input the instrument address with a number between 001 and 099. **(confirm with “prog. ↵”)
12		Addr	
13	▲	dLSE	SELECT DELAY TIME IF HALF DUPLEX
14	prog. ↵	10	Setup serial answer delay time (between 0 and 255mSec). **(confirm with “prog. ↵”)
15		dLSE	
16	Reset Exit	Read out	Procedure for exiting programming area

** to modify the number set-up see the procedure illustrated in the paragraph “SET-UPS”.



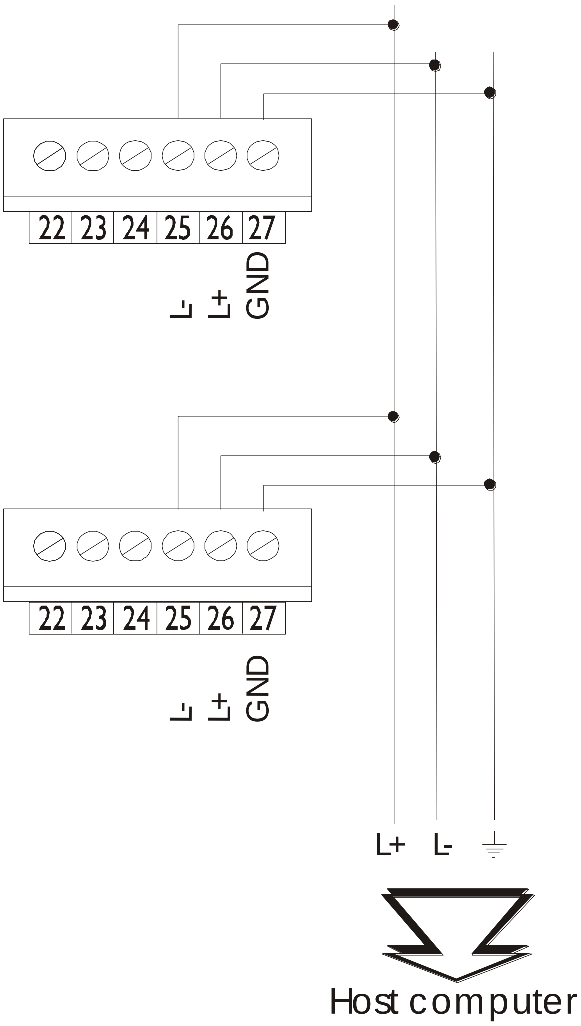


Figure C.(RS232) **Figure D (RS485)**

10.1 DATA READING FROM HOST TO INSTRUMENT MPCT301 P6

Transmission string set-up.

EOT <u>GID GID</u> <u>UID UID</u> <u>C1 C2</u> ENQ

<u>EOT</u> = EOT from host indicates start of transmission string
<u>GID</u> = Instrument address: ASCII in decimal code to transmit twice consecutively
<u>UID</u> = Instrument address: in units ASCII to transmit twice consecutively
<u>C1 C2</u> = mnemonic ASCII code for command to follow (see paragraph “command codes”).

EXAMPLE: data transmission string from host to MPCT301 P6 with address "01" for data request "Reading scale end" (FL).

EOT	0	0	1	1	O	F	ENQ	
04	30	30	31	31	4F	46	05	cod. ASCII

The instrument, as soon as receives the first string code transmitted by the host, leaves 400 ms. during which it waits for the completion of the transmission operation. When the 400 ms. operation finishes, or when the data reception is complete, the instrument, depending on the information received, can behave in the following ways :

1. If the data string received presents errors which do not allow address identification then the instrument cannot reply and rejects the information received.
2. The string has a correct address code but it detects other errors: in this case the instrument transmits the ASCII code: NACK (not understood) and rejects the information received.
3. The received data string is totally correct, in this case the instrument transmits the data requested in ASCII format. (see paragraph “Data trasmission from MPCT301 P6 to host”)
4. When the complete message is not received before "timeout" (400 ms), the instrument rejects the information received and is ready to receive a new message.

10.2 DATA TRANSMISSION FROM MPCT301 P6 TO HOST

Transmission String configuration

STX <u>C1 C2</u> <u>D1 . . . . D8</u> ETX BCC

<u>STX</u> = text beginning
<u>C1 C2</u> = mnemonic code ASCII relative to command to follow. (see paragraph “command codes”).

<u>D1 ÷D8</u> = digits observed, including negative nos. , also ">", decimal points (if required) and blank or zero for digit not used (the transmitted digits must always be eight)
ATTENTION: the data must always be right justified and in any case the significant numbers cannot be more than five. In the case of positive numbers the sign "+" must not be transmitted.

EXAMPLE: the number -5.6 can be written in two ways

1)	blank	blank	blank	blank	-	5	.	6
	20	20	20	20	2D	35	2E	36
2)	-	0	0	0	0	5	.	6
	2D	30	30	30	30	35	2E	36

<u>EXT</u> = End of text
<u>BCC</u> = Checksum, obtained using EXCLUSIVE OR, of the string transmitted excluding the code "STX" comprising "ETX" in the indicated order.

$$BCC = C1 + C2 + D1 + D2 + D3 + D4 + D5 + D6 + D7 + D8 + ETX$$

EXAMPLE: data string from MPCT/301/P6 to host in response to preceding example.

STX	O	F	blank	blank	blank	blank	0	1	0	0	ETX	BCC	
02	4F	46	20	20	20	20	30	31	30	30	03	0B	cod. ascii

The MPCT301 P6 after having transmitted the string with the data requested from the host-computer awaits the reply confirming the result of the transmission.

1. The host-computer replies in ASCII: NACK (retransmit the message). The MPCT301 P6 retransmits the data string.
2. The host-computer does not reply. In this case the instrument awaits the next EOT on the network to set up the next communication.
3. The host-computer replies in ASCII: ACK (understood). The instrument awaits new commands.

10.3 DATA WRITING FROM HOST TO MPCT301 P6

Set up of transmission string

EOT <u>GID GID</u> <u>UID UID</u> STX <u>C1 C2</u> <u>D1 . . . D8</u> ETX BCC

<u>EOT</u> = EOT from host indicates start of transmission string
<u>GID</u> = Instrument address: ASCII code in decimal twice to transmit consecutively
<u>UID</u> = Instrument address: ASCII in units to transmit twice consecutively
<u>C1 C2</u> = mnemonic ASCII code for command to follow . (see paragraph “command codes”).
<u>D1 ÷ D8</u> = Digits seen. The same rules are valid as those described in the paragraph " data transmission from MPCT301 P6 to host"
<u>BCC</u> = Checksum, obtained using EXCLUSIVE OR, of the transmitted string excluding code "STX" comprising "ETX" in the order indicated

$$BCC = C1 + C2 + D1 + D2 + D3 + D4 + D5 + D6 + D7 + D8 + ETX$$

EXAMPLE: string for writing data from host to MPCT301 P6 with "01" address.

EOT	0	0	1	1	STX	O	F	blank	blank	blank	blank	0	1	0	0	ETX	BCC
04	30	30	31	31	02	4F	46	20	20	20	20	30	31	30	30	03	0B

The instrument starting from the first code received of the data string transmitted by the host, leaves 400 ms during which it waits for the transmission operation to be completed. When the 400 ms operation finishes, or when the data reception is complete, the instrument , depending on the information received, can behave in four different ways :

1. If the data string received presents errors which do not allow address identification, then the instrument cannot reply and rejects the information received.
2. The string has a correct address code but detects other errors: in this case the instrument transmits the ASCII code: NACK (not understood) and rejects the information received.
3. The received data string is totally complete, in which case the instrument stores the information and transmits the code ASCII=ACK (understood)
4. When the complete message is not received before "time-out" (400 ms), the instrument rejects the information received and is ready to receive a new message.

10.4 COMMAND CODES

The codes of the variables used for the MPCT301 P6 instrument programming, are listed in the following Table. Not all the parameters allow the writing from host, in this case the instrument replies "NACK" (read only parameters).

Table 21

COMMAND CODES	**COMMAND DESCRIPTION**	**POSSIBLE OPERATION**	**DATE CODE**
SC	Instrument selection (rpm, freq, prh, cim or csec)	read/write	hexadecimal 0 = RPM 1 = Pr.h 2 = Freq. 3 = CIM 4 = CSEC
NT	notches per revolution	read/write	ASCII 0÷ 999999
OF	PrESE CIM	read/write	ASCII 0÷ 999999
PR	PrESE CSEC	read/write	ASCII 0÷ 999999
PM	PICC (Peak-hold)	read/write	hexadecimal 0 = POFF 1 = P.ho 2 = P.hi 3 = P.Lo 4 = P.Li
TI	.HLd	read/write	ASCII 0÷19.9
PT	P.dEC (decimal point)	read/write	hexadecimal 0 = no point 1 = 99999.9 2 = 9999.99 3 = 999.999 4 = 99.9999 5 = 9.99999

COMMAND CODES	COMMAND DESCRIPTION	POSSIBLE OPERATION	DATE CODE
NU	Num (multiplying factor)	read/write	ASCII 1÷65535
DN	Deno (division factor)	read/write	ASCII 1÷65535
NM	nFIL (filtering number)	read/write	hexadecimal 0 = no filter 1 = 2 2 = 4 3 = 8 4 = 16 5 = 32 6 = 64 7 = 128
MO	SCAL (SELECTION MEASURING SCALE)	read/write	hexadecimal 0 = 9999.99 sec 1 = 99999.9 sec 2 = 999999 sec 6 = 999999 min 8 = 999999 h 3 = 9999 min 59 sec 7 = 9999 h 59 min 4 = 99 h 59 min 59 s 5 = 23 h 59 min 59 s
SA	dEL (width filter)	read/write	ASCII 0÷199
PE	Per (filter permanence)	read/write	ASCII 0÷1.99
AT	SEL.A (analogue output selection)	read/write	hexadecimal 0 = E0.10 1 = C0.20 2 = C4.20
IU	IS (out an)	read/write	ASCII 0÷999999
FU	FS (out an)	read/write	ASCII 0÷999999
IO	ISO (out an)	read/write	ASCII 0÷19999
FO	FSO (out an)	read/write	ASCII 0÷19999
DS	DLSE	read/write	ASCII 0÷255
RS	Display reset	Write only	hexadecimal 0 = reset
RT	Display total reset	write only	hexadecimal 0 = reset
RP	Peak reset	read/write	ASCII

COMMAND CODES	COMMAND DESCRIPTION	POSSIBLE OPERATION	DATE CODE
RO	read out (display)	read only	ASCII 0÷999999
AR	Generic status word	read/write	See "Generic status word" paragraph
A1-A2-A3*	SP1 (AL1÷AL3)	read/write	ASCII 0÷999999
B1-B2-B3*	SP2 (AL1÷AL3)	read/write	ASCII 0÷999999
H1-H2-H3*	HY (AL1÷AL3)	read/write	ASCII 0÷199
D1-D2-D3*	Delay (AL1÷AL3)	read/write	ASCII 0÷199
W1-W2-W3*	status word alarms	read/write	hexadecimal (see paragraph)

* The code is composed by the letter followed by the number of the alarm to program

10.5 TRANSMISSION OF HEXADECIMAL VALUES

Some values must be transmitted in a hexadecimal format. In that case the protocol string must be preceded by the ASCII character ">".
EXAMPLE: the string for reading or writing the decimal point in the position 99999.9 will be:
Blank blank blank > 0001
EXAMPLE TO READ DECIMAL POINT POSITION
HOST:

EOT 0 0 1 1 P T ENQ
04 30 30 31 31 50 54 05

INSTRUMENT MPCT301 P6

STX P T blank blank blank > 0 0 0 4 ETX BCC
02 50 54 20 20 20 3E 30 30 30 34 03 1D

EXAMPLE TO WRITE DECIMAL POINT POSITION
HOST:

EOT 0 0 1 1 STX P T blank blank blank > 0 0 0 2 ETX BCC
04 30 30 31 31 02 50 54 20 20 20 3E 30 30 30 32 03 1B

INSTRUMENT MPCT301 P6

ACK
06

ATTENTION:
In the readout transmission (code "RO") appears also the word that indicates if the instrument is in hold state. In the paragraphs above it has been said that, in normal conditions, the data are transmitted from "D1" to "D8" and particularly"D1" and "D2" are considered "blank". With the instrument in hold state, "D1" gets the H value while "D2" keeps staying "blank".

10.6 ALARM SETTING

MPCT301 P6 series instruments can have 3 alarms. These alarms can work in different ways basing on the reading selection. If the instrument works with “rpm” or “hourly production” reading, the relevant codes to program are:

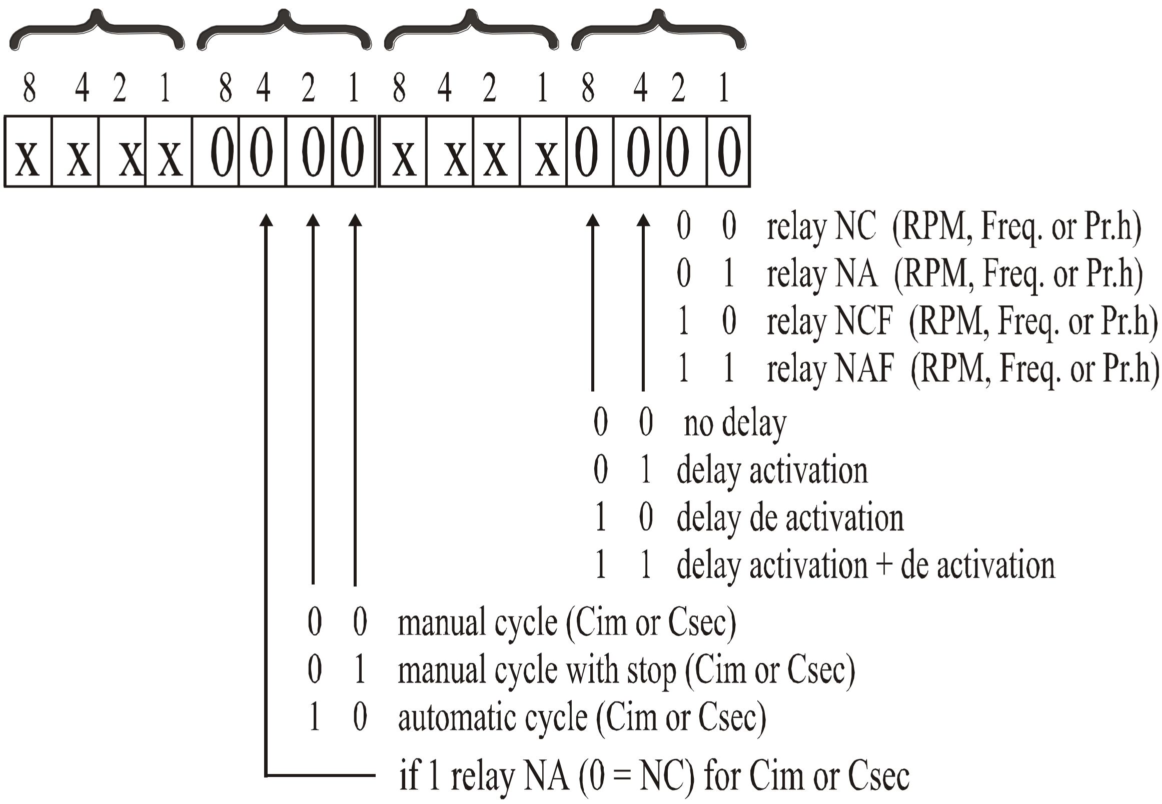
A reading/writing of SP1
B reading/writing of SP2
H reading/writing of hysteresis
D reading/writing of delay time
W reading/writing of the status word of the alarm

The code is followed by a number indicating the alarm number.
For instance, “H2” means hysteresis for alarm 2 while “A1” indicates the set-point 1 of the alarm 1.
The status word W gives the information on the relay status (normal or windowed alarm) and about the kind of delay (excitation or de-excitation**).**
The alarms’ status word accepts hexadecimal numbers from 0 to F as shown in the table below.
If the instrument works as pulse counter the item to program are:

A reading/writing of SP
D reading/writing of delay of automatic cycle
W reading/writing of alarms status word

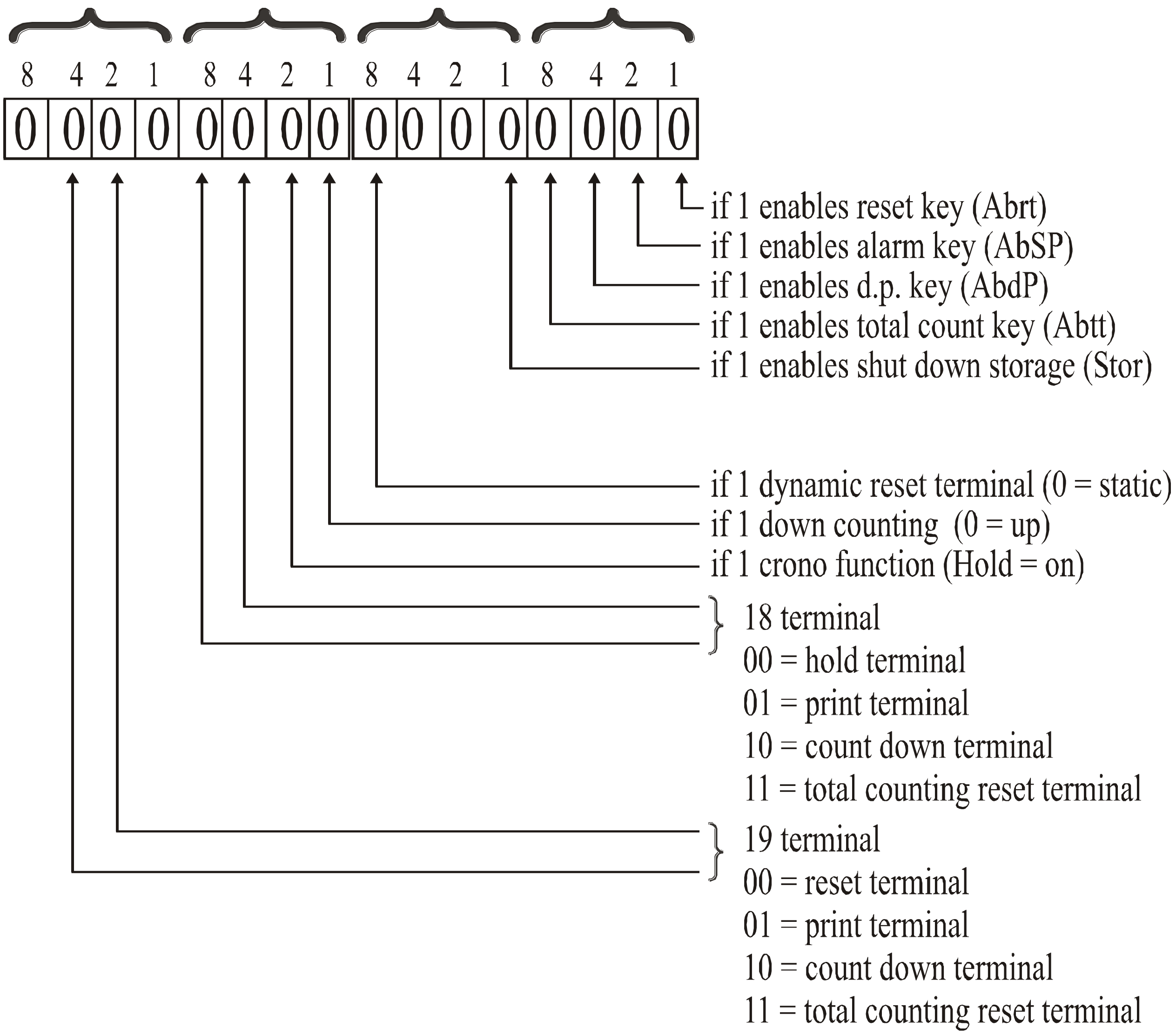
A number which indicates the trigger alarm that you want to program follows the described code. For instance “D2” indicates time of the alarm 2, while “A1” indicates the set point 1of alarm 1.

The exchange relay and the cycle functioning (manual, manual with stop and automatic) are programmed with the status word. The following figure describes the meaning of this set up.



10.7 AR STATUS WORD

The “AR” status word allows to configure the front keys enabling by serial line, the terminal configuration, the Up-Down counting and the timer–chronometer selection. You can see the status word description in the following picture.



10.8 PEAK-HOLD RESET

MPCT301 P6 instrument has a peak-hold capability. The peak value can be reset by writing the serial code “RP”. This code can be written or read. In particular in the “RP” code you can read the “0” value, which means the up-to-date visualization, or “1”, which means that the visualization is stopped at the max or min programmed value.
Then to read the peak value, you have to verify that the “RP” code is at “1”, while to zero this visualization you have to write “0” in the “RP” code.

10.9 BASIC PROGRAM

The following basic program shows the reading of the set-point of an instrument by an host computer.

```
on error goto 20
cls
open “com1: 9600, n, 8, 1” for random as #1
print #1, chr$(4) + “0” + “0” + “1” + “1” + “R” + “O” + chr$(5)
print “waiting for answer …”
```

```
cls
a$ = input$(13, #1)
b$ = mid $(a$, 5, 7)
print
print "read : ";b$
end
20 print "no answer"
resume
```

11.0 PASSWORD FUNCTION

Programmed data can be protected from unauthorised changes using the password function.
The instrument is supplied with the password code set = 0; any number in the range 0 to 9999 can be used as access key to changing set data.
See following table for setting a customer password.
The password code is requested when accessing the programming menu.
The instruments, after receiving the password number, can behave in two different ways.

1) **correct Password number:** The user can gain access to programming menu and modify any function or number that is flashing.
2) **false Password number:** The user can only see the programmed numbers but cannot modify them.

WARNING. The code programmed at the item "c.PASS" by the user, shall be entered in the field "n.PASS" every time access is required to the programming menu to change the set data.
Should the user forget the programmed password code, our Customer Service should be called to unlock the instrument.

Table 22

n° seq.	Touch key	Appears 0n the display	NOTES
1	prog. ↵	PASS	Touch the "prog. ↵" key to get into the programming menu
2	prog. ↵	0 000	
3	prog. ↵	Ou	
4	▲	InP	
5	▲	c.PAS	PERSONAL PASSWORD
6	prog. ↵	0 000	Input a Password number between 0 and 9999. ** (confirm to "prog. ↵")
7		c.PAS	

n° seq.	Touch key	Appears 0n the display	NOTES
8	Reset Exit	measure	procedure to exit the programming mode

** see para. “SET UPS” to change the set value.

12.0 SET UPS

Instructions for changing and storing programming numbers. In this paragraph the instructions to set up “SP1” item are shown but the procedure is the same for all items.

Table 23

n° seq.	Touch key	Appears on the display	REMARKS
1		SP1	example of changing set point value
2	prog. ↵	0 00000	the display shows the first digit blinking
3	▶	0 0 0000	key “ ▶ ”moves the blinking digit forward right
4	▲	0 1 0000	key “ ▲ ” increases the blinking digit
5	prog. ↵	SP1	The value is stored and the display moves back to the selected item.

13.0 NOTES

The instrument does not have a power on switch and an internal fuse, but it immediately switch on when the correct voltage is applied (see the operating voltage on the instrument label). Keep the power line separate from the signal lines.
For security reasons, it is necessary to provide externally a two phases switch and a protective fuse near the instrument with easy access for the user.
Avoid the presence of others power elements, humidity, acid, heat sources, etc..
The instruments must be powered by safety isolating transformer or by selv type power supply.

Mect srl is not responsible for damages to humans or goods for an improper use of the instrument or not conforming to the characteristics of its instrument.
In mect srl there has an help desk office.