



ACORE Industrie S.a.
Constructions Électriques et Électroniques

COUNTER

**AMPERE HOUR
AMPERE MINUTE
COULOMB
GOLD GRAM
SILVER GRAM**

μ AI 200

**INSTALLATION AND
OPERATION HANDBOOK**

CONTENTS

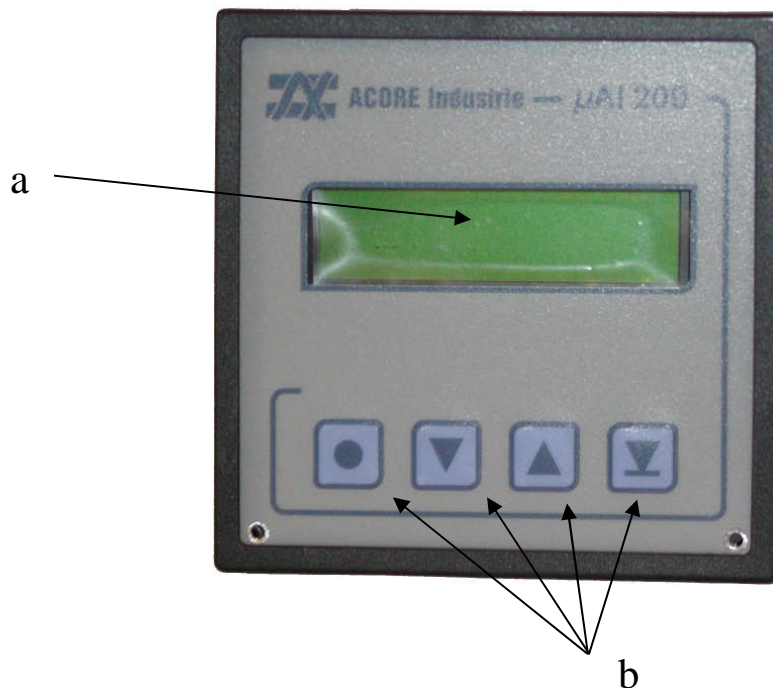
1. GENERAL FEATURES	3
1.1. COUNTER FRONT DESCRIPTION	3
1.2. FUNCTIONS	4
1.2.1. <i>Preselection $\overline{P}r$</i>	4
1.2.2. <i>Pump Preselection $\overline{P}P$</i>	5
1.2.3. <i>Timer $\overline{P}h$</i>	5
1.2.4. <i>Controller Impulse $\overline{A}u$</i>	5
1.2.5. <i>Double Preselections</i>	6
1.2.6.	8
1.2.6. <i>Generalities</i>	8
1.2.7. <i>μAI 200 Options</i>	9
1.3. TERMINAL BLOCK DESCRIPTION.....	10
1.4. TECHNICAL FEATURES.....	11
1.5. MECHANICAL FEATURES.....	13
1.6. CONNECTION LAYOUT	14
1.6.1. <i>Mains supply wiring Plan</i>	14
1.6.2. <i>Pump wiring Plan</i>	14
1.6.3. <i>Measure wiring Plan</i>	15
1.6.4. <i>RAZ and INH wiring Plan</i>	15
1.6.5. <i>P.L.C. impulse output diagram</i>	16
2. COUNTER CONFIGURATION	17
3. COMMON FUNCTIONS	21
3.1. ADDING FUNCTION	21
3.1.1. <i>Gold-gramm or Silver-gramm counting particularities:</i>	21
3.2. DAILY FUNCTION J.....	21
3.3. AMMETER A	21
3.3.1. <i>Threshold adjustment</i>	22
4. FUNCTIONS	23
4.1. PRESELECTION OPTION: $\overline{P}r$	23
4.2. PUMP PRESELECTION: $\overline{P}P$	24
4.3. TIMER : $\overline{P}h$	25
4.4. CONTROLLER IMPULSE: $\overline{A}u$	26
5. SAFETY AND ELECTROMAGNETIC COMPATIBILITY INSTRUCTIONS	28
5.1. SAFETY	28
5.2. ELECTROMAGNETIC COMPATIBILITY	28
6. REQUIREMENTS RELATED TO INSTALLATION ELECTROMAGNETIC COMPATIBILITY	28
6.1. WIRING.....	28
7. MAINTENANCE AND REPAIR	29
8. SAFETY TECHNICAL REQUIREMENTS	29

8.1.	EQUIPMENT RATED VALUES	29
8.2.	ENVIRONMENT RATED VALUES	29
8.3.	SAFETY SYMBOLS.....	30
9.	INSTALLATION SAFETY REQUIREMENTS.....	30
9.1.	STAFF	31
9.2.	PROTECTION FOR CHARGED-PARTS UNDER VOLTAGE	31
9.3.	WIRING.....	31
9.4.	ISOLATION	31
9.5.	CURRENT OVERLOAD PROTECTION.....	31
9.6.	RATED VOLTAGE.....	31
9.7.	CONDUCTIVE POLLUTION	32
9.8.	EARTHING.....	32
9.9.	ELECTROSTATIC DISCHARGES PRECAUTIONS.....	32
9.10.	PROTECTION AGAINST AUTOMATED SYSTEM FAILURES	32
10.	ADDING FUNCTION RESET	33
11.	DATAS SAFEGUARD	33
12.	TROUBLES.....	33

OPERATION HANDBOOK

1. GENERAL FEATURES

1.1. Counter front description








Picture 1

a) LCD 2 display \times 16 digits:

The screen LCD 2 \times 16 prints can display some numbers and alphanumerical text.

b) 4 keys keyboard

Four keys     are used for parameter and for displaying all functions.

The key  : for a general use and, you can see all parameters if you combine this key with the others.

The key  : valid selected parameters or reset

Keys  and  : to go over options and to go up and down values.

Each function for one key is described in each option.

☞ This counter includes only four keys, you must then sometimes pressing several keys at same time to get some functions, in this case, the order for using keys is very important.

1.2. Functions

Our counter μ AI 200 is useful to execute many functions useful for metal finishing surface treatment.

Basic functions in all counters (basic version: **CJ** counter (*Daily Countering*)):

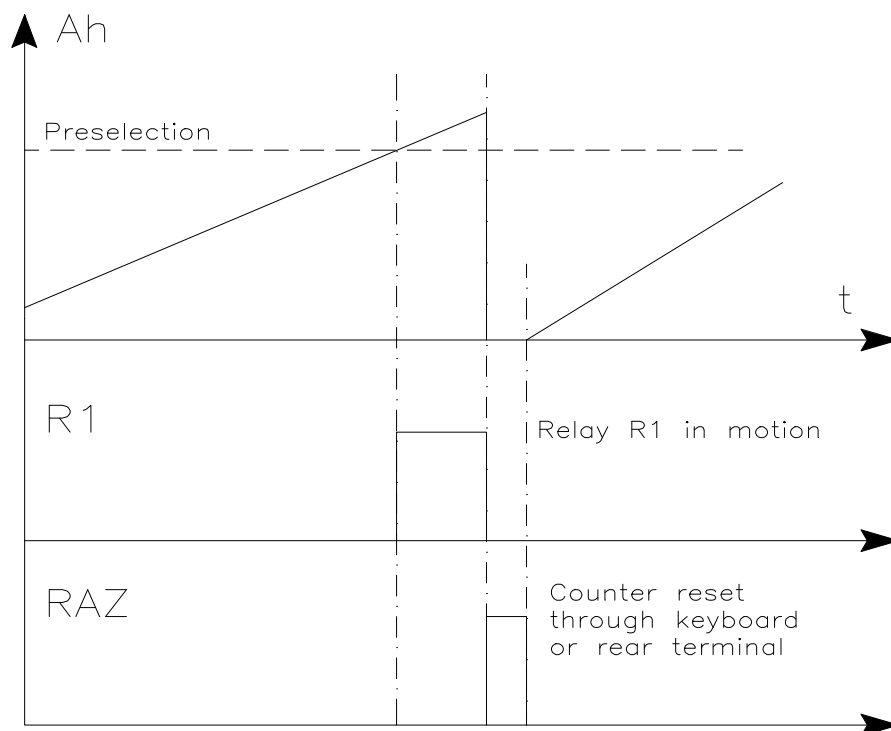
1. Adding Counter : 8 digits Display;
2. Daily counter : 7 digits Display;
3. Ammeter function: 5 digits Display for current strength.

All additional functions are as follow:

1.2.1. Preselection Pr

A relay is driven as soon as the fixed Ampere-hour (or whatever the unit) is ended. These relays allow to control devices (e.g. : Stopping the rectifier)

The counter reset gets the process to start again (by the keyboard or by the input switch on the rear panel)



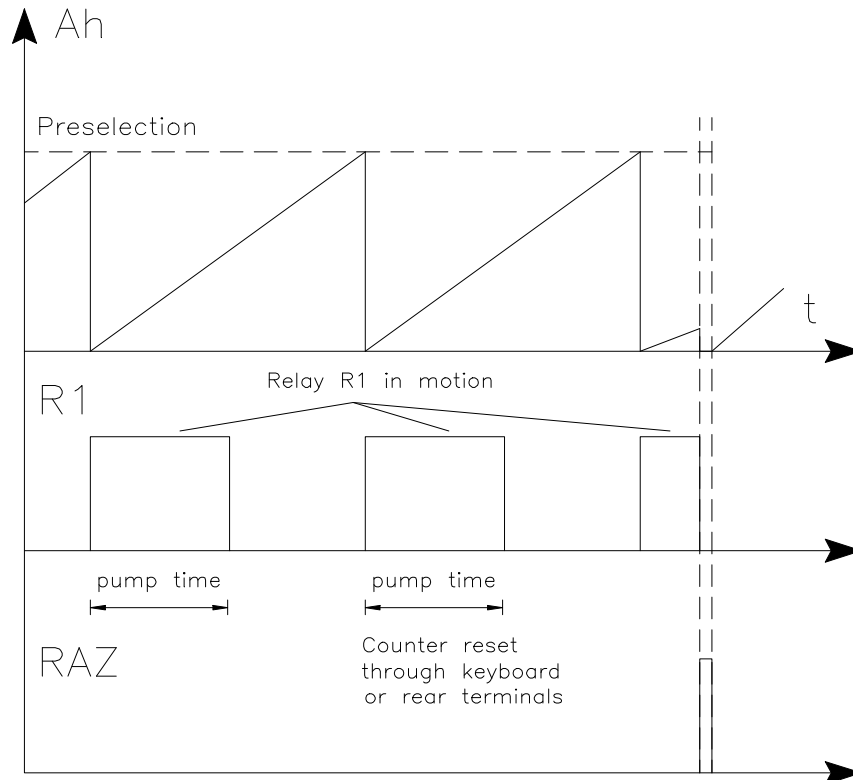
Picture 2

1.2.2. Pump Preselection FF

This function is used for bath electrolyte regeneration especially when a dosing pump (starting as soon as a set value is reached) is needed for this process.

In this case, you set an Ampere-hour (or another required value) preselected value, and as soon as this value is reached, the relay acts on the dosing pump.

The dosing pump is working during a set time. The counter is reset, the count starts again in a new cycle when the set value is reached.



Picture 3

1.2.3. Timer Fh

A relay is driven when the set time is ended and through the relay switch you can control automatic devices. It works identically as the preselection but the Ampere-hour preselection (see Picture 2 page 4) is replaced by time.

1.2.4. Controller Impulse \hat{A}

Each time one digit is incrementing; the counter drives a relay (available contacts on rear panel). These switches may have a counting function for the controller. You can parameter the impulse time.

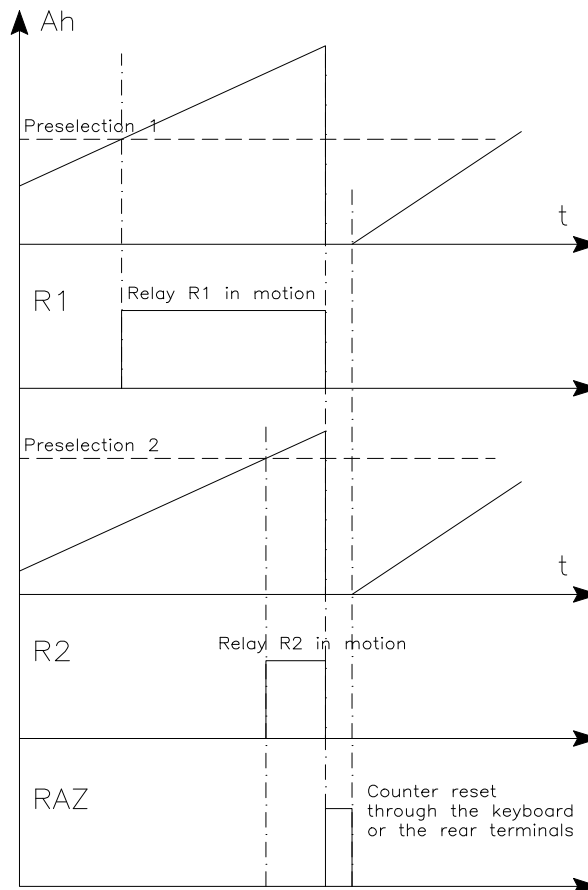
1.2.5. Double Preselections

Two basic functions may be associated:

Pr Preselection, P Pump Preselection, Timer Ph and PLC Impulse Au .

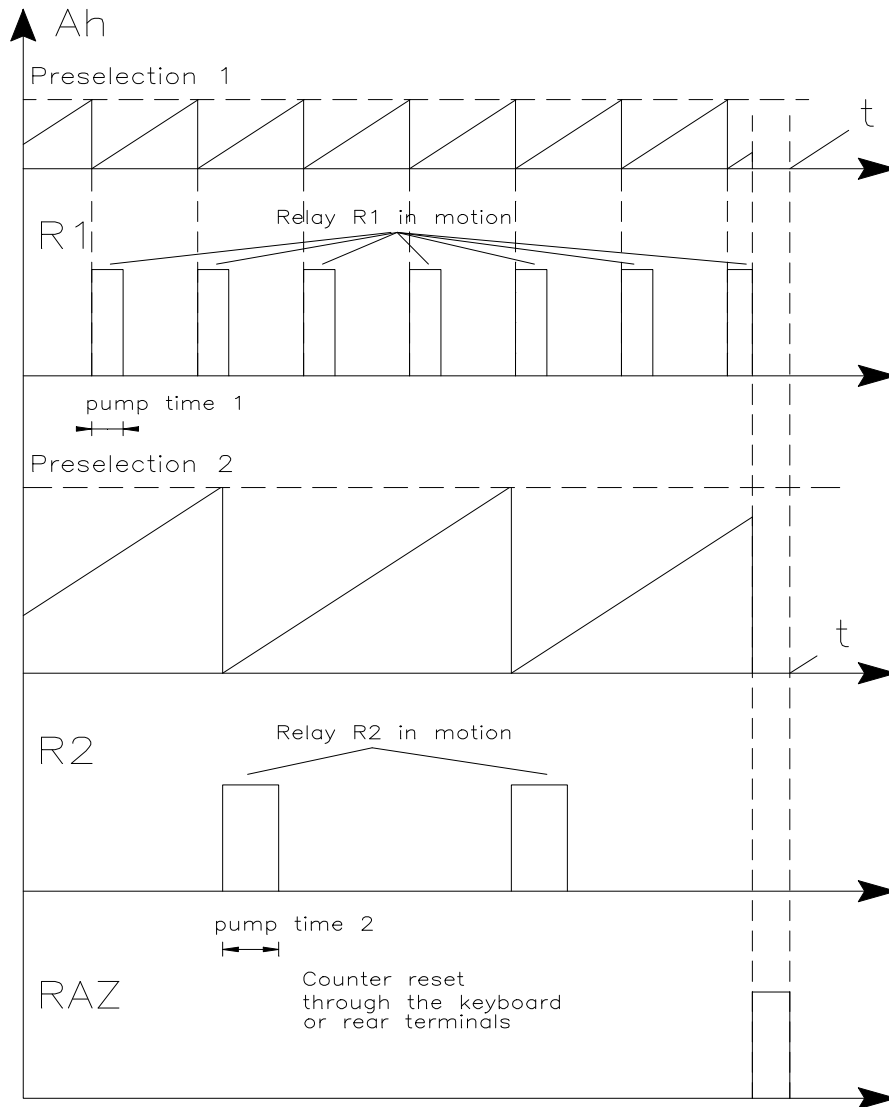
WARNING: these functions work independently but they receive the same shunt information. All functions are linked to one sole counting.

example: Pr+Pr: association





Picture 4

example: PP+PP: association



Picture 5

1.2.6.Generalities

With key  or  the user can visualise all functions and values displayed on scrolling screens. The LCD 2 display \times 16 alphanumerical signs allow to distinguish each screen.

As a general rule, the second line described values are displayed on the first line.

In case the counter is programmed to execute many functions. All are simultaneously actives. The display allows enables you to check separately all functions state as soon as you scroll manually all screens linked to each function.

A lot of messages help you using keyboard and display to configure the counter

Counting units are:

- Ampere-hour,
- Ampere-minute,
- Coulomb,
- Gold-gram,
- Silver-gram.

You can also set the display precision from $\times 1/1000$. to $\times 100$.

WARNING, all schemes are possible but not necessarily judicious. .
Indeed, displaying counter values at 1/1000 scale when the counter is connected on a 50mV/10 000A class 1 shunt is incoherent (Current precision $\pm 100A$). All values underneath 100 Ah are thus insignificant, even with a perfect precision.

The **μ AI 200** is digital, the measure $Q = \int I dt$ is got by a digital calculation.

The display is renewed every 0,5 seconds, when the reckoning is continuous.

The measured size value can get thus several units at each renewal.

The display size value may increase according to current calibre and selected precision. The analogue counter would work differently from the digital counter.

Highest are precision and current calibre, or smallest is the unit, more this fact is emphasised ($\hat{A}h \Leftrightarrow \hat{A}mn \Leftrightarrow \hat{C}$).

1.2.7. μ AI 200 Options

The μ AI 200 counter is made into 3 models:

CJ:

Basic version: this version includes adding, daily counter and ammeter functions

CJ + 1 function:

In addition to basic functions, adding others functions: Preselection (Pr), Pump Preselection (PF), Timer (Ph), Controller impulse (Au) is possible

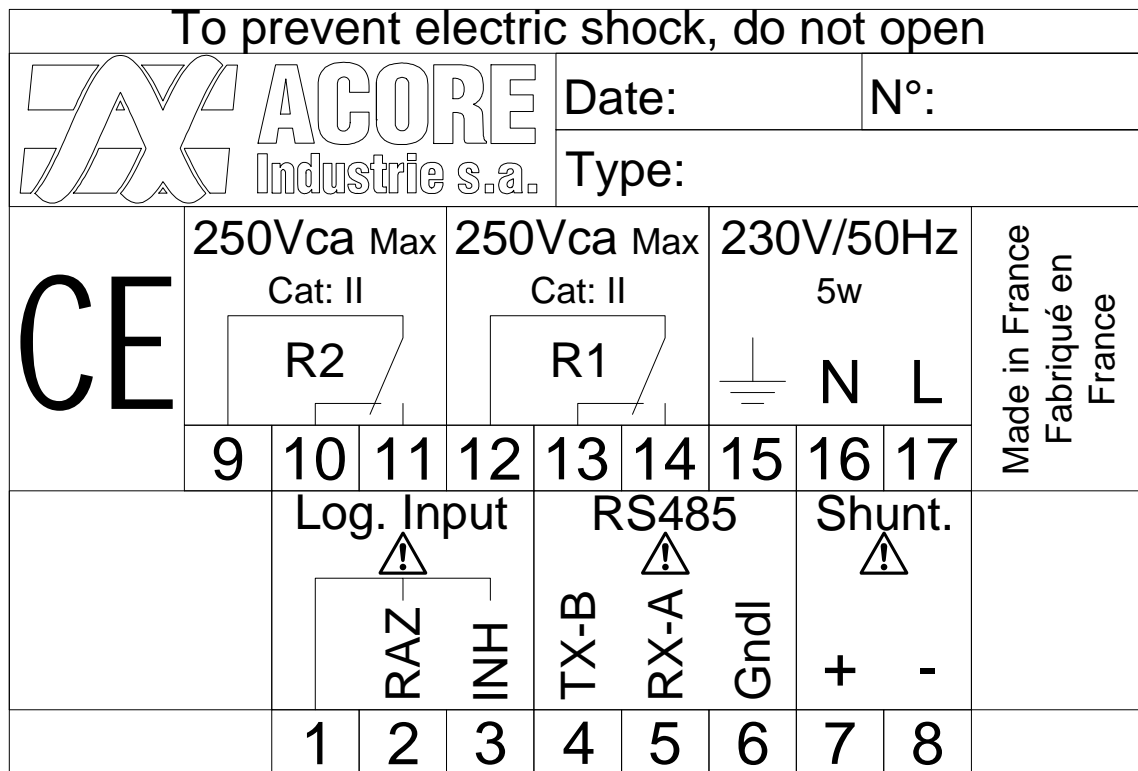
CJ + 2 functions:

In addition to basic functions, you can combine two other functions: Preselection (Pr), Pump Preselection (PF), Timer (Ph), Controller impulse (Au).

Example Pr+PF ; Pr+Au etc...

1.3. Terminal block description

All connection pins (mains, shunt measure, contacts,...) are on the counter's back.



Picture 6

- TERMINAL 1: common for the logicals inputs 1 and 2
- TERMINAL 2: logic input 1 RAZ reset to 0
- TERMINAL 3: logic input 2 INH inhibition input
- TERMINAL 4: wire B serial bus RS485 TX serial bus RS232 (option)
- TERMINAL 5: wire A serial bus RS485 RX serial bus RS232 (option)
- TERMINAL 6: GndI serial bus common RS485/RS232 (option)
- TERMINAL 7: shunt + measure input
- TERMINAL 8: shunt -measure input
- TERMINAL 9: contact Relay 2 - COM2
- TERMINAL 10: contact Relay 2 - NC2
- TERMINAL 11: contact Relay 2 - NO2
- TERMINAL 12: contact Relay 1 - COM1
- TERMINAL 13: contact Relay 1 - NC1
- TERMINAL 14: contact Relay 1 - NO1
- TERMINAL 15: Ground
- TERMINAL 16: Main alim supply 230V neutral
- TERMINAL 17: Main alim 230V phase




Notes:

Counting function will be immediately stopped as soon as logical inputs (pin 1) and INH (pin 3) common are short-circuited.

All daily and preselection counting values will be immediately reset as soon as logic inputs (pin 1) and RAZ (pin 2) common are short-circuited.



WARNING: Make all short-circuits only with dry no potential contact. No voltage must supply these pins; indeed voltage supply could lead to irreversible damages on the counter.

All following symbols are displayed indicating when relays 1 or 2 are operating: symbols  for preselection  for the pump preselection  for timer, on associated functions respective screens.

Contacts power cut capacity is 5A.

1.4. Technical Features

Mains Supply	230V \pm 10% 50 Hz		
Consumption	5 VA		
Insulation	shunt input/Supply	1500 V	
	R1 Contacts /Supply	3000 V	
	R2 Contacts /Supply	3000 V	
Minimum sensivity	0,8 %		
Maximum sensivity	+5% of shunt calibre (1,05 of shunt calibre. ex: shunt 50mV 1000 A, I _{max} = 1050 A).		
Accuracy	less than 1 %		
Limit temperature range	Operating:	0 to 70 °C	
	Storage:	-20 °C to 80 °C	
Thermal shunt	30 ppm/°C		
Data	Saved on a 10 000 cycles EEPROM memory		
Relay 1	Contacts NO1 - NC1 - COM1 250V c.a., 5 A/30 V c.c., 5 A. Not protected against surge voltage.		
Relay 2	Contacts NO2 - NC1 - COM2 250V c.a., 5 A/30 V c.c., 5 A. Not protected against surge voltage.		
	Or 24 V c.c., 0,5 A polarised for count impulses aimed for a controller.		

Shunt: 50mV
60mV
75mV
100mV
250mV
300mV
500mV

Current gauge (Ampere): from 0,01A to 99 999,99 A

Unity Ampere-hour
 Ampere-minute
 Coulomb
 Gold-gram
 Silver-gram

Scale $\times 0.001$
 $\times 0.01$
 $\times 0.1$
 $\times 1.$
 $\times 10.$
 $\times 100.$

Adding function 0 - 99999999 counting units

Daily function 0 - 9999999 counting unites

Ammeter $I \geq 1000 \text{ A}$ display 99999.
 $1000 \text{ A} >$ $I \geq 100 \text{ A}$ display 999.9
 $100 \text{ A} > I$ $\geq 10 \text{ A}$ display 99.99
 $10 \text{ A} > I$ $\geq 1 \text{ A}$ display 9.999
 $1 \text{ A} > I$ $\geq 0.1 \text{ A}$ display 0.9999
 $0.1 \text{ A} > I$ $\geq 0.01 \text{ A}$ display 0.99999

Preselection 0 - 999999 count units

Pump time 0 - 255 seconds

Timer 0 - 99h 59 min 59s

Controller Impulses adjustable 0 - 1000 mS by 20 mS steps

Options:

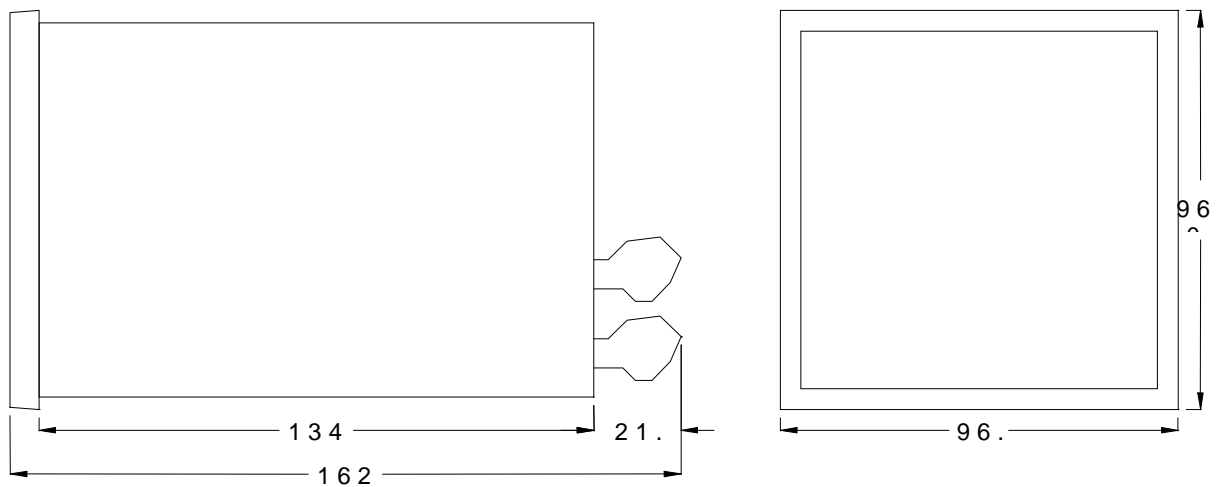
CJ Adding, Daily, Ammeter

CJ + 1 function Adding, Daily, Ammeter, 1 function to select among °:
 Pr Preselection, PP Pump Preselection, Ph Timer, Au PLC
 Impulse

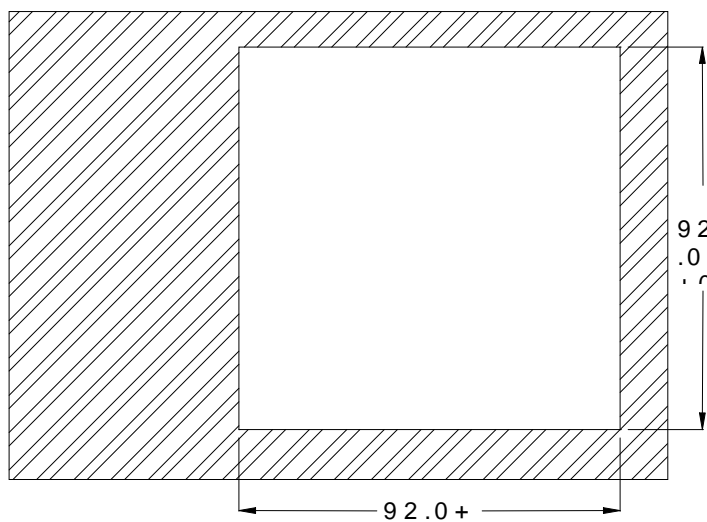
CJ + 2 functions Adding, Daily, Ammeter, 2 functions selected among:
Pr Preselection, PP Pump Preselection, Ph Timer, Au PLC Impulse

1.5. Mechanical features

Dimensions $96 \times 96 \times 141$
Weight 0,8 Kg
Front frame 92×92
Airtightness IP 51 option: front protection panel



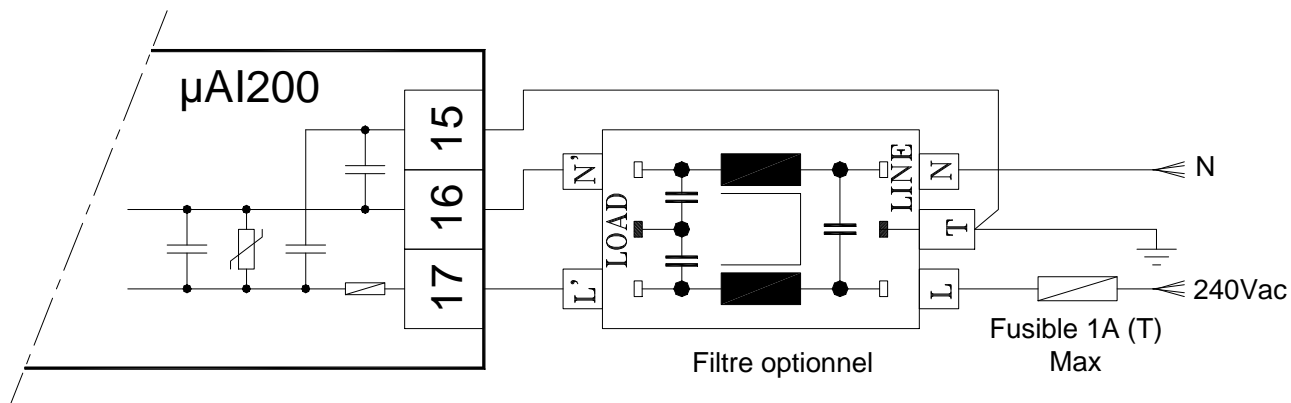
Panel drawings



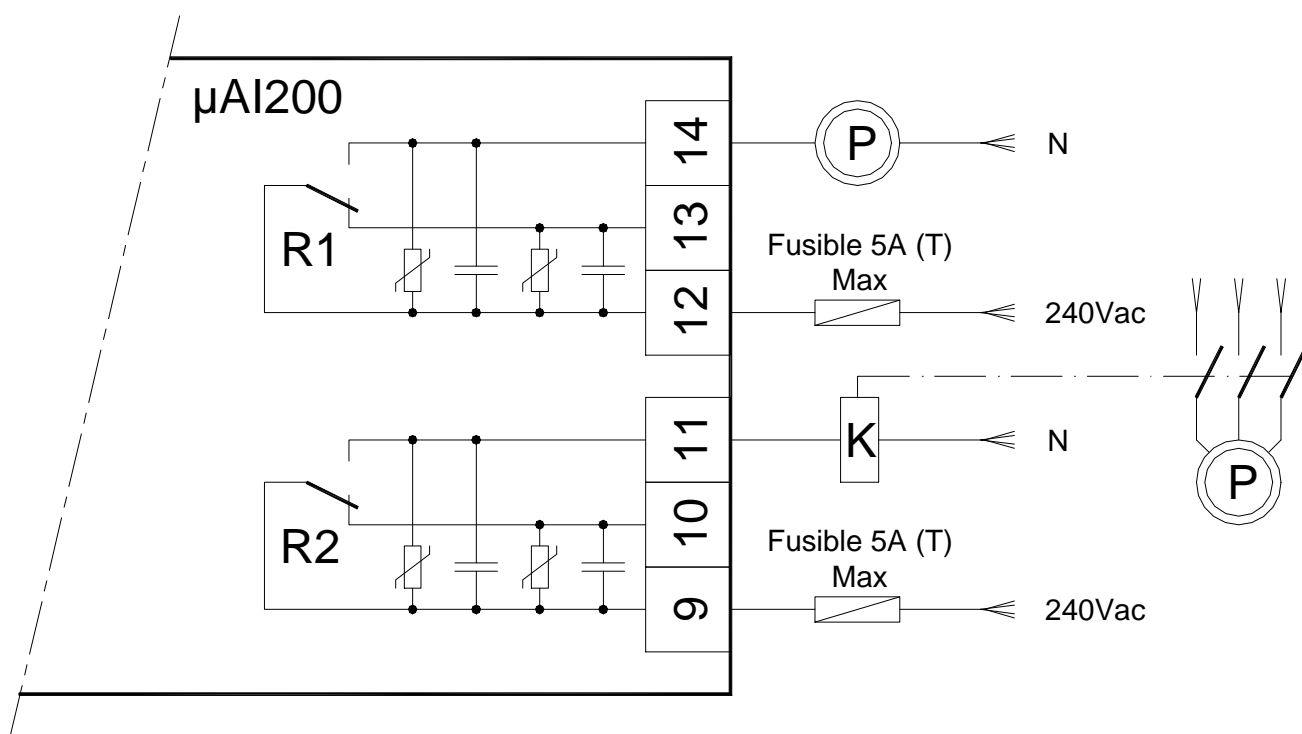
Picture 7

1.6. Connection layout

1.6.1.Mains supply wiring Plan



1.6.2.Pump wiring Plan

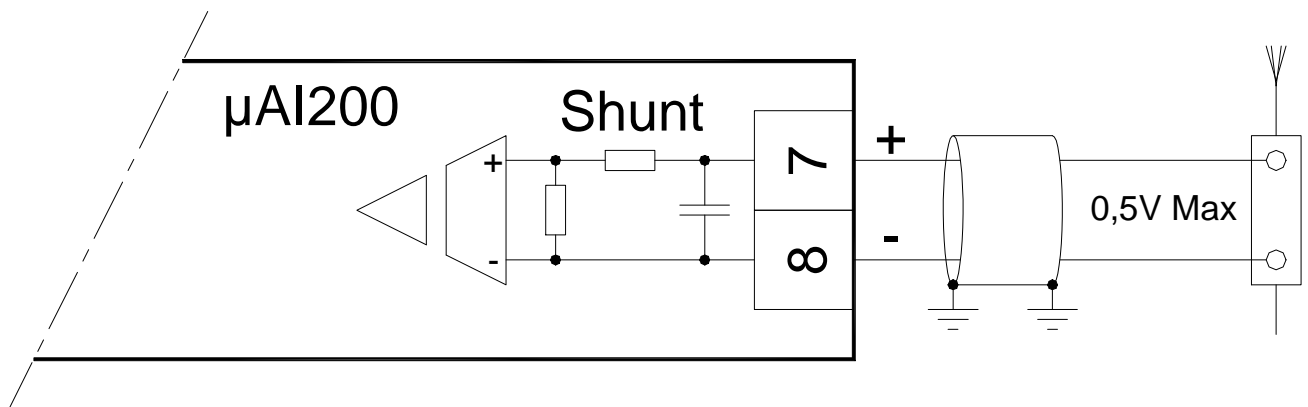


Relay Contacts features:

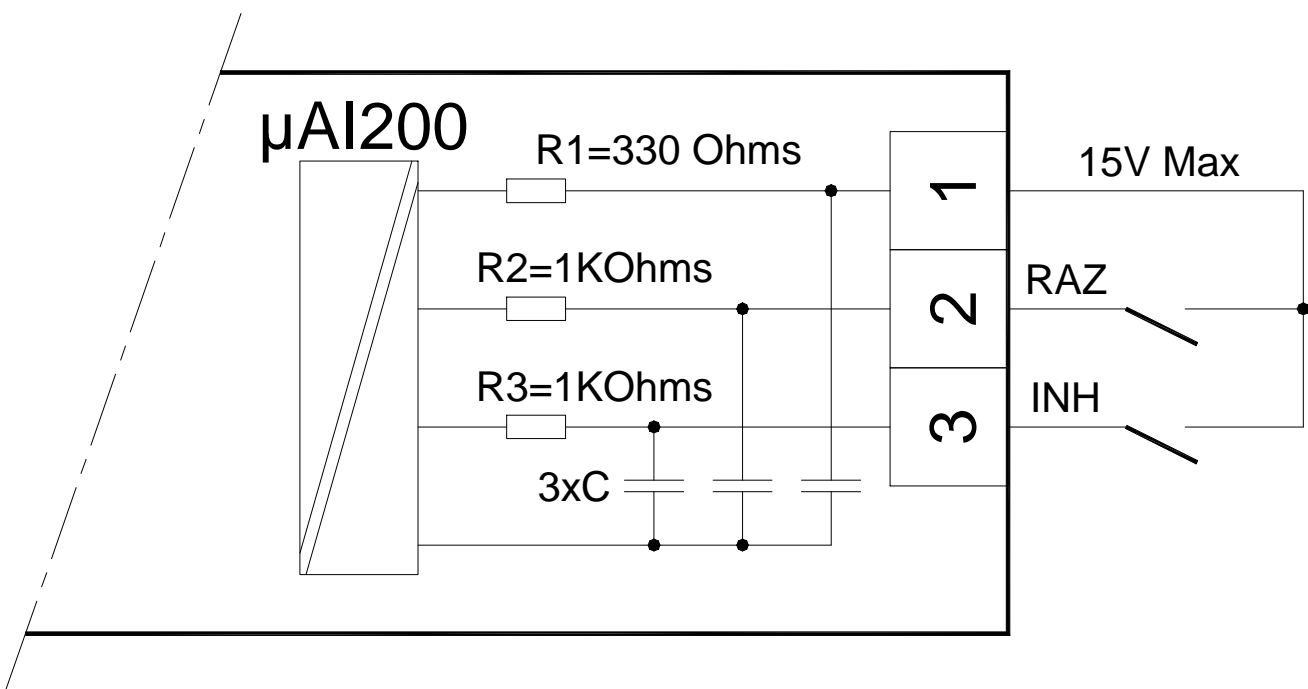
resistive load
250 V c.a. 5 A
30 V c.c. 5 A

choke load
 $\cos \varphi = 0,4$
 $L/R = 7 \text{ mS}$
250 V a.c. 2 A
30 V c.c. 2 A

1.6.3.Measure wiring Plan



1.6.4.RAZ and INH wiring Plan



Keep apart low-level circuits from 240 V a.c. circuits

Logical inputs features:

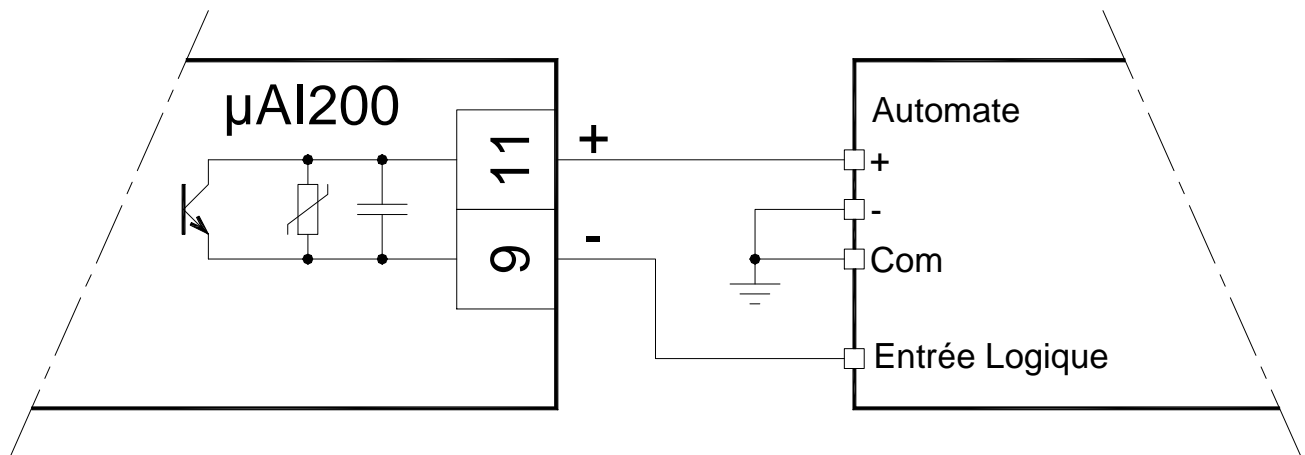
Voltage

Current

5 V c.c. max

0,005 A max

1.6.5.P.L.C. impulse output diagram



Keep apart low-level circuits from 240 V a.c. circuits

Output features:

Voltage	Current
3 to 26 V c.c.	0,01 to 0,5 A

2. COUNTER CONFIGURATION

Counter configuration is realised in our factory according to all features and options included in your order.

You can modify parameters when your requirements are changing .

These parameters are:

- Shunt gauge (50mV 60mV etc...),
- Shunt current gauge (100 A, 500 A, 1000 A, 1500 A, etc...),
- Counting unit (Ah, Amn, C, Gr.or, Gr.ag),
- Display scale ($\times 0,001$ - $\times 0,01$ - $\times 0,1$ - $\times 1$, - $\times 10$, - $\times 100$),.

To get parameters above described, press keys then simultaneously for few seconds. Now " Confis. Compteur " message is displayed on screen.

As soon as Language choice is displayed, release these keys
You have reached now parameter menu .

All counter parameters are scrolling successively.

Keys or allow to scroll available choices among all offered values.

The key is used for your entry validation and for access to following parameters.

The key is used to cancel current parameter modification, and then program goes up to next parameter (if you press key : message " Bye" is displayed on the first line).





All different offered parameters in parameter menu:


1. Language selection
2. Current selection
3. Shunt selection
4. Units selection
5. Scale selection
6. Function 1 selection (if consideration this option)
7. Function 2 selection (if consideration this option)

1 Language range :

French
English
German


2 Rated current:

You must record the shunt rated current you used (e.g. 1000 A for 50 mV). You set the current value one digit per digit from right to left XX XXX.XXX A, the total is 8 digits. The key  is used to go up to the following digit, whereas the key  is used to go back to previous digit. For each digit, the keys  and  allow to increment or to decrement the corresponding digit.

The blinking cursor  indicates the modifying digit. For current parametering, set all required values on each digit, from right to left.

Examples :


1.5 A	→	00 001.500 A
10. A	→	00 010.000 A
1500. A	→	01 500.000 A
1.5 A	→	00 001.500 A
15000 A	→	15 000.000 A

On the last digit (the most on the left), press key  again, then the following message is displayed on the first line :

 if good ?

followed on second line, by current value previously recorded.

If that value suits you, press key .

Otherwise, press key . The “Bye” message is displayed, but the previous value is recorded.

WARNING : the set current value when this value is recorded takes into account the measure accuracy. All inaccurate digits will be then truncated.

Example : if you record the value

01 500.950 A, the kept value will be 01 500.000 A.

3 Shunt selection range :

50 mV
60 mV
75 mV
100 mV

250 mV
300 mV
500 mV

4 Unit selection range :

Ampere-hour
Ampere-minute
Coulomb
Gold-gramm
Silver-Gramm

5 Scale selection range :

0.001
0.01
0.1
1.
10.
100.

The value display takes into account selected scale. In case you select the scale 100, then the first two digits will always be at 0.

6 Efficiency:

You can select this parameter only if the selected unit are Gold-gramme or Silver-gramme. The value is 100% (defaults). The keys or allow to increase or decrease this value.

7 Function 1: select among:

Preselection
Pump Preselection
Timer
Imp. Automate

You can select this parameter only if this option is included into the counter.

8 Function 2: select among:

Preselection
Pump Preselection
Timer
Imp. Automate

You can select this parameter only if this option is included into the counter.

WARNING: you can group all selections, but all schemes are not necessarily judicious. ex: calibre 10 000 A, unit Ampere-minute, scale 0.001 ???

Comments:

- As soon as the counter is power on, the whole counter parameters as well as the software version index are successively scrolling to warn the user of current configuration.
- Further to parameter modifications, all different count values (adding counter, daily counter, preselections, ...) can be reset to zero. This occurs especially when the user modifies units.
- The decimal point (scale) modification alters the count values. When scale values are decreasing ($0.001 \Rightarrow 0.01 \Rightarrow 0.1 \Rightarrow 1 \Rightarrow 10 \Rightarrow 100$), all significant digits are definitively eliminated on all values. When scale values are increasing ($100 \Rightarrow 10 \Rightarrow 1 \Rightarrow 0.1 \Rightarrow 0.01 \Rightarrow 0.001$) digits which appear and are systematically reset to 0.

Example: when scale changes from 0.01 to 1; if counter value was 12034.53, display is now 12034. Inversely, if value was 12034., it will display 12034.00.

We calibrate all counters in our factory. To realize it, the final user needs necessary equipment and his confidential code (refer to calibration handbook). Nevertheless, we advise you against modifying these adjustments.

3. COMMON FUNCTIONS

All basic functions common to all counters: Adding, Daily, Ammeter, are included on basic counter **CJ**.



3.1. Adding function

Adding position: the accumulated count value (in definite unit and scale) is displayed. This value is recorded in memory.

The adding function is reset to 0, only when changing units is made at the end of parameter procedure. A special procedure to reset the adding function is available. Refer to calibration handbook or the reset section regarding this adding function (§ Error: Source of the untraceable reference page 33).

3.1.1. Gold-gramm or Silver-gramm counting particularities:

When Gold-gramm or Silver-gramm functions are selected, the counting coefficient may be changed to meet bath efficiency.


Available values are from 0 to 120 %. The output modification may take place in the whole configuration ( +  keys)

Counting in Gold-Gramm or Silver-Gramm is equal to convert the measured electricity quantity into metal quantity coating. One coulomb represents 2,041 coated Gold mg or 1,117 coated Silver mg with a 100 % efficiency.

3.2. Daily function J

The user can reset the counter with key  whenever the user needs it.

You may be able to reset the counter to 0 by RAZ and RAZ(COM) terminals on counter back. Forecast a dry contact between these two terminals.

 Under no circumstances, there must be no voltage flow on these terminals in order not to damage the counter.

3.3. Ammeter A

This function allows to display the measured current value. You can use thus the counter as ammeter.

The current measure range is from 0 to +5% of the current calibre. As soon as this limit is reached, the display is blinking.

In this ammeter configuration, the user can adjust the minimum threshold value. Outside this value, the counter stops counting.

As soon as the current is lower than the threshold value, the count is stopped.

3.3.1.Threshold adjustment

Press keys + , but press first key . The next screen is displayed (example) :

```
Threshold adjust
00 000.300 A
```

The user can increase or decrease all displayed value with buttons or .

As soon as you have selected a required value, press to validate your entry.

To escape from threshold adjustment program, press on . If this value has already been changed, this last operation will be not accepted.

4. FUNCTIONS

All functions and their use here under described include a relay. The user can use and trigger this relay according to selected process.

The R1 relay is associated to option 1 and the relay R2 is associated to option 2 and whatever the selected function may be.

4.1. Preselection Option: Pr.

In this version, the counter includes a preselection function (see § 1.2.1 p°4).

After the selection of this option, the following screen is displayed when screens are scrolling with keys \blacktriangledown or \blacktriangle (example):

```
PRES1<= 120.
          98. Ah
```

On the first line, the maximum aimed preselection value is displayed. As soon as you select this function in option 1, PRES1 is displayed and in option 2, PRES2 is displayed.

The present count value is displayed on the second line.

When the preselection value is reached, the relay is triggered. The symbol ? is displayed on the second line as below:

```
PRES1<= 120.
?       120. Ah
```

Preselection modification: Put the display on the screen "preselection" to modify.

Press keys \bullet + \blacktriangle , pressing at first key \bullet . The following screen is displayed (example):

```
PRES1<= 000120.
          98. Ah
```

The blinking cursor \blacksquare shows the current modifying digit position. Press keys \blacktriangledown or \blacktriangle to increase or decrease the digit. Press \blacktriangledown to go to the next digit (digit on the left of the present cursor). You can go over all digits. The new value is recorded, and the basic position is displayed.

Preselection reset to 0 : For preselection reset to 0, either press key \blacktriangledown , or short-circuit the 2 pins 1 and 2(RAZ) on back rear terminal.

4.2. Pump Preselection: PP.

This function is used for bath electrolyte regeneration (voir § 1.2.2 page 5).

As soon as you select this option, the user can see the following display when screens are scrolling, with keys \blacktriangledown or \blacktriangle (example) :

```
PRES2<= 280.0
        112.4 Ah
```

The pump time is displayed on screen just after it:

```
PUMP TIME 2
        0s < 30s
```

On the first line in the first screen, you can see the aimed preselection value. If this function is selected in option 1, then PRES1 is displayed and for option 2, PRES2 is displayed.

On the second line in the first screen, the present count value is displayed.

As soon as the preselection value is get, the relay is triggered. Now the symbol \dot{Q} is displayed on second line during whole relay triggering time, as shown below:

```
PRES2<= 280.0
 $\dot{Q}$       0.0 Ah
```

The count (second line) starts from scratch (0).

The relay trigger time (as soon as the preselection value is reached) is displayed (in this case 30s : 0s < 30s), on the right of the sign < ; on the left of the sign < is the passed triggering time (0s if the relay is not triggered).

Preselection modification: The screen must be set on ‘Preselection’ you want to modify. Press on \bullet + \blacktriangle , but press on \bullet first. The following screen is displayed (example) :

```
PRES2<= 00280.0
        76.3 Ah
```

The blinking cursor █ shows the current modifying digit position. Press ▼ or ▲ to increase or decrease the digit. Press ▼ to go to the next digit (digit on the left of the current cursor). You can now select each individual digit. The new value is now recorded, screen displays basic original display.

Relay triggering length modification: The screen must be set on “ Pump Time” to modify. Press on ● + ▲ , but press on ● first. The following screen is displayed (example) :

```
PUMP TIME 2
  0s < 3█ s
```

The counter is currently modifying the pump-time with the right hand-side blinking cursor █ . Press keys ▼ or ▲ to increase or decrease the value. Press on key ▼ to record this new value (the screen displays the basic usual display).

Press on key ● to escape from the current procedure.

Preselection Reset to 0 : Reset the preselection to 0 either with the key ▼ (in this case the display must be on “Preselection display” position), or with the rear terminal with the pins 1 and 2(RAZ) short-circuit.

4.3. Timer : Ph.

With this special option the counter can trigger a relay at a time-value previously set by the final user and the user can read eventually the consumed electricity quantity at the end of this time.

When you select this option: the following screen is displayed when you make all screens scrolling with the keys ▼ or ▲ (example):

```
MN1<= 0h 3mn45s
  0h 2mn23s
```

On the first line, the determined timer-value is displayed.

MN1 is displayed as soon as this function is selected in option 1, MN2 in option 2.

The current timer-value is displayed on the second line.

As soon as this timer-value is get, the relay is triggered.

You see now the symbol U displayed on the second line as following :

```
MN1<= 0h 3mn45s
  U 0h23mn18s
```

Timer modification: Set the display-screen on “Timer” to modify. Press keys \blacksquare + \blacktriangle , and press on \blacksquare first. Now following display is as following (example) :

```
MN1<= 0h 3mn4 s
      0h 1mn13s
```

The current modifying value position is indicated by the blinking-cursor \blacksquare (hour, minute or second). Press keys \blacktriangledown or \blacktriangle to increase or decrease this value.

Press key \blacktriangledown to go up to the next value (minute, after hour). You go then through all seconds, minute, hour values. Press once again the key \blacktriangledown , this new value is thus recorded, the screen displays the basic display.

Preselection Reset to 0 : You are able to reset the timer to 0 : either with key \blacktriangledown , or with the rear terminal by creating a short-circuit between pins 1 and 2(RAZ).

In order to memorize the counting-value until the timer is ended, you must stop the counting process. You can stop the counting with the timer relay contact to short-circuit the inhibition Pins (1 and 3 INH).

4.4. *Controller Impulse: Au*

Each time the counter is incrementing, this function issues a varying impulse-time.

As soon as you have selected this option, the following screen is displayed when you make all displays scrolling with keys \blacktriangledown or \blacktriangle (example):

```
IMPULSE 1
      4 x 20mS
```

IMPULSE 1 is displayed as soon as you have selected this function in option 1, IMPULSE 2 in option 2.

The impulse time is displayed on second line (20mS multiple).

Impulse time modification: Set the display screen on the display “Impulse” to modify. Press keys \blacksquare + \blacktriangle , but press key \blacksquare first. The following screen is displayed (example) :

```
IMPULSE 1
       $\blacksquare$  x 20mS
```

The current modified impulse-time is indicated by the blinking cursor.

Press keys \blacktriangledown or \blacktriangle to increase or decrease the value. Press key \blacktriangledown to record the new value (the screen displays the basic displays).

Press key \bullet to escape/ leave from the current process.

WARNING The impulse time must be less than the separating time between the incrementation from one digit. This time depends on selected current, unit and scale values.

$$\Delta t \leq \frac{\text{coeff} \times \text{scale}}{I_n} \text{ (mS)}$$

unity	Ah	Amn	C	gr. or	gr. ag
coeff	3 600 000	60 000	1 000	489 929,8	894 595,3

Scale : 0.001, 0.01, 0.1, 1., 10., 100.

example: $I_n = 1000 \text{ A}$, unity = Ah, scale = 1 $\Rightarrow \Delta t \leq 3600 \text{ mS}$
 $I_n = 100 \text{ A}$, unity = Ah, scale = 0.01 $\Rightarrow \Delta t \leq 360 \text{ mS}$
 $I_n = 250 \text{ A}$, unity = gr. or, scale = 0.01 \Rightarrow
 $\Delta t \leq 19,59 \text{ mS}$ this last combination is not usable...

5. SAFETY AND ELECTROMAGNETIC COMPATIBILITY INSTRUCTIONS

Prior to counter installation we advise you to read carefully this section.

This counter comes up to the European directives as far as the safety and electromagnetic compatibility are concerned; however, the supplier must warranty the security and electromagnetic compatibility for each counter.

5.1. Safety

This counter meets the European directive related to low voltage 73/23/EEC, replaced by the 93/68/EEC directive, because this meets to the safety standard EN 61010(93).

5.2. Electromagnetic Compatibility

This counter meets the essential European directive essential requirements related to electromagnetic compatibility 89/336/EEC, modified and replaced by the directive 93/68/EEC, thanks to the application of a technical construction file.

6. REQUIREMENTS RELATED TO INSTALLATION ELECTROMAGNETIC COMPATIBILITY

You must respect all following precautions when you install the counter in order to safe the conformity with electromagnetic compatibility harmonised European standards:

- For all general indications, please consult the required standard
- When you use relay outputs, it may be necessary to fit up a filter to delete some electromagnetic emissions. The filter features are linked to the load type. For all standard applications, we advise you to install Schaffner filters type FN321 or FN612.
- When the counter is plugged in a basic socket and installed in laboratory equipment be sure to adhere to electromagnetic emissions standards, mostly in business and light industrial sectors. In this case, you must install a strong mains filter to conform to controlled electromagnetic emissions.
We advise you to set Schaffner FN321 and FN612 filters.

6.1. Wiring

To reduce all electric sounds effects, the wiring for logic outputs and capteurs inputs must be as far as possible from electrical high current wires.

If you can not realise it, you must use shielded wires, the shielding must be linked to Earth on both extremities.

7. MAINTENANCE AND REPAIR

In this counter, the final user must not act on any part. For any repairs or maintenance, keep in touch with ACORE INDUSTRIE S.A.

8. SAFETY TECHNICAL REQUIREMENTS

8.1. Equipment rated values

Mains voltage :	230V -15% $+10\%$
Mains Frequency :	48 to 62 Hz
Consumed power :	5 Watts maximum
Reverse Relay:	<p>Maximum : - On resistive load $\cos \varphi=1$ L/R = 0ms 250Vca, 5A and 30Vcc, 5A - On inductive load $\cos \varphi =0,4$ L/R = 7ms 250Vca, 2A and 30Vcc, 2A</p> <p>Minimum : - 5Vcc, 10mA</p>
Leakage Current :	Leakage current through the RC on all relay contacts is lower than 2mA on 250Vca 50 Hz.
Overcurrent protection :	<p>Protective external device to avoid overcurrent related to complete wiring must be installed. We advise you to install a minimal wire 0,5mm² (16 awg). Set independent fuses for mains-supply and for all relay outputs.</p> <p>Install fuses type T : delayed action fuses (IEC 127) :. Mains supply: 230Vca 1A (T) Relay outputs : 3A (T) ;</p>
E/S low level :	All others input and output connections are aimed for low level signals lower than 42 V ;
Analog output (non insulated) :	0 to 10V (10k Ω min) ;
Double logic input :	11 to 15 Vcc (isolated) ;
Numeric Communications :	EIA-232/485 bifilar plus earthing references (isolated) ;

8.2. Environment rated Values

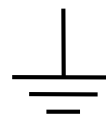
Panel airtightness :	All counters will be installed on panels standard EN 60529 : IP 51 defines the panel airtight degree In option add a flexible transparent cover (reference 96GHN) to get the IP65 protection,
Operating Temperature :	from 0 to 55 °C. Check the adequate ventilation inside the cabinet ;
Relative Humidity :	from 5 to 95 % without condensation ;
Atmosphere :	Do not use the counter neither at a high altitude higher than 2000 m nor in explosive or corrosive atmosphere
Electric Security:	EN 61010, Installation category II, pollution degree 2 ;
Installation Category II :	The transient overvoltage on mains network connected to the counter must be lower than 2,5 kV ;
Pollution Degree 2 :	Take any piping pollution off from the cabinet where the counter is installed ;
Insulation :	All inputs and outputs are fit out with a strengthened insulation to protect the user from the electrocution, except the analogical outputs electrically connected to variable process input (Shunt, Voltage).

8.3. Safety Symbols

All safety symbols on the counter have the following meanings:



Warning : (please consulte all enclosed documents)



Functional earthing

The functional Earth is aimed for others additional functions as CEM filters earthing

9. INSTALLATION SAFETY REQUIREMENTS

9.1. Staff

Only qualified personnel may perform work of this device/ system.

9.2. Protection for charged-parts under voltage

Install the counter in an enclosure to avoid any contacts between user hands or tools and load-voltage parts.

9.3. Wiring

Respect and adhere imperatively to wiring features detailed in this handbook to connect the counter. Do not connect the alternative supply neither to low voltage input signal nor to logic or direct outputs and inputs. The whole device wiring must respect all local suitable wiring regulations.

Please find below all wiring essential basic rules to respect (reminder) :

- do not set logical contacts in parallel ;
- do not connect a non-insulated input signal on a non-insulated input ;
- do not connect a non-isolated output on a device with a non-insulated input ;
- do not connect the alternative supply neither to input signal, nor to logic or direct inputs or outputs ;
- check all earth connecting and all equipotentialities ;
- verify compatibility between all input and output impedances ;

9.4. Isolation

The counter must include a current disconnecting-switch set very close to the counter and within user accessibility, and identified as counter disconnecting switch.

9.5. Current overload Protection

To protect the counter from overload current, the alternative supply and all power outputs must be wired thanks to fuses and with fuse cutout indicated in technical features.

9.6. Rated Voltage

The maximum voltage existing between the following pins must be lower than 250Vca :

- Line or neutral on all others connections ;
- Relay output, analogic or the shunt ;
- The Earth.

Do not supply the counter with a threephase supply with branching Y would not be connected to Earth. If damages occur, mains supply would be upper than 250 V alternative related to Earth, and this product would become dangerous.

The supply transient overvoltage between mains supply and Earth must be lower than 2,5 kV. If getting or measuring transient overvoltage is needed, you must set a transient overvoltage limiter. These devices include MOV systems allowing to limit and regulate supply line transient overvoltage, created by thunderbolt and inductive load switching.

9.7. Conductive Pollution

Take any conductive pollution off the cabinet where the counter is installed in. For example, the carbon dust is one of all pollution. Install a filter on cabinet air inlet in order to keep and warranty a good atmosphere in conductive pollution conditions. Condensation risks may occur for example at low temperature, in that case, set a thermostat to regulate the cabinet inner temperature.

9.8. Earthing

Do not earth through the counter casing.

9.9. Electrostatic discharges Precautions

When you take the counter off from it application, some electrostatic discharges coming from the user may damage all electronic components. To avoid it you must be earthed when you operate the disconnected counter.

9.10. Protection against Automated system failures

When the regulation device is designed, the manufacturer must think about which could be all consequences if the system would fail. In these regulation applications, pumping operating continuously would be the main danger. It could damage the bath and also the pumps would be damaged or even cause a fire.

Pumping would operate continuously because:




- If an external contactor remains locked
- A bad counter parametering

We advise you therefore to use INDEPANDANTS AND REGULARLY CONTROLLED safety devices.

N.B. : The counter relays are not a protection in any failures situations.

10. ADDING FUNCTION RESET





The Totaliser fonction must be displayed.

Press for few secondes on  + , press at first on , until following message is displayed:

```

Password 1st try
-----

```

Enter then the totalizer reset code : **32342112**. Only 3 tests are available (keys correspondance : =1 ; =2 ; =3 ; =4).

11. DATAS SAFEGUARD

This counter includes a safeguard process if a temporary power failure occur (flicker).

If this power failure lasts longer, as soon as power supply comes back well, the counter is initialized as a basic power-on.

In any cases, Write/ Erase endurance of the counter configuration and preselection values on EEPROM 10 000 cycles memory system and data retention 10 years type EEPROM.

When the counter is powered-on, configuration is the same as before (when it is switched-off). Relays state are identical and preselection cycles start again from their last point.

12. TROUBLES

You find hereafter-detailed advices to diagnose failures and troubles:

First, check all counter parameters. Function, shunt, current, unity and scale (as soon as counter is powered-on or if the user check the parameter mode). Any unusual working is caused by any difference.

Common message:

```

prog.Error
reset

```

As soon as the program warning alarm is triggered, this message is displayed. Any frequent message display is caused by interference onto counter mains supply. See all sections concerning the electromagnetic compatibility.

The display remains switched-off:

Check if the counter is rightly supplied. Switch-off then switch-off the counter. And if it still does not work, please get in touch with the Manufacturer.

The counting is stopped:

Check if all counting values are accurately displayed.

Check if counter shunt input is correctly supplied with mV

Check the shunt input polarity.

Check if shunt input value is not on this side of set counting threshold (see « Threshold adjustment » § 3.3.1 page 22). Ammeter is blinking as soon as shunt input is on this side of threshold.

Test if 1 and 3 INH pins on rear-terminal are not in short-circuit.

If it still doesn't work normally after all tests, please get in touch with the supplier.

☞ Current measure is fluctuating if shunt input is in the air, the current displayed value may be upper than 0. All values are measured through a high impedance differential amplifier. All these operations are common on counter operation.

Current display is blinking or does not suit with real current:

When current display is blinking, either measure is in maximum thrust: $1,05 \times$ rated current, or on this side of counting threshold.

All measures are insignificant beyond this thrust bearing.

If current seems to be wrong, check the shunt voltage among parameters (e.g. when you power on). This value must be equivalent to shunt calibre on which the counter is installed.

The preselection function does not operate correctly:

Check all values.

When pump is operating, the counter goes on counting running electricity quantity. When the pump-time is ended, counting value is different from 0.

If the previously set preselection value is lower than the total electricity quantity passed through the counter during the pump operating time, then a new pump cycle will start again.

When several units are added to digits at same time:

This operation is common in one digital counter type. The display function is separated from counting function, and this display is renewed about every 0,5 second.

Counting operation is made numerically. Between two displays renewable, the counter may have measured an electricity quantity and this last value is added to current display value. It depends exclusively of selected current, accuracy and unity. You must thus decide on a coherent parametering.

PERSONAL NOTES