BAMOCOR 190 E - M

FREE ACTIVE CHLORINE TRANSMITTER

Instruction manual

VERSION 4.XX

BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr

FREE ACTIVE CHLORINE TRANSMITTER
BAMOCOR 190 E - M
05/11/2002
190 M1 01 D

MES
190/1

BAMOCOR 190 E - M

TABLE OF CONTENTS

BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr

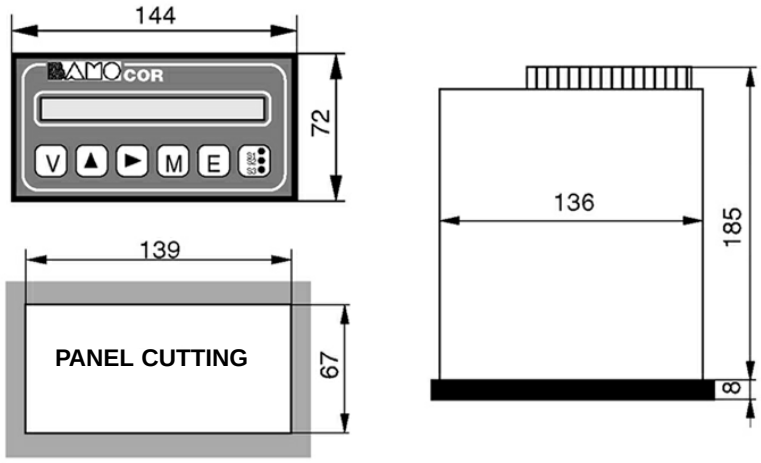
1 - TECHNICAL SPECIFICATIONS

Supply voltage:	230 ± 10 % 50-60 Hz single phase (117 V, 48 V, 24 V, on request)	
Power comsuption:	10 VA	
Enclosure Box	Dimensions :	72 x 144 x 185 mm
	Weight:	1100 g
	Protection:	IP 40 / IP 65 for front face
	Material:	Noryl, Front face polycarbonate
	Wiring:	Pull off terminal screw
Wall mounting box	Dimensions:	355 x 237 x 95 mm
	Weight:	1900 g
	Protection:	IP 65
	Material:	ABS, front face polycarbonat
	Connection:	Terminal scew, input by plastic cable gland
Temperature	Stocking:	-10 to 70 °C
	Functionning:	-5 to 50 °C
Measuring range	Free chlorine:	From 0 up to 5,000 mg / liter
	Temperature:	From 0 up to 100°C
Sensors	Temperature:	Pt 100 Ω at 0 °C, 3 wires
Accuracy	Chlorine:	± 0,3 % of the same range
	Temperature:	± 0,3 °C
Display:	16 alphanumeric characters LCD Back lighted - H = 9,22 mm	
Probe Input:	Terminal plug	
Impulse regulation:	Cycle time adjustable from 0 up to 9999 s High and low adjustable proportionnal band Adjustable dead zone	
Relay 1 and 2:	Output on change-over switch relay at 500 VA / 250 / 2 A Independant adjustment on: - Chlorine and temperature measurement - Relay excitation point - Relay excitation timer - Relay on stanby - Timer on stanby	
S3 Relay:	For too long injection, adjustable timer 0 to 9999 s	
Current output selection:	0/4 - 20 mA (max. 600 Ω), Proportionnal to the measure, galvanic isolation included	
Communication:	Connection J-BUS - Slave binary (option) Output RS 232 V24 or RS 485 2 Wires (on request) 110 to 9600 baud	
Configuration:	By 5 touchs keyboard on the front panel - Programm protection by access code	
Measure simulation:	By menu - Action on the output measure and temperature	

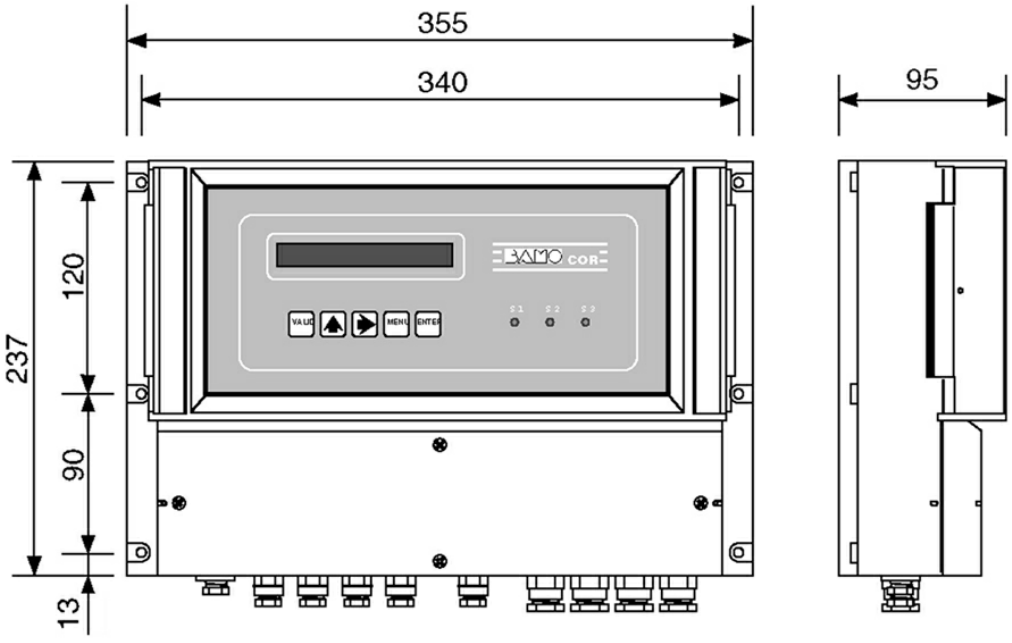
BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr

2 - DIMENSIONS

ENCLOSURE BOX



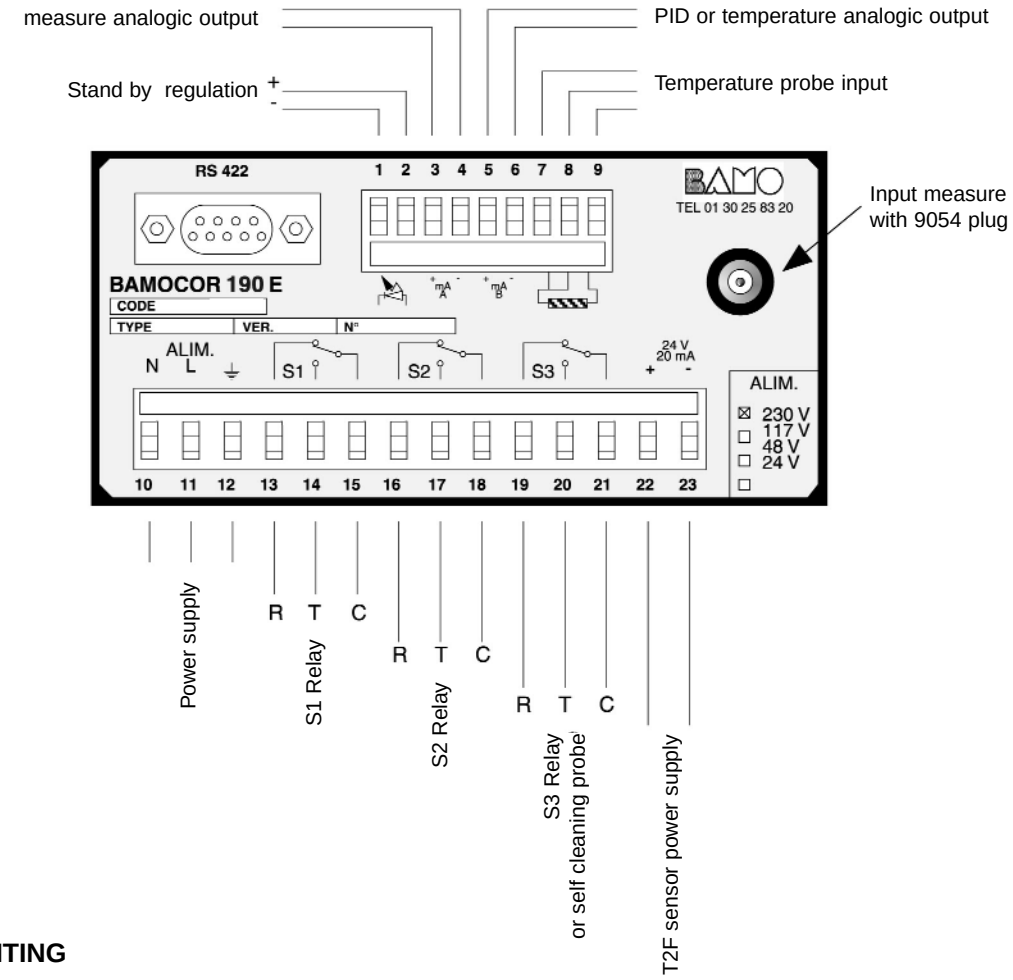
WALL MOUNTING



BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr

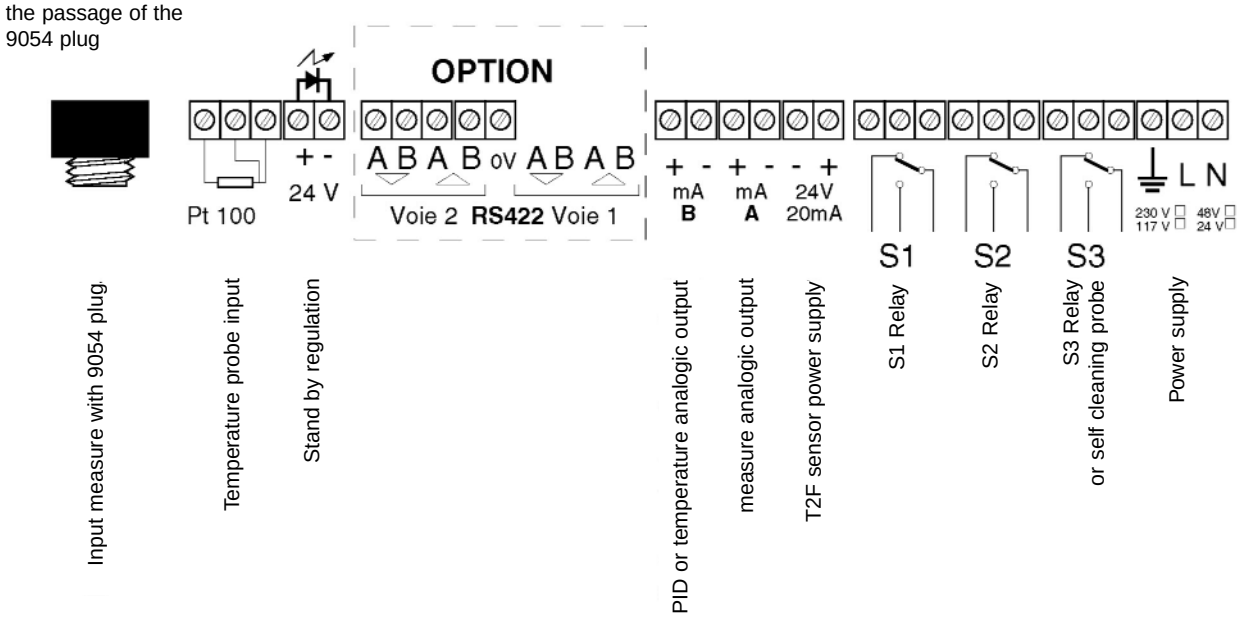
3 - WIRING

ENCLOSURE BOX



WALL MOUNTING

The dismantling of cable gland allows the passage of the 9054 plug



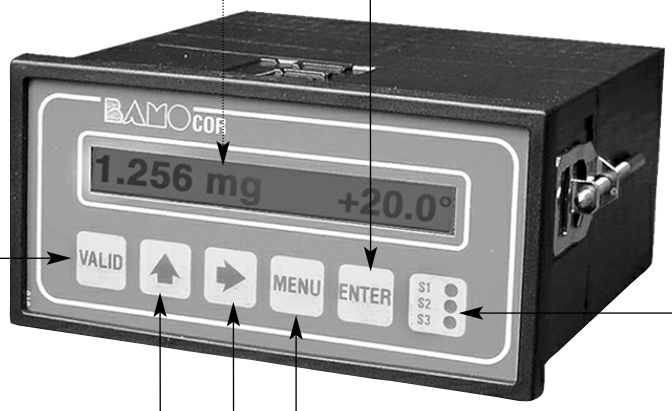
BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr

4 - FRONT PANEL

16 alphanumeric characters
H = 9.22 mm - Back lighted

VALID Key to write parameters on the EPROM when the displayer ask you: **VALIDATION ?**
Take care, when you press this push-button, all the parameters are saved. If you are not sure of our manipulation, dont press VALID key, (previews data programmation will be lost).

ENTER Key to change the step displayed menu.
At the last step, it comes back to the first line



Press ⇧ to change parameters of data capture:

- Numéric input increase the flashing digit (loop 0 after 9).
- Reverse the choose Yes / No, Up/Donw, 0-20 mA / 4-20 mA etc.

L.E.D **S1**, **S2** or **S3** indicate relay status.
Red light: Relay ON
No light: Relay OFF
Flashing: Timer

Press ⇨ going to the next display or to change the value.

MENU key move the cursor during programmation.
At the last digit, comes back on the first one.

BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr

5 - CONSULTATION / MODIFICATION MODE

There are two modes of progress in the menus.
- **Consultation mode:** For parameters and visualisation reading only.
- **Modification mode:** The operator can configure and calibrate the device (alarm, regulation, temperature...) this mode is accessible by access code which corresponds to the last four figures of the serial number of the device.
  (Ex: 12345-67. The code will be so 4567)

6 - MENU LIST

6.1 CONSULTATION MODE

DISPLAY

6.1.1 Measures display or forcing measure

Display of measure and temperature in °C	**04,20 mg +20,0°C**
Press **ENTER**	
IF the PID regulation is on	
Display the PID regulation output value in %	**Cde PID out. 12,25 %**
In MODIFICATION mode, it is possible to forcing the PID regulation	
Press **ENTER**	**FORCED MEASURE**
Press **ENTER**	**04,20 mg +20,0°C**
Change the measure value with ⇧ and ⇨ on the flashing display. This modification is immediatly validated by the electronic and all other parameter. (alarm, regulations, output mA…)	
Press **ENTER**	**FORCED PID out.**
Press **ENTER**	**04,20 mg 12,25 %**
Change the measure value with ⇧ and ⇨ on the flashing display. The modification is immediately validated by the device (alarm, regulations, output mA…)	
It is possible to forcing the PID regulation 4-20 mA output if the PID regulation is ON and on MANUAL mode (See § 6.1.7)	
Come back right on the measure by pressing **ENTER**	

6.1.2 BAMOCOR Identification: Software version and serial number

Press **MENU**	**ABOUT BAMOCOR**
Press **ENTER**	**VERSION : 4.XX**
Press **ENTER**	**SERIAL N° :**
Press **ENTER**	**12345-67**

Note : Access code is four last serial number digits for MODIFICATION mode. (See §5).

6.1.3 Choice: Consultation or Modification by access code

Check or set data configuration

Set MODIFICATION mode

Press **MENU**	**CONSULTATION**
Press ⇧	**MODIFICATION**
Press **ENTER**	**CODE ? 0000**
Dial the password (see § 5) with ⇧ and ⇨	
Press **ENTER**	
If wrong password, display “ERROR” during 3 second	**ERROR**
If good password	**TIME : 30 mn !**
The CONSULTATION mode come back automatiquely after 30 minutes (Come back MEASURES menu).	

Press MENU to choose programmation step.

Password : to know the password see § 5.

BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr

6.1.4 S1 relay adjustment

<u>CAUTION:</u> The acess is only possible if REGULATION mode is OFF (see § 6.1.6)

DISPLAY

To adjust the S1 relay
Press **ENTER** — **ALARM 1 ON (OFF)**
(In MODIFICATION mode, choose with ⇧)

Press **ENTER** — **ALARM TEMP. (MEASURE)**
TEMP. = Change status to setted temperature value
MEASURE = Change status to setted measure value
(In MODIFICATION mode, choose with ⇧)

Press **ENTER** — **ALARM 1 LOW (HIGH)**
HIGH = relay ON if the measure is upper the set up value
LOW = relay is ON if the measure is lower the set up value
(In MODIFICATION mode, choose with ⇧)

Press **ENTER** — **ON 0,300 mg (+50°C)**
Threshold S1relay is ON
(In MODIFICATION mode, choose with ⇧ and ⇨)

Press **ENTER** — **OFF 0,250 mg (+45°C)**
Threshold S1relay is OFF
(In MODIFICATION mode, choose with ⇧ and ⇨)

Press **ENTER** — **DELAY UP ON (OFF)**
With or without delay S1 for ON
(In MODIFICATION mode, choose with ⇧)

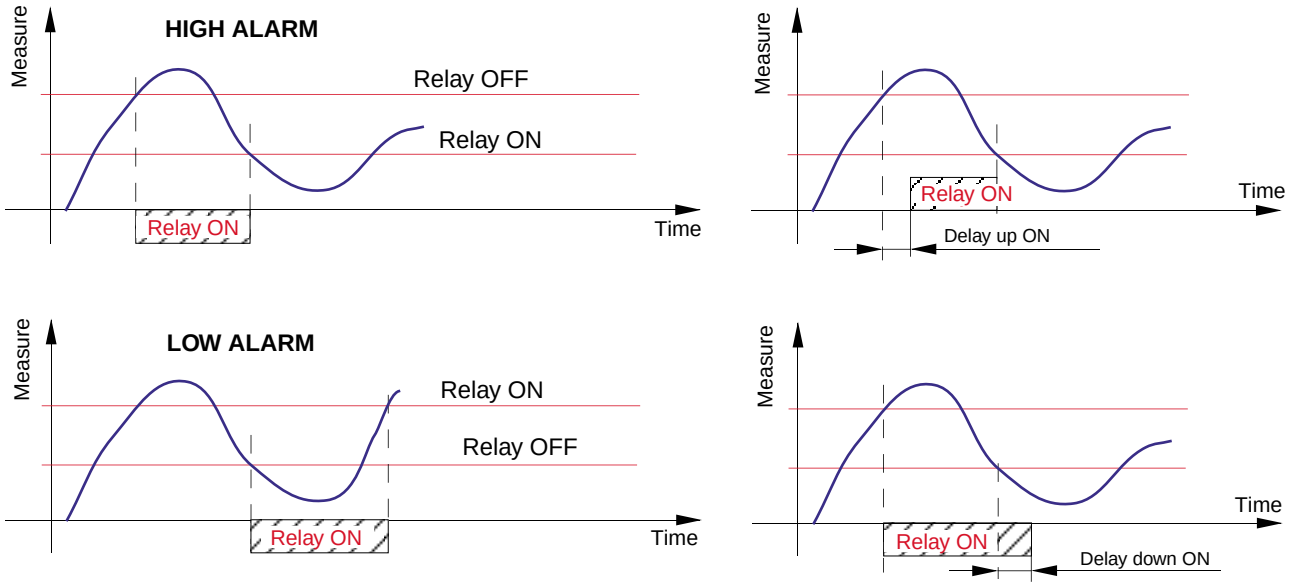
Press **ENTER** — **TIME 0010 Sec**
Set S1 delay time
(In MODIFICATION mode, choose with ⇧ and ⇨)

Press **ENTER** — **DELAY DOWN ON (OFF)**
With or without S1 delay for OFF
(In MODIFICATION mode, choose with ⇧)

Press **ENTER** — **TIME 0060 Sec**
Set S1 delay time
(In MODIFICATION mode, choose with ⇧ and ⇨)

Press **ENTER** — **SAVING ?**
Press **VALID** to save all data.

6.1.5 S2 relay adjustment (same as before for relay S1) (§ 6.1.4)



BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr

6.1.6 Relay regulation

This mode is for a proportionnal regulation.

DISPLAY

Press "ENTER"
If display is: **ON / OFF MODE**
Go to ADJUST ALARM 1 and ADJUST ALARM 2 to turn OFF
ALARM 1 OFF / ALARM 2 OFF (See § 6.1.4 and 6.1.5)

or

If display is: **PID MODE**
BAMOCOR is on PID regulation mode.
Go to REGUL. PID and turn it OFF
REGULATION OFF (See § 6.1.7)

Modification is done.

Press **ENTER** **REGULATION OFF (ON)**

With ⇧, turn position ON.

You turn it ON, Press **ENTER** **SET VAL 0,500 mg**

With ⇧ and ⇨, Choose your set point.

Press **ENTER** **T. CYCLE 0010 Sec**

With ⇧ and ⇨, Choose the cycle time.
This cycle time is direct function with the process.

Press **ENTER** **HIGH PB 0,400 mg**

With ⇧ and ⇨, Choose the value for the high proportional band

Press **ENTER** **LOW PB 0,400 mg**

With ⇧ and ⇨, Choose the value for the low proportional band.

Press **ENTER** **HIGH DZ 00,50 mg**

With ⇧ and ⇨, Choose the value for the high Dead Zone

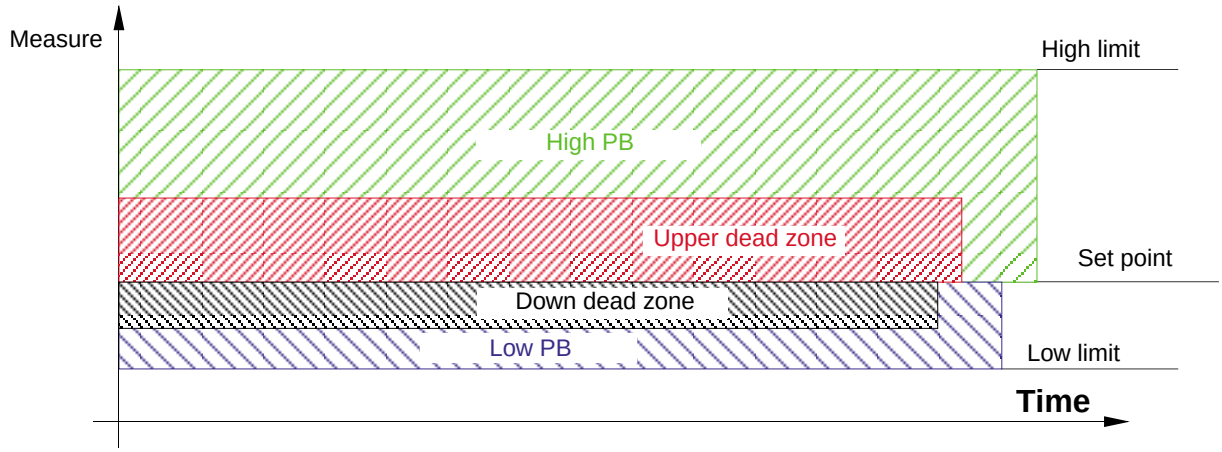
Press **ENTER** **LOW ZM 00,50 mg**

With ⇧ and ⇨, Choose the value for the low Dead Zone

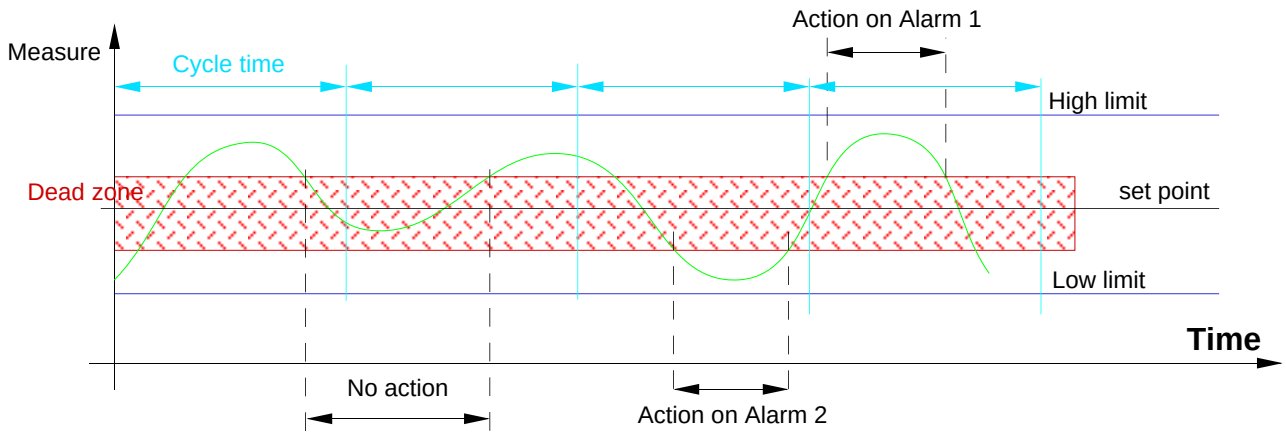
Press **ENTER** **SAVING ?**

Press **VALID** to save all data.

<u>IMPORTANT NOTE:</u> The output relay S1 is for the low PB and the relay S2 is for the high PB.



BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr



Exemple :

For the following data :

- Set point : 0,500 mg
- High DZ : 0,050 mg from 0,500 to 0,550 mg
- Low DZ : 0,050 mg from 0,450 to 0,500 mg
- High PB : 0,400 mg (so 0,900 mg for high limit)
- Low PB : 0,400 mg (so 0,100 mg for low limit)

- Over the high limit, so between 0,9 and 2 mg, S2 relay is continuously actived (continuous injection)
- Under the low limit, so between 0 and 0,100 mg, S1 relay is continously actived (continuous injection)
- Inside DZ, so between 0,45 and 0,55 mg, the pump command is OFF.
- If measure is between the DEAD ZONE and the high limit (from 0,55 to 0,900mg), or between the DEAD ZONE and the low limit (from 0,100 to 0,45 mg), tresholds 1 and 2 are actived during a period proportionally to the step between measure and step point.

$$\text{Runing time} = \frac{\text{Cycle time x (Measure - Consigne)}}{\text{Proportional Band (Hygh or Low)}}$$

Caution: The minimum time for the pump command is 1 second.

If the measure M = 0,680
the cycle time = 10 s

$$\frac{10 \times (0{,}68-0{,}50)}{0{,}400} = 4{,}5 = 5 \text{ sec}$$

BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr

6.1.7 P.I.D. Regulation

DISPLAY

This regulation mode is for PID action with analogic output in mA (0/20 or 4/20 mA).

Press "ENTER"
If display is : **RELAY. MODE**
BAMOCOR is on RELAY regulation mode.
Go to RELAY REGULATION and turn it OFF
REGULATION OFF (See § 6.1.6)

Otherwise: **REGULATION OFF (ON)**

With ⇧, turn position ON.

ON mode,
Press **ENTER** **REGUL. MANU (AUTO)**

With ⇧, make your choise.

Nota : if MANU is selected, the output can be forced by the operator (see § 6.1.1)

IF regulation PID is in AUTO mode:

Press **ENTER** **SET VAL 0,500 mg**

With ⇧ and ⇨, change the value for set point.

Press **ENTER** **GAIN 4,800**

With ⇧ and ⇨, change the gain
(see § 6.1.7.1 the description to choose data for a good PID regulation).

Press **ENTER** **Ti : 0150 Sec**

With ⇧ and ⇨, change the integral value.

Press **ENTER** **Td : 0012 Sec**

With ⇧ and ⇨, change the derived time value.

Press **ENTER** **ACTION : DIRECT**

With ⇧, Choose the PID action **ACTION : REVERSE**
Depending on the fluid used as additive.

Press **ENTER** **OUTPUT 4/20 mA (0/20 mA)**

With ⇧, Choose the output signal.(Depend of the actuator)

Press **ENTER** **SAVING ?**

Press **VALID** to save all data.

Nota : If this regulation mode is turned OFF, the analogic output is assigned to the temperature measure output (see § 6.1.9).

To stand by the PID regulation, input 24 V= 20 mA on terminal 2 (+) and 1 (-).

6.1.7.1 P.I.D. regulation adjustment method

In order to fix the starting value for PID regulation, we recommend to use the Ziegler - Nichols open loops method.
Proceed as following:

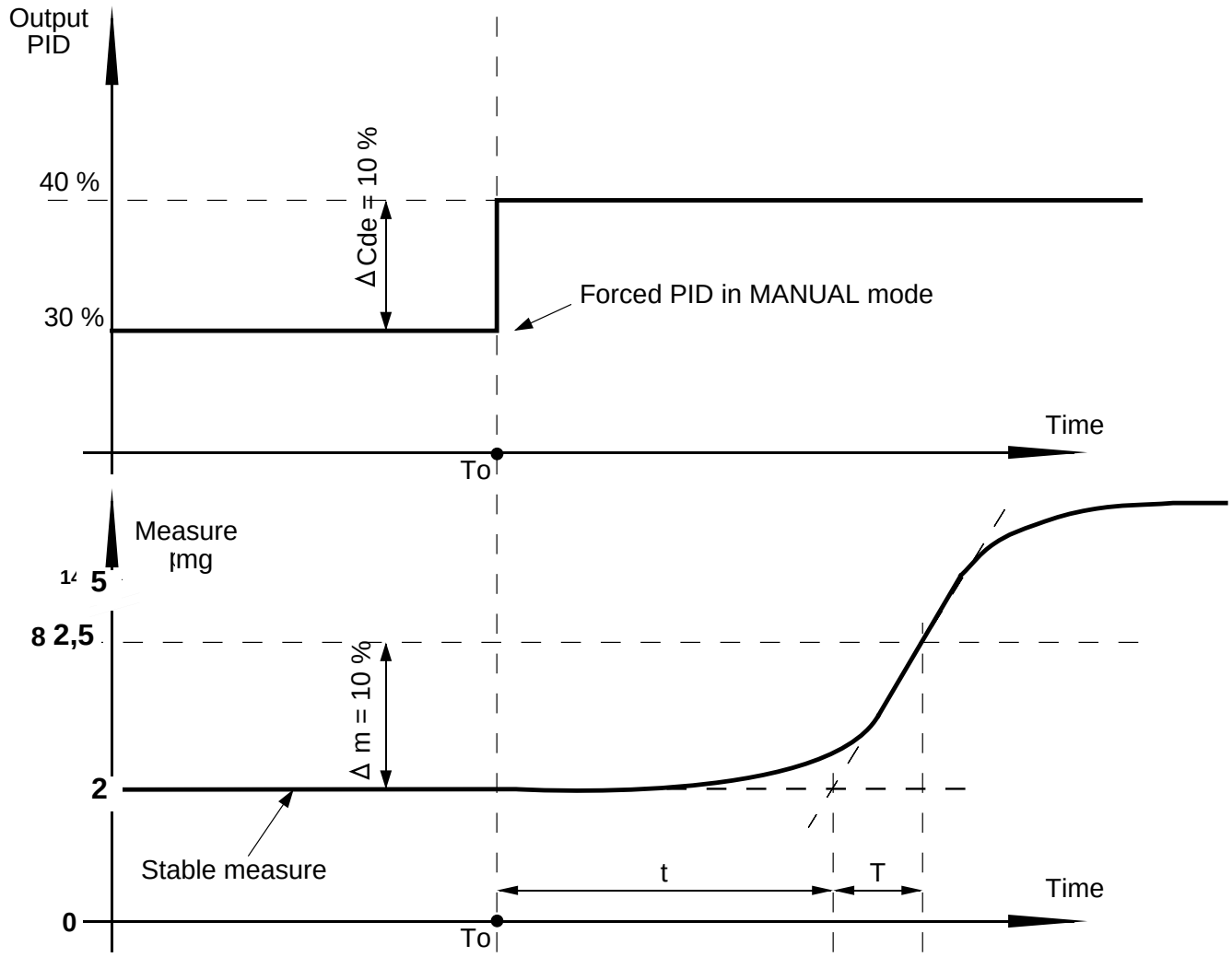
Connect a reccorder on the analogic measure output or write the reading measure value and draw the measure curve fonction of the time.

- Start PID regulation with MANU mode (§ 6.1.7).
- Keep the measure stable near the set point with forced mode. (see § 6.1.1)
- Apply an step ΔCde of 10 % on the analogic output.

Exemple: If the value is 30,00 %, apply 40,00 %

- Note on the evolution curve the time T0 corresponding to this step.
- Found on the curve times t and T as:
  t = delay of reponse
  T = Time regarding % of variation Δm from the measure to the commande ΔCde, (Δm = ΔCde).
  This value can be found on the slope.
- Change the PID data as following calculation:

Regulation	Gain	Ti(s)	Td(s)
PID	1,2 x T/t	2 x t	0,5 x t
PI	0,9 x T/t	3,3 x t	0
P	T/t	9999	0



BAMO MESURES
13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
Tél : (+33) 01 30 25 83 20 - E-mail : info@bamo.fr
Fax : (+33) 01 34 10 16 05 - Site : http://www.bamo.fr

FREE ACTIVE CHLORINE TRANSMITTER

BAMOCOR 190 E - M

05/11/2002

190 M1 01 D

MES

190/12

6.1.8 mA output Measure

DISPLAY

Programming the measure analogic output.

Press **ENTER** — **HIGHER 5,000 mg**
value for 20,00 mA output
With ⇧ and ⇨, change the value

Press **ENTER** — **LOWER 00,00 mg**
Measure value output 0,00 mA or 4,00 mA
With ⇧ and ⇨, change the value

Press **ENTER** — **OUTPUT 4/20 mA (0/20 mA)**
Choose the output signal 0,00 mA or 4,00 mA
With ⇧, change the value

Press **ENTER** — **VALIDATION ?**

Press **VALID** to save all data.

6.1.9 mA output Temperature

If P.I.D. Regulation is turned ON, this step can not be dispayed.

Press **ENTER** — **HIGHER +100,0°C**
value for 20,00 mA output
With ⇧ and ⇨, change the value

Press **ENTER** — **LOWER +000,0°C**
Temperature value output 0,00 mA or 4,00 mA
With ⇧ and ⇨, change the value

Press **ENTER** — **OUTPUT 4/20 mA (0/20 mA)**
Choose the output signal 0,00 mA or 4,00 mA
With ⇧, change the value

Press **ENTER** — **SAVING ?**

Press **VALID** to save all data.

To stand by the PID regulation, input 24 V= 20 mA on terminal 2(+) and 1(-)

6.1.10 Temperature: Automatic or Manual

Parameter of the temperature compensation

Press **ENTER** — **MEASURE : MANUAL (AUTO)**

MEASURE AUTO: The measure is done through the Pt 100 Ω temperature probe.
With ⇧, change the value

MESURE MANU: The temperature value is manualy input on the next step.

Press **ENTER** — **FLUID T. +020,0°C**
This can appear only if you select MANUAL
Enter manualy the temperature value
With ⇧ and ⇨, change the value

Press **ENTER** — **SAVING ?**

Press **VALID** to save all data.

6.1.11 S1 and S2 Relay forcing

This fonction can help you to controle the good fonctionning of your wiring of S1 and S2 and so on.

DISPLAY

Press **ENTER** — **ALARM 1 OFF**

Press ⇧ — **ALARM 1 ON**
S1 turn ON and led is red

same for ALARM 2

6.1.12 Alarm set up S3 relay (malfunction on regulation)

Press **ENTER** — **WITH ALARM (WITHOUT)**
With ⇧, to select WITH or WITHOUT

Press **ENTER** — **TIME MAX. S1 0005 Sec**
With ⇧ and ⇨**,** maximum function time S1

Press **ENTER** — **TIME MAX. S2 0005 Sec**
With ⇧ and ⇨**,** maximum function time S2

Press **ENTER** — **SAVING ?**

Press **VALID** to save all data.

6.1.13 Serial communication

J-BUS calibration.
Press **ENTER** — **DATA : 8 bits**
This can not be change. It is the size of a word

Press **ENTER** — **SPEED 2400 Bds (4800, 9600)**
Transmission speed
With ⇧ change the value.

Press **ENTER** — **PARITY EVEN (ODD, NO)**
With ⇧ change the value.

Press **ENTER** — **STOP Nb.1 (1,5, 2)**
With ⇧ change the value.

Press **ENTER** — **STATION 0123**
Station number from 1 to 247
With ⇧ and ⇨, change the value.

Press **ENTER** — **SAVING ?**
Press **VALID** to save all J-BUS data

6.1.14 Display language: French / English

Choose the language for the different menu

Press **ENTER** — **ENGLISH (FRENCH)**
ANGLAIS (FRANCAIS)

Choose your language with ⇧.

Press **ENTER** — **SAVING ?**

Press **VALID** to confirm your choise

6.2 MAINTENANCE

6.2.1 Probe calibration

Come in MODIFICATION mode (§ 6.1.3)

This function allows the measuring electrod calibration In order to do not disturb the process. Measure is fixed during the entry in menu calibration.This fixing is avalable for the calibration time more one litle time delay.This delay allows to restart measure chain (connection of the probe onthe measure line, restart fluid circulation ect ..).

With the **MENU** touch, put the diplay on — **ADJUST ELECTROD**
Press **ENTER** — **ZERO ADJUST**

Choose The zero calibration with ⇧ and ⇨,
If NO, — **CAL. SLOPE**

Press **ENTER**

f you have choose YES — **STANDARD 0 mg**
In the probe make a water circulation without chlorine
(passins through active charcoal).

Press **ENTER** — **ASYM 0,342 mg**
Keep the flow about 5 minutes to stabilize zero measure.

Press **ENTER**

If zero measure is too high — **ERROR**
- Check the active charcoal cartridge
- Check the cell clogging

If zero measure is normal or if you haven't calibrated zero — **SLOPE ADJUST YES (NO)**

Choose the slope calibration with ⇧ and ⇨,
If NO, — **DELAY**

If you choose YES — **STAND x,xxx mg**
Make a circulation of chlorine water and proceed to an analyse
to know the active free chlorine content.

Enter this nvalue with ⇧ and ⇨
(For a good calibration, this value should be the nearest possible from the equipment full range)

Press **ENTER** — **SLOPE xxx,x %**
Display the cell gain

Press **ENTER**

<u>CAUTION:</u> IF SLOPE IS >150 % OR <50 % DO NOT VALID

- Check the cell clogging (copper corrosion)
- Make a second analyze to confirm the first one

If GAIN is normal — **DELAY 0015 Sec**
- Imput time during witch measure (and other ouput mA, relay...) stay still to the value preceeding the begining of the calibration

- Press MENU key to display real measure

6.2.2 J-BUS parameters

Parameters table is only on request.