

BAMOCOR 450 E - M

OXYGEN MEASURE



Instruction manual

VERSION 4.XX

BAMOMESURES

13, rue Pasteur - 95 100 ARGENTEUIL - FRANCE
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1- TECHNICAL SPECIFICATIONS

Supply voltage	: 230 V \pm 10 % 50-60 Hz single phase (117 V, 48 V, 24 V on request)
Power consumption	: 10 VA
Enclosure Box	Dimensions : 72 x 144 x 185 Weight : 1110 g Protection : IP 40 / Ip 65 for front face Material : Noryl, Front face polycarbonate Connection : Pull off terminal screw
Wall mounting box	Dimensions : 355 x 237 x 95 Weight : 2225 g Protection : IP 66 Material : ABS, front face polycarbonat Connection : Terminal scew, input by plastic cable gland
Temperature	Stock : -10 à 70 °C Functionning : -5 to 50°C
Measuring range	Oxygen : From 0 up to 100 % or mg/l Temperature : From 0 up to 100°C
Sensors	Cathode : Siilver (BAMOX 15.1) or Gold (BAMOX 15.2) Temperature : CTN
Accuracy	Oxygen : \pm 0,3 % of the full range Temperature : \pm 0,3 °C
Display:	16 alphanumeric characters LCD Back lighted - H = 9,22 mm
Sensor Input:	Terminal plug
Impulse regulation:	Cycle time adjustable from 0 to 9999 s / or cleaning probe High and low adjustable proportional band Adjustable dead zone
P.I.D. regulation:	Gain adjustable from 0 to 9999 % Complete and derived adjustable from 0 to 9999 s
Relay 1 and 2:	Output on change-over switch relay at 500 VA / 250 / 2 A Independant adjustment on: - Oxygen and temperature measurement - Relay excitation point - Relay excitation timer - Relay on standby - Timer on standby
S3 Relay:	For too long injection, adjustable timer 0 to 9999 s
Current output selection:	0/4 - 20 mA (max. 600 Ω), Proportional to the measure, galvanic isolation included
Current output / T° or PID:	0/4 - 20 mA (max. 600 Ω) Proportional to the Temperature and output PID
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 code and access code. Neutralization of contact output, analogic output maintainedto the last value during calibration.
Measure simulation:	By menu - Action on the output measure and temperature

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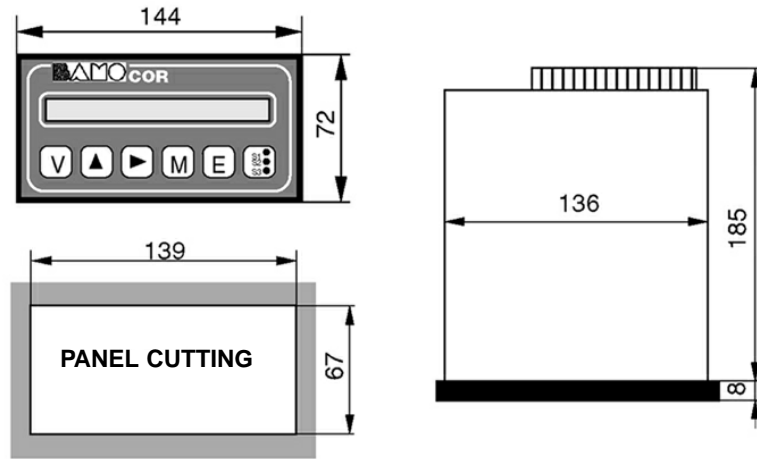
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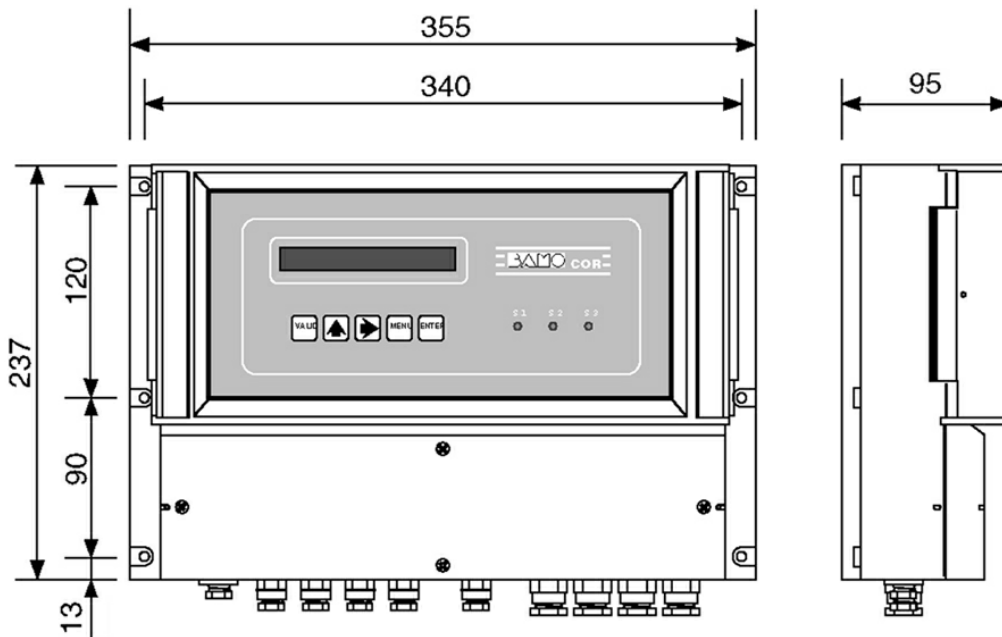
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2 - DIMENSIONS

ENCLOSURE BOX



WALL MOUNTING



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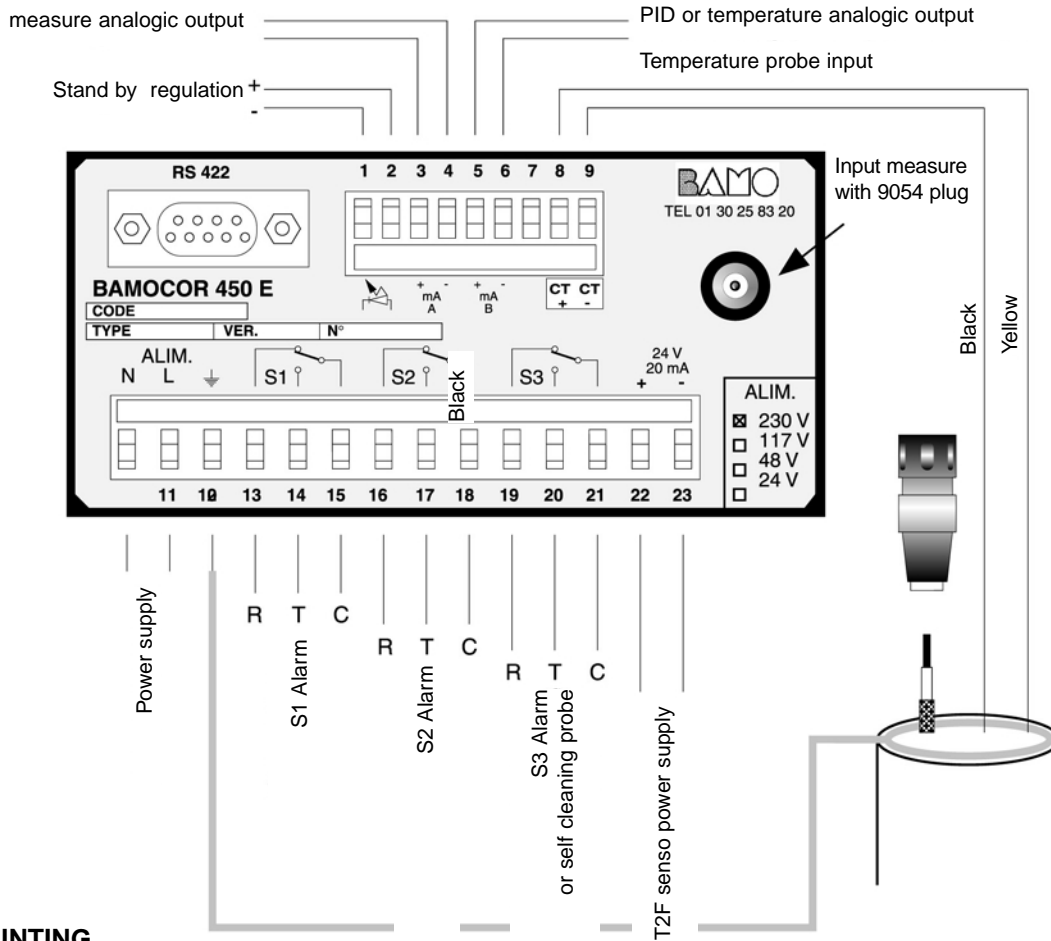
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3 - WARING

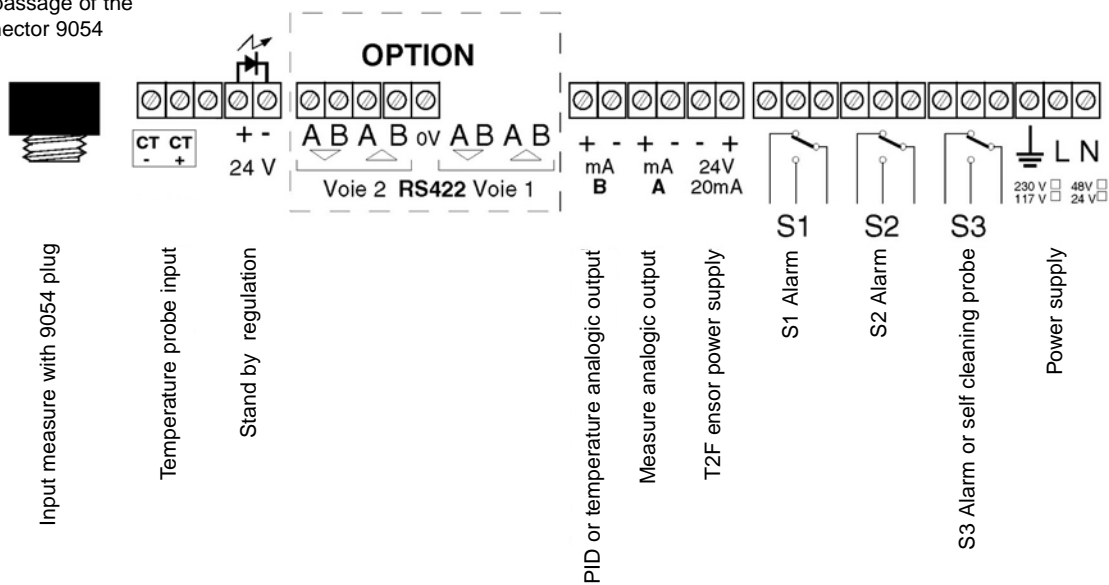
ENCLOSURE BOX



WALL MOUNTING

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

BOITIER MURAL



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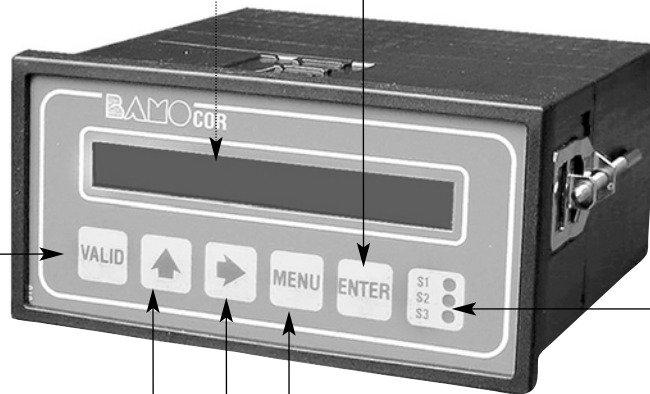
4 - FRONT PANEL

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.

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

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

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

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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

6.1.1 Display / forcing measures

Press **ENTER** : Display of oxygen measure either or % or mg/l or Temperature in °C

Press **ENTER** : Display = **OXYG. 000,0** or **OXYG. 00,00 mg/l** or **TEMP. + 00,0°C**

With MODIFICATION mode, it is possible to force measure

Press **ENTER** : Display = FORCED MEASURE

Press **ENTER** : Display = **043,25 %** with cursor flashing on one of the dial measure.

Change the value with \uparrow and \Rightarrow on the flashing display.

This modification is immediatly understood by the electronic and all other parameters.
(alarm, regulation, output mA...)

Come back on the right measure by pressing **ENTER**

DISPLAY



6.1.2 About BAMOCOR (Soft version and serial number)

Press **MENU**

Press **ENTER**

Press **ENTER**

Press **ENTER**

ABOUT BAMOCOR

VERSION : 4.XX

SERIAL N° :

12345-67

Note : Four right figures correspond to the number of code allowing for acces to MODIFICATION mode. (See §5).

6.1.3 Choice: Consultation or Modification by access code

Check or set data configuration

Set MODIFICATION mode

Press **MENU**

Press \uparrow

Press **ENTER**

Dial the password (see § 5) with \uparrow and \Rightarrow

Press **ENTER**

If wrong password, display "ERROR" during 3 second

If good password, display:

The CONSULTATION mode come back automatiquely after 30 minutes (Come back MEASURES menu).

Press MENU to choose the data to change.

Password: to know the password see § 5.

CONSULTATION

MODIFICATION

CODE ? 0000

ERROR

TIME : 30 mn !

6.1.4 Measure parameters

Normally those parameters are preset at the factory.

Press **ENTER**

Choose unit % or mg/l for alarm functioning or 4-20 mA ouput
(With MODIFICATION mode, choose the unit with touch)

Press **ENTER**

Press **ENTER**

Check the correspondance with the probe associated to this device.

PARAMETR. MEASURE

DISPLAY % (mg/l)

PROBE TYPE

BAMOX 15-1

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6.1.5 Atmospheric pressure

The data capture of atmospheric pressure.
The data capture of atmospheric pressure is necerequired before calibration in air and for calculation in mg/l

Press **ENTER**
(In MODIFICATION mode, choose with ↑ and ⇒)
Press **VALID**, to save modification.

DISPLAY



P = 1013 hPa

6.1.6 Salinity

The data capture of salinity.
The oxygen solubility decrease when salinity increase.
Salinity will be expressed in equivalent NaCl gramme by Kg of solution.

Press **ENTER**
(In MODIFICATION mode, choose with ↑ and ⇒)
Press **VALID**, to save modification.

g/Kg = 00,00

6.1.7 S1 relay adjustment

To adjust the S1 relay

Press **ENTER**
(In MODIFICATION mode, choose with ↑)

ALARM 1 ON (OFF)

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 value
LOW = relay is ON if the measure is lower the set value
(In MODIFICATION mode, choose with ↑)

ON 10,0 %

Press **ENTER**

Threshold S1 relay is ON (unit dependding of § 6.1.4)
(In MODIFICATION mode, choose with ↑ and ⇒)

OFF 15,00 %

Press **ENTER**

Threshold S1 relay is OFF
(In MODIFICATION mode, choose with ↑ and ⇒)

DELAY UP ON (OFF)

Press **ENTER**

With or without delay S1 for ON
(In MODIFICATION mode, choose with ↑)

TIME 0010 Sec

Press **ENTER**

Set S1 delay time
(In MODIFICATION mode, choose with ↑ and ⇒)

DELAY DOWN ON (OFF)

Press **ENTER**

With or without delay S1 for OFF
(In MODIFICATION mode, choose with ↑)

TIME 0060 Sec

Press **ENTER**

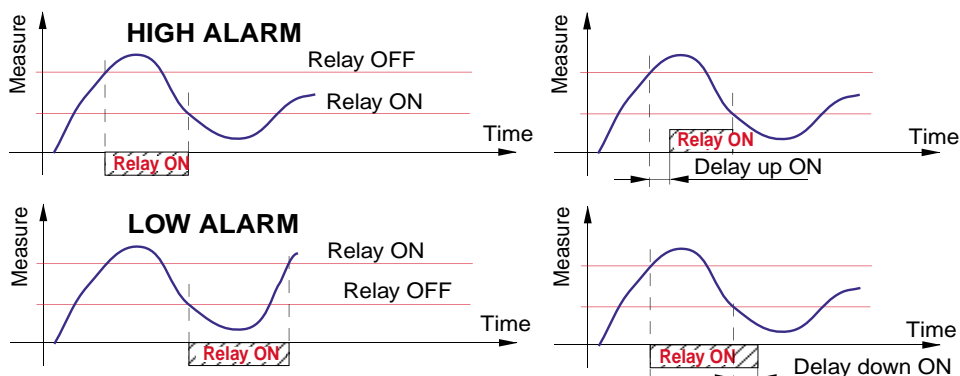
Time of the delay S1
(In MODIFICATION mode, choose with ↑ and ⇒)

Press **ENTER**

SAVING ?

Press **VALID** to save all data.

6.1.8 S2 relay adjustment (same as before for relay S1) (§ 6.1.7)



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6.1.9 Relay regulation

This mode is for a proportionnal regulation.

Press "ENTER"

If display is:

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:

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

With ↑, turn position ON.

You turn it ON, Press ENTER

With ↑ and ⇒, Choose your set point.

Press ENTER

With ↑ and ⇒, Choose the cycle time.

This cycle time is direct function with the process.

Press ENTER

With ↑ and ⇒, Choose the value for the high proportional band

Press ENTER

With ↑ and ⇒, Choose the value for the low proportional band.

Press ENTER

With ↑ and ⇒, Choose the value for the high Dead Zone

Press ENTER

With ↑ and ⇒, Choose the value for the low Dead Zone

Press ENTER

Press VALID to save all data.

DISPLAY
ON / OFF MODE

PID MODE

REGULATION OFF (ON)

SET VAL 050,0 %

T. CYCLE 0010 Sec

HIGH PB 050,0 %

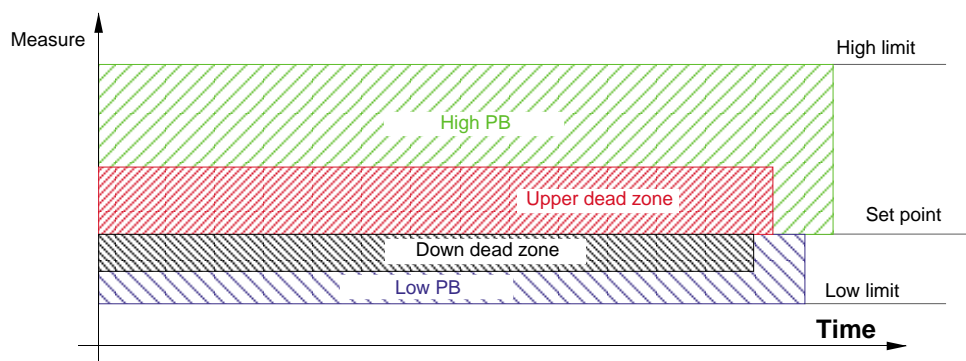
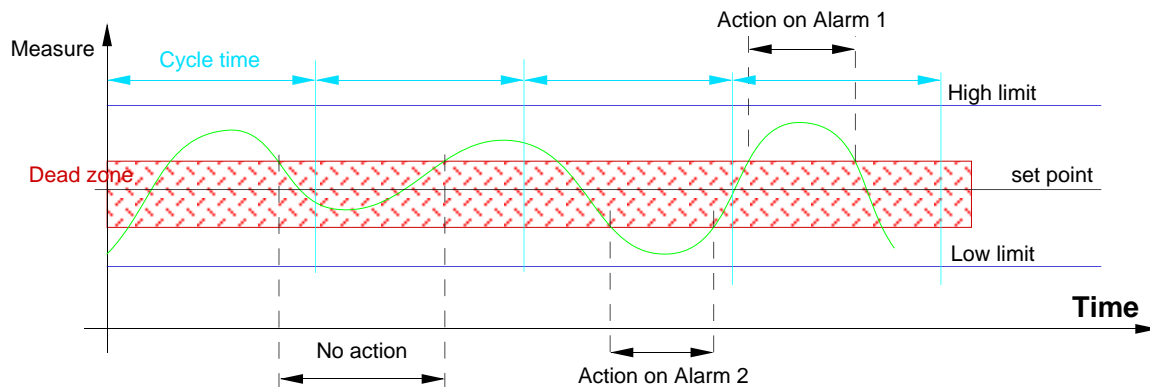
LOW PB 050,0 %

HIGH DZ 005,0%

LOW ZM 005,0%

SAVING ?

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



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6.1.10 P.I.D. Regulation

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

Press "ENTER"

If display is :

**BAMOCOR is on RELAY regulation mode.
Go to RELAY REGULATION and turn it OFF
REGULATION OFF (See § 6.1.6)**

Otherwise:

With ↑, turn position ON.

ON mode,
Press ENTER

With ↑, make your choice.

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

With ↑ and ⇒, change the value for set point.

Press ENTER

With ↑ and ⇒, change the gain
(see § 6.1.10.1 the description to choose data for a good PID regulation).

Press ENTER

With ↑ and ⇒, change the integral value.

Press ENTER

With ↑ and ⇒, change the derived time value.

Press ENTER

With ↑, Choose the PID action
Depending on the fluid used as additive.

Press ENTER

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

Press ENTER

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 (-).

DISPLAY



RELAY. MODE

REGULATION OFF (ON)

REGUL. MANU (AUTO)

SET VAL 050,0 %

GAIN 4,800

Ti : 0150 Sec

Td : 0012 Sec

ACTION : DIRECT
ACTION : REVERSE

OUTPUT 4/20 mA (0/20 mA)

SAVING ?

6.1.10.1 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:

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

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6.1.11 mA output Measure

Programming the measure analogic output.

Press **ENTER**
value for 20,00 mA output
With \uparrow and \Rightarrow , change the value

Press **ENTER**
Measure value output 0,00 mA or 4,00 mA
With \uparrow and \Rightarrow , change the value

Press **ENTER**
Choose the output signal 0,00 mA or 4,00 mA
With \uparrow , change the value

Press **ENTER**
Press **VALID** to save all data.

DISPLAY


HIGHER 100,0 %

LOWER 000,0 %

OUTPUT 4/20 mA (0/20 mA)

VALIDATION ?

6.1.12 mA output Temperature

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

Press **ENTER**
value for 20,00 mA output
With \uparrow and \Rightarrow , change the value

Press **ENTER**
Temperature value output 0,00 mA or 4,00 mA
With \uparrow and \Rightarrow , change the value

Press **ENTER**
Choose the output signal 0,00 mA or 4,00 mA
With \uparrow , change the value

Press **ENTER**
Press **VALID** to save all data.

HIGHER +050,0°C

LOWER +000,0°C

OUTPUT 4/20 mA (0/20 mA)

SAVING ?

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

6.1.13 Temperature: Automatic or Manual

Parameter of the temperature compensation

Press **ENTER**

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

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

Press **ENTER**
This can appear only if you select MANUAL
Enter manually the temperature value
With \uparrow and \Rightarrow , change the value

Press **ENTER**
Press **VALID** to save all data.

MEASURE : MANUAL (AUTO)

T° BATH + 025,0°C

SAVING ?

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6.1.14 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.

Press **ENTER**

Press **↑**

S1 turn ON and led is red
same for ALARM 2

DISPLAY



ALARM 1 OFF

ALARM 1 ON

6.1.15 Alarm set up S3 relay (malfunction on regulation)

Press **ENTER**

With **↑**, to select WITH or WITHOUT

Press **ENTER**

With **↑** and **⇒**, maximum function time S1

Press **ENTER**

With **↑** and **⇒**, maximum function time S2

Press **ENTER**

Press **VALID** to save all data.

WITH ALARM (WITHOUT)

TMAX S1 0005 Sec

TMAX S2 0005 Sec

SAVING ?

6.1.18 Self cleaning probe (S3)

In order to not perturbed the process, during this cleaning the measuring outputs are fixed. This fixing is avable for the cleaning time more one lite time delay. This delay is to give time for the cleaning liquide to disperse itself before restart the regulation.

If ADJUST ALARM is turned ON

Go to Alarm set up S3 relay and turned it OFF (see §6.1.15)

Press **ENTER**

With **↑**, change to YES:

Press **ENTER**

With **↑** and **⇒**, choose the periode of the cleaning.

Press **ENTER**

With **↑** and **⇒**, chosse how long time the cleaning is.

Press **ENTER**

With **↑** and **⇒**, Choose the delay time to restart the regulation mode.

Press **ENTER**

Press **VALID** to save all data.

ALARM MODE

CLEANING NO (YES)

PERIOD 1800 Sec

TIME 0010 Sec

DELAY 0015 Sec

SAVING ?

6.1.17 Serial communication

J-BUS calibration.

Press **ENTER**

This can not be change. It is the size of a word

Press **ENTER**

Transmission speed

With **↑** change the value.

Press **ENTER**

With **↑** change the value.

Press **ENTER**

With **↑** change the value.

Press **ENTER**

Station number from 1 to 247

With **↑** and **⇒**, change the value.

Press **ENTER**

Press **VALID** to save all J-BUS data

DATA : 8 bits

SPEED 2400 Bds (4800, 9600)

PARITY EVEN (ODD, NO)

STOP Nb.1 (1,5, 2)

STATION 0123

SAVING ?

6.1.18 Display language: French / English

Choose the language for the different menu

Press **ENTER**

Choose your language with **↑**

Press **ENTER**

Press **VALID** to confirm your choice

ENGLISH (FRENCH)

ANGLAIS (FRANCAIS)

SAVING ?

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6.2 MAINTENANCE

6.2.1 Probe calibration

Come in MODIFICATION mode (§ 6.1.3)

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

With the MENU touch, put the display on

ADJUST ELECTROD

Press **ENTER**

ZERO ADJUST

Drive the probe in water without oxygen.

Press **ENTER**

ASYM 0002

Keep it in the flow about 5 minutes to stabilize zero measure.

Press **ENTER**

ERROR

If zero measure is too high

Check buffer solution

Check the cell clogging

If zero measure is normal

PROBE IN AIR

Take the probe in your hand and shake it in air with represent 100 % (For a good calibration, this value should be the nearest possible from the equipment full range).

Press **ENTER**

COEF 1350

Display the cell gain

Press **ENTER**

DELAY 0015 Sec

If gain is normal

Input time during with measure (and other output mA, relay...)

stay still to the value preceding the beginning of the calibration.

If gain too small or too high.

Come back to parameter

**ERROR
PROBE IN AIR**

Make a second analyze to confirm the first one

If the error is confirmed, go back to calibration menu with MENU

Check the cell clogging (grease deposit).

If necessary change membrane.

If every thing is OK, save calibration with with VALID.

Back to the touch MENU to display right measure

6.2.2 J-BUS parameters

Parameters table is only on request.

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