BAMOPHOX 106 E - M

pH/mV meter

Option: 4 stages regulation processor

INSTRUCTION MANUAL

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pH/mV meter
4 stages regulation processor
BAMOPHOX 106
26-11-2008 106 M1 02 B

MES
106-02/1

pH/mV meter
4 stages regulation option

BAMOPHOX 106

(Technical information and Manual for LOGGER /RS422 version are on a specific document)

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1. TECHNICAL FEATURES

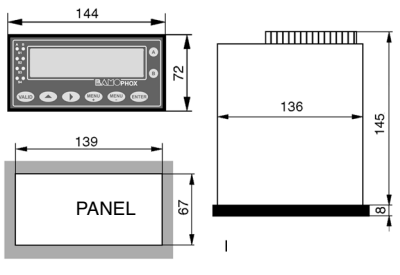
Displayed parameters:	Measurement values pH/ORP - Configuration Menu - Temperature value
Display:	Back lighted - 2 lines of 16 alphanumerical characters ; 9,2 mm high
Indication:	LED alarms status
Configuration:	8 push buttons keyboard on front face - Keyword protected
Scales:	0 to 14 pH – pH-meter configuration / ±1000 mV ORP-meter configuration
Accuracy:	± 0,03 pH or ± 3 mV
Input impedance:	$>10^{13}$ Ω
Probe input:	Coaxial connector, code 9054
Temperature compensation:	Automatic with an input for a 3 wires Pt 100 Ohm/0°C range, 0…100°C Manually from 0…100°C
Relay outputs:	4 closing contacts (Silver alloy), voltage free S1 / Regulation Low Bandwidth S2 / Regulation High Bandwidth S3 / Contact "End of process" S4 / Alarm contact – disabled or set up simultaneously for: - Too long injection - Temperature out of range: - pH>14 or open loop - Pt 100 Ω dysfunction or probe cleaning function
Contact:	Initial resistance 100 mΩ as a maximum (voltage drop 6 V DC 1 A) Rated at 831 V AC / 3 A / 277 V AC ; 90 W / 3 A / 30 V DC Switching capacity (minimum) 100 mA, 5 V DC (depending of switching frequency, ambient conditions, accuracy) Mechanical life time (minimum) 5 $x10^6$ operations (180 commutation/min) Electrical life time (minimum) 2 $x10^5$ (20 comm./min) [3 A, 125 V AC], [3 A, 30 V DC] and 10^5 (evaluated charge) for 3 A, 125 V AC
Calibration sequence:	Regulation on standby, relay outputs inhibited, analog outputs stand on last values
Self-cleaning program:	Frequency and duration settings, with regulation inhibited and analog outputs standing on last values
Measurement output:	0/4-20 mA (maxi 600 Ω) proportional to measurement, galvanic insulated
Temperature output:	0/4-20 mA (max 600 Ω), scaling 0…100°C, galvanic insulated
Program tseting	Simulation through the menu on relays outputs.
Main power supply:	230 V AC / 50-60 Hz [other on request] - Consumption 10 VA
Models:	Panel mounting, IP65, 72 x144 mm, connections on screw terminal IP40 Idem DIN Rail mounting, only for blind monitor Wall mounting, IP65, cable glands, connections on screw terminal

OPTION (RS 422 + Logger)

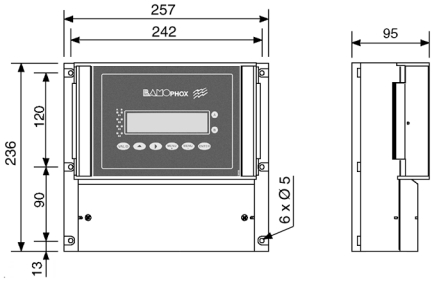
Communication:	RS422 output, J-BUS link, binary slave mode, 2400 to 9600 bauds
Data Logger:	Cycle average measurement record, with a programmable period, 150000 records maxi on MMC (multi media card) / External driver necessary

2. DIMENSIONS

Extension terminal:
identical to the panel
or wall mounting



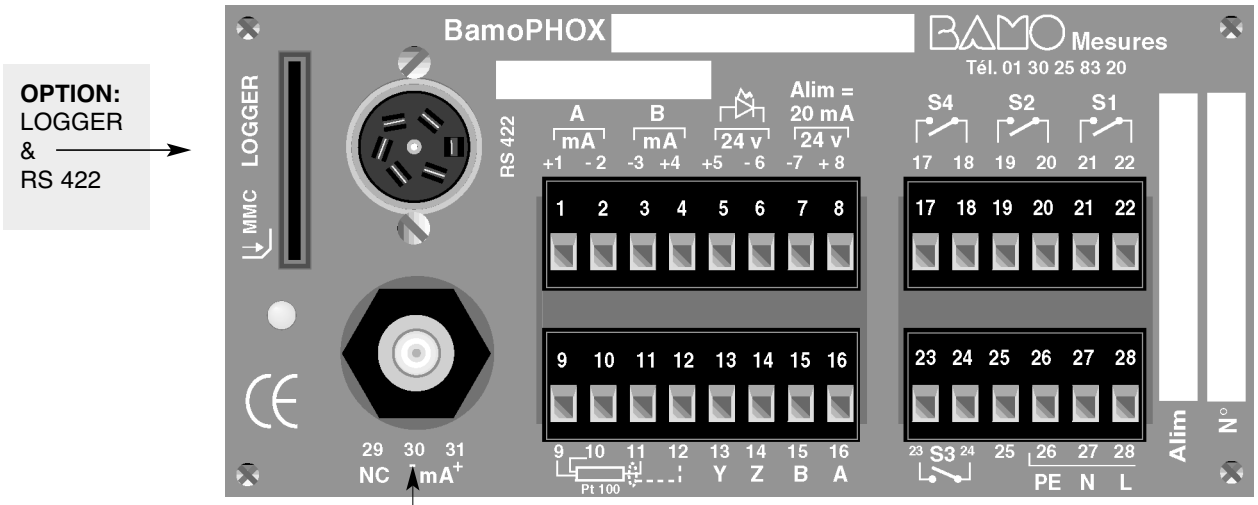
Panel mounting instrument



Wall mounting instrument

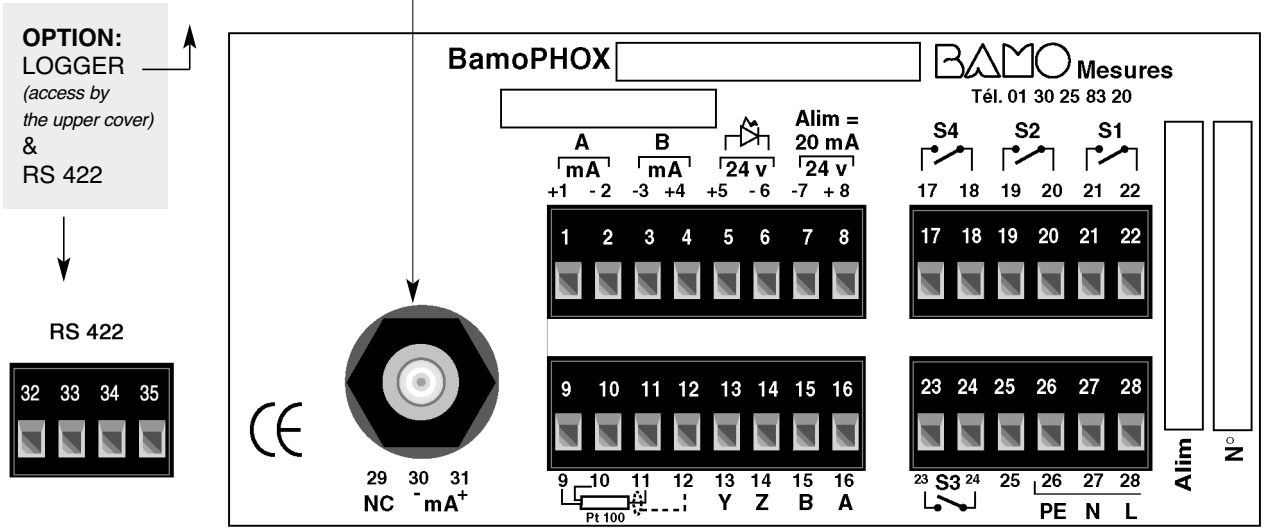
3. WIRING

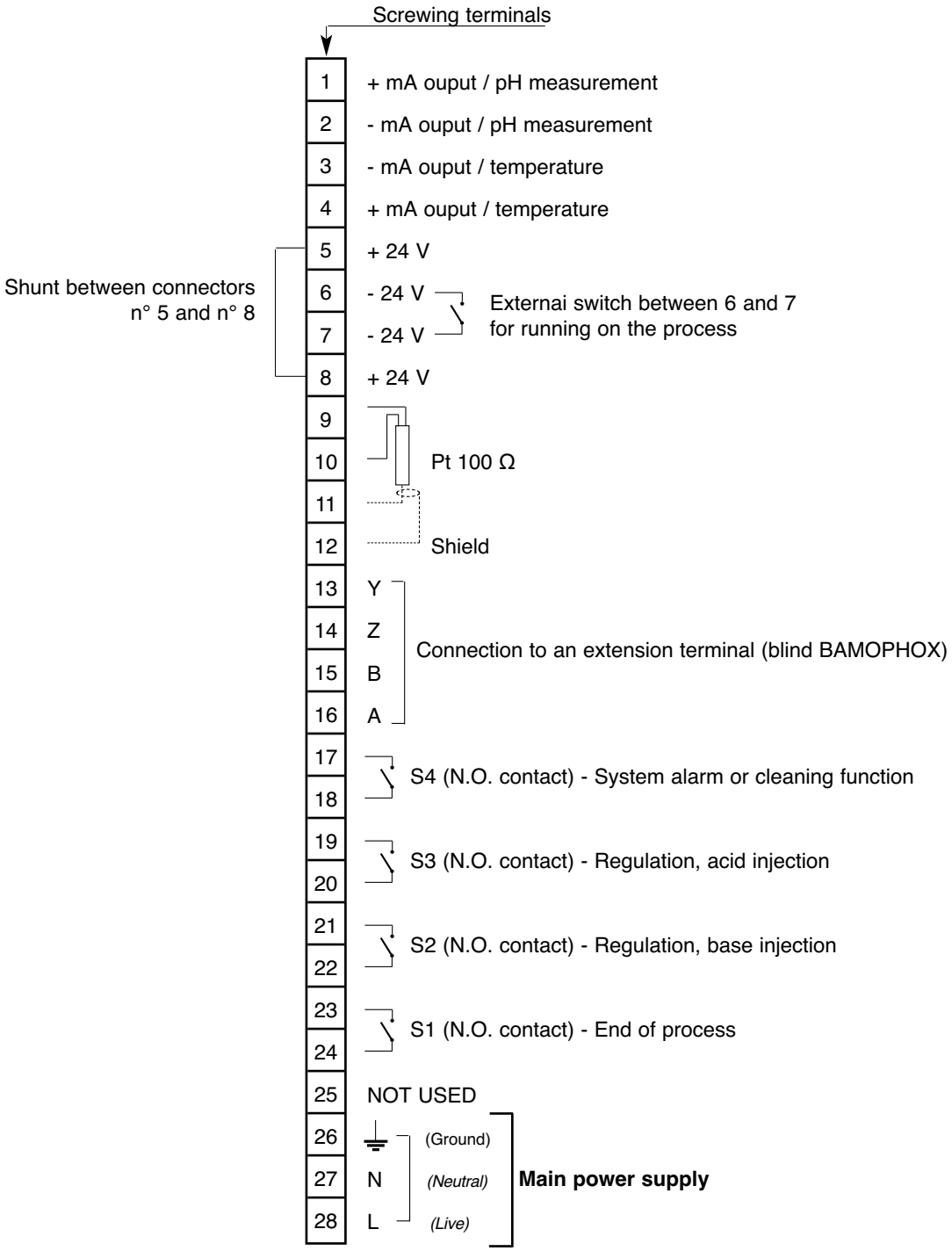
PANEL MOUNTING



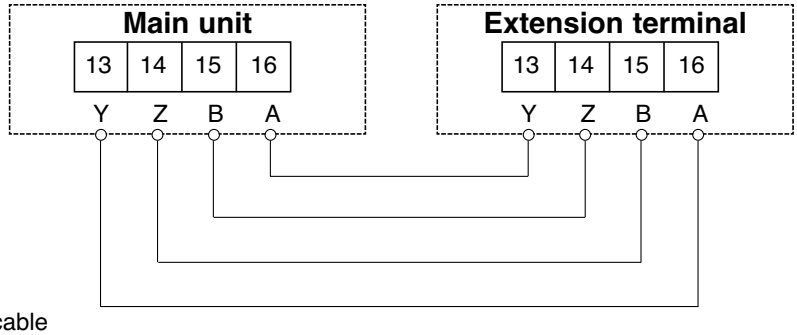
pH/mV input connector
9054

WALL MOUNTING





Wiring from wall or panel mounting BAMOPHOX to an Extension terminal BAMOPHOX



- Maximum length cable
  500 m

- Wire specifications:
  Mains cable or 4 wires shielded cable
  ≥ 0,25 mm² cross section

4. FRONT PANEL

S1, S2, S3, and S4
indicate relays status:

LED lighting = contact ON
LED OFF = contact OFF
LED flashing = Timer in use

2 lines /16 alphanumeric characters
9.22 mm high - Back lighted

Key **"A"**
To display the parameters of upper line.
(main BAMOPHOX)

Key **"B"**
To display the parameters of lower line.
(Extension blind BAMOPHOX)

"VALID" key
To save the parameters on EPROM
when it asks:

VALIDATION ?

Caution, when you press this key,
all parameters are saved.
(previous data programmation
will be overwrited).
If you are not sure of any modification,
do not press the VALID key,

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

"MENU - " key
To move the cursor during configuration.
At the last digit, comes back on the first one.

To change parameters of data capture:

Numéric input increase the
flashing digit (loop 0 after 9).

Reverse the choice Yes / No,
Up/Down, 0-20 mA / 4-20 mA etc.

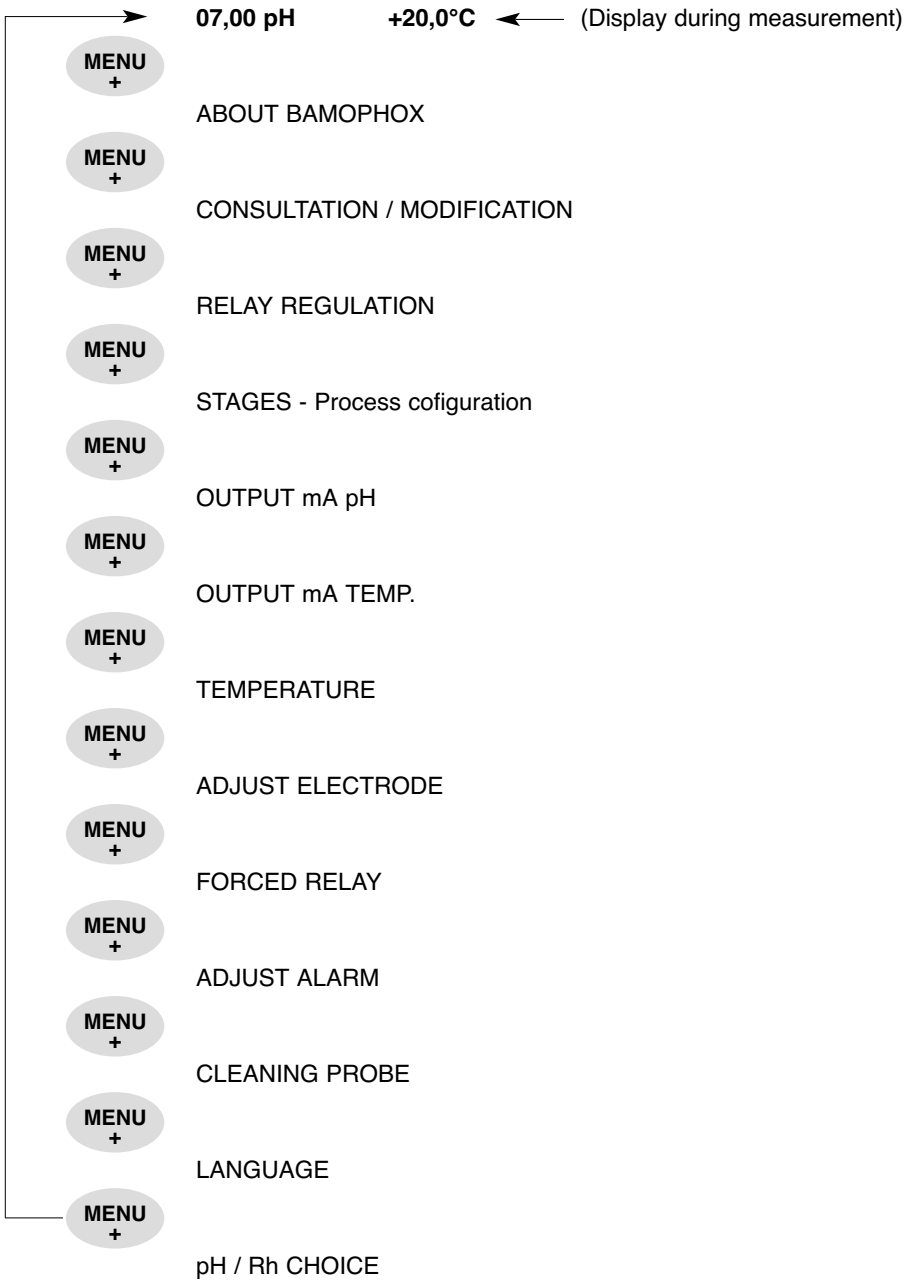
"MENU +" key
To go to the next menu.

Pushing simultaneously both keys
"**MENU +**" and **"ENTER"**
allows a fast return to measurement display.

To go to the next display or to change a value.

<u>On measurement mode,</u> by pressing on "ENTER" key, the regulation status is displayed.

SCROLLING MENU



ABOUT Bamophox

ENTER

ABOUT BAMOPHOX

ENTER

VERSION 3,00

ENTER

SERIAL N°

ENTER

211 6801

CONSULTATION / MODIFICATION

CONSULTATION

▲

MODIFICATION

ENTER

CODE ? 0000

ENTER

CODE ? 6801 ▲ ▶

Last 4 digits (of serial number) are the key code to access the MODIFICATION menu.
When wrong code is entered, a message **"ERROR"** appears during 3 seconds.

ENTER

TIME : 30 mn

After 30 minutes, the display returns automatically to the measurement mode.

MENU +

From this mode MODIFICATION it is easy to return back to measurement for testing the relay outputs and regulation mode.
Once in modification mode, **reach measurement display and press ENTER**

ENTER

FORCED MEASURE

ENTER

0,000 pH +20°C ▲ ▶

(one digit is flashing) Modify the value. Immediately the instrument acts within the configuration (thresholds, regulation, analog outputs ...).

RELAY REGULATION

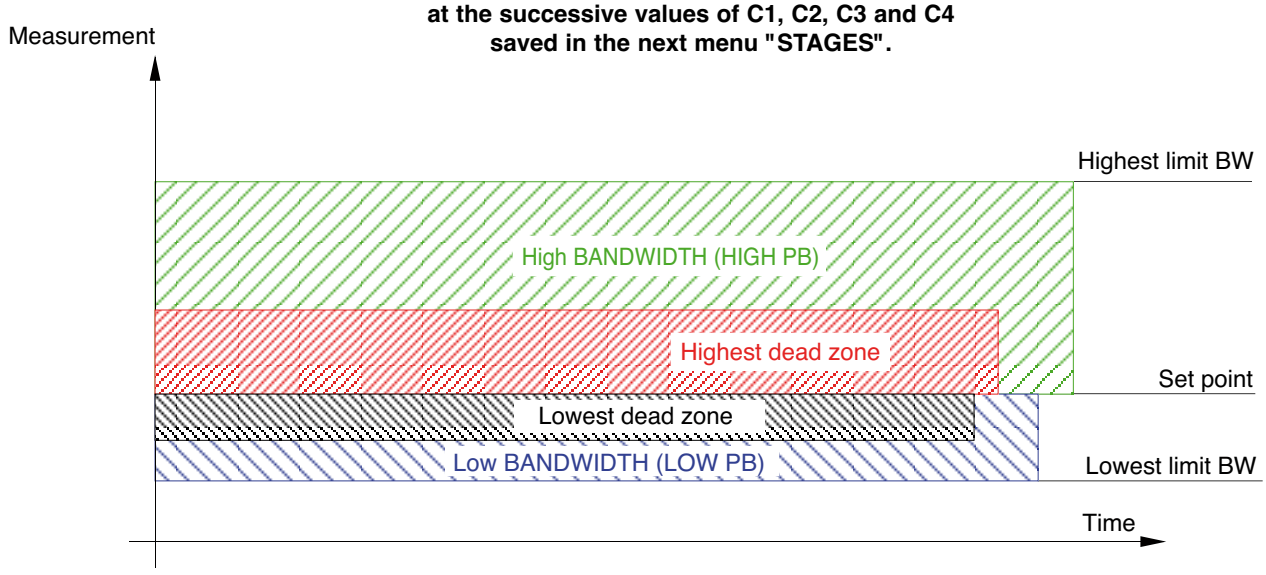
MENU + → STAGES - Process configuration

ENTER	REGUL **ON/OFF**	Relay regulation mode
ENTER	SET VAL. **07,00** pH	Set point: As soon as the process is launched, the values of set points C1, C2, C3 and C4 from process configuration are condidered for each stage.
ENTER	T. CYCLE **0000** SEC	Cycle time
ENTER	HIGH PB **05,00** pH	Highest limit for proportional bandwith
ENTER	LOW PB **05,00** pH	Lowest limit for proportional bandwith
ENTER	HIGH DZ **00,50** pH	Highest value for dead zone
ENTER	LOW DZ **00,00** pH	Lowest value for dead zone
VALID	SAVING ?	

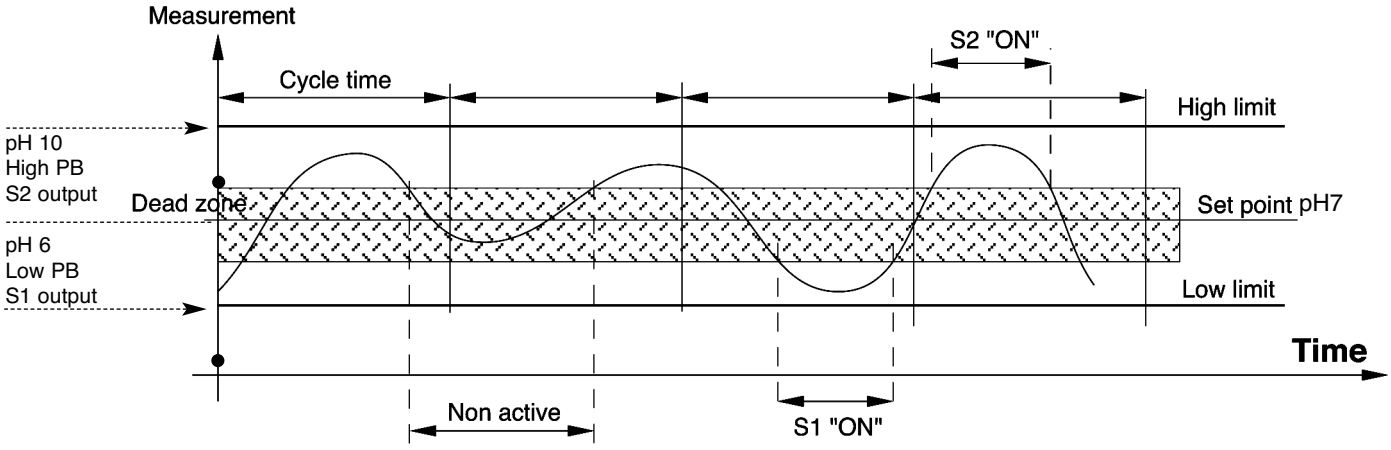
This menu, RELAY REGULATION, allows a configuration in accordance with the response time of the system: tank + pumps + sensors + valves + pipes + agitators... etc.

You may consider the delay to have a measurement as a good image as of the real value due to the mixing of fluids, in progress during the operation.

The set point value will be automatically set up at the successive values of C1, C2, C3 and C4 saved in the next menu "STAGES".



Caution: **On S1 (base injection) you set up the lowest value for proportional bandwidth and, respectively on S2 (acid injection), the highest value.**



CAUTION: The bandwidth limits are respectively
- Low proportional bandwidth for relay 1
- High proportional bandwidth for relay 2

You may nor invert them

Example: Process regulation with acid and base injections

With process configuration:

- Set point: pH 7
- High dead zone: 0,3 pH between 7 and 7,3 pH
- Low dead zone : 0,7 pH between 6,3 and 7 pH
- High Bandwidth: 3 pH (Limit of pH 10 as a maximum)
- Low Bandwidth: 1 pH (Limit of pH 6 as a minimum)

- Over the highest limit (from ph 10 to 14), S2 is “ON”: permanent injection
- Under the lowest limit (from ph 6 to 0), S1 is “ON”: permanent injection
- Inside the dead zone (from ph 6,3 to 7,3), S1 and S2 are “OFF”
- If the measurement value is between the dead zone and the highest limit (from pH7,3 to 10) or between the dead zone and the lowest limit (from pH 6,3 to 6), the contact S1 or S2 are “ON” only for a time proportional to the step between measurement and desired value.

$$\text{Closing contact time} = \frac{\text{Cycle time x (Measurement - Set point)}}{\text{Proportional bandwidth}}$$

Caution: The minimum closing time of a relay is 1 second
If the measurement M=7,8 when the cycle time is 10 second,

the closing contact time is: $\frac{10 \times (7{,}8-7)}{3} = 2{,}66 \# 3$ s

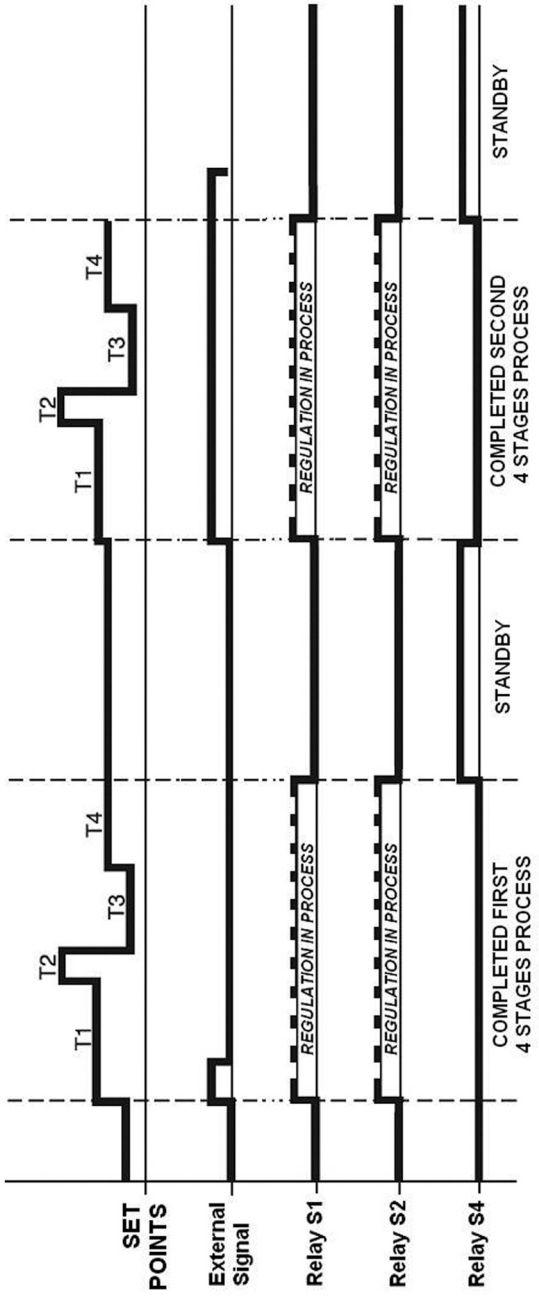
NOTE: The cycle time is measured and will depend of the installation and injected volumes

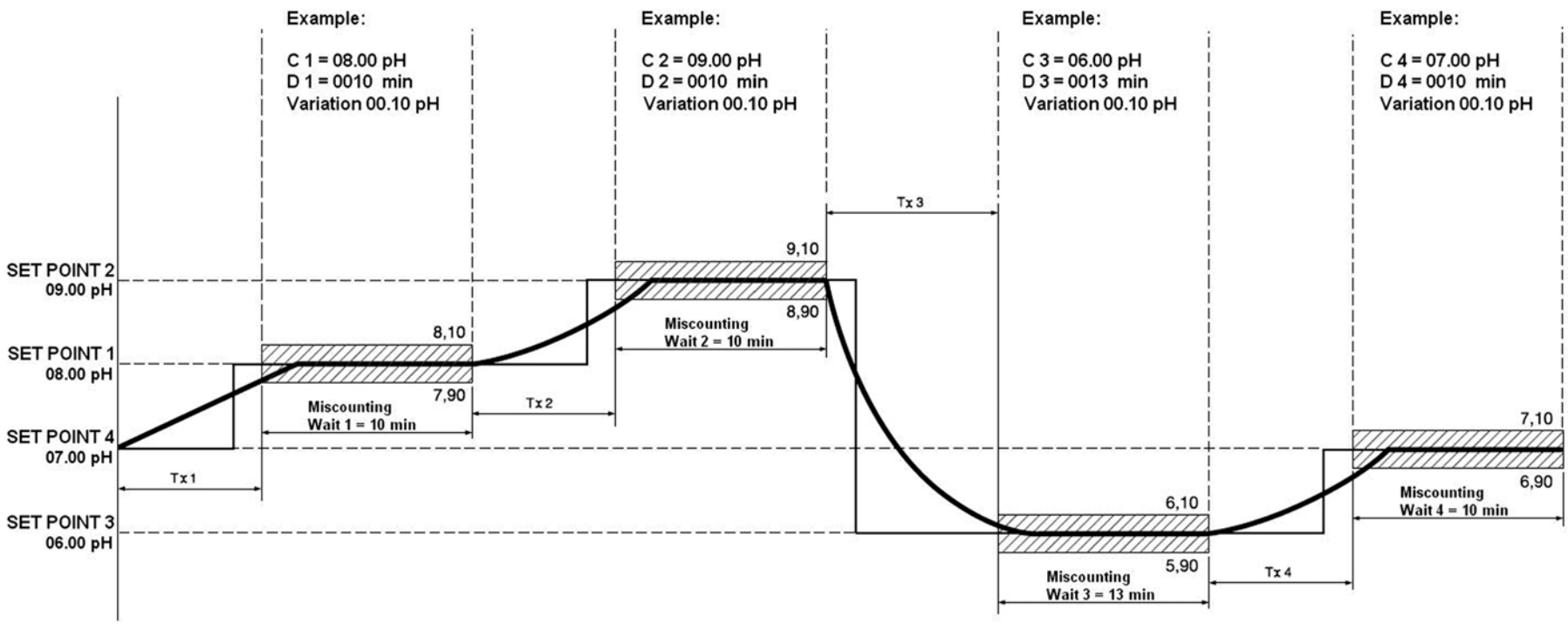
STAGES - Process regulation — MENU + → Output mA

ENTER	REGULATION	**ON/OFF**	
ENTER	SET-UP. 1	**00,00** pH	Set point C1
ENTER	LENGTH 1	**0000** mn	Wait 1, in minutes
ENTER	VARIATION 1	**00,00** pH	Variation on C1 - limits within process step is valid
ENTER	TMAX 1	**0000** mn	Tx1, maximal duration before to start miscounting, stage 1
ENTER	SET-UP. 2	**00,00** pH	Set point C2
ENTER	LENGTH 2	**0000** mn	Wait 2, in minutes
ENTER	VARIATION 2	**00,00** pH	Variation on C2 - limits within process step is valid
ENTER	TMAX 2	**0000** mn	Tx2, maximal duration before to start miscounting, stage 1
ENTER	SET-UP. 3	**00,00** pH	Set point C3
ENTER	LENGTH 3	**0000** mn	Wait 3, in minutes
ENTER	VARIATION 3	**00,00** pH	Variation on C3 - limits within process step is valid
ENTER	TMAX 3	**0000** mn	Tx3, maximal duration before to start miscounting, stage 1
ENTER	SET-UP. 4	**00,00** pH	Set point C4
ENTER	LENGTH 4	**0000** mn	Wait 4, in minutes
ENTER	VARIATION 4	**00,00** pH	Variation on C4 - limits within process step is valid
ENTER	TMAX 4	**0000** mn	Tx4, maximal duration before to start miscounting, stage 1
VALID	SAVING ?		

NOTES:

- A free potential switch (external) starts the process.
- When this contact is maintained closed, it does not allow a new processing sequence.
- On the switch loop, it is possible to add in line, other safety controls such as level switches.





Available information on the LCD display by pressing "ENTER"	
Process not in operation:	STOP : 000 mn
Process in operation:	
Stage n° and time before ending	1 : 0002 mn
when pH value is out of bandwith	! 1 : 0010 mn

If an alarm condition occurs: (when Tx > T max)	lighting LED (S4)

⚠ (S4) is lighting until the alarm condition disappears.

There is no need to reset the alarm status; the process runs after the alarm condition disappears.

Output mA pH — MENU + → Output mA TEMP.

Measurement signal copy on the analog output

ENTER

HIGHER **00,00** pH — ▲ ▶ Value corresponding to 20,00 mA

ENTER

LOWER **00,00** pH — ▲ ▶ Value corresponding to 00,00 or 04,00 mA

ENTER

OUTPUT **4/20 mA** / **0/20 mA** — ▲ Output type

ENTER

SAVING ?

VALID

Output mA TEMP. — MENU + → TEMPERATURE

ENTER

HIGHER **+160,0** °C — ▲ ▶ Value corresponding to 20,00 mA

ENTER

LOWER **+000,0** °C — ▲ ▶ Value corresponding to 00,00 or 04,00 mA

ENTER

OUTPUT **4/20 mA** / **0/20 mA** — ▲ Output type

ENTER

SAVING ?

VALID

TEMPERATURE — MENU + → ADJUST ELECTRODE

ENTER

MEASURE : **AUTO / MANUAL** — ▲

AUTO: A Pt 100 probe should be connected

MANUAL: Without Pt 100 probe
Manualy entered temperature value

ENTER

FLUIDE T. + **000,0** °C — ▲ ▶ (MANUAL mode)

ENTER

SAVING ?

VALID

ADJUST ELECTRODE

MENU + → FORCED RELAY

CAUTION: Set up the instrument on MANUAL mode at 20°C.

ENTER

STANDARD **7,00** pH

Immerge the electrode in the buffer pH 07,00

ENTER

When display stabilizes, press ENTER to fix up the 07,00 pH (electrical zero)

ASYM. +**00,00** pH

If the "ASYM" value is too high, an "**ERROR**" message appears.
So you may check all the connections, cable and buffer type solution.

If the "**ERROR**" message persists, please replace the electrode with a new one.

ENTER

STAND. **00,00** pH

▲ ▶

When pH 07,00 is fixed up, rinse the electrode with tap water (Never use paper or tissue).
Enter the pH value of the next buffer (04,00 or 10,00)
(it would be better to choose an acidic buffer for an acidic process)

ENTER

SLOPE **000,0** %

Sensor gain is displayed.

If it is too weak (< 70%) an "**ERROR**" message appears.
So, check the buffer solution. if persisting, please replace
If the "ERROR" message still appears, replace the electrode.

ENTER

the

DELAY **0000** Sec

▲ ▶

Set up the delay before to start back the regulation mode once the calibration is ending ("SAVING")

ENTER

SAVING ?

VALID

CAUTION: If a PT100 probe is connected, reset the default status

FORCED RELAY — MENU + → ADJUST ALARM

ENTER

ALARM 1 **ON/OFF** ▲

ENTER

ALARM 2 **ON/OFF** ▲

ENTER

ALARM 3 **ON/OFF** ▲

ENTER

ALARM 4 **ON/OFF** ▲

VALID

Diagnostic mode to test the threshold configurations

ADJUST ALARM — MENU + → CLEANING PROBE

This mode allows to detect a malfunction on S1 and S2 contacts ; an overtime contact could be set up.

ENTER

WITH / WITHOUT ALARM ▲

ENTER

TIME. S1 **0000** Sec ▲ ▶ Overtiming on S1 closed contact (maximum time for active relay)

ENTER

TIME. S2 **0000** Sec ▲ ▶ Overtiming on S2 closed contact (maximum time for active relay)

ENTER

SAVING ?

VALID

CLEANING PROBE — MENU + → LANGUAGE

With this mode, the alarms on S1 and S2 are disabled.

(Contact S4)
In order to protect the regulation, all measurements are on stand-by during the cleaning process (plus a delay before to restart the operating mode).

ENTER

ALARM MODE

This message informs that regulation mode is "ON". Switch off this mode in the menu "ADJUST ALARM" (previous menu).

ENTER

CLEANING **YES / NO**

ENTER

PERIOD **0000** Sec ▲ — Set up the time after wich a cleaning sequence will begin

ENTER

TIME **0000** Sec ▲ ▶ — Cleaning time

ENTER

DELAY **0000** Sec ▲ ▶ — Delay after cleaning, before to restart the regulation mode

ENTER

SAVING ? ▲ ▶

VALID

LANGUAGE — MENU + → CHOICE OF THE PARAMETER

ENTER

ENGLISH / ITALIAN / GERMAN / FRENCH ▲

ENTER

SAVING ?

VALID

CHOICE OF THE PARAMETER — MENU + → Back to measurement mode

ENTER

pH / Rh - METRE ▲

ENTER

SAVING ?

VALID