

# RESISTIVITY / CONDUCTIVITY BAMOPHOX 322

322



Panel mounting (main device)



Wall mounting (main device)

- $\mu\text{S} / \text{cm}$  or  $\text{M}\Omega . \text{cm}$  built-in program
- Programmable scales:  
 0...200  $\Omega . \text{cm}$  up to 0...200  $\text{M}\Omega . \text{cm}$   
 0...2  $\mu\text{S} / \text{cm}$  up to 0...20  $\text{mS} / \text{cm}$   
 TOR version: 0...2  $\text{mS} / \text{cm}$  up to 0...2000  $\text{mS} / \text{cm}$
- Convenient probes  
 factor: 10 - 1 - 0.1 - 0.01  
 TOR sensor TCS 100
- Temperature compensation  
 Automatic or manual
- 2 analog outputs 0/4-20mA,  
 galvanic insulated
- 3 relay outputs (Normally open contact)
- 1 input to switch the regulation on Stand-by
- 2 models:  
 Panel mounting 72 x 144  
 Wall mounting IP 65
- OPTIONS :  
 RS 422 /J-BUS + LOGGER  
 Extension for 2nd measurement input

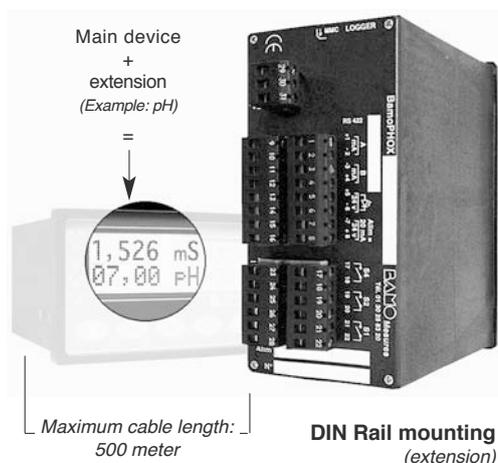
## EXTENSION TERMINAL

An extension terminal (wall or panel mounting):

- Allows a second measurement parameter (pH, Conductivity, Chlorine, Turbidity, Flow, and 4-20 mA, depending of the model)
- The data from this blind device are displayed on the main device (second line display). A 4 wires shielded cable is necessary to link both devices (maximum length of 500m)
- The options RS422 and the data logger are shared between both BAMOPHOX.

## DESCRIPTION

The BAMOPHOX 322 offers high flexibility on use mixing different built-in programmes for regulation, thresholds, temperature compensation, and alarms. The 2 lines back lighted display, 16 alphanumerical characters, gives an easy measurement and temperature reading in any conditions. It also displays the configuration menu and settings of thresholds, analogical outputs, operation data modes, calibration steps.



To allow a quick and easy diagnostic after configuration a simulation program is built-in with direct actuation on contacts outputs, analogical outputs and PID regulation. A copy of the signal on the 4-20 mA output is galvanic insulated; it can be set up within the all range of the parameter. Temperature measurement is also available on a 4-20 mA output (this output is not available when PID regulation is in use).

Associated probes may have a conductance factor from 0,01 to 10 to get an accurate measurement from 200  $\Omega$  up to 200 M $\Omega$  or from 2  $\mu$ S up to 20 mS.

## TECHNICAL FEATURES

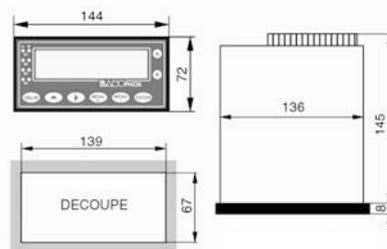
Displayed parameters:	Measurement values - Configuration Menu - Temperature value
Display:	Back lighted - 2 lines of 16 alphanumeric characters ; 9,2 mm high
Indication:	LED alarms status
Configuration:	8 push buttons keyboard on front face - Keyword protected
Scales:	
	322 CE 0...2 $\mu$ S /cm, 0...20 $\mu$ S /cm, 0...200 $\mu$ S /cm, 0...2 mS /cm, 0...20 mS /cm
	322 RE 0...200 $\Omega$ .cm, 0...2 k $\Omega$ .cm, 0...20 k $\Omega$ .cm, 0...200 k $\Omega$ .cm, 0...2 M $\Omega$ .cm, 0...20 M $\Omega$ .cm, 0...200 M $\Omega$ .cm
	322 TOR 0...2 mS /cm, 0...20 mS /cm, 0...200 mS /cm, 0...2000 mS /cm
Accuracy:	$\pm 0,3\%$ , $\pm 0,3^{\circ}\text{C}$
Probe input:	BNC plug
Temperature compensation:	Automatic with an input for a 3 wires Pt 100 Ohm/ $^{\circ}\text{C}$ , range 0...100 $^{\circ}\text{C}$ Manually from 0...100 $^{\circ}\text{C}$
Relay outputs:	4 closing contacts (Silver alloy), voltage free Thresholds: 3 programmable independent thresholds - with adjustable hysteresis 0...100% and adjustable timer from 0 to 9999 sec 1 Output relay: Common alarm signal for system dysfunction:
Contact:	Initial resistance 100 m $\Omega$ 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 <sup>6</sup> operations (180 commutation/min) Electrical life time (minimum) 2 x10 <sup>5</sup> (20 comm./min) [3 A, 125 V AC], [3 A, 30 V DC] and 10 <sup>5</sup> (evaluated charge) for 3 A, 125 V AC
Measurement output:	0/4-20 mA (maxi 600 $\Omega$ ) proportional to measurement, galvanic insulated
Temperature output:	0/4-20 mA (max 600 $\Omega$ ), scaling 0...100 $^{\circ}\text{C}$ , galvanic insulated
Program Testing:	simulation through the menu on measurement, temperature, and relay outputs
Main power supply:	230 V AC / 50-60 Hz [other on request] - Consumption 10 VA
Models:	Panel mounting, IP65, 72 x 144 mm, connections on screw terminal IP40 Cycle average measurement record, with a programmable period, 150000 records maxi on MMC (multi media card) / External driver necessary

### OPTION (RS 422 + Logger)

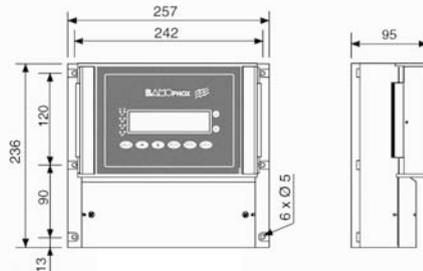
Communication:	RS422 output, J-BUS link, binary slave mode, 2400 to 9600 bauds
Data Logger:	Cycle average measurement record, with a programmable period, 150000 records maxi on (multi media card) / External driver necessary
MMC	

## DIMENSIONS

**Extension terminal:**  
identical to the panel  
or wall mounting



Panel mounting instrument



Wall mounting instrument

# BAMO MESURES

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RESISTIVITY / CONDUCTIVITY  
**BAMOPHOX 322**

20-05-2008

322 I1 01 G

pH

322-01/2

## CODE NUMBERS AND REFERENCES

Code	Reference (Resistivity)	Type
322 300	BAMOPHOX 322 RE	Panel mounting – front IP 65 - screw terminal IP40
322 301	BAMOPHOX 322 RE/A	Panel mounting - Blind for extension
322 303	BAMOPHOX 322 RD/A	Rail DIN mounting - Blind for extension - screw terminal IP40
322 350	BAMOPHOX 322 RE LOG BUS	Panel mounting / RS 422 + LOGGER – front: IP 65, screw terminal IP 40
322 400	BAMOPHOX 322 RM	Wall housing - IP 65 - Screw terminal through cable gland
322 401	BAMOPHOX 322 RM/A	Wall housing - IP 65 / Blind for extension - Screw terminal through cable gland
322 450	BAMOPHOX 322 RM LOG BUS	Wall housing - IP 65 / RS 422 + LOGGER - Screw terminal through cable gland

Code	Reference (Conductivity)	Type
322 500	BAMOPHOX 322 CE	Panel mounting – front IP 65 - screw terminal IP40
322 501	BAMOPHOX 322 CE/A	Panel mounting - Blind for extension
322 503	BAMOPHOX 322 CD/A	Rail DIN mounting - Blind for extension - screw terminal IP40
322 550	BAMOPHOX 322 CE LOG BUS	Panel mounting / RS 422 + LOGGER – front: IP 65, screw terminal IP 40
322 600	BAMOPHOX 322 CM	Wall housing - IP 65 - Screw terminal through cable gland
322 601	BAMOPHOX 322 CM/A	Wall housing - IP 65 / Blind for extension - Screw terminal through cable gland
322 650	BAMOPHOX 322 CM LOG BUS	Wall housing - IP 65 / RS 422 + LOGGER - Screw terminal through cable gland

## MEASUREMENT SCALES (TOR probe are exclude, please see documentation 364-01)

### With automatic temperature compensation

CONDUCTIVITY				
Factor	0,01	0,1	1	10
Scale 1	2,000 $\mu$ S	20,00 $\mu$ S	200,0 $\mu$ S	2,000 mS
Scale 2	20,00 $\mu$ S	200,0 $\mu$ S	2,000 mS	20,00 mS
RESISTIVITY				
Factor	0,01	0,1	1	10
Scale 1	20,00 MOhms	2,000 MOhms	200,0 KOhms	20,00 KOhms
Scale 2	2,000 MOhms	200,0 KOhms	20,00 KOhms	2,000 KOhms

### Without automatic temperature compensation

CONDUCTIVITY				
Factor	0,01	0,1	1	10
Scale 1	2,000 $\mu$ S	2,000 $\mu$ S	20,00 $\mu$ S	200,0 $\mu$ S
Scale 2	20,00 $\mu$ S	20,00 $\mu$ S	200,0 $\mu$ S	2,000 mS
Scale 3		200,0 $\mu$ S	2,000 mS	20 mS
RESISTIVITY				
Factor	0,01	0,1	1	10
Scale 1	200,0 MOhms	20,00 MOhms	2,000 MOhms	200,0 KOhms
Scale 2	20,00 MOhms	2,000 MOhms	200,0 KOhms	20,00 KOhms
Scale 3	2,00 MOhms	200,0 KOhms	20,00 KOhms	2,000 KOhms
Scale 4	200,0 KOhms	20,00 KOhms	2,000 KOhms	200,0 Ohms



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322 I1 01 G

**RES**

**322-01/3**

## SELECTION OF THE PROBE

The range dictates the probe factor in order to work with optimal conditions and reliable measurements. Our technicians are ready to help you: please indicate the fluid, its concentration, temperature and pressure. The exact probe factor is entered through the menu of the BAMOPHOX 322.

## TEMPERATURE COMPENSATION

The BAMOPHOX 322 allows automatic or manual temperature compensation. The temperature affects the behaviour pattern of the fluid, not of the probe. The ionic dissociations are different regarding the fluid, the temperature and the measurement range. The resistivity (or conductivity) changes with small temperature variations. For example, with demineralised water (18 MOhm), the slope varies from 2% in low temperatures (5 to 10 °C) to only 0.5% between 80 and 90°C. These variations are different for highly salted water. A correction universal and linear is therefore difficult. The BAMOPHOX 322 allows automatic or manual temperature compensation over 2 measurement ranges between 0 and 100°C for the same factor probe vs. fluid concentration. When the temperature is constant, so without temperature compensation, 3 or 4 measurement ranges are possible for the same factor probe vs. fluid concentration. Only the choice of the probe will determine the possible ranges according to its coefficient. In case of an over scaling the meter displays the dysfunction with the symbol >2 MOhm for a chosen scale 0...2 MOhm.

### Manual temperature compensation

The temperature will not be measured. The resistivity (conductivity) displayed will be therefore the measurement from the probe with a correction made at the manually entered temperature, to a standard 20 or 25°C temperature. This application is correct only when the temperature varies a few degrees.

### Automatic temperature compensation

The temperature will be measured with a Pt 100 Ohm / 0°C sensor, built in the conductivity cell or with a separate probe. The correction is made with the microprocessor between 0 and 100 °C on two measurement ranges according to the probe factor. Our technicians are ready to help you for specific applications and customized temperature compensation. Please indicate the fluid, its concentration, temperature and pressure.

## CABLE CONNECTION

The choice of the cable is very important. The cable resistance and capacity can produce an error up to 50% of the real value, mostly on high resistive (low conductive) liquids. The wiring may be done without any intermediate connection between the probe and the BAMOPHOX. The maximum cable length depends of the measurement range and the probe factor. As a standard, you may use our shielded coaxial cable reference CCA (code 368100); in some applications the type 9060 (code 160 300) is convenient for probes BS 1200+. The cable has to be separated from main power cables and any other power source for at least 20 cm; we advice to use separate cable glands. In case of crossing power cables it is necessary to cross them at 90) angle to limit the interferences.

## LENGTH OF CABLES

### Conductivity

Due to a specific electronic circuit on conductivity measurement, the cable could have a length of 100 m (on any ranges) whatever is the factor probe. e.

### Resistivity

According to the following table (maximum length in meter).

Scale	Factor	0,01	0,1	1	10
200 MOhms		10			
20 MOhms		50	10		
2 MOhms		100	50	10	
200 KOhms			100	50	10
20 KOhms			100	100	50
2 KOhms				100	100
200 Ohms				100	100

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322 I1 01 G

**RES**

**322-01/4**