Conductivity monitor for inductive probe
BAMOPHAR 364

USER MANUAL

Conductivity monitor for
inductive probe
BAMOPHAR 364

07-12-2018 M-364.04-EN-AE

RES

364-04 /1

SUMMARY

1.   DESCRIPTION

BAMOPHAR displays on a color touch-sensitive screen a multilingual friendly using menu; Reading is easy for measurement, temperature and relay status. Conductivity and temperature values are readable (copies) from outputs 4-20 mA. BAMOPHAR displays the conductivty corrected at 20 °C (refrence · for temperature compensation).

With inductive probes TCS 3020 or TCS S50, BAMOPHAR 364 allows measurements from 10 µS/cm up to 2000 mS/cm throughout the process.

- Probe TCS 3020 in NORYL (data-sheet 364-01) is recommended for neutral liquids.
- Probe TCS S50 in PEEK (data-sheet 364-05) is recommended when application requires high chemical resistance or at high temperature.

Available ranges for set up:

0... 2 mS/cm
0... 20 mS/cm
0... 200 mS/cm
0... 2000 mS/cm

Specific monitors are available for concentration monitoring (e.g. Sodium chloride, brine)

NaCl : 0 ... 26 % - Temperature compensation: -20 °C ... +36 °C / Reference at 20 °C

A complete system includes:
- 1 Inductive probe, cable output
- 1 Probe holder for immersion or on-line application.
- 1 Converter, factory calibrated.
- 1 Monitor BAMOPHAR 364
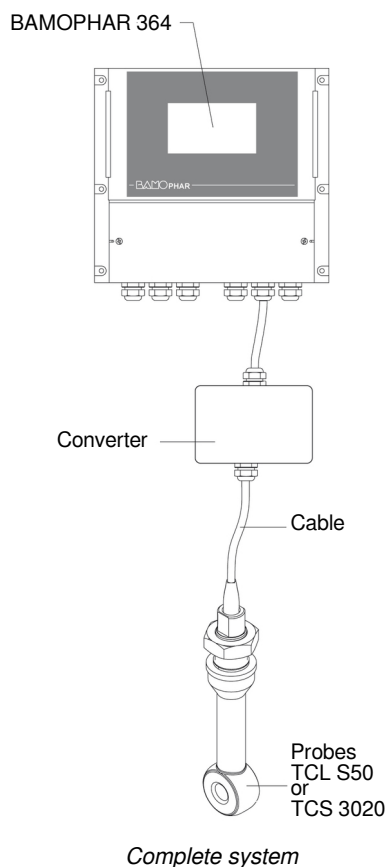
BAMOPHAR 364

Converter

Cable

Probes
TCL S50
or
TCS 3020

Complete system

BAMO INTERNATIONAL

22, Rue de la Voie des Bans · Z.I. de la gare · 95100 ARGENTEUIL
Tel   +33 (0)1 30 25 83 20   Web   www.bamo.eu
Fax   +33 (0)1 34 10 16 05   E-mail   export@bamo.fr

Conductivity monitor for inductive probe
BAMOPHAR 364
07-12-2018   M-364.04-EN-AE

RES

364-04 /3

2.   TECHNICAL FEATURES

|	
End-user interface	Color touch-sensitive screen 4.3", resolution 480x272 pixels Display of measurements, menus, temperature, relay status Programming - Program protection by password
Measuring range	10 µS/cm up to 2000 mS/cm
Programmable scales	0... 2 mS/cm; 0 ... 20 mS/cm; 0 ... 200 mS/cm; 0 ... 2000 mS/cm
Probes	Inductive toroïdal conductivity probes
Accuracy	± 0.3 %; ± 0.3 °C
Input impedance	> 10^{13} Ω
Probe signal connection	Plug-in screw terminals
Temperature compensation	Automatic with signal from sensor Pt 100 Ω (3-wire) Manually (entering temperature through the keyboard)
Relay outputs	3 contacts, N.O., potential free
Configurable thresholds	3 independent thresholds, for measurement, temperature (or an external contact for S3) S4, to set up for alarm process or Pt 100 default Hysteresis adjustable between 0 and 100 %
Contact initial resistance	100 mΩ max. (voltage drop 6 V DC 1 A)
Switching power	831 V AC / 3 A / 277 V AC 90 W / 3 A / 30 V DC
Switching capacity (min.)	100 mA, 5 V DC (depends of frequency, ambient conditions, accuracy)
Mechanical lifetime (min.)	5×10^6 operations (180 op./min)
Electrical lifetime (min.)	2×10^5 (at 20 op/min) for 3A 125 V AC, 3A 30 V DC - 10^5 (rated load) for 3A 125 V AC
Output signal, measurement (copy)	0/4 - 20 mA (max. 600 Ω) proportional to measurement
Output signal, temperature (copy)	0/4 - 20 mA (load 600 Ω max.) over all scales, from -20 to +160 °C
Main power supply	230 V AC - 50/60 Hz - Other supplies on request - Consumption 10 VA
Models	Panel mounting, 96x144 mm, Front IP65, rear back screw terminal IP40 Wall mounting, IP65, cable glands, screw terminals

OPTION (RS 422 + Logger)

Interface	RS422 output, J-BUS link - Binary slave mode - 2400 to 9600 bauds
Data Logger	Record of cycle average measurement, programmable cycle time 150 000 records max. on memory card; Download through an external drive

3.   DIMENSIONS
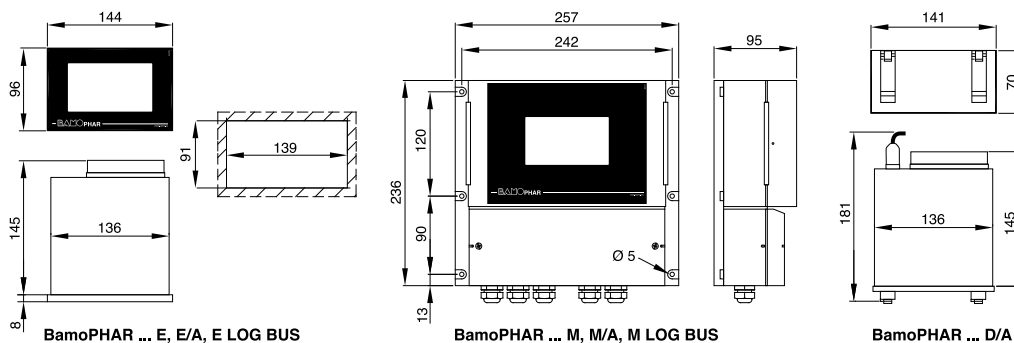
BamoPHAR ... E, E/A, E LOG BUS

BamoPHAR ... M, M/A, M LOG BUS

BamoPHAR ... D/A

Conductivity monitor for inductive probe
BAMOPHAR 364

07-12-2018   M-364.04-EN-AE

RES

364-04 /4

4.   ELECTRICAL CONNECTIONS

PANEL MOUNT MODEL
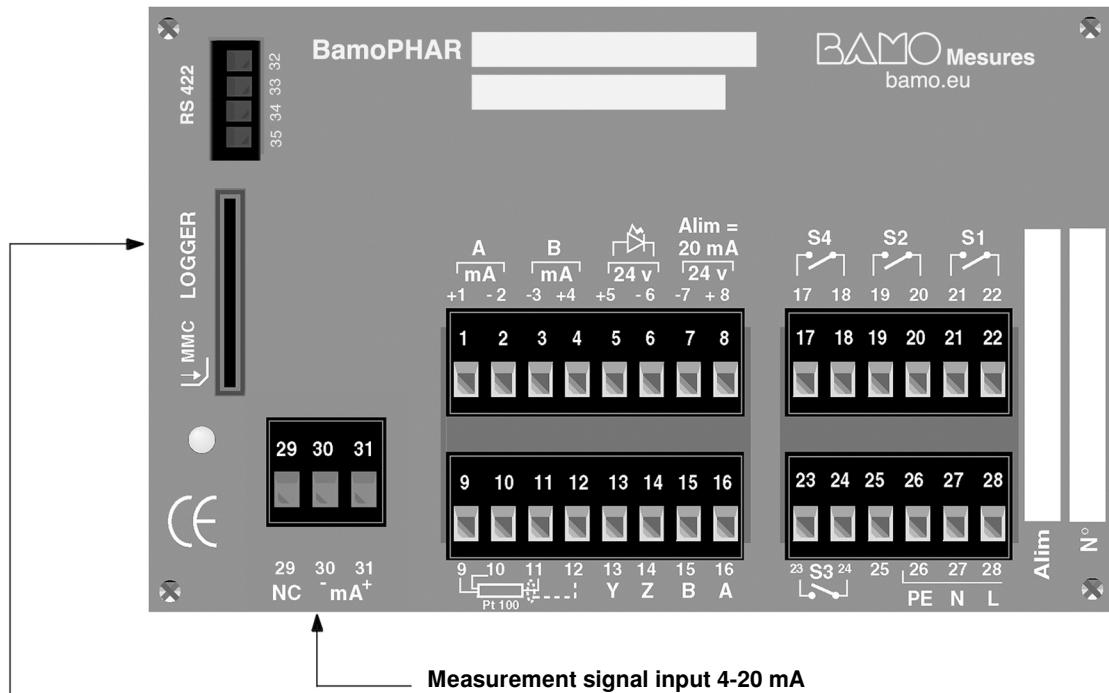
OPTION : LOGGER & RS 422

(On wall mount model, access to slot by removing the cover)

Measurement signal input 4-20 mA

WALL MOUNT MODEL

Measurement signal input 4-20 mA

Conductivity monitor for inductive probe
BAMOPHAR 364

07-12-2018   M-364.04-EN-AE
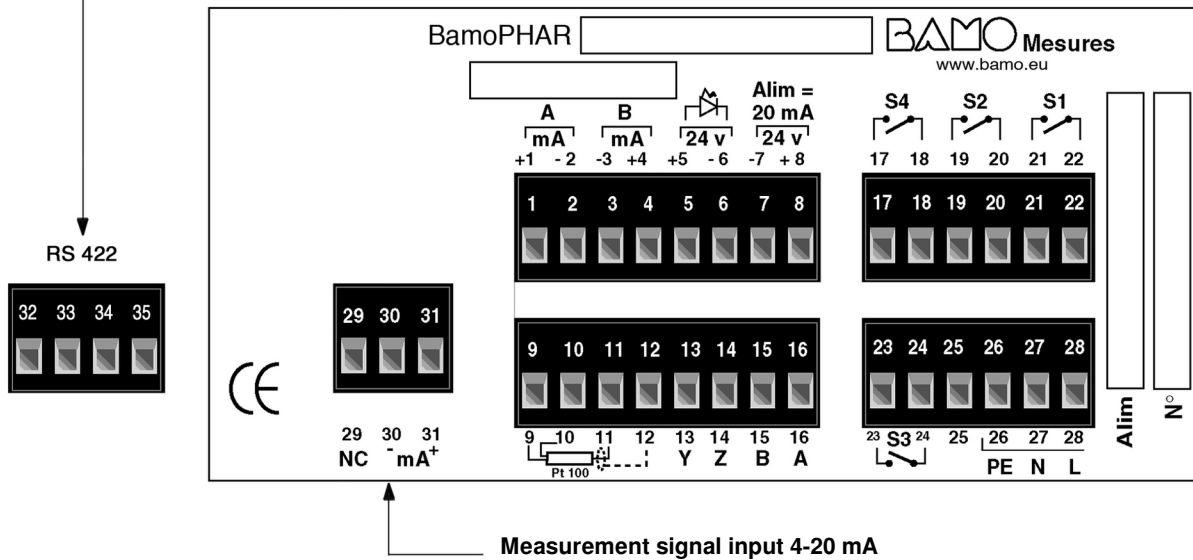
RES

364-04 /5

4.1 ELECTRICAL CONNECTIONS ON BAMOPHAR 364

Description	Terminal	Connection according model	
		230 V AC	**24 V DC**
Output mA (A)	**1**	+ mA	+ mA
	2	- mA	- mA
Output mA (B)	**3**	- mA	- mA
	4	+ mA	+ mA
External sensor	**5**	+ 24 V	+ 24 V
	6	0V	0V
Power supply to conductivity probe	**7**	0V	*Not in use*
Model 230 V AC only	**8**	+ 24 V DC	*Not in use*
Temperature sensor Pt 100 Ω, 3-wire	**9**	+	+
	10	+	+
	11	-	-
	12	Shielding	Shielding
Connection to extension unit (blind version)	**13**	Y	Y
	14	Z	Z
	15	B	B
	16	A	A
Relay S4: Failure on Pt100 loop	**17**	S4	S4
	18		
Relay S2 (N.O.): Measurement/Temperature	**19**	S2	S2
	20		
Relay S1 (N.O.): Measuement/Temperature	**21**	S1	S1
	22		
Relay S3 (N.O.); Measurement/Temperature Can be assigned to external sensor and becomes N.C. (see § 10.2.2)	**23**	S3	S3
	24		
	25	*Not in use*	*Not in use*
Power supply to BAMOPHAR	**26**	PE: ground (equipotential)	Ground (equipotential)
	27	N: Neutral	0V
	28	L: Live	+ 24 V DC
	29	*Not in use*	*Not in use*
Signal input from conductivity probe (see wiring on page 7)	**30**	- mA	- mA
	31	+ mA	+ mA

Connection of Extension unit
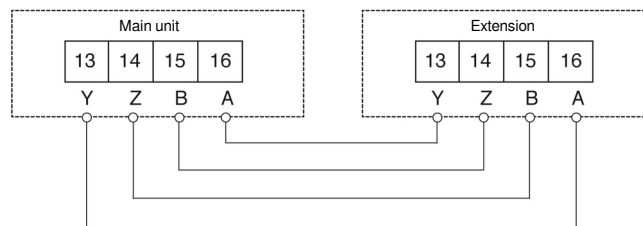
Maximum distance between both units	**500 metres**
Cable type	Network cable or shielded cable with 4 wires, each ≥ 0.25 mm²

Conductivity monitor for inductive probe
BAMOPHAR 364

RES

364-04 /6

07-12-2018   M-364.04-EN-AE

4.2 PROBE CONNECTION FROM CONVERTER TO BAMOPHAR 364

CAUTION
Each conductivity TOR probe is paired at the laboratory with a converter and a BAMOPHAR
Serial numbers of the probe and the BAMOPHAR must be paired.

Example: If the serial number of BAMOPHAR 364 is 21285-02, the appropriate probe should have the same serial number plus 1 letter such as 21285-02A.

Model 230 V AC
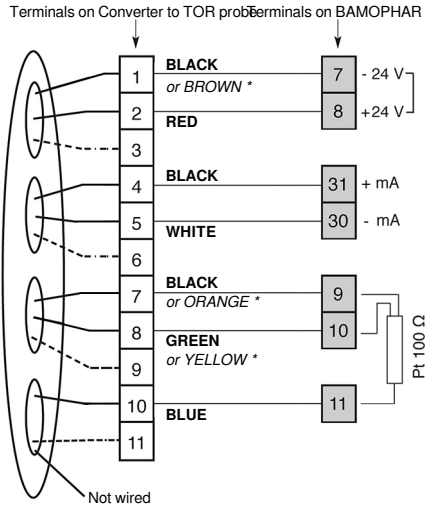
Model 24 V DC

----- : Shielding   (*): Second set of coloured wires, possibility
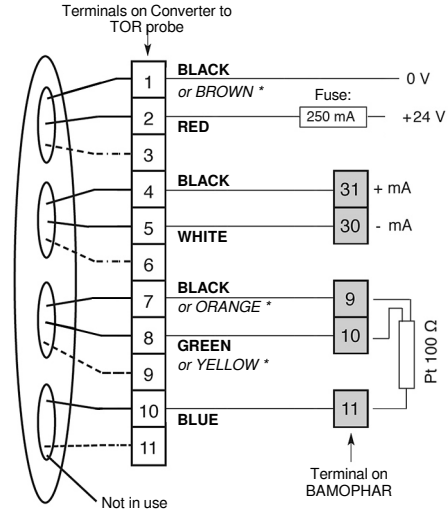
----- : Shielding   (*): Second set of coloured wires, possibility

5. SELECT THE MEASURING RANGE ON CONVERTER
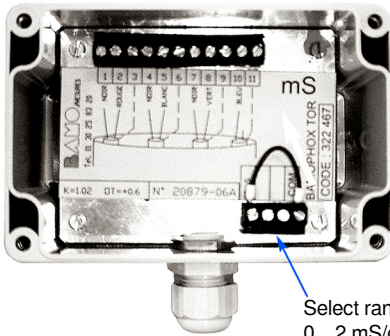
Select range with a shunt:
0... 2 mS/cm
0... 20 mS/cm
0... 200 mS/cm
0... 2000 mS/cm
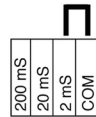
Range
0... 2 mS/cm
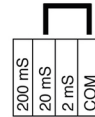
Range
0... 20 mS/cm

Range
0... 200 mS/cm
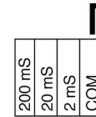
Range
0... 2000 mS/cm

Conductivity monitor for inductive probe
BAMOPHAR 364
07-12-2018   M-364.04-EN-AE

RES

364-04/7

6. MAIN SCREEN

6.1 WITHOUT EXTENSION UNIT

Status of relays S1, S2, S3, S4
(Open or Closed)

Designation

Measured value display
Conductivity and temperature

E1 Status
Closed =
Actuated; Open =
non active

A

S1
S2
S3
S4
E1

Voie A

1,526 mS

+22,0°C

Menu

21/12/2016 14:24:50

To parameter settings

To settings of display unit

Date and time
(Only for the version with data logger)

To measurement details display

6.2 WITH AN EXTENSION UNIT

Status of relays S1, S2, S3, S4
(Open or closed)

Designation of monitors

Measured values display
Conductivity + Extension (e.g. Resistivity)

Main unit A is shown in yellow
Extension unit B is shown in green

A   B

S1
S2
S3
S4
E1

Pos. 1

1,526 mS
+22,0°C

Voie B

12,37 MΩ
+18,6°C

Menu A **Menu B**

21/12/2016 14:24:50

To parameters settings

To settings of display

Date and time
(Only for the version with data logger)

To Measurements details

highlight

Conductivity monitor for
inductive probe
BAMOPHAR 364

07-12-2018   M-364.04-EN-AE

RES

364-04 /8

7. FUNCTIONS OF ICONS

With the touch sensitive screen you can navigate through the menus and access to all settings.
For each yellow button dedicated to the main unit, there is a green variant dedicated to the extension unit.

MAIN SCREEN
Return to main screen (home)
Example with green icon for extension unit

SETTINGS
Access to settings of display unit (language and device designation)

LANGUAGE
Language selection

MENU
Access to parameter settings

INFO
Access to the BAMOPHAR's serial number and version

PADLOCK
Open = MODIFICATION MODE
Closed = CONSULTATION (Query mode)

RETURN KEY
Return to previous screen

ARROWS
Display cursor for navigating within the menus

SELECTION
Scroll through the selection list

CONFIRM
Access to the next parameter

SAVE
Save parameters

8. DISPLAY SETTINGS

To access to the display settings, BAMOPHAR must be in MODIFICATION mode (See § CONSULTATION / MODIFICATION).

8.1 SCREEN INFORMATION

Screen identification number and its version are available in this menu.

8.2 SCREENSAVER

Screensaver brightness is adjusted by moving the cursor: decreasing by the left, increasing by the right.

8.3 LANGUAGE SELECTION

Select the flag according to your choice.
The display automatically returns to previous view.
Press icon "HOME" to go back to the MAIN MENU

BAMO INTERNATIONAL
22, Rue de la Voie des Bans · Z.I. de la gare · 95100 ARGENTEUIL
Tel +33 (0)1 30 25 83 20   Web   www.bamo.eu
Fax +33 (0)1 34 10 16 05   E-mail export@bamo.fr

Conductivity monitor for inductive probe
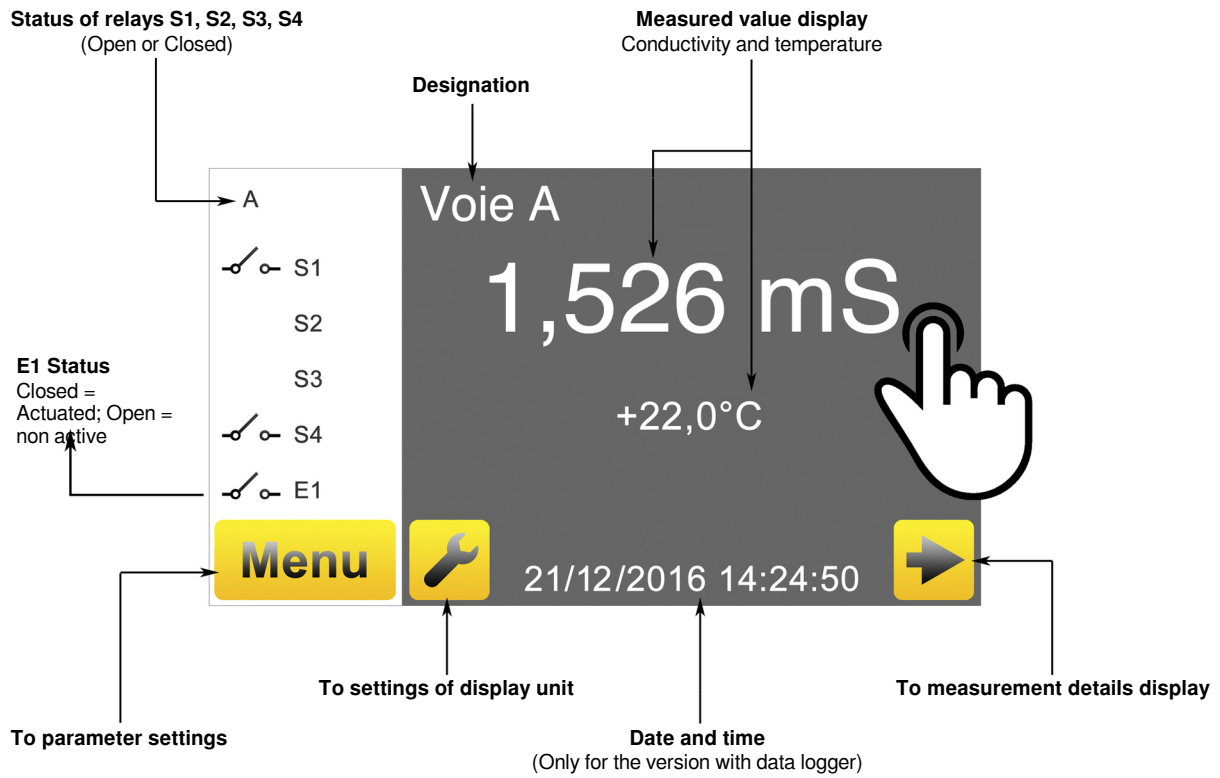**BAMOPHAR 364**
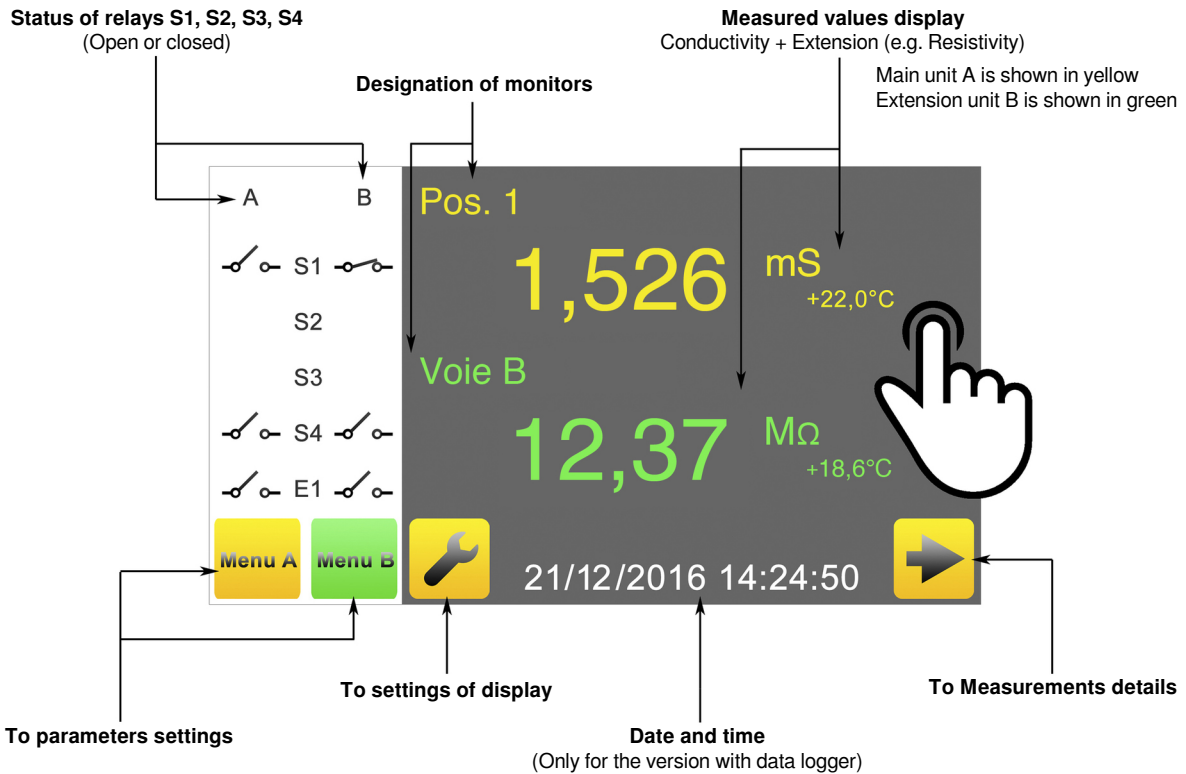07-12-2018   M-364.04-EN-AE

RES

364-04 /9

8.4 DESIGNATION

It is recommended to name each channel (main unit A and Extension unit B):

1) Press on icon A or B according to the instrument you wish to rename.
2) A keyboard appears, enter the new name.
3) Save to record the new designation.

9. CONSULTATION/ MODIFICATION

CONSULTATION mode allows the operator to check out all working parameters.
This mode is represented by the closed padlock icon.

To change the settings of the BAMOPHAR, you need to enter in the MODIFICATION mode.
This mode is protected by a password identical to the last 4 digits of the serial number.

On the main display, press MENU icon.
Press the padlock icon and type the 4 last digits of Serial Number.
To confirm, press "OK"; Device is now in MODIFICATION mode (padlock is open).
If the entered keyword is wrong, an ERROR message appears for 3 seconds.

After 30 minutes the mode MODIFICATION switches back to CONSULTATION mode.

Where can we find the serial number?
The serial number (SN) is written on the identification label of the device.
It appears as well in "MENU", icon " i " (INFORMATION).

10. BAMOPHAR 364 SETTINGS

10.1 SETTING THE MEASUREMENT

10.1.1 CONDUCTIVITY MEASUREMENT PARAMETERS (mS/cm)
Go to the menu MEASURE DATA

CONDUCTIVITY	Confirm in order to proceed to the next parameter.
PROBE: TCS3020 / TCLS50	Select the probe type (TCS 3020 or TCL S50) in use with the BAMOPHAR 364, then confirm.
KR: 1.000	Enter the correction factor KR (indicated on the converter terminal), then confirm.
SCALES: xxxx mS	Select the scale (on display: 2 mS / 20 mS / 200 mS / 2000 mS), then confirm.
O.T.: +000.6 °C	This parameter corrects a temperature deviation. Enter the temperature deviation value, then confirm.
SAVE ?	To record the settings, press the icon SAVE.

10.1.2 MEASUREMENT PARAMETERS FOR THE MODEL "NaCl" (in %)

Important:
The probe measures the conductivity and the temperature of the liquid. Measurement is compensated in temperature with reference to 20 °C. This value is combined with an internal chart and BAMOPHAR calculates the concentration of NaCl in % to display. Therefore, NaCl concentration measurement implies that there are no other elements in the liquid that can alter the conductivity of the liquid, otherwise the measurement would be erroneous.

Go to the menu MEASURE DATA

KR: 1.000	Enter the correction factor KR (indicated on the converter terminal), then confirm.
O.T.: +000.6°C	Enter the temperature deviation value, then confirm.
SAVE ?	To record the settings, press the icon SAVE.

BAMO INTERNATIONAL
22, Rue de la Voie des Bans · Z.I. de la gare · 95100 ARGENTEUIL
Tel +33 (0)1 30 25 83 20 Web www.bamo.eu
Fax +33 (0)1 34 10 16 05 E-mail export@bamo.fr

Conductivity monitor for inductive probe
BAMOPHAR 364
07-12-2018 M-364.04-EN-AE

RES

364-04 /10

10.2 SETTINGS OF THRESHOLDS

10.2.1 SETTING VALUES FOR RELAYS S1, S2 AND S3

As an example, below is a detailed description of the steps to set the threshold S1:
Go to the menu ADJUST ALARM 1.

|	
ALARM 1 ON / OFF	Select the "ON" mode in order to activate the relay, then confirm.
	Select the "OFF" mode in order to deactivate the relay, then confirm and save (press the icon SAVE).
ALARM 1 MEASURE / TEMP	The measured value or the temperature can be assigned to ALARM 1 in the "ON" mode.
	The measured value from the conductivity measurement is assigned to S1 by selecting MEASURED VALUE = ALARM
	The temperature is assigned to S1 by selecting TEMPERATURE = ALARM
	Select the mode, then confirm.
ALARM 1 HIGH / LOW	By selecting HIGH, triggering takes place as soon as the measured value is greater than the selected limit value.
	By selecting LOW, triggering takes place as soon as the measured value is less than the selected limit value.
	Select the mode, then confirm.
ON 0000 mS (or °C)	Enter the value at which relay S1 will be actuated, then confirm.
OFF 0000 mS (or °C)	Enter the value at which relay S1 will be deactivated, then confirm.
DELAY UP ON / OFF	With (ON) or without (OFF) pick-up delay for relay S1, then confirm.
TIME 0000 SEC	Enter a delay duration for relay S1, then confirm.
DELAY DOWN ON / OFF	With or without dropout delay for relay S1.TIME 0000 SECEnter a delay duration for relay S1 and acknowledge your entry.
TIME 0000 SEC	Enter a delay duration for relay S1 and acknowledge your entry.
SAVE ?	To record the settings, press the icon SAVE.

The parameters for S2 and S3 are available in the respective "ALARM 2" and "ALARM 3" menus.

10.2.2 ASSIGNING S3 TO AN EXTERNAL SIGNAL

Relay S3 may be assigned to an external sensor signal (terminals 5 and 6, see sensor wiring diagram). In this case, relay S3 normally becomes N.C. (closed) and it opens when the external sensor is activated.

Go to the menu ADJUST ALARM 3.

ALARM 3 ON / OFF	Select the "ON" mode in order to activate the relay, then confirm.
EXTERN NO / YES	NO = next parameters to set up are identical as for as relays S1 and S2.
	YES = assignment of external sensor signal to actuate relay S3
	Confirm your selection.
SAVE ?	To record the settings, press the icon SAVE.
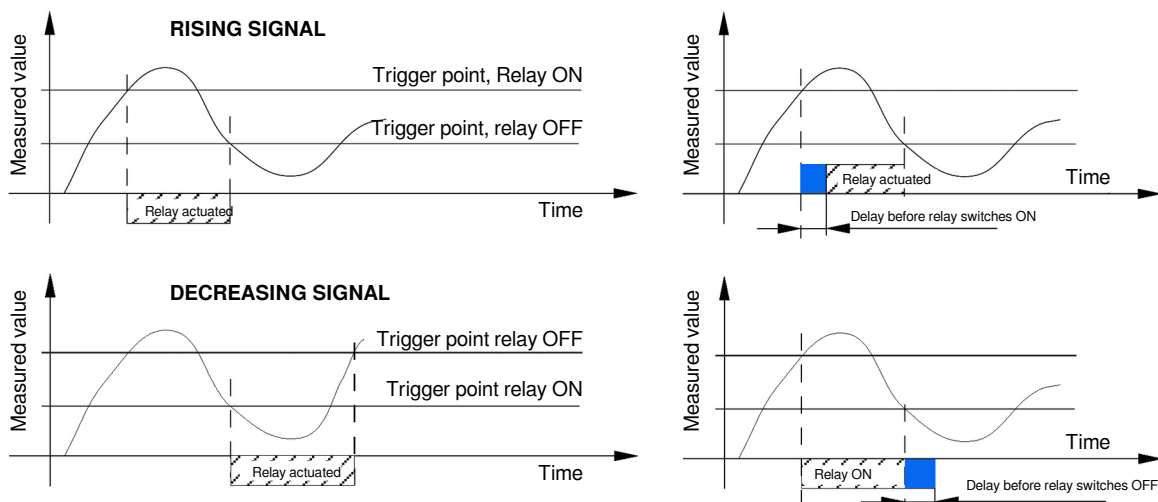
BAMO INTERNATIONAL

22, Rue de la Voie des Bans · Z.I. de la gare · 95100 ARGENTEUIL
Tel   +33 (0)1 30 25 83 20   Web   www.bamo.eu
Fax   +33 (0)1 34 10 16 05   E-mail   export@bamo.fr

Conductivity monitor for inductive probe
BAMOPHAR 364
07-12-2018   M-364.04-EN-AE

RES

364-04/11

10.3 SETTING THE TEMPERATURE COMPENSATION

Go to the menu TEMPERATURE

MEASURE: AUTO / MANUAL	AUTO: Measurement is performed with a Pt100 sensor
	MANU: Without sensor, temperature value is manually set.
	Confirm your selection
FLUID T. + 00.00 °C	If the MANU (manual) mode is selected, enter the temperature of the liquid, then confirm.
AUTO T.C. YES / NO	AUTO temperature compensation:
T. DE REF: 20 / 25 °C	If YES is selected, choose a reference value at 20 °C or at 25 °C, then confirm.
	If NO is selected, confirm your choice.
SAVE ?	To record the settings, press the icon SAVE.

10.4 mA OUTPUT SETTINGS FOR THE MEASUREMENT

Go to the menu OUTPUT mA

HIGHER: 2000 mS	Enter the measured value for which the output is 20 mA, then confirm.
LOWER: 0000 mS	Enter the measured value for which the output is 0 or 4 mA
OUTPUT 4-20 mA / 0-20 mA	Select the desired scale, then confirm.
SAVE ?	To record the settings, press the icon SAVE.

10.5 mA OUTPUT SETTINGS FOR THE TEMPERATURE

Go to the menu OUTPUT mA TEMP.

HIGHER 160.0 °C	Enter the temperature value for which the output is 20 mA, then confirm.
LOWER 000.0 °C	Enter the temperature value for which the output is 0 or 4 mA, then confirm.
OUTPUT 4-20 mA / 0-20 mA	Select the desired scale, then confirm.
SAVE ?	To record the settings, press the icon SAVE.

10.6 SIMULATION OF THE RELAYS

With the menu FORCED RELAY, it is possible to manually test (force) relays S1, S2, S3 and S4.
Last one, S3, is N.O. by default. Test begins by relay S1
The respective relay can be switched from OFF (open) to ON (closed).
Confirm at each test to go to the next relay.

10.7 SIMULATION OF MEASUREMENT

Go to the menu FORCED MEASURE

0000 mS	Simulation at this measured value.
	First line corresponds to the measurement in course.
	Confirm, then enter the value to simulate.

Note: The value is immediately considered by the monitor and actuate thresholds, 4-20mA outputs, etc.