Instruction manual

PH 7687

pH/ORP CONTROLLER

Option
S/N
REP N°

Power supply: 85 ÷ 264 Vac
Installed firmware: R 1.0x

INDEX

1 GENERAL WARNINGS AND INFORMATION FOR ALL USERS

1.1 WARRANTY

This product is guaranteed for 5 years from the date of purchase for all manufacturing defects.

Please take a look at the terms and conditions described on the warranty certificate at the end of the manual.

1.2 AFTER SALES SERVICE

B&C Electronics offers to all of its customers the following services:
- a free of charge technical assistance over the phone and email for problems regarding installation, calibration and regular maintenance;
- a repairing service in our Carnate (Italy) headquarter for all types of damages, calibration or for a scheduled maintenance.

Please take a look at the technical support data sheet at the end of the manual for more details.

1.3 CE MARKING

This instrument is manufactured according to the following european community directives:
- 2011/65/EU "Restriction of the use of certain hazardous substances in electrical and electronic equipment"
- 2015/863/UE RoHS
- 2014/35/EU "Low Voltage" LV
- 2014/30/EU "Electromagnetic compatibility" EMC
- EN 61010-1/2011 "Low Voltage" LV
- EN 61326-1/2013 "Electromagnetic compatibility" EMC
    - Industrial electromagnetic environment
- EN 55011/2009 "Radio-frequency disturbance characteristics"
    - Class A (devices for usage in all establishment other than domestic)
    - Group 1 (Industrial equipment that do not exceed 9kHz)

The CE marking is placed on the packaging and on the S/N label of the instrument.

1.4   SAFETY WARNINGS

It is important to underline the fact that electronic instruments are subject to accidental failure. For this, it is important to take all necessary precautions to avoid damages caused by malfunctions.

Any operation must be performed by authorized and trained staff.

The use of this controller must comply with the parameters described in chapter "Technical data (page 13)", in order to avoid potential damages and a reduction of its operating life.

1.5   MANUAL REVISIONS

This chapter shortly describes the differences between previously released versions of the same manual, so to help users that are already familiar with the product.

Rev. A: first release.

2 PRODUCT OVERVIEW

2.1 FUNCTIONAL PURPOSE OF THE DEVICE

The system for monitoring pH and ORP consists of two main parts:
- the meter/regulator described in this instruction manual;
- a probe/measuring electrode.

The instrument contains the electronic circuitry and firmware to perform the following functions:
- display the measurement values of pH or ORP of aqueous solutions, with an appropriate sensor connected;
- view of the temperature values, if a temperature sensor Pt100 or Pt1000 is connected;
- perform the automatic or manual temperature compensation of pH measurements;
- automatic control of pH or ORP, if the output relays are connected to appropriate metering pumps or solenoid valves;
- provide an alarm if the measuring exceeds the minimum or maximum limits established of if relays remain activated for more time than established;
- provide two output signals for recording or the acquisition of pH or ORP measuring values;
- acquire external contacts to activate the alarm or keep the instrument in hold;
- enable automatic or manual cleaning cycles when connected to appropriate devices.

Pumps or valves can be activated directly by the instrument or by external control switches if their power load is not compatible with the instrument's relays.

2.2 ACCESSORIES

Sensors and accessories for different applications are available, to be ordered separately.

Our web site www.bc-electronics.it shows accessories, upgrades and detailed specifications of each product.

Our staff is always available to help costumers to select the most appropriate and suitable solution for their specific needs.

3   INSTRUCTION MANUAL CONTENTS

This chapter describes the manual and gives suggestions to all users on how to read it and use it.

The manual is written according to the following norms:

- UNI 10893   "Instructions for use";
- UNI 10653   "Quality of product technical documentation".

The terminologies indicated in the international metrology vocabulary (VIM) are respected as far as possible.

3.1   SYMBOLS

Throughout the manual you may find the following symbols, which are both dictated by a norm or that are simply conventional.

⚠ WARNINGS: this symbol is used to warn users that if the instructions are ignored or not correctly followed, damage to the instrument can be caused.

💡 *NOTE: this symbol is to invite the user to pay particular attention to a specific section of the manual.*

3.2   HOW TO READ THE INSTRUCTION MANUAL

The manual contains all the information needed to acquire full knowledge of the product, to ensure a proper installation, proper use and maintenance in order to achieve the desired result at the time of its choice.

The manual is aimed at staff with appropriate knowledge and experience in the field of measurement and control through the use of sensors and transmitters in the context of industrial plants.

The index of the manual refers the reader to the chapters on aspects that want to learn and develop.

In particular, the first chapters show general topics and allow the user to become familiar with the product and its functional purpose.

The user can then check whether he knows all the elements necessary for the use of the instrument and of the measuring/control.

The instrument has been designed keeping in mind three different levels of use: generic use (end user), control (maintenance staff), installation (plant engineer).

💡 *The user normally can read the values on the display.*
He will read the parts of the manual regarding the:
- "Users instruction (page 29)".

Maintenance staff could be more interesting in the chapters regarding:
- "Users instruction (page 29)";
- "Maintenance instructions (page 32)";
- "Warranty (page 45)";
- "Repairs (page 45)".

The plant engineer will have to read the chapters and look at the application drawings in order to:
- verify that the technical and functional characteristics are conformed with the plants requirements;
- verify that the environmental and climatic conditions required by the instruments are respected;
- make the correct electrical connections;
- become familiar with the instrument's firmware;
- configure the instrument according to the application;
- run all of the necessary tests before starting the instrument;
- calibrate the instrument once the sensor is connected.

💡 *The data shown in the displays in this manual are only illustrative.*

3.2.1   USING THE INSTRUMENT ON THE PLANT

For the generic use, the end user can operate with a locked keyboard (suggested mode and to be set by maintenance staff). By this, he can check the set point parameters without the possibility of changing the configured set points values and the zero/sensitivity calibration.

3.2.2   PLANT MAINTENANCE STAFF

Maintenance staff can select the operating values, by setting the desired parameters of the setup menu and after inserting the password. He can also enable the user's access to calibration, set point and alarm settings.

The location of this set parameters can be seen in the left column of the technical specifications table and they are identified by a letter "S" followed by a number.

The operations that need to be done during the start-up and the periodical tests are the following:

• to disable the calibration of the instrument and of the set points to the user;
• to calibrate the sensors by means of ZERO and SENS keys;
• to set the following parameters:
  – set point 1 and set point 2 through the keys SET1 and SET2
  – hysteresis and delay on set point (ON-OFF)

–   band, integration and derivative time, actuation on the set point (PID opera-
    tion)

–   minimum and maximum alarm values

–   delay on alarm

–   activation/deactivation of the logic inputs

–   on/off function of automatic or manual sensor cleaning

–   cleaning interval, cleaning time and hold time of the measurement

•   to modify the password to access the setup.

3.2.3   INSTRUMENT INSTALLATION

The plant engineer, by inserting the access password and by setting and modifying the configuration parameters, will be able to select the necessary functions required by the plant.

The location of this set parameters can be seen in the left column of the technical specifications table and they are identified by a letter "C" followed by a number.

The operations that need to be done during the instrument installation are the following:

•   operating mode (AUTO/MEAS/SIM);

•   electrode input of pH or ORP;

•   input from glass electrode or antimony (only for pH);

•   filter software (SMALL e LARGE);

•   type of temperature sensor (Pt100/Pt1000);

•   type of control (ON-OFF/PID);

•   type PID (FM or WM relay or analog output);

•   minimum/maximum function of the set point (LO/HI);

•   alarms associated with the operation time of the set point;

•   condition of the alarm relay (ACTIVE/NON ACTIVE);

•   measure related to the analog outputs;

•   outputs 0-20 mA or 4-20 mA scalable;

•   hold/alarm function of the logic inputs;

•   password access to the configuration.

4 SPECIFICATIONS AND TECHNICAL DATA

4.1 FUNCTIONAL SPECIFICATION

Display

The instrument is equipped with a graphic display that shows the values of the measures and messages to the operator in the various stages of use of the unit.

At the top left it is shown the ID number reported to the technical specifications.

In case of inactivity, after 3 minutes the display returns to the main measure.

The brightness and contrast of the screen can be changed. The mode of presentation "reverse" can be chosen.

Keyboard

The instrument has a keyboard with 4 keys with dual functionality which allow access to all available functions.

The functions of the upper part of the keys are dedicated to the calibration of the zero and sensitivity and the setting of the set point; these actions can be password protected in the setup menu.

For the functions of other buttons, see next paragraphs and chapters.

Inputs

The instrument is able to perform the measurement of pH or ORP and temperature.

The pH value can be measured with a glass electrode or antimony.

The temperature in °C or °F can be measured by a Pt100 or Pt1000 connected to 2-wire or 3-wire in case of large distances between sensor and instrument.

Scales

If configured for the measurement of pH, the instrument has a scale of 0 to14 pH, if configured for the measurement of the ORP has a scale of -2000 to 2000 mV.

In case of out of range measurements the instrument sends messages under range or over range.

Temperature compensation

The instrument displays the temperature value and is designed for manual and automatic temperature compensation in pH measurement.

For absence or malfunction of the temperature sensor the instrument automatically switches to manual compensation, displaying the value of the compensation temperature.

Set points

The instrument has two independent set points which can be programmed across the whole scale to activate the correspondent relay contacts (SPST) or the PID action.

When using the ON/OFF function, the display shows the status of excitement and delayed actuation.

When using the PID action, the display shows the status of actuation.

Thanks to the specific front panel keys SET1 and SET2, setting the set point value is very simple.

A password can be set in order to avoid that other users may change the settings.

For each relay, it is possible to select:

- the ON/OFF or PID action into the configuration menu;
- the type of PID adjustment: FM (proportional to pulse frequency) or WM (pulse width proportional) or addressed directly on the analog outputs;
- the function min (LO) or max (HI);
- the parameters of the selected function in the setup menu.

Alarm

The instrument has an alarm relay, which contact are SPDT type.

The alarm condition can be configured for:

- higher or lower values of the measuring compared to the set ones;
- the presence of the contact on the logic input, coming from an external device (if this function is activated);
- overtime of the SET1 and SET2 activation.

The operator can select the activated/deactivated status of relay corresponding to the alarm condition and the delay function.

The alarm status and the cause that generated it are displayed.

Analog outputs

The instrument has two analog current outputs for PID control or to transmit the value of the main measurement and/or temperature.

The output signal is programmable in 0-20 mA or 4-20 mA.

The outputs are galvanically isolated, and then directly interfaced with a PLC or with data acquisition cards and do not require external power.

Logic inputs

The instrument has two logic inputs to which connect a free voltage contact from an external device.

The function of the logic inputs can be enabled or disabled from the setup menu.

The function of these inputs can be on hold/alarm (HOLD/ALARM), whose actions are described in chapter "Technical data (page 13)", and can be selected in the configuration menu.

The HOLD condition always prevails over the ALARM.

In case of activation of the hold function in the display Messages section "Display (page 28)" will be displayed HOLD status, in case there is a previous alarm condition will be maintained such indication.

Autoclean

The instrument is equipped with a relay with SPDT contacts to connect an external device for the self-cleaning of the sensors.

Into the setup menu, you can:

- enable or disable the automatic/manual cleaning function;
- set the interval of time between two cleaning cycles;
- set the cleaning time;
- set the holding time of measurement after cleaning.

During the cleaning and holding time the instrument retains the last value on the analog output, while the set points and alarm relays are disabled.

Operating mode

The instrument is provided with 3 programmable modes of operation.

Automatic operation (AUTO)

The automatic mode is the normal operation mode of the unit.

Measuring operation (MEAS)

In this operation mode the display indicates only the measure, the analog outputs are active but the control relays are deactivated.

This would be the mode to use if the relays are not being used for alarm or control functions.

The measuring operation mode is useful for start up or for manual operation of disinfection plants.

Simulated operation (SIM)

The instrument uses the simulated value in the main display to activate the relay set point, the alarm relay and analog outputs.

In this operating mode the users modify the displayed value by means of the keyboard (see chapter "Configuration (page 40)").

The unit maintains the set point, alarm and analog outputs parameters in order to test the plant.

The type of action, the set points and parameters of the analog outputs remain as previously set.

The simulation of values is useful for testing the actuation of the devices connected to the relays and the analog outputs without connecting the sensor.

Filter software

The input signal has a filter with two selectable response time.

The user can separately set the response time relative to signals of small or large variation in order to obtain good reading stability and fast response to the variations of the measurement in the process.

Universal power supply

The instrument is equipped with a universal power supply that allows the use of the voltage from 85 to 264 Vac, 50-60 Hz.

Option low voltage 9 ÷ 36 Vdc or 12 ÷ 24 Vac

The installation of this option allows you to use either a DC power supply from 9 to 36 V or an AC voltage from 12 to 24 V, 50-60 Hz.

Setup

The instrument features a setup menu, which access is protected by a specific password and where you can;

- disable the calibration functions and change the set points;
- set the measuring unit of the temperature and the possible manual temperature compensation;
- choose the operating parameters the set point, the alarm and logic inputs;
- set the parameters of the cleaning function of the sensors;
- set a new password.

Configuration

The instrument features a configuration menu protected by a specific password, in which you can select:

- mode of operation (AUTO/MEASURE/SIMULATION);
- electrode input of pH or ORP;
- input from glass electrode or antimony (only for pH) ;
- filter software (SMALL e LARGE);
- type of temperature sensor (Pt100/Pt1000);
- type of control on set point (ON-OFF/PID);
- actuation type for PID (FM,WM or analog outputs);
- minimum/maximum function of the set point (LO/HI);
- alarms associated with the operation time of the set point;
- alarm condition relay on/off (ACTIVE/NON ACTIVE);
- measure related to the analog outputs;
- range 0-20 mA or 4-20 mA scalable;
- hold/alarm function of the logic inputs;
- password access to the configuration.

Info menu

The instrument is provided with an information menu to show:

- p/n and firmware release;
- LCD screen parameters;
- total operating hours.

4.2   TECHNICAL DATA

4.2.1   GENERAL SPECIFICATIONS

Accuracy	0.2 %
Ripetibility	0.1 %
Non linearity	0.1 %
Alphanumeric display	LCD 128 x 64 pixel
Keyboard	4 keys
Operating temperature	-10 ÷ 60 ˚C
Humidity	95 % without condensate
Power supply	85 ÷ 264 Vac +/- 10 % 50/60 Hz
	9 ÷ 36 Vcc 12 ÷ 24 Vac (091.427 option)
Power	6 VA max.
Isolation	4000 V between primary and secondary
Immunity performance loss	< 1 % full scale
Terminal blocks	extractable
Weight	450 g
Dimensions	98 x 98 x 104 mm
	90 x 90 x 95 mm panel cutout
Protection	IP 65 (front panel)
EMC/RFI conformity	EN61326
Registered design	002564666-003

4.2.2   TECHNICAL SPECIFICATIONS

In the left column is indicated the number of the display concerning:

- SETUP parameters are indicated by "S xy"

- CONFIGURATION parameters are indicated by "C xy"

  x = paragraph, y = sequential 1..2..3..4..ecc

D1.0	MAIN MEASURE		Default
C1.0	Operating mode	AUTO / MEAS / SIM	AUTO
C1.1	Type of measure	pH / ORP	pH
C1.2	Type of pH sensor Type of ORP sensor	GLASS / ANTIMONY ORP	GLASS
	GLASS pH electrode		
	• Slope	59.16 mV / pH at 25 ˚C	
	• Asymmetric potential 7.00 pH	0.0 mV	
D1.1	• Zero	± 2.00 pH	0.00 pH
D1.2	• Sensitivity	80 % ÷ 110 %	100 %
	ANTIMONY pH electrode		
	• Slope	50.00 mV / pH at 25 ˚C	
	• Asymmetric potential 7.00 pH	-325 mV	
D1.1	• Zero	± 2.00 pH	0.00 pH
D1.2	• Sensitivity	70 % ÷ 140 %	100 %
	ORP electrode		
D1.1	• Zero	± 100 mV	0 mV
D1.2	• Sensitivity	80 % ÷ 110 %	100 %
	pH scale	0.00 ÷ 14.00 pH	
	Resolution	0.01 pH	
	Under range	-1.00 pH	
	Over range	15.00 pH	
	ORP scale	-2000 ÷ 2000 mV	
	Resolution	1 mV	
	Under range	-2100 mV	

D1.0	MAIN MEASURE		Default
	Over range	2100 mV	
			-
	Filter software		
C1.3	Response time at 90 % large signal	0.4 ÷ 50.0 seconds	2.0 s
C1.4	Response time at 90 % small signal	0.4 ÷ 50.0 seconds	10.0 s

D2.0	SECONDARY MEASURE		Default
C2.1	Input Connection	RTD Pt100 / Pt1000 3 wires	Pt100
S2.1	Measuring unit	˚C / ˚F	˚C
	Temperature scale	-10.0 ÷ 110.0 ˚C 14.0 ÷ 230.0 ˚F	
	Resolution	0.1 ˚C / ˚F	
D2.1	Zero	±5.0 ˚C ±9.0 ˚F	0.0 ˚C 0.0 ˚F
S2.2	Manual temperature	0.0 ÷ 100.0 ˚C 32.0 ÷ 212.0 ˚F	20.0 ˚C 68.0 ˚F

3.1	SET POINT 1		Default
C3.1	Type of regulation SET1	ON-OFF / PID	ON-OFF
		ON-OFF related to relay 1	
		PID related to relay 1 or OUT1	
C3.2	Regulation SET1 related to (only PID)	FM / WM / OUT1 FM/WM on relay 1	FM
	ON-OFF regulation		
D3.1	• Set point (pH)	0.00 ÷ 14.00 pH	0.00 pH
D3.1	• Set point (ORP)	-2000 ÷ 2000 mV	0 mV
S3.1A	• Hysteresis (pH)	0.00 ÷ 1.40 pH	0.02 pH
S3.1A	• Hysteresis (mV)	0 ÷ 200 mV	1 mV
S3.2A	• Delay	0.0 ÷ 100.0 seconds	0.2 s
C3.3	• Function	LO / HI (Min / Max)	LO
	Regulation PID		
D3.1	• Set point (pH)	0.00 ÷ 14.00 pH	0.00 pH
D3.1	• Set point (ORP)	-2000 ÷ 2000 mV	0 mV

3.1	**SET POINT 1**		Default
S3.1B	• Proportional band	0.0 ÷ 400.0 %	1.0 %
S3.2B	• Integral time	0.0 ÷ 999.9 minutes	0.0 min
S3.3B	• Derivative time	0.0 ÷ 999.9 minutes (0=disabl.)	0.0 min
C3.3	• Function	LO / HI (Min / Max)	LO
	<u>FM regulation on relay 1</u>		
S3.4B	• Pulse frequency	0 ÷ 120 pulses/minute	100 i/min
	• Pulse length	0.1 seconds	
	<u>WM regulation on relay 1</u>		
S3.4B	• Pulse width	0 ÷ 99.9 seconds	20.0 s
	• Minimum pulse length	0.3 seconds	
	Relay contacts	SPST 220 V 5 A resistive load	
	Analog output 1	4-20 mA	

3.2	**SET POINT 2**		Default
C3.4	Type of regulation SET2	ON-OFF / PID	ON-OFF
		ON-OFF related to relay 2	
		PID related to relay 2 or OUT2	
C3.5	Regulation SET2 related to (only PID)	FM / WM / OUT2 FM/WM on relay 2	FM
	<u>Regulation ON-OFF</u>		
D3.2	• Set point (pH)	0.00 ÷ 14.00 pH	0.00 pH
D3.2	• Set point (ORP)	-2000 ÷ 2000 mV	0 mV
S3.5A	• Hysteresis (pH)	0.00 ÷ 1.40 pH	0.02 pH
S3.5A	• Hysteresis (mV)	0 ÷ 200 mV	1 mV
S3.6A	• Delay	0.0 ÷ 100.0 seconds	0.2 s
C3.6	• Function	LO / HI (Min / Max)	HI
	<u>Regulation PID</u>		
D3.2	• Set point (pH)	0.00 ÷ 14.00 pH	0.00 pH
D3.2	• Set point (ORP)	-2000 ÷ 2000 mV	0 mV
S3.5B	• Proportional band	0.0 ÷ 400.0 %	1.0 %
S3.6B	• Integral time	0.0 ÷ 999.9 minutes	0.0 min
S3.7B	• Derivative time	0.0 ÷ 999.9 minutes (0=dasabl.)	0.0 min

3.2	SET POINT 2		Default
C3.6	• Function	LO / HI (Min / Max)	HI
	FM regulation on relay 2		
S3.8B	• Pulse frequency	0 ÷ 120 pulses/minute	100 i/min
	• Pulse length	0.1 seconds	
	WM regulation on relay 2		
S3.8B	• Pulse width	0 ÷ 99.9 seconds	20.0 s
	• Minimum pulse length	0.3 seconds	
	Relay contacts	SPST 220 V 5 A resistive load	
	Analog output 2	4-20 mA	

4.0	ALARM		Default
	Window alarm		
S4.1	• Low value (pH)	0.00 ÷ 14.00 pH	0.00 pH
S4.2	• High value (pH)	0.00 ÷ 14.00 pH	14.00 pH
	• Hysteresis (pH)	± 0.2 pH	
S4.1	• Low value (ORP)	-2000 ÷ 2000 mV	-2000 mV
S4.2	• High value (ORP)	-2000 ÷ 2000 mV	2000 mV
	• Hysteresis (ORP)	± 1 mV	
S4.3	• Delay	0.0 ÷ 100.0 seconds	1.0 s
	Alarm on set point		
C4.1	• Alarm on operation SET1	ON / OFF	OFF
C4.2	• Operation time of SET1	0 ÷ 60 minutes	60 min
C4.3	• Alarm on operation SET2	ON / OFF	OFF
C4.4	• Operation time of SET2	0 ÷ 60 minutes	60 min
C4.5	Function of the contacts	ACTIVE / NON ACTIVE	ACTIVE
	Relay contacts	SPDT 220 V 5 A resistive	

D5.1	ANALOG OUTPUT 1		Default
	If not related to SET1		
C5.1	Input related to OUT1	pH | mV / ˚C | ˚F	pH
C5.2	Range	0-20 / 4-20 mA	0-20 mA
	Under / Over range (0-20)	0.00 / 20.50 mA	

D5.1	**ANALOG OUTPUT 1**		Default
	Under / Over range (4-20)	3.50 / 20.50 mA	
C5.3	Point 1 (0 mA o 4 mA) (pH)	0.00 ÷ 14.00 pH	0.00 pH
C5.4	Point 2 (20 mA) (pH)	0.00 ÷ 14.00 pH	14.00 pH
C5.3	Point 1 (0 mA o 4 mA) (ORP)	-2000 ÷ 2000 mV	-2000 mV
C5.4	Point 2 (20 mA) (ORP)	-2000 ÷ 2000 mV	2000 mV
C5.3	Point 1 (0 mA o 4 mA) (°C)	-10.0 ÷ 110.0 °C	-10.0 °C
C5.4	Point 2 (20 mA) (°C)	-10.0 ÷ 110.0 °C	110.0 °C
C5.3	Point 1 (0 mA o 4 mA) (°F)	14.0 ÷ 230.0 °F	14.0 °F
C5.4	Point 2 (20 mA) (°F)	14.0 ÷ 230.0 °F	230.0 °F
	Response time	2.5 seconds for 98 %	
	Isolation	250 Vac	
	R max	600 ohm	

D5.2	**ANALOG OUTPUT 2**		Default
	If not related to SET2		
C5.5	Input related to OUT2	pH | mV / °C | °F	pH
C5.6	Range	0-20 / 4-20 mA	0-20 mA
	Under / Over range (0-20)	0.00 / 20.50 mA	
	Under / Over range (4-20)	3.50 / 20.50 mA	
C5.7	Point 1 (0 mA o 4 mA) (pH)	0.00 ÷ 14.00 pH	0.00 pH
C5.8	Point 2 (20 mA) (pH)	0.00 ÷ 14.00 pH	14.00 pH
C5.7	Point 1 (0 mA o 4 mA) (ORP)	-2000 ÷ 2000 mV	-2000 mV
C5.8	Point 2 (20 mA) (ORP)	-2000 ÷ 2000 mV	2000 mV
C5.7	Point 1 (0 mA o 4 mA) (°C)	-10.0 ÷ 110.0 °C	-10.0 °C
C5.8	Point 2 (20 mA) (°C)	-10.0 ÷ 110.0 °C	110.0 °C
C5.7	Point 1 (0 mA o 4 mA) (°F)	14.0 ÷ 230.0 °F	14.0 °F
C5.8	Point 2 (20 mA) (°F)	14.0 ÷ 230.0 °F	230.0 °F
	Response time	2.5 seconds for 98 %	
	Isolation	250 Vac	
	R max	600 ohm	

6.0	**LOGIC INPUT (D1 and D2)**		Default
	HOLD condition		
	• Analog output	HOLD	
	• Set point	HOLD	
	• Alarm status	Alarm relay OFF Alarm indication held on display	

6.0	**LOGIC INPUT (D1 and D2)**		Default
	ALARM condition		
	• Analog output	RUN	
	• Set point	OFF	
	• Alarm status	ON	
S6.1	Logic input 1	ON / OFF	OFF
C6.1	Function of the logic input 1	HOLD / ALARM	HOLD
S6.2	Logic input 2	ON / OFF	OFF
C6.2	Function of the logic input 2	HOLD / ALARM	ALARM
	Logic input actuation	free voltage contacts	

D7.0	**AUTOCLEAN**		Default
S7.1	Cleaning functions	OFF / AUTO / MANUAL	OFF
	Cleaning parameters		
S7.2	• Repetition time	0.5 ÷ 100.0 hours	24.0 h
S7.3	• Cleaning time	1.0 ÷ 60.0 seconds	15.0 s
S7.4	• Holding time	0.1 ÷ 20.0 minutes	3.0 min
	Cleaning cycle time		
	• Analog output	HOLD	
	• Set point	OFF	
	• Alarm status	OFF	

D50.0	**SETUP**		Default
D50.1	Password	000 ÷ 999	0
S1.1	Calibration and set point	ON / OFF	ON
S2.1	Temperature measuring unit	˚C / ˚F	˚C
S2.2	Manual temperature	0.0 ÷ 100.0 ˚C 32.0 ÷ 212.0 ˚F	20.0 ˚C
S3.1A	Hysteresis SET1 (ON-OFF)	0.00 ÷ 1.40 pH	0.02 pH
S3.2A	Delay SET1 (ON-OFF)	0.0 ÷ 100.0 seconds	0.2 s
S3.1B	Proportional band SET1	0.0 ÷ 400.0 %	1.0 %
S3.2B	Integral time SET1	0.0 ÷ 999.9 minutes	0.0 min
S3.3B	Derivative time SET1	0.0 ÷ 999.9 minutes	0.0 min
S3.4B	Pulse frequency FM SET1	0 ÷ 120 pulses/minute	100 i/min

D50.0	SETUP		Default
S3.4B	Pulse width WM SET1	0 ÷ 99.9 seconds	20.0 s
S3.5A	Hysteresis SET2 (ON-OFF)	0.00 ÷ 1.40 pH	0.02 pH
S3.6A	Delay SET2 (ON-OFF)	0.0 ÷ 100.0 seconds	0.2 s
S3.5B	Proportional band SET2	0.0 ÷ 400.0 %	1.0 %
S3.6B	Integral time SET2	0.0 ÷ 999.9 minutes	0.0 min
S3.7B	Derivative time SET2	0.0 ÷ 999.9 minutes	0.0 min
S3.8B	Pulse frequency FM SET2	0 ÷ 120 pulses/minute	100 i/min
S3.8B	Pulse width WM SET2	0 ÷ 99.9 seconds	20.0 s
S4.1	Alarm LO (low value)	0.00 ÷ 14.0 pH	0.00 pH
S4.2	Alarm HI (high value)	0.00 ÷ 14.0 pH	14.00 pH
S4.3	Alarm delay	0.0 ÷ 100.0 seconds	1.0 s
S6.1	Logic input 1	ON / OFF	OFF
S6.2	Logic input 2	ON / OFF	OFF
S7.1	Cleaning function	OFF / AUTO / MANUAL	OFF
S7.2	Repetition time	0.5 ÷ 100.0 hours	24.0 h
S7.3	Cleaning time	1.0 ÷ 60.0 seconds	15.0 s
S7.4	Holding time	0.1 ÷ 20.0 minutes	3.0 min
S50.1	Password change	XXX	

D60.0	CONFIGURATION		Default
D60.1	Password	000 ÷ 999	0
C1.0	Operating mode	AUTO / MEAS / SIM	AUTO
C1.1	Type of measure	pH / ORP	pH
C1.2	Type of pH sensor	GLASS / ANTIMONY	GLASS
C1.3	RT Large Signal	0.4 ÷ 50.0 seconds	2.0 s
C1.4	RT Small Signal	0.4 ÷ 50.0 seconds	10.0 s
C2.1	Input	RTD Pt100 / Pt1000	Pt100
C3.1	SET1 regulation	ON-OFF / PID	ON-OFF
C3.2	SET1 regulation related to (PID only)	FM / WM / OUT1 FM/WM on relay 1	FM
C3.3	SET1 function	LO / HI (Min / Max)	LO
C3.4	SET2 regulation	ON-OFF / PID	OFF
C3.5	SET2 regulation related to (PID only)	FM / WM / OUT2 FM/WM on relay 2	FM
C3.6	SET2 function	LO / HI (Min / Max)	HI
C4.1	Alarm related to SET1 operation time	ON / OFF	OFF

D60.0	CONFIGURATION		Default
C4.2	SET1 operation time	0 ÷ 60 minutes	60 min
C4.3	Alarm related to SET2 operation time	ON / OFF	OFF
C4.4	SET2 operation time	0 ÷ 60 minutes	60 min
C4.5	Alarm function	ACTIVE / NON ACTIVE	ACTIVE
C5.1	Input related to the analog output 1	pH / mV ˚C / ˚F	pH
C5.2	Analog output 1 range	0-20 / 4-20 mA	0-20 mA
C5.3	Point 1 analog output 1	0.00 ÷ 14.00 pH	0.00 pH
C5.4	Point 2 analog output 1	0.00 ÷ 14.00 pH	14.00 pH
C5.5	Input related to the analog output 2	pH / mV ˚C / ˚F	pH
C5.6	Analog output 2 range	0-20 / 4-20 mA	0-20 mA
C5.7	Point 1 analog output 2	0.00 ÷ 14.00 pH	0.00 pH
C5.8	Point 2 analog output 2	0.00 ÷ 14.00 pH	14.00 pH
C6.1	Logic input 1 function	HOLD / ALARM	HOLD
C6.2	Logic input 2 function	HOLD / ALARM	ALARM
C60.1	Password change	XXX	

70.0	INFO MENU		Default
I1.0	Release code	PH7687 R1.0X	
I2.0	LCD brightness	(0 ÷ 30)	20
I3.0	LCD contrast	(0 ÷ 30)	12
I4.0	LCD mode	NORMAL / REVERSE	NORMAL
I5.0	Hours of operation time	xxxxxx hours	

5 INSTALLATION

5.1 PACKING LIST

The package contains:
- N° 1 unit with serial number label;
- N° 1 instruction manual.

5.2 PACKING AND UNPACKING

1 Open the carton box and keep it.
2 Remove the instrument for the carton box.
3 Remove the plastic protection from the instrument.
If repackaging do the reverse.

5.3 STORAGE AND TRANSPORT

For prolonged storage, keep the product in dry places.
In case of transportation, pack the product in a carton box.

5.4 INSTALLATION OF THE INSTRUMENT

The instrument can be installed in proximity of the sensor, or in a remote area, in the electrical control panel.
Panel installation must be performed on a rigid surface, in a protected position from shock, moisture, and corrosive fumes.

5.5 INSTALLATION OF THE PROBE

Follow the instructions for installation of submersible or in line probes.

The submersible B&C Electronics probes contain the sensor (also called electrode) and are equipped with a ring to adjust the depth of immersion in the test liquid. Secure the probe to the tank with a mounting bracket 36 mm in diameter.

The installation of the sensors by means of holders in flow (for example the models SZ 7101, SZ 7105 or SZ 7108 of B&C Electronics) must be carried out keeping the sensor oriented downwards, with a maximum inclination of 45° to the vertical.

Protect the coax cable of the sensor from rain or corrosive agents, for example through a sheath.

The interruption of the coax cable can cause interferences, therefor is not recommended.

In case of extension cable use high isolation IP 65 junction box (for example the accessory SZ 740).

Keep the coax cable of the sensor away from the power cables.

5.6 ELECTRICAL INSTALLATION

For all the electrical connections refer to the label on the instruments, also shown and described in the chapter "Installation drawings (page 43)".

All connections to the instrument are made using removable terminal blocks.

The power connections are on a 13-position terminal block.

The power connections of the input signals of the transmitters are on a 5-position terminal block.

The connections of the analog and logic input are on a 6-position terminal block.

5.6.1 CONNECTING TO THE MAINS

- Connect the ground to the terminal 3
- Connect the mains to the terminals 1-2 marked L-N.

⚠ The device is very sensitive and absorbs very little power.

Use the following precautions to avoid irreversible damage to the electronic circuits.

- Power the device between phase and neutral. Avoid the use of auto-transformers.

- Avoid power taken from nodes with strong inductive loads that may produce noise or damage to the internal circuits.

- In the case of installations with the presence of inverter, check that they are properly installed and not induce noise on the network, on the ground or on the signals.

- Install a switch in the control cabinet for the power of the instrument. This switch can be "specific" or "general" for all electronic equipment installed.

- Install in the control cabinet protection fuses for power supply.

- Install the power cables away from the signal cables.

- Check the voltage supply before turning on the power.

⚠ It should be remembered that the electronic instruments may be subject to accidental failures.

Take the necessary precautions to avoid any damage caused by their dysfunction.

5.6.2 CONNECTING THE ELECTRODES AND PROBES

The connection of the input signals is the most critical part of the whole system because of possible noise or interference.

The pH or ORP electrodes are connected to the central wire of the coaxial cable.

The reference electrodes are connected to the shield of the coaxial cable.

- Connect the central of the coaxial cable to the electrode terminal <u>31</u> high impedance marked <u>HI</u>.
- Connect the shield of the coaxial cable to the electrode terminal <u>30</u> low impedance marked <u>LO</u>.

Use only the original coax cables supplied by the manufacturer in between sensor and input terminals of the instrument.

⚠ The connecting cable between the electrode and the instrument generally has a thin conductive sheath between the central and the shield.

Remove this sheath for at least 5 mm in order to avoid the contact between the terminal of the central wire and the shielded.

5.6.3   CONNECTING THE TEMPERATURE SENSOR

To get the display of the temperature value and the automatic compensation of the effect of temperature on the pH measurement is necessary to connect the temperature sensor Pt100 or Pt1000 as shown in chapter "Connection diagram (page 43)"), using the appropriate wire gauge.

If the temperature sensor is not connected, interrupted or in short circuit, the instrument automatically switches to the manual temperature compensation.

Two-wire Pt100 / Pt1000 connection for short distances
- Connect the Pt100 / Pt1000 to terminals <u>27-28</u> (marked <u>t1-t2</u>) and install a jumper between <u>28-29</u> (marked <u>t2-t0</u>).

Three wire Pt100 / Pt1000 connection for large distances
- Connect a Pt100 / Pt1000 wire to terminal <u>27</u> marked <u>t1</u>.
- Connect the Pt100 / Pt1000 common wire to terminal <u>29</u> marked <u>t0</u> and to terminal <u>28</u> marked <u>t2</u> using two separate wires.

Warnings:
- do not interrupt the connecting cable. Use extension cable fastened on high insulation junction box;
- keep the cable away from the power cables;
- in case of interference use shielded cable, connecting the shield to ground terminal <u>3</u>.

5.6.4   CONNECTING ANALOG OUTPUTS

The instrument provides two output current signals to drive an external recorder, PLC or other similar devices.
- Connect the <u>(+)</u> of the recorder N°1 to the terminal <u>15</u> marked <u>R1 +</u>.
- Connect the <u>(+)</u> of the recorder N°2 to the terminal <u>14</u> marked <u>R2 +</u>.
- Connect the <u>(-)</u> of the recorder to the terminal <u>16</u> marked <u>R0 -</u>.

If the output signal must drive more devices, they must be connected in "series" between them. The sum of their input resistance must not be greater than 600 Ω.

Alternatively the outputs can be used for PID control, and connected to actuators accepting analog current signals (the connections are analogous to what reported for recorders and PLC).

⚠️ Do not provide any power to the output terminals to avoid damaging the instrument circuit. The output current is generated by the instrument circuits.

5.6.5   CONNECTING PUMPS, SOLENOIDS AND ALARMS

The relays contacts are available on the terminal block of the instrument.

They consist of two open contacts SPST corresponding to the set point 1 and set point 2 and a contact SPDT corresponding to the alarm.

SET POINT 1

terminal 5 marked C : common

terminal 4 marked NO : normally open

SET POINT 2

terminal 7 marked C : common

terminal 6 marked NO : normally open

Drive the loads of the relay by a power different from that of the instrument in order to prevent disturbances arising from loads of inductive nature.

If necessary use snubbers.

Protect the relay contacts by fuse.

Do not exceed the rated current value of the contacts (5 A resistive).

Each relay can be configured to perform the functions of the maximum or minimum.

The set point values can be set if it was not inhibited calibration, the delay is set in the setup menu. (See chapters "Set point (page 37)" and "Setup (page 38)").

To change the minimum/maximum (LO/HI) function of the set point, see chapter "Configuration (page 40)".

ALARM

terminal 9 marked C : common

terminal 8 marked NO : normally open

terminal 10 marked NC : normally closed

The alarm relay can be configured ACTIVE/NON ACTIVE during alarm conditions.

The configuration NON ACTIVE allows to signal also the shutdown of the instrument.

The alarm condition occurs when:
- the measure exceeds the selected min/max values;
- the operating time of set point 1 and 2 is exceed (if configurated);
- contact from logic input 1 and 2 (if configurated).

As for set point the user can set a delay (see "Setup (page 38)").

5.6.6 CONNECTING THE LOGIC INPUTS

The free voltage contacts (in closure) from an external device should be applied to the logic input terminals <u>18-17</u> (marked <u>D1-D+</u>) and <u>19-17</u> (marked <u>D2-D+</u>).

The activation and the configuration of the logic input are described on the display S6.1 ("Setup (page 38)") and C6.1 ("Configuration (page 40)").

The hold or alarm function are described in the chapter "Technical data (page 13)".

5.6.7 CONNECTING THE CLEAN SYSTEM

The contacts of the cleaning relay are on the terminal block of the instrument.

terminal <u>12</u> marked <u>C</u> : common

terminal <u>11</u> marked <u>NO</u> : normally open

terminal <u>13</u> marked <u>NC</u> : normally closed

5.7 DISPOSAL

In case of disposal of the instrument, apply the terms of the law provided for the disposal of electronic devices.

6 OPERATING PROCEDURE

6.1 OPERATING PRINCIPLES

In the case of pH measurement the instrument receives a signal in mV from the sensor and provides the value in pH units, according to the Nernst's law.

In the case of ORP measurement the instrument receives a mV signal from the sensor and provides the value in mV.
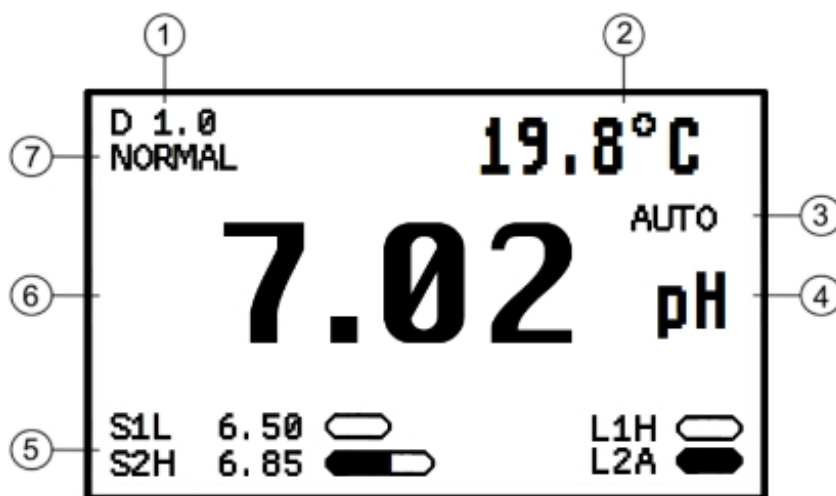
In both cases, you can make corrections (zero and sensitivity) to compensate for changes in sensor response due to the conditions of use.

The temperature influences the activity of the ionic solution and with it the signal provided by the sensor.

For this reason, in the pH measuring it is necessary to use the temperature compensation in applications where the temperature of the liquid is significantly different from the reference value of 20 ˚C.

The user needs to evaluate the installation of a temperature probe in order to perform the automatic compensation in case the temperature undergoes large changes.

6.2   DISPLAY

```
 ①                           ②
┌─────────────────────────────────┐
│ D 1.0                  19.8°C    │
│ NORMAL                          │
│                           AUTO   │
│   7.02                    pH     │
│                                  │
│ S1L  6.50 ⬭          L1H ⬭      │
│ S2H  6.85 ⬤          L2A ⬤      │
└─────────────────────────────────┘
```

|	
1. Display ID	5. Information display (set points and analog inputs status; functions and messages)
2. Secondary display	6. Main display
3. Operating mode	7. Instrument status: NORMAL, CLEAN, HOLD, ALARM (MEAS/S1/S2/L1/L2)
4. Main measuring unit	

6.3   KEYBOARD

KEYS	FUNCTION
ZERO MODE	- To visualize the available displays - To exit from the not confirmed calibrations sequences - >3 s To access the zero calibration
SENS ∧	Key "UP" - To turn the unit to the main display - To modify (increase) the displayed data - >3 s To access the sensitivity calibration
SET 1 ∨	Key "DOWN" - To modify (decrease) the displayed data - >3 s To access the set point 1 setting
SET 2 ENT	- To enter the effected changings and selections - >3 s To access the set point 2 setting

6.4   USERS INSTRUCTION

6.4.1   MAIN MEASURE

The display shows the measured value and allows access to the calibration procedures and set point values, if these were not reserved to the maintenance staff.
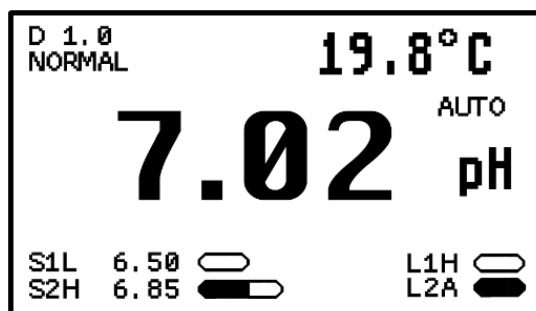

If the user has enabled the cleaning function, during the cleaning cycle will show the value of the measure and the cleaning phase in progress: CLEAN or HOLD.

| Symbol map	
⬣	Active relay or input
⬭	Non active relay or input
◖▭	Relay's activation delayed
⬣▭	Proportional activation level (PID)

6.4.2   SECONDARY MEASURING

Press the MODE key from the display D1.0 to visualize the temperature value and to access the sensor calibration (if connected).
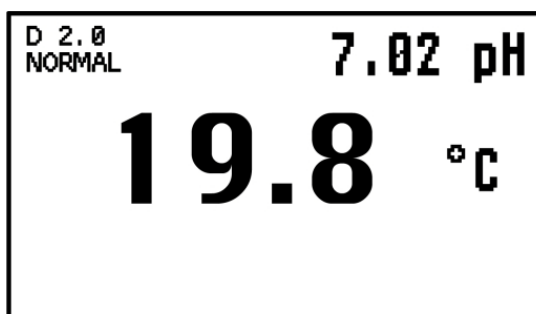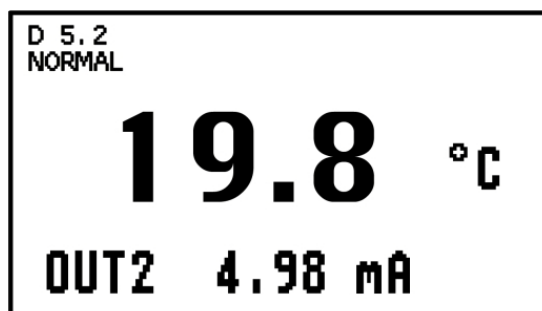
6.4.3   ANALOG OUTPUT 1 VALUES

Press MODE two times from the display D1.0 to visualize the output signal and the corresponding current value.

```
D 5.1
NORMAL

    7.02  pH

OUT1   10.02 mA
```
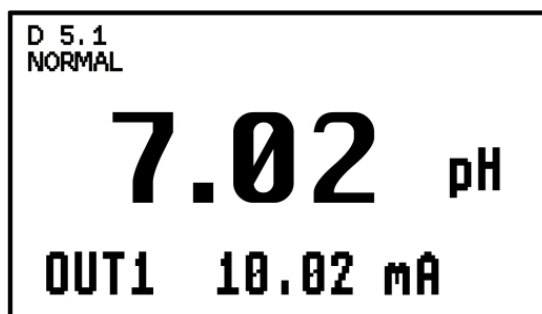
6.4.4   ANALOG OUTPUT 2 VALUES

Press MODE three times from the display D1.0 to visualize the output signal and the corresponding current value.

```
D 5.2
NORMAL

    19.8  °C

OUT2   4.98 mA
```

6.4.5   AUTOCLEAN

Press MODE four times from the display D1.0 to visualize the autoclean state, the remaining time to the next cycle and the repetition time as configured in the setup menu.

```
D 7.0
NORMAL

CLEAN AUTO

NEXT XXX.X HOURS

REPETITION XXX.X H
PRESS ENT TO CLEAN
```
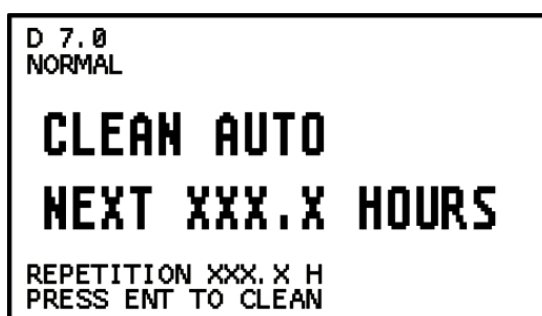
ENT   to start a cleaning cycle.

6.4.6 PARAMETERS FOR THE MAINTENANCE

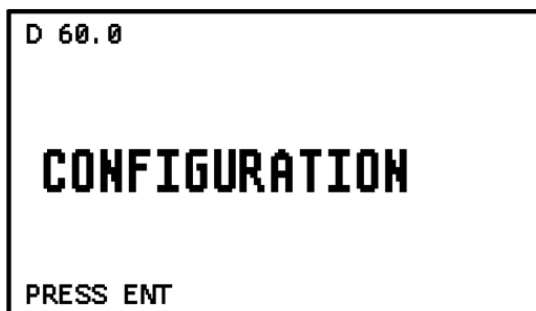Press MODE five times from the display D1.0 to visualize the SETUP display to access to the maintenance menu of the unit.

```
D 50.0


   SET-UP


PRESS ENT
```

6.4.7 PARAMETERS FOR THE PLANT ENGINEER

Press MODE six times from the display D1.0 to visualize the CONFIGURATION display to access to the installation menu of the unit.

```
D 60.0


 CONFIGURATION


PRESS ENT
```

6.4.8 INFORMATION MENU

Press MODE seven times from the display D1.0 to visualize the information menu from which you can access the information functions of the instrument.

```
D 70.0


 INFO / DISPLAY


PRESS ENT
```

ENT	press the key to visualize and to confirm in sequence the setup parameters
UP or DOWN	press the key to modify the values
MODE	press the key to turn to the D70.0 display any time

Display	Contents	Meaning	Possible values
I1.0	B&C electronics PH7687 R1.00	P/N e firmware release	
I2.0	LCD BRIGHTNESS 8	Screen brightness	0 ÷ 30
I3.0	LCD CONTRAST 8	Screen contrast	0 ÷ 30
I4.0	LCD MODE NORMAL	Type of visualization of the screen	NORMAL REVERSE
I5.0	TOTAL: XXXXX h	Total operating hours	

6.5 MAINTENANCE INSTRUCTIONS

6.5.1 PRELIMINARY OPERATIONS

All the functioning operations must be done with sensor or simulator connected to the unit.

If you do not have a simulator it is possible to install a jumper to the input terminals of the pH/ORP electrode to simulate the values of pH=7 or mV=0.

Verify if the configuration, the set point and the alarm parameter are suitable for the current application.

Follow the procedures described in the chapter "Setup (page 38)" to verify the parameters without modifying the values.

The display and the keys in the front panel allow the operator to perform the preliminary check.

The lit display indicates that the unit is powered and the power circuits work correctly.

6.5.2 MEASURING OPERATIONS

In order to operate the system, verify previously the following:
- the sensors are connected and in operation;
- the power and the ground are connected;

and if necessary
- the analog outputs;
- the loads of relays 1 and 2;
- the alarm relay;
- the logic inputs.

Power the unit and look on the display the measuring value and the set points status.

If the sensors are connected as described in the chapter "Installation (page 22)", the system will work correctly and it will need just the calibration, the set points and alarm values selection.

6.5.3   PH CALIBRATION

Before calibration (also called electrodes standardization), check that the glass membrane of the sensor was kept moist during storage.

If the protective reservoir is empty and the glass membrane is dry, immerse the electrode in a buffer solution or in tap water (do not use distilled water) for at least three hours before proceeding.

In any case, follow the instructions of the manufacturer of the electrode.

To make the standardization of the pH electrodes you can use the buffer solutions from B&C Electronics.

Zero calibration

Place the electrode in solution at pH = 7 (SZ 954) to calibrate the 1st point (Zero calibration).

Press MODE (ZERO) for at least 3 seconds to get the following display:

```
D 1.1              19.8 °C
NORMAL
                     AUTO
7.02                 pH

ZERO:-0.50pH
```
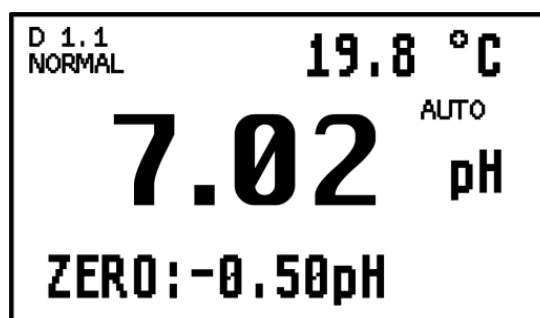
UP and DOWN	to change the displayed value
ENT	to confirm the displayed value

On the information display will appear UPDATE message or error message if the calibration is not successful.

💡 *The user can reset to zero factory as follows:*
start the calibration of zero, simultaneously press UP, DOWN and ENT.

Sensitivity calibration

Place the electrode in solution at pH = 4 (SZ 952) or pH = 9 (SZ 956) to calibrate the 2nd point (Calibration of sensitivity).

Press UP (SENS) for at least 3 seconds to get the following display:

```
D 1.2                20.0 °C
NORMAL
                       AUTO
 4.06                  pH
SENS: 99.4 %
```
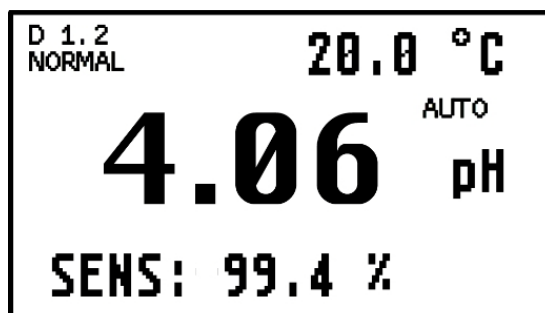
UP and DOWN   to change the displayed value

ENT   to confirm the displayed value

On the information display will appear UPDATE message or error message if the calibration is not successful.

💡 *The user can reset to sensitivity factory as follows:*
start the calibration of sensitivity, simultaneously press UP,
DOWN and ENT.

One point calibration

In some cases it may be considered sufficient to perform a one point calibration with a buffer solution of value close to the average measure.

In this case follow the zero calibration procedure.

Error messages

The error messages during the calibration inform the user that the pH electrode is in unacceptable operating condition and therefore risky for the plant.

In fact a deviation of zero > 2 pH is indicative of excessive pollution of the reference electrode.

A deviation of sensitivity < 80 % or > 110 % indicates an exhausted electrode or losses in connection cable.

In these situations is suggested to replace the electrode.

⚠ If the value of the standard solution is different from expected it may mean that:
- the real value of the buffer used is very different from the nominal one (the solution is polluted or altered):
- the electrode is not operating normally (broken, badly installed).

The calibration of the pH meter in case of temperature compensation requires special precautions:

- consider the value of pH of the buffer at the operating temperature;
- detect the value of the temperature of the solution;
- wait for the stabilization of the temperature measurement.

6.5.4   ORP CALIBRATION

In general it is recommended to trust the factory calibration to measure the ORP values provided by electrode.

Should calibration be necessary is advisable to perform only zero calibration.

If the sensing part is dry, soak the electrode in tap water (do not use the distilled water) for at least three hours before proceeding.
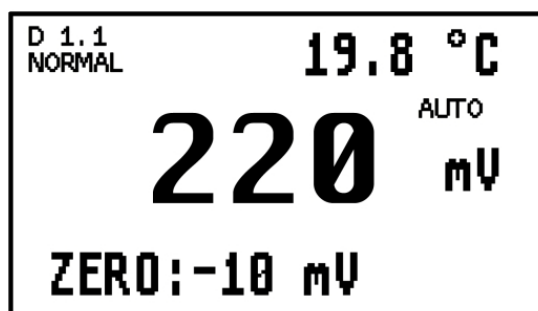
In any case, follow the instructions of the manufacturer of the electrode.

To standardize the ORP electrode you can use the standard solution of the B&C Electronics.

Zero calibration

Place the electrode in the standard solution at mV = 220 (SZ 961) to calibrate the 1st point (Zero calibration).

Press MODE (ZERO) for at least 3 seconds to get the following display:

```
┌─────────────────────────────────┐
│ D 1.1              19.8 °C       │
│ NORMAL                           │
│                    AUTO          │
│           220      mV            │
│                                  │
│ ZERO:-10 mV                      │
└─────────────────────────────────┘
```

UP and DOWN   to change the displayed value

ENT   to confirm the displayed value

On the information display will appear UPDATE message or error message if the calibration is not successful.

> *The user can reset to zero factory as follows:*
>
> *start the calibration of zero, simultaneously press UP, DOWN and ENT.*

Sensitivity calibration (only if necessary)

If the sensitivity calibration is necessary, place the electrode in the second standard solution.

Press UP (SENS) for at least 3 seconds to get the following display:

```
┌─────────────────────────────────┐
│ D 1.2              20.0 °C       │
│ NORMAL                          │
│                    AUTO          │
│     400           mV             │
│                                  │
│ SENS: 98.6 %                     │
└─────────────────────────────────┘
```

UP and DOWN   to change the displayed value

ENT   to confirm the displayed value

On the information display will appear UPDATE message or error message if the calibration is not successful.
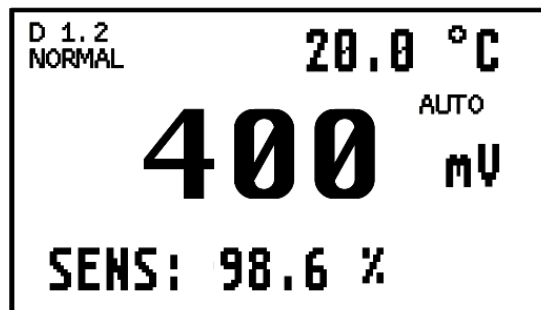
The user can reset to sensitivity factory as follows:
start the calibration of sensitivity, simultaneously press UP,
DOWN and ENT.

Error messages

The error messages during the calibration inform the user that the ORP electrode is in unacceptable operating condition and therefore risky for the plant.

In fact a deviation of zero > 100 mV is indicative of excessive pollution of the reference electrode.

A deviation of sensitivity < 70 % or > 140 % indicates an exhausted electrode or losses in connection cable.

In these situations is suggested to replace the electrode.

⚠ If the value of the standard solution is different from expected it may mean that:
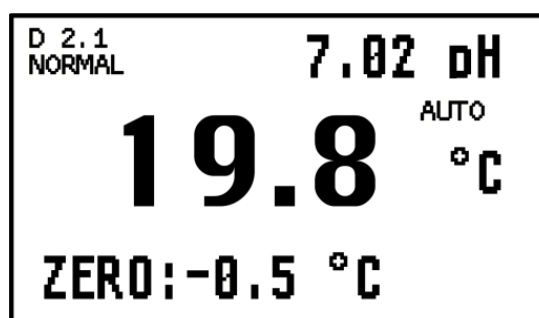
- the real value of the buffer used is very different from the nominal one (the solution is polluted or altered):

- the electrode is not operating normally (broken, badly installed).

6.5.5   TEMPERATURE CALIBRATION

<u>Temperature sensor connected</u>

Place the sensor in a liquid or keep the sensor in the air knowing the value of the temperature.

MODE	press the key from D1.0 display to go to D2.0 display
MODE	press the key for at least 3 seconds to get the following display:

```
┌─────────────────────────────┐
│ D 2.1            7.02 pH     │
│ NORMAL                      │
│                       AUTO   │
│      19.8       °C           │
│                              │
│ ZERO:-0.5 °C                 │
└─────────────────────────────┘
```

UP and DOWN	press to change the displayed value
ENT	press to confirm the displayed value

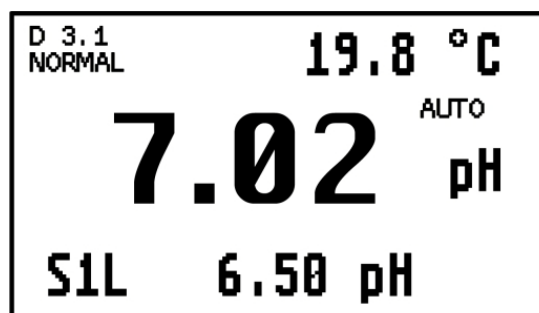On the information display will appear UPDATE message or error message if the calibration is not successful.

> 💡 *The reset to factory value in the main display is done as follows:*
> *start the calibration of temperature, simultaneously press the*
> *UP, DOWN and ENT.*

<u>Temperature sensor not connected</u>

The temperature setting for the measure compensation can be changed in the setup menu, refer to the chapter "Setup (page 38)".

6.5.6   SET POINT

Press DOWN (SET1) or ENT (SET2) for at least 3 seconds to get the following display:

```
┌─────────────────────────────┐
│ D 3.1           19.8 °C      │
│ NORMAL                      │
│                       AUTO   │
│      7.02        pH          │
│                              │
│ S1L   6.50 pH                │
└─────────────────────────────┘
```

UP and DOWN	to change the displayed value
ENT	to confirm the displayed value

6.5.7 SETUP

Press MODE five times from the D1.0 display to go to the D50.0 display.

```
D 50.0


SET-UP


PRESS ENT
```

ENT   press to display and confirm the sequence of the setup parameter of the unite

UP and DOWN   press to change the displayed value

MODE   press to turn to the D50.0 display any time

💡 *Depending on the configuration of the instrument the setup parameters may not be visualized.*

Display	Contents	Meaning	Possible values
D50.1	PASSWORD SET-UP ---	Password to access the setup menu	000 ÷ 999
S1.1	CAL FUNCTION ON	Inhibition of the zero and sensitivity calibration and set point changings	ON OFF
S2.1	TEMP. UNIT °C	Temperature measuring unit	°C °F
S2.2	TEMP. MANUAL 20.0 °CM	Manual temperature compensation	Selectable
S3.1A	HYSTERESIS SET1 0.02 pH	Hysteresis of the set point 1	Selectable
S3.2A	SET1 DELAY 0.2 s	Delay of the set point 1	0.0 ÷ 99.0 s
S3.1B	PROP. BAND SET1 1.0 %	Proportional band of the set point 1 in PID function	0.0 ÷ 400.0 %
S3.2B	INTEG. TIME SET1 0.0 min	Integral time (minutes) of the set point 1 in PID function	0.0 ÷ 999.9 min
S3.3B	DERIV. TIME SET1 0.0 min	Derivative time (minutes of the set point 1 in PID function	0.0 ÷ 999.9 min
S3.4B	IMPULSE F. SET1 100 i/min	Pulse frequency of the set point 1 in PID (FM) function	0 ÷ 120 i/min
S3.4B	IMPULSE T. SET1 20.0 s	Pulse width of the set point 1 in PID (WM)	0 ÷ 99.9 s

Display	Contents	Meaning	Possible values
S3.5A	HYSTERESIS SET2 0.02 pH	Hysteresis of the set point 2	Selectable
S3.6A	SET2 DELAY 0.2 s	Delay of the set point 2	0.0 ÷ 99.0 s
S3.5B	PROP. BAND SET2 1.0 %	Proportional band of the set point 2 in PID function	0.0 ÷ 400.0 %
S3.6B	INTEG. TIME SET2 0.0 min	Integral time (minutes) of the set point 2 in PID function	0.0 ÷ 999.9 min
S3.7B	DERIV. TIME SET2 0.0 min	Derivative time (minutes of the set point 2 in PID function	0.0 ÷ 999.9 min
S3.8B	IMPULSE F. SET2 100 i/min	Pulse frequency of the set point 2 in PID (FM) function	0 ÷ 120 i/min
S3.8B	IMPULSE T. SET2 20.0 s	Pulse width of the set point 2 in PID (WM)	0 ÷ 99.9 s
S4.1	LO ALARM 0.00 pH	Alarm relay minimum value	Selectable
S4.2	HI ALARM 14.00 pH	Alarm relay maximum value	Selectable
S4.3	ALARM DELAY 1.0 s	Delay (seconds) of the alarm relay	0.0 ÷ 100.0 s
S6.1	LOGIC INPUT1 OFF	Logic input 1 function	ON OFF
S6.2	LOGIC INPUT2 OFF	Logic input 2 function	ON OFF
S7.1	CLEAN OFF	Autoclean function	OFF AUTO MANUAL
S7.2	CLEAN REPETITION 24.0 h	Cleaning cycle	0.5 ÷ 100.0 h
S7.3	CLEAN TIME 15.0 s	Cleaning time	1.0 ÷ 60.0 s
S7.4	HOLD TIME 3.0 min	Holding time after the cleaning cycle	0.1 ÷ 20.0 min
S50.1	PASSWORD MODIFY ---	Password changing of the setup menu	0 ÷ 999

6.5.8   MAINTENANCE

Quality components are used to give the controller a high reliability.
The frequency of controller's maintenance depends on the nature of each particular application.

⚠ Disconnect the power supply to the unit before performing the following:
- dust removal from the terminals;
- operations on the wires connecting the terminals;
- mounting of the instrument on the switch board panel.

As with any electronic device mechanical components such as buttons, relays, terminal blocks, are the parts most subject to failure.

- Periodically check that the device is not subject to excessive moisture.
- Check that the connections to the terminals are free of dust and corrosion.
- Check that the terminals screws are tight.

6.5.9   SENSORS MAINTENANCE

It is recommended to perform periodical maintenance of the sensor as described below, so to avoid incorrect measurements.

The electrodes must be inspected and cleaned regularly, most frequently in the case of applications in alkaline liquids, or fat-containing or organic substances.

Periodically, according to the needs of the application, perform the calibration operations.

In case of no use for long periods, store the electrode with the protective cap containing a storage liquid, or tap water.

Do not use distilled water.

# 6.6   INSTALLATION INSTRUCTION

6.6.1   SAFETY REQUIREMENTS

⚠ After performing the installation (see chapter "Installation (page 22)"), before turning the power on and proceed to the configuration of the instrument is recommended to do the following:

- check that the terminal 3 is grounded;
- check that all connections are correct;
- check that all wires are blocked on the terminals;
- check that the mechanical fixing of the cables does not cause any twisting or bending on the terminal blocks;
- check that eventual protection fuses are of appropriate value.

⚠ The damages due to incorrect connections during the installation are not covered by warranty.

6.6.2   CONFIGURATION

Press MODE six times from the D1.0 display to get the D60.0 display.

```
D 60.0



CONFIGURATION



PRESS ENT
```
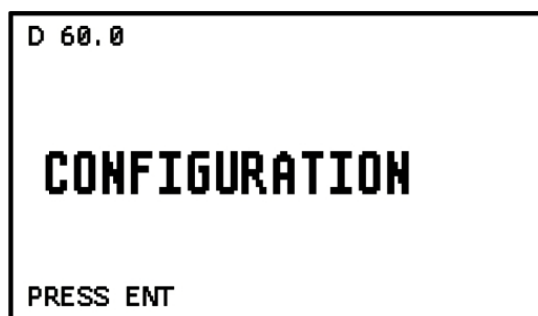
ENT   press the key to visualize and to confirm in sequence the configuration
                parameters

UP or DOWN   press the key to modify the values

MODE   press the key to turn to the D60.0 display any time

💡 *Depending on the configuration of the instrument, few configuration parameters may not be visualized.*

| Display	Contents	Meaning	Possible values
D60.1	PASSWORD CONFIG. ---	Password to access the configuration	000 ÷ 999
C1.0	CONTROLLER MODE AUTO	Operating mode selection	AUTO MEAS SIM
C1.1	MEASURE pH	pH/ORP selection	pH ORP
C1.2	pH SENSOR GLASS	pH sensor type	GLASS ANTIMONY
C1.3	RT LARGE SIGNAL 2.0 s	Filter software large	0.4 ÷ 50 s
C1.4	RT SMALL SIGNAL 10.0 s	Filter software small	0.4 ÷ 50 s
C2.1	TEMP. SENSOR PT100	Pt100/Pt1000 temperature sensor type	PT100 PT1000
C3.1	REGUL. MODE SET1 ON-OFF	Set point 1 regulation type	ON-OFF PID
C3.2	ACTUATION SET1 FM	PID regulation related to set point 1	FM WM OUT1
C3.3	SET1 FUNCTION LO	Set point 1 function HI/LO	LO HI
C3.4	REGUL. MODE SET2 ON-OFF	Set point 2 regulation type	ON-OFF PID

Display	Contents	Meaning	Possible values
C3.5	ACTUATION SET2 FM	PID regulation related to set point 2	FM WM OUT2
C3.6	SET2 FUNCTION HI	Set point 2 function HI/LO	LO HI
C4.1	ALARM SET1 OFF	Alarm activation on set point 1 operation time	ON OFF
C4.2	TIME SET1 60 min	Operation time setting	0 ÷ 60 min
C4.3	ALARM SET2 OFF	Alarm activation on set point 2 operation time	ON OFF
C4.4	TIME SET2 60 min	Operation time setting	0 ÷ 60 min
C4.5	ALARM FUNCTION ACTIVE	Alarm relay function	ACTIVE NON ACTIVE
C5.1	OUT1 INPUT pH	Measure related to the analog output 1	pH / mV ˚C / ˚F
C5.2	OUT1 0-20mA	Range of the analog output 1	0-20 mA 4-20 mA
C5.3	OUT1 POINT P1 0.00 pH	First point of the analog output 1	Variable
C5.4	OUT1 POINT P2 14.00 pH	Second point of the analog output 1	Variable
C5.5	OUT2 INPUT pH	Measure related to the analog output 2	pH / mV ˚C / ˚F
C5.6	OUT2 0-20mA	Range of the analog output 2	0-20 mA 4-20 mA
C5.7	OUT2 POINT P1 0.00 pH	First point of the analog output 2	Variable
C5.8	OUT2 POINT P2 14.00 pH	Second point of the analog output 2	Variable
C6.1	LOGIC INPUT1 HOLD	Logic input 1 function	HOLD ALARM
C6.2	LOGIC INPUT2 ALARM	Logic input 2 function	HOLD ALARM
C60.1	PASSWORD MODIFY ---	Password change	0 ÷ 999

💡 *In SIM operating mode the user can change the displayed value by means of ENTER key followed by UP and DOWN keys and confirm it with ENTER key.*
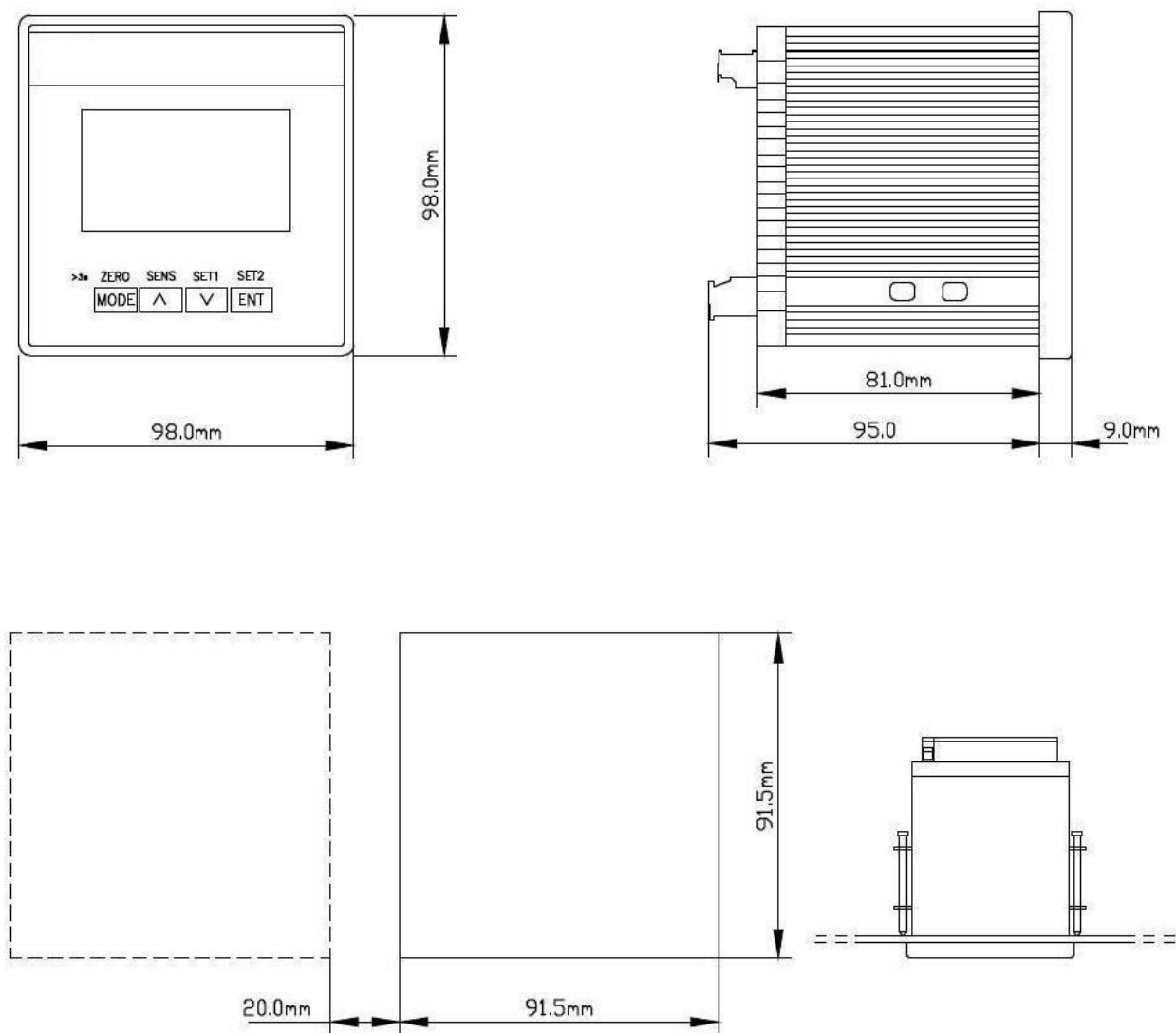
7 INSTALLATION DRAWINGS

7.1 CONNECTION DIAGRAM
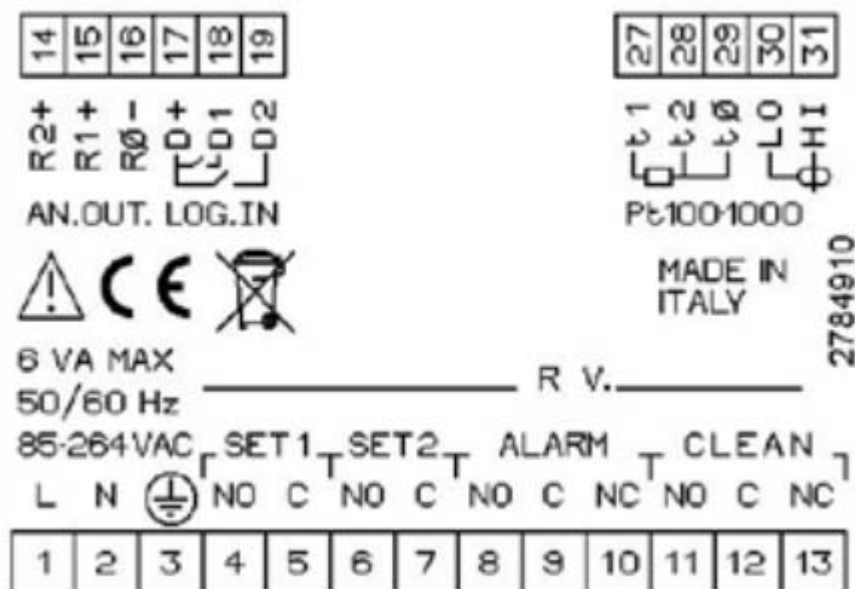
Terminal	Function	Terminal	Function
1	Power supply 85 ÷ 264 Vac	14	+ Analog output 2
2	Power supply 85 ÷ 264 Vac	15	+ Analog output 1
3	Ground	16	- Common analog outputs
4	NO Set point 1	17	Common logic inputs
5	C Set point 1	18	Logic input 1
6	NO Set point 2	19	Logic input 2
7	C Set point 2	27	Temperature sensor input
8	NO Alarm	28	Common temperature sensor input
9	C Alarm	29	Common temperature sensor input
10	NC Alarm	30	pH/ORP reference electrode input
11	NO Autoclean	31	pH/ORP electrode input
12	C Autoclean		
13	NC Autoclean		

7.2   DIMENSIONS

98.0mm

98.0mm

>3■ ZERO   SENS   SET1   SET2
MODE   ∧   ∨   ENT

81.0mm

95.0

9.0mm

20.0mm

91.5mm

91.5mm

8   WARRANTY

1   Your product is guaranteed for 5 years from the date of purchase, for failure due to manufacturing defects.

2   The warranty is void in case of tampering or deterioration due to improper installation or maintenance.

3   The warranty covers only free repair at the laboratories of the manufacturer.

4   B&C Electronics is not liable for any damage arising from misusing its instruments and products.

_____

9   REPAIRS

For faster and efficient service it is recommended to fill in the "Information card" for the repair service and attach it to a "Repair order".

1   The estimated cost, if required by the customer, is free if the repair is confirmed. Otherwise flat rate results in a charge for the analytical work performed and expenses incurred.

2   The products to be repaired must be sent to B&C Electronics with freight prepaid. Any expenses incurred on behalf of the client and not previously agreed will be charged.

3   Our sales department will submit to the customer the repair estimate or offer a replacement in the following cases:

    –   repair cost is considered excessive in relation to the cost of the product;

    –   the repair is technically impossible or unreliable.

4   In order to reduce the time of delivery of the repaired products, unless otherwise offered or arranged by the customer, the shipment will be made with ex-factory, prepaid carriage by a courier.

INFORMATION SHEET
for service repairs

In the event of a fault, we recommend you contact our repair service, to photocopy and complete this information sheet to be attached to the product to be repaired.

□ ESTIMATE   □ REPAIR

_____
COMPANY NAME

_____
ADDRESS   ZIP   TOWN

_____
REFER TO MR/MRS   TELEPHONE

_____
MODEL   S/N   DATE

_____

Consult the instruction manual to identify the area of the defect and/or describe it:

□ SENSOR   □ ANALOG OUTPT

□ POWER SUPPLY   □ SET POINT

□ CALIBRATION   □ RELAYS CONTACTS

□ DISPLAY   □ INTERMITTENT PROBLEM

_____

DESCRIPTION OF THE DEFECT

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