Instruction manual

C 6587

CONDUCTIVITY CONTROLLER
wall mounting

Option
S/N
REP N°

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

Cod. 28003651 - Rev A

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 14)", 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 the electric conductivity of liquids consists of two main parts:

- the meter/regulator described in this instruction manual;
- the measuring cell.

The instrument contains the electronic circuitry and firmware to perform the following functions:

- measurement of conductivity, TDS, concentration (indirect measuring) and visualization of the resistivity of liquids, interfacing with the appropriate sensor/cell;
- measurement of temperature, if it is connected to a temperature sensor Pt100 or Pt1000;
- automatic or manual temperature compensation;
- automatic adjustment of the values o f the main measurement, if the relay outputs or analog outputs are connected to appropriate dosing pumps or valves;
- min/max alarm and a checkout time alarm on the set point;
- two analog output for the main measuring, temperature or PID;
- alarm or hold condition by two external contacts;
- automatic or manual cleaning cycles.

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 36)".

Maintenance staff could be more interesting in the chapters regarding:
- "Users instruction (page 36)";
- "Maintenance instructions (page 40)";
- "Warranty (page 54)";
- "Repairs (page 54)".

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;
- perform the correct installation;
- 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 general 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:
  - °C or °F temperature scale selection;

- manual temperature value;
- reference temperature value;
- temperature coefficient value or compensation table
- 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 operation)
- 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;
• type of measure: CONDUCTIVITY / TDS / INDIRECT;
• K of the cell;
• conductivity scale;
• TDS scale;
• TDS/EC conversion factor;
• indirect measuring unit, decimal point position and full scale;
• EC/indirect measuring table;
• resistivity measuring;
• filter software: LARGE and SMALL;
• type of temperature sensor: Pt100 / Pt1000;
• coefficient or compensation or temperature table;
• type of control: ON-OFF / PID;
• type of 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 1 and 2;
• 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.

After 3 minutes of inactivity on the keyboard, the screen automatically returns to the main display; In the displays showing the conductivity and resistivity parameters, you can disable this function by pressing the DOWN key.

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 8 keys which allow access to all functions available.

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 keys, see next paragraphs and chapters.

Inputs

The instrument performs the measurement of the main parameter and temperature.

The conductivity can be measured through cells with selectable K (cell constant) to cover the range from high purity water to high electrolytes concentration.

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

The instrument can be configured for measuring and regulating the conductivity or TDS or an indirect measure (by means of an 8 point editable EC/concentration conversion table).

The instrument in addition can show the calculated resistivity value.

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

Temperature compensation

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

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

Temperature compensation can be made by a wide choice of temperature coefficient selectable in the setup menu or by an 8-point table inserted in the configuration menu and reflecting the conductivity of the sample according to temperature.

The reference temperature can be selected at 20 ° C or 25 ° C.

The instrument contains the table of the intrinsic conductivity as a function of the water temperature without any ion, so in the ultrapure conductivity measurements only the pollutant temperature coefficient and the reference temperature are to be selected.

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 in the setup menu.

The function of these inputs can be selected as hold/alarm (HOLD/ALARM), whose actions are described in chapter "Technical specification (page 15)", and can be selected in the configuration menu.

HOLD condition always prevails on ALARM.

If the hold function is activated, in the display Messages section "Display (page 35)" the HOLD status will be displayed, if there is a previous alarm condition, this indication will be retained.

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 set point and alarm relays are not activated.

The set point status is not displayed on the main display.

This mode of operation is useful for initial and ordinary calibration and to follow the reading values in case of manual operation of the plant or during start up.

Simulated operation (SIM)

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

In this operating mode the users choose the displayed value by means of the keyboard (see chapter "Configuration (page 48)").

In this mode of operation, it is not possible to access the calibration of the main measurement parameters.

The type of action, set point values, and analog output parameters remain those previously set.

The values simulation allows testing the operation of the devices connected to relays and 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 has a setup menu whose access is protected by a specific password and where it is possible:

- disable the calibration functions and change the set points;
- set the measuring unit of the temperature and the manual temperature compensation;
- set the reference temperature for the compensation;
- choose the value of the temperature coefficient unless the compensation table has been configured;
- choose the operating parameters of 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 has a configuration menu protected by a specific password, in which you can select:

- operating mode: AUTO / MEAS / SIM;
- type of measure: CONDUCTIVITY / TDS / INDIRECT;
- K of the cell;
- conductivity scale;
- TDS scale;
- TDS/EC conversion factor;
- indirect measuring unit, decimal point position and full scale;
- EC/indirect measuring table;
- resistivity measuring;
- filter software: LARGE and SMALL;
- type of temperature sensor: Pt100 / Pt1000;
- coefficient or compensation temperature table;
- inserting a 8-point temperature compensation table;
- type of control: ON-OFF / PID;

- type PID: FM or WM on relay or analog output;
- minimum/maximum function of the set point LO / HI;
- alarms associated with the set point permanence time;
- condition of the alarm relay ACTIVE / NON ACTIVE;
- measure related to the analog outputs 1 and 2;
- outputs 0-20 mA or 4-20 mA scalable;
- hold/alarm function of the logic inputs;
- new password for configuration access.

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	8 keys
Operating temperature	-10 ÷ 60 °C
Humidity	95 % without condensate
Power supply	85 ÷ 2640 Vac +/- 10 % 50/60 Hz
	9 ÷ 36 Vcc 12 ÷ 24 Vac (091.428 option)
Power	6 VA max.
Isolation	4000 V between primary and secondary
Immunity performance loss	< 1 % full scale
Terminal blocks	extractable
Weight	1300 g
Dimensions	256 x 230 x 89 mm
Protection	IP 65
EMC/RFI conformity	EN61326
Registered design	002564666-002

4.2.2 TECHNICAL SPECIFICATION

In the left column is indicated the number of the display concerned:
- 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	**MEAN MEASURE**						**Default**
D1.0	Measure	Conductivity TDS Indirect (table)					
D1.0A		Conductivity parameters					
D1.5	Accessory measure	Resistivity (only visualization)					
	Input	cell 2 / 4 wires (opt. 091.1382)					
C1.0	Operating mode	HRZ 3 AUTO / MEAS / SIM					AUTO
C1.1	Measure type	CONDUCTIVITY /TDS / INDIRECT					COND.
C1.2	K cell	0.01 / 0.1 / 0.5 / 1.0 / 10					1.0
C1.3	Scales	1	2	3	4	5	
	K=0.01	200.0 nS / 2000 nS / 20.00 µS / 200.0 µS / 2000 µS					
	K=0.1	2000 nS / 20.00 µS / 200.0 µS / 2000 µS / 20.00 mS					
	K=0.5	10.00 µS / 100.0 µS / 1000 µS / 10.00 mS / 100.0 mS					
	K=1.0	20.00 µS / 200.0 µS / 2000 µS / 20.00 mS / 200.0 mS					2000 µS
	K=10	200.0 µS / 2000 µS / 20.00 mS / 200.0 mS / 2000 mS					
	Scales	Resolution	Reading limits				
	200.0 nS	0.1	-10.0 / 210.0				
	2000 nS	1	-100 / 2100				
	10.00 µS	0.01	-0.50 / 10.50				
	20.00 µS	0.01	-1.00 / 21.00				
	100.0 µS	0.1	-5.0 / 105.0				
	200.0 µS	0.1	-10.0 / 210.0				
	1000 µS	1	-50 / 1050				
	2000 µS	1	-100 / 2100				
	10.00 mS	0.01	-0.50 / 10.50				
	20.00 mS	0.01	-1.00 / 21.00				

D1.0	MEAN MEASURE				Default
	100.0 mS	0.1	-5.0 / 105.0		
	200.0 mS	0.1	-10.0 / 210.0		
	2000 mS	1	-100 / 2100		
D1.1	Zero (conductivity)	±10 % of the scale			0 %
	Calibration	the zero calibration is done automatically on all scales from the lowest one			
D1.2A	Sensitivity (conductivity) Calibration type	60 ÷ 160 % KCl STANDARD / MEASURE ADJ / SENS ADJ			100 % KCl STD
D1.3A	Calibration solution temperature	AUTO/MAN 0 ÷ 100 °C (32 ÷ 212 °F)			AUTO
D1.3C	SENS ADJ calibration	Sensitivity direct calibration. Ex. K=1,034 : Sens=103,4 % Ex. K=0.996 : Sens=99,6 %			
D1.4A	KCl STANDARD calibration TC for calibration	Man/auto with KCl STD solutions KCl solution's TC			
	Solutions standard KCl	0.01 N	0.1 N	1 N	
	Tref 20 °C	1278 µS	11.67 mS	102.1 mS	
	Tref 25 °C	1413 µS	12.88 mS	111.8 mS	
D1.4B	MEASURE ADJ calibration TC for calibration	Calibration by comparison or with STD solutions similar to process solution TC from configuration			
C1.3A	TDS scale	Scale EC	TDS scale	Resolution	
		200.0 nS	100.0 ppb	0.1 ppb	
		2000 nS	1000 ppb	1 ppb	
		10.00 µS	5.00 ppm	0.01 ppm	
		20.00 µS	10.00 ppm	0.01 ppm	
		100.0 µS	50.0 ppm	0.1 ppm	

D1.0	MEAN MEASURE				Default
		200.0 µS	100.0 ppm	0.1 ppm	
		1000 µS	500 ppm	1 ppm	
		2000 µS	1000 ppm	1 ppm	1000 ppm
		10.00 mS	5.00 ppt	0.01 ppt	
		20.00 mS	10.00 ppt	0.01 ppt	
		100.0 mS	50.0 ppt	0.1 ppt	
		200.0 mS	100.0 ppt	0.1 ppt	
		2000 mS	1000 ppt	1 ppt	
C1.4A	Conversion factor TDS/EC	0.450 / 1.000 1/S			0.500
D1.2	TDS calibration	1) Calibration by comparison or TDS solutions with automatic TDS factor correction. 2) Inserimento diretto del fattore TDS in configurazione.			
	Indirect measurement with programmable scale and table				
C1.4B	Measuring unit	% / ppt / ppm / ppb / g/l / mg/l / µg/l / Bè / Custom			%
C1.5B	Custom measuring unit	ABCD (4 characters max)			ABCD
C1.6B	Decimal point	YYYY / YYY.Y / YY.YY / Y.YYY			YYY.Y
C1.7B	Full scale	100 ÷ 9999 digit			100.0 %
C1.8B	EC/indirect measuring table	Editable up to 8 points			2 point
D1.2	Sensitivity (indirect measure)	80 ÷ 120 %			100 %
C1.9	Visualization resistivity measure	ON / OFF			OFF
		Scala EC	R scale		
		200.0 nS	5.00 ÷ 999.99 MOhm		
		2000 nS	0.500 ÷ 99.999 MOhm		
		10.00 µS / 20.00 µS	50.0 ÷ 9999.9 kOhm		
		100.0 µS / 200.0 µS	5.00 ÷ 999.99 kOhm		

D1.0	MEAN MEASURE			Default
		1000 µS / 2000 µS	0.500 ÷ 99.999 kOhm	
		10.00 mS / 20.00 mS	50.0 ÷ 9999.9 Ohm	
		100.0 mS / 200.0 mS	5.00 ÷ 999.99 Ohm	
		2000 mS	0.500 ÷ 99.999 Ohm	
C1.10	RT 90 % large signal	0.4 ÷ 50.0 seconds		2.0 s
C1.11	RT 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
S2.3	Reference temperature	20 / 25 °C	20 °C
C2.2	Thermocompensation	COEFFICIENT / TABLE	COEFF.
S2.4	Temperature coefficient	0.00 ÷ 3.50 %/°C (TABLE)	2.20 %/°C
	TEMP/EC table	Editable up to 8 points	

3.1	SET POINT 1		Default
C3.1	Type of regulation SET1	ON-OFF / PID	ON-OFF
		ON-OFF related to RELAY1	
		PID related to RELAY1 or OUT1	
C3.2	Regulation SET1 related to (only PID)	FM / WM / OUT1 FM / WM on RELAY1	FM
	ON-OFF regulation		

3.1	SET POINT 1		Default
D3.1	• Set point (cond.)	0 ÷ full scale	0 µS
S3.1A	• Hysteresis (cond.)	0 ÷10 % of full scale	2 µS
D3.1	• Set point (TDS / indirect)	0 ÷ full scale	0 ppm
S3.1A	• Hysteresis (TDS / indirect)	0 ÷10 % of full scale	1 ppm
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 (cond.)	0 ÷ full scale	0 µS
D3.1	• Set point (TDS / indirect)	0 ÷ full scale	0 ppm
S3.1B	• Proportional band	0.0 ÷ 400.0 %	1.0 %
S3.2B	• Integral time	0.0 ÷ 999.9 minutes	0.0 min
S3.2B	• Derivative time	0.0 ÷ 999.9 minutes	0.0 min
C3.3	• Function	LO / HI (Min / Max)	LO
	Regulation RELAY1 FM		
S3.4B	• Pulse frequency	0 ÷ 120 pulses/minute	100 i/min
	• Pulse length	0.1 seconds	
	Regulation RELAY1 WM		
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 RELAY2	
		PID related to RELAY2 or OUT2	
C3.5	Regulation SET2 related to (only PID)	FM / WM / OUT2 FM / WM on RELAY2	FM
	Regulation ON-OFF		
D3.2	• Set point (cond.)	0 ÷ full scale	0 µS
S3.5A	• Hysteresis (cond.)	0 ÷10 % of full scale	2 µS

3.2	SET POINT 2		Default
D3.2	• Set point (TDS / indirect)	0 ÷ full scale	0 ppm
S3.5A	• Hysteresis (TDS / indirect)	0 ÷10 % of full scale	1 ppm
S3.6A	• Delay	0.0 ÷ 100.0 seconds	0.2 s
C3.6	• Function	LO / HI (Min / Max)	HI
	Regulation PID		
D3.2	• Set point (cond.)	0 ÷ full scale	0 µS
D3.2	• Set point (TDS / indirect)	0 ÷ full scale	0 ppm
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	0.0 min
C3.6	• Function	LO / HI (Min / Max)	HI
	Regulation RELAY2 FM		
S3.8B	• Pulse frequency	0 ÷ 120 pulsee/minute	100 i/min
	• Pulse length	0.1 seconds	
	Regulation RELAY2 WM		
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 (cond.)	-0 % ÷ 100 % full scale	0 µS
S4.2	• High value (cond.)	-0 % ÷ 100 % full scale	2000 µS
	• Hysteresis (cond.)	± 0.1 % of full scale	
S4.1	• Low value (TDS / indirect)	-0 % ÷ 100 % full scale	0 ppm
S4.2	• High value (TDS / indirect)	-0 % ÷ 100 % full scale	1000 ppm
	• Hysteresis (TDS / indirect)	± 0.1 % of full scale	
S4.3	• Delay	0.0 ÷ 100.0 seconds	1.0 s
	Alarm on set point		
C4.1	• Alarm on operation SET1	ON / OFF	OFF

4.0	ALARM		Default
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	cond. (TDS) (indirect) / °C (°F)	µS
C5.2	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	
C5.3	Point 1 (0 mA o 4 mA) (cond.)	0 ÷ full scale	0 µS
C5.4	Point 2 (20 mA) (cond.)	0 ÷ full scale	2000 µS
C5.3	Point 1 (0 mA o 4 mA) (TDS / indirect)	0 ÷ full scale	0 ppm
C5.4	Point 2 (20 mA) (TDS / indirect)	0 ÷ full scale	1000 ppm
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	cond. (TDS) (indirect) / °C (°F)	µS
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) (cond.)	0 ÷ full scale	0 µS
C5.8	Point 2 (20 mA) (cond.)	0 ÷ full scale	2000 µS
C5.7	Point 1 (0 mA o 4 mA) (TDS / indirect)	0 ÷ full scale	0 ppm

D5.2	ANALOG OUTPUT 2		Default
C5.8	Point 2 (20 mA) (TDS / indirect)	0 ÷ full scale	1000 ppm
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 (2)		Default
	HOLD condition		
	• Analog output	HOLD	
	• Set point	HOLD	
	• Alarm status	Alarm relay OFF Alarm indication held on display	
	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 / AUTOCLEAN / MANUAL	OFF
	Cleaning parameters		
S7.2	• Repetition time	0.5 ÷ 100.0 hours	24 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	

D7.0	AUTOCLEAN		Default
	• 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
S2.3	Reference temperature	20 / 25 °C	20 °C
S2.4	Temperature coefficient	0.00 ÷ 3.50 %/°C (TABLE)	2.20 %/°C
S3.1A	Hysteresis SET1 (ON-OFF)	0 ÷10 % of FS	2 µS
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=disabled)	0.0 min
S3.4B	Pulse frequency FM SET1	0 ÷ 120 pulses/minute	100 i/min
S3.4B	Pulse width WM SET1	0 ÷ 99.9 seconds	20.0 s
S3.5A	Hysteresis SET2 (ON-OFF)	0 ÷10 % of FS	2 µS
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=disabled)	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 % ÷ 100 % full scale	0 µS
S4.2	Alarm HI (high)	0 % ÷ 100 % full scale	2000 µS
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 / AUTOCLEAN / 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	Measure type	CONDUCTIVITY / TDS / INDIRECT	COND.
C1.2	K cell	0.01 / 0.1 / 0.5 / 1.0 / 10 cm-1	1.0 cm-1
C1.3	EC scales		
	K=0.01	200.0 nS / 2000 nS / 20.00 µS / 200.0 µS / 2000 µS	
	K=0.1	2000 nS / 20.00 µS / 200.0 µS / 2000 µS / 20.00 mS	
	K=0.5	10.00 µS / 100.0 µS / 1000 µS / 10.00 mS / 100.0 mS	
	K=1.0	20.00 µS / 200.0 µS / 2000 µS / 20.00 mS / 200.0 mS	2000 µS
	K=10	200.0 µS / 2000 µS / 20.00 mS / 200.0 mS / 2000 mS	
C1.3A	TDS scale	Depending on the cell K	1000 ppm
C1.4A	TDS/EC conversion factor	0.450 ÷ 1.000 1/S	0.670
C1.4B	Measuring unit	% / ppt / ppm / ppb / g/l / mg/l / µg/l / Bè / Custom	%
C1.5B	Custom measuring unit	ABCD (4 characters max)	ABCD
C1.6B	Decimal point	YYYY / YYY.Y / YY.YY / Y.YYY	YYY.Y
C1.7B	Full scale	100 ÷ 9999 digit	100.0 %
C1.8B	EC/indirect measuring table	Editable up to 8 points	2 point
C1.9	Resistivity measure	ON / OFF	OFF
C1.10	RT Large Signal	0.4 ÷ 50.0 seconds	2.0 s
C1.11	RT Small Signal	0.4 ÷ 50.0 seconds	10.0 s
C2.1	Temperature sensor	Pt100 / Pt1000	Pt100
C2.2	Thermocompensation	COEFFICIENT / TABLE	COEFF.
C3.1	SET 1 regulation	ON-OFF / PID	ON-OFF
C3.2	SET 1 actuation (PID only)	FM / WM / OUT1	FM
C3.3	SET 1 function	LO / HI (Min / Max)	LO
C3.4	SET 2 regulation	ON-OFF / PID	ON-OFF
C3.5	SET 2 actuation (PID only)	FM / WM / OUT2	FM
C3.6	SET 2 function	LO / HI (Min / Max)	HI
C4.1	Alarm related to SET1 operation time	ON / OFF	OFF
C4.2	SET1 operation time	0 ÷ 60 minutes	60 min
C4.3	Alarm related to SET2 operation time	ON / OFF	OFF

D60.0	CONFIGURATION		Default
C4.4	SET2 operation time	0 ÷ 60 minutes	60 min
C4.5	Alarm function	ACTIVE / NON ACTIVE	ACTIVE
C5.1	Measure on analog output 1	cond. (TDS) (indirect) / °C (°F)	µS
C5.2	Analog output 1 range	0-20 / 4-20 mA	0-20 mA
C5.3	Point 1 analog output 1	0 ÷ full scale	0 µS
C5.4	Point 2 analog output 1	0 ÷ full scale	2000 µS
C5.5	Measure on analog output 2	cond. (TDS) (indirect) / °C (°F)	µS
C5.6	Analog output 2 range	0-20 / 4-20 mA	0-20 mA
C5.7	Point 1 analog output 2	0 ÷ full scale	0 µS
C5.8	Point 2 analog output 2	0 ÷ full scale	2000 µS
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	C6587 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.
Panel installation must be performed on a rigid surface, in a protected position from shock and corrosive fumes.
Accessories for alternate mounting are available on request (see Fig. 3 and Fig. 4 of chapter "Dimensions and installation (page 52)").

5.4.1 WALL MOUNTING INSTRUCTIONS

The instrument requires 3 screws and fixing accessories suitable for the wall material for mounting (see Fig. 2):
- a screw in the top center of the instrument to hang it;
- two fixing screws at the bottom of the instrument.

Open the front cover to fix these two screws.
The diameter for the top screw head is 8.5 mm.
The diameter for the bottom screws is 4.7 mm.

Mounting without a drilling template

1 Fix the central screw on the wall, ensuring a distance of 6 mm between the screw head and the wall.

2 Remove the front cover of the instrument.

3 Hang the instrument on the central screw (attention to the projection of the screw head, if excessive it can remove the instrument's inner seal).

4 Mark on the wall the position of the bottom holes.

5 Remove the instrument and drill the two holes.

6 Hang the instrument again.

7 Fasten the two bottom screws in the holes.

8 After making all electrical connections required, close the lid.

Mounting with a drilling template

1 Prepare a drilling template according to the measurements shown in Fig. 1 of chapter "Dimensions and installation (page 52)".

2 Make the 3 holes required.

3 Perform actions 1-2-3-7-8 from "Mounting without a drilling template".

5.5 INSTALLATION OF THE CONDUCTIVITY CELL

The conductivity cell must be installed properly if you want the system to function accurately and efficiently.

In particular, it should be noted that:

- the sample in contact with the cell must be representative of the solution to be measured;
- the liquid must circulate continuously through the cell; if the cell is immersed, the liquid must be agitated;
- the flow ratey must be such as to avoid cavitation;
- the assembly of the cell must be such as to avoid air bubbles on the electrodes; generally a 45 ° installation or an elbow with the electrodes invested by the flow does not create problems;
- sediments or deposits of foreign materials should not be accumulated in the area of the electrodes affected by the measurement;
- verify that the temperature and pressure limitations of the used cell are respected.

It is also necessary to verify that the type of cell used is adequate to the selected measuring range and that the connection cable is adequate to the distance between the cell and the instrument.

Measurement of low conductivity values may require the use of a special cable (eg the SZ 927.1 model) and special arrangements in connection with instruments installed at large distances from the cell. Contact our sales offices for advice and assistance in special applications.

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

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

In case of need or cable extension use high insulation terminal block and protected against moisture

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

5.6 ELECTRICAL INSTALLATION

For all the electrical connections refer to the printing on the rear panel of the instruments, also shown and described in the chapter "Installation drawings (page 51)".

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

The cable glands are supplied with a cap that ensures IP65 seal; unscrew the nut and remove it only for the cable glands actually used.

Use cables of the appropriate diameter to ensure the IP65 sealing.

The power connections are on two terminal blocks (one for a power supply and one for connection to the relays).

The connections of the input signals of the transmitters are on a 7-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 CONDUCTIVITY CELL

⚠ The connection of the cell is the most critical part of the whole system.

The application also accidentally of voltages not related to the process can damage the circuitry of the input amplifier:

- use only the cables supplied with the sensor;

- avoid interruptions in the cables. If necessary use only special blocks at a very high insulation and protection from moisture;

- very long connections may require "zero" compensation in case of low conductivity values;

- keep the cell cable far from the power cables also inside the switch board.

Two electrodes cell

Connect the cell to terminals 22 and 20 marked CO and CI.

In case of coaxial cell connect the central electrode to the terminal 20 marked CI and the external electrode to the terminal 22 marked CO.

Four electrodes cell

Refer to the manuals for option 091.1382 "4 electrodes input option" and for the cell used.

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 measurement is necessary to connect the temperature sensor Pt100 or Pt1000 as shown in chapter "Connection diagram (page 51)", 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 17-18 (marked T2-T1) and install a jumper between 16-17 (marked T0-T2).

Three wire Pt100 / Pt1000 connection for large distances

- Connect a Pt100 / Pt1000 wire to terminal 18 marked T1.
- Connect the Pt100 / Pt1000 common wire to terminal 16 marked T0 and to terminal 17 marked T2 using two separate wires.

⚠ 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 3.

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 (+) of the device N°1 to the terminal 30 marked R1 +.
- Connect the (+) of the device N°2 to the terminal 31 marked R2 +.
- Connect the (-) of the device to the terminal 29 marked R0 -.

If the analog output signal has to drive multiple devices, they must be connected in "series" with each other. The sum of their input resistance should not exceed 600 Ω.

Alternatively, the outputs can be used for PID control and then connected to actuators designed to accept an analog current signal (the connection is similar to the one used for reading / recording devices).

⚠ Do not supply any power to the analog output so as not to damage 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 4 marked NO : normally open

terminal 5 marked C : common

SET POINT 2

terminal 6 marked NO : normally open

terminal 7 marked C : common

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 45)" and "Setup (page 45)").

To change the minimum/maximum (LO/HI) function of the set point, see chapter "Configuration (page 48)".

ALARM

terminal 8 marked NO : normally open

terminal 9 marked C : common

terminal 10 marked NC : normally closed

The alarm relay can be configured ACTIVE/NOT ACTIVE during alarm conditions.
The configuration NOT 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 45)").

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 27-28 (marked D1-D+) e 26-28 (marked D2-D+).
The activation and the configuration of the logic input are described on the display S6.1 ("Setup (page 45)") and C6.1 ("Configuration (page 48)").
The hold or alarm function are described on the chapter "Technical specification (page 15)".

5.6.7 CONNECTING THE CLEAN SYSTEM

The contacts of the cleaning relay are on the terminal block of the instrument.
terminal 11 marked NO : normally open
terminal 12 marked C : common
terminal 13 marked NC : 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 CONDUCTIVITY MEASURING PRINCIPLES

The instrument is used to measure the electrical conductivity of a liquid that depends on the ionic concentration in solution.

The conductivity measurement is carried out by means of a cell with two electrodes of geometric size defined and completely surrounded by the liquid to which an alternating voltage of appropriate frequency is applied, to avoid polarization of the same caused by electrochemical effects.

Electrode geometry defines the cell constant, normally referred to as "K".

Normally it is used a cell having the value K = 1, but this instrument can work with conductivity cells having values K = 0.01, K = 0.1, K = 0.5 and K = 10 in order to obtain measurements in a very wide range.

The type of electrodes material sets limits on the choice of the measurement scale normally indicated in the specifications of the cell itself.

The temperature of the solution has a significant influence on the measurement as it depends on the ionic activity of the substances present in the sample.

There is therefore a significant increase in conductivity as the temperature increases even if the sample content remains constant.

In many cases, it is important to have a temperature-independent conductivity measurement and refer to a conventional temperature (20 °C or 25 °C). It is necessary to use the automatic compensation of the temperature effect, by detecting the temperature with a sensor immersed in the sample and the electronic correction of the measured conductivity value.

In the case of very high conductivity values, a four electrodes cell should be used in order to obtain good linearity and a wide degree of independence from the electrodes dirty conditions.

6.2 ULTRA PURE WATER CONDUCTIVITY MEASURING PRINCIPLE

This instrument measures the conductivity of ultrapure water taking into account the conductivity of the same at the temperature considered and the conductivity of the pollutant.

The value of the conductivity of the ultrapure water as a function of the temperature is stored in a table and the compensation of the effect of the temperature caused by the pollutant is carried out by means of a temperature coefficient selected by the user.

The unit uses the equation:

$$C_{Tref} = \frac{C_t - C_{wt}}{1 + \mathrm{Tc(t - Tref)}} + C_{wTref}$$

C_{Tref}	conductivity at the reference temperature (20, 25 °C)
Ct	conductivity at the operating temperature
C_{wt}	ultra pure water conductivity at the operating temperature
C_{wTref}	ultra pure water conductivity at the reference temperature
t	operating temperature
Tref	reference temperature (20, 25 °C)
Tc	temperature coefficient of the dissolved ions

Therefore the conductivity of the sample at the selected reference temperature is equal to the sum of the conductivity due to the pollutant (temperature compensated value) and the conductivity of the ultrapure water at the reference temperature.

The temperature/conductivity table used for ultrapure water is the following:

°C	0	10	20	30	40	50	60	70	80	90	100
nS	11.6	23.0	41.9	71.0	113.5	172.1	249.8	348.6	469.4	611.4	770.9
Mohm	86.3	43.4	23.9	14.1	8.8	5.8	4.0	2.9	2.1	1.6	1.3

6.3 TDS MEASURING PRINCIPLE

TDS (total dissolved solids) measurements are required in particular applications to know the impurities present in the solution that can create incrustations (such as in boilers or cooling towers) or in solutions with high salinity such as in sea water.

The measurement method consists of evaporating a liter of sample from which the solids are removed/filtered, and weighed the dry residue.

However, for practical and economic reasons, an indirect measurement is carried out continuously by the conductivity measurement that is converted by the instrument into ppm or mg/l, multiplying the conductivity value for the conversion coefficient.

Therefore, the validity of the measure is closely related to the correctness of that coefficient.

Depending on the applications, three different conversion coefficients are used, referring to solutions containing sodium chloride, potassium chloride or a mixture called 442 (consisting of 40% sodium sulphate, 40% sodium bicarbonate and 20% sodium chloride).

It should be noted that the conversion coefficients vary depending on the concentration of the solution.

For example, in solutions at 25 ° C with conductivity from 80 µS to 80 mS the coefficients vary as follows:

- NaCl: from 0.475 to 0,605;
- KCl: from 0,505 to 0,650;
- 442: from 0,655 to 0,995.

The instrument allows you to measure the TDS by entering a selectable conversion coefficient within a wide range of values.

The TDS-configured instrument keeps all the adjustment, alarm and analogue outputs present in the conductivity measurement.

Calibrations should instead be carried out in the conductivity scale corresponding to the TDS scale, by using standard conductivity solutions.

However, it is possible to fine-tune the coefficient by entering the value of a known solution or by comparing it with a field instrument.

6.4 CONCENTRATION MEASURING PRINCIPLE (INDIRECT MEASURING)

The concentration measurement is required in particular applications with solutions that contain predominantly one type of electrolyte such as hydrochloric acid, sulfuric acid, nitric acid, sodium hydroxide, calcium chloride, and so on.

The measurement method consists of a specific laboratory analysis for each type of substance.

However, in some cases, an indirect measure is continuously carried out using the conductivity measurement that is converted to %, ppm, mg / l, gr / l etc. by a conversion table.

The instrument allows you to carry out the concentration measurement (indirect measurement) by inserting a conversion table of up to 8 points.

In this configuration it keeps all the adjustment, alarm and analog outputs present in the conductivity measurement.

Calibrations should instead be carried out in the conductivity scale corresponding to the concentration scale, using standard conductivity solutions.

However, it will still be possible to fine-tune the conversion by entering the value of a known or comparable laboratory solution.

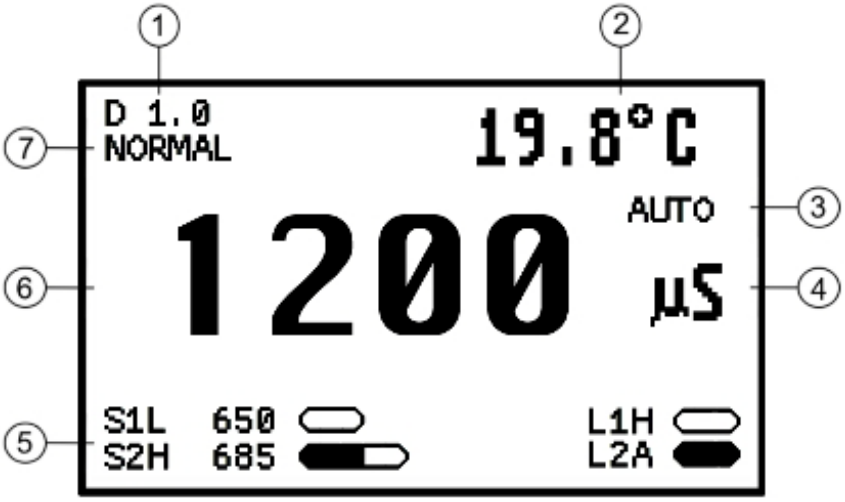
6.5 RESISTIVITY MEASURING PRINCIPLE

The electrical resistivity is the attitude of a material to resist to the passage of electric charges and same as the conductivity it depends on the ionic concentration in solution.

The instrument allows the display of the resistivity and the conductivity value from which it is calculated and on which the adjustments will be made.

The measure of resistivity is usually used for the characterization of ultrapure waters.

6.6 DISPLAY



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

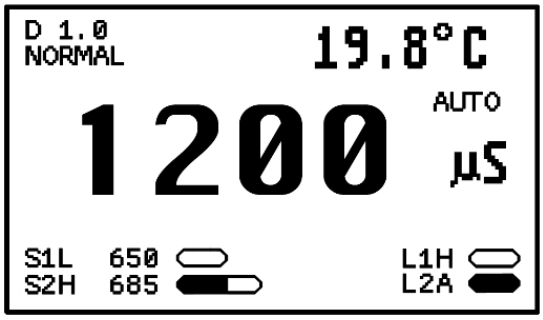
6.7 KEYBOARD

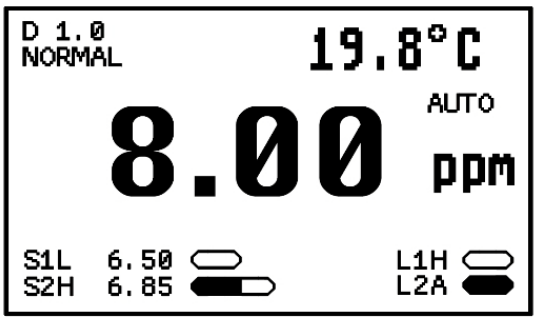
KEYS	FUNCTION
ZERO	- To access the zero calibration
SENS	- To access the sensitivity calibration
SET 1	- To access the set point 1 setting
SET 2	- To access the set point 2 setting
MODE	- To visualize the available displays - To exit from the not confirmed calibrations sequences
∧	Key "UP" - To modify (increase) the displayed data - To turn the unit to the main display
∨	Key "DOWN" - To modify (decrease) the displayed data - To not return to the main display (valid only for D1.0A and D1.5)
ENT	- To enter the effected changings and selections

6.8 USERS INSTRUCTION

6.8.1 MAIN MEASURE

The display shows the measured value in the configurated unit and allows the setting of the set points and the fine calibration for TDS or indirect measurements if they have not been retained by the maintainer.



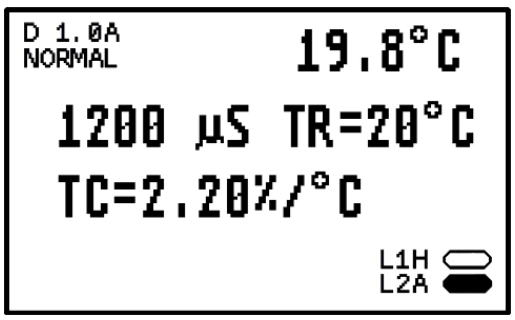


If the user has enabled the cleaning function, during the cleaning cycle the instrument will show the value of the measure and the cleaning phase in progress: CLEAN or HOLD.

Symbol map	
	Active relay or input
	Non active relay or input
	Relay's activation delayed
	Proportional activation level (PID)

6.8.2 CONDUCTIVITY PARAMETERS

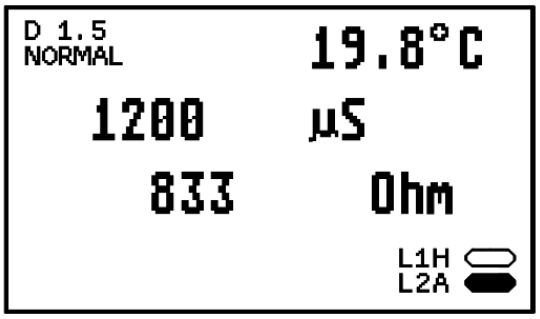
Press MODE from the display D1.0 to visualize the conductivity parameters and to access to the calibration procedures, if these were not reserved to the maintenance staff.



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

6.8.3 RESISTIVITY MEASURE

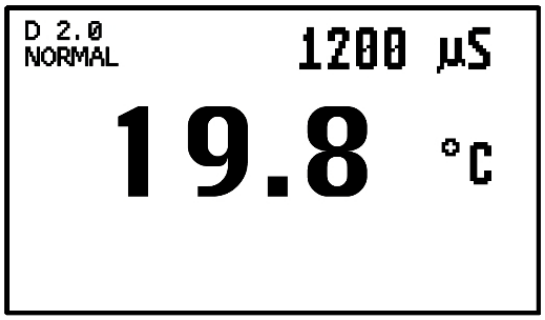
Press MODE two times from the display D1.0 to visualize the conductivity measure and the resistivity value only if configurated.



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

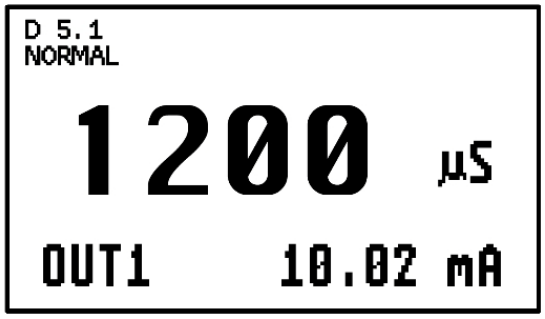
6.8.4 TEMPERATURE VALUES

Press MODE three times (two if the resistivity measure is not active) from the display D1.0 to visualize the temperature value and to access to its calibration.



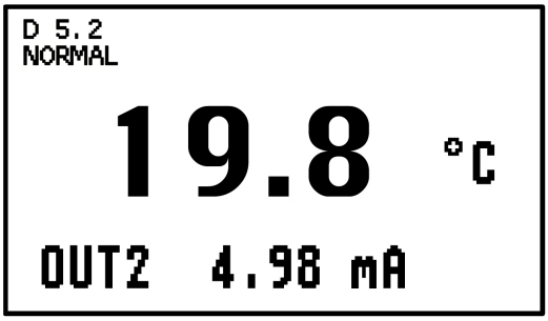
6.8.5 ANALOG OUTPUT 1 VALUES

Press MODE four times (three if the resistivity measure is not active) from the display D1.0 to visualize the output signal and the corresponding current value.



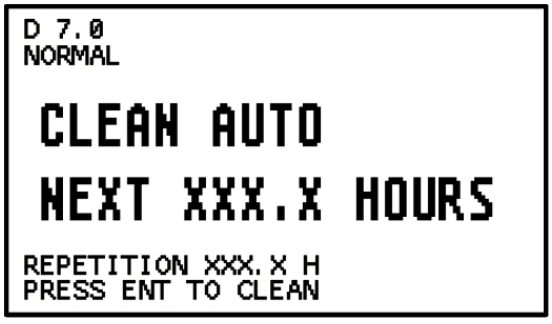
6.8.6 ANALOG OUTPUT 2 VALUES

Press MODE five times (four if the resistivity measure is not active) from the display D1.0 to visualize the output signal and the corresponding current value.



6.8.7 CLEANING FUNCTION

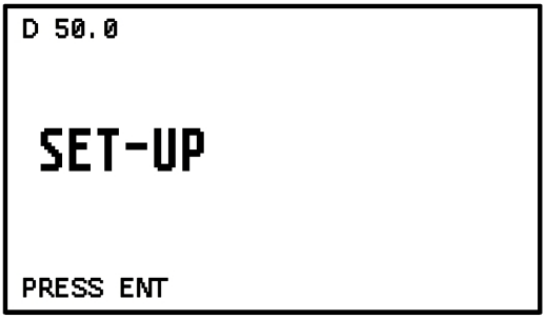
Press MODE six times (five if the resistivity measure is not active) from the display D1.0 to visualize the autoclean state, the remaining time to the next cycle and the repetition time as configured in the setup menu.



ENT to start a cleaning cycle.

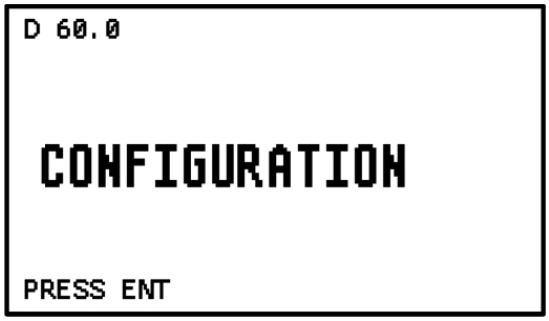
6.8.8 PARAMETERS FOR THE MAINTENANCE

Press MODE seven times (six if the resistivity measure is not active) from the display D1.0 to visualize the SETUP display to access to the maintenance menu of the unit.



6.8.9 PARAMETERS FOR THE PLANT ENGINEER

Press MODE eight times (seven if the resistivity measure is not active) from the display D1.0 to visualize the CONFIGURATION display to access to the installation menu of the unit.



6.8.10 INFORMATION MENU

Press MODE nine times (eight if the resistivity measure is not active) from the display D1.0 to visualize the information menu from which you can access the information functions of the instrument.

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 C6587 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	

6.9 MAINTENANCE INSTRUCTIONS

6.9.1 PRELIMINARY OPERATIONS

Any control of the operation must take place with the measuring cell connected to the input of the instrument.

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

Follow the procedures described in the chapter "Setup (page 45)" 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.

6.9.2 MEASUREMENTS

In order to operate the system, verify previously the following:

- the sensors are connected and in contact with the liquid;
- 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 26)", the system will work correctly and it will need just the calibration, the set points and alarm values selection.

6.9.3 CONDUCTIVITY CALIBRATION

Install the cell into the flow cell and connect it to the instrument.

The calibration of the zero and the sensitivity of the instrument can be performed on the conductivity measurement.

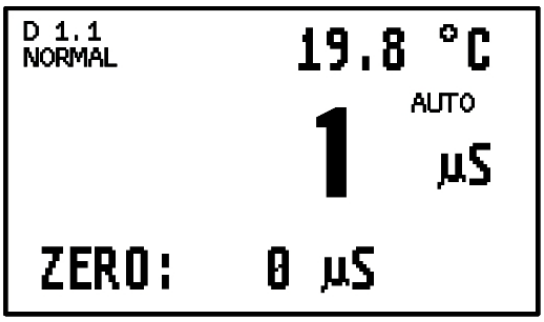
Zero calibration

The zero calibration, if necessary, is done by keeping the dry cell in air.

If there are no effects due to the length and type of connection cable, the value of the measurement should indicate the zero value.

Please contact our sales office for very high zero values.

Press ZERO from display D1.0A to get the following display:



ENT to start the zero calibration for every scale

The unit will make the zeroing of the 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

The instrument is supplied with a factory calibration that is equivalent to the use of a cell with K = 1.

Sensitivity calibration is used to compensate the K cell value different from the nominal one.

Usually a known KCl solution is used, chosen within the range of measurements in which it is intended to operate.

Press SENS from the display D1.0A.

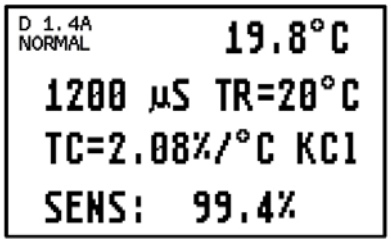
The unit will ask to select the calibration type to be performed.

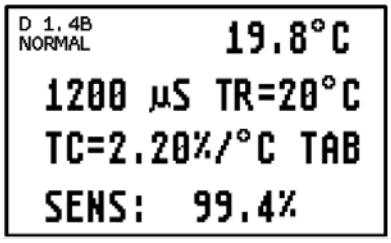
- KCl STANDARD: If you choose to calibrate with the standard KCl solution, you are asked whether the temperature compensation is done automatically (AUTO) or manual (MAN) at a set value.
- The instrument performs the calibration by applying the actual KCl temperature coefficient which may be different from that set for the temperature compensation of the sample in question.This implies that after the calibration the measurement value of the standard is slightly different from that of the standard itself;
-
- MEASURE ADJ: If you choose to calibrate the conductivity value by comparison, you are asked if the temperature compensation is performed in AUTO or MAN (MAN) at a set value. The instrument performs the calibration by applying the temperature coefficient set for the solution under consideration;
-
- SENS ADJ: If you choose to set the cell's nominal value. This method is used especially in ultra-pure water applications due to the difficulty of obtaining reliable reference standards.

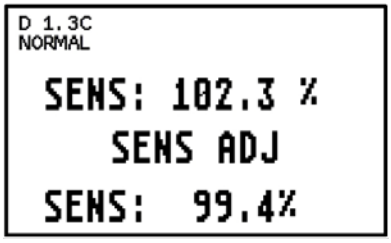
UP and DOWN to change the displayed value

ENT to confirm the displayed value

After confirming the choice and the type of compensation to be used, you will be able to calibrate.







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 almost all cases it can be considered sufficient to perform only the sensitivity calibration that should be made with the methods given in the previous chapter.

Error messages

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

Deviations of zero value above +/- 10 % of full scale and deviations of the sensitivity under 60 % or above 160 % of full scale, are considered errors.

In case of error is advisable to check the sensor, the actual value of the K cell and its state of cleaning.

6.9.4 TDS CALIBRATION

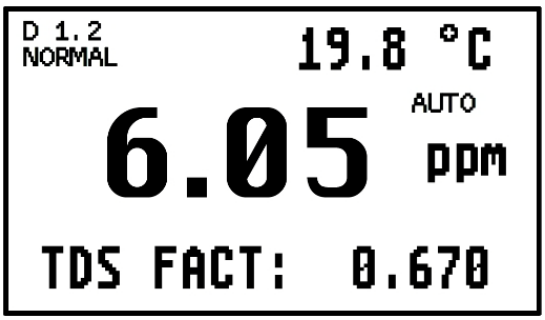
On TDS measure it can be done zero and sensitivity calibration.

Sensitivity calibration

The instrument comes with a factory configuration with a conversion coefficient of 0.670 that can be edited in the configuration menu.

Sensitivity calibration allows to change the conversion coefficient to show on the display the value of the standard solution used or the laboratory value or that of a reference instrument.

Press SENS to get the following display:



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.

6.9.5 INDIRECT MEASURE CALIBRATION

On main measure it can be done zero and sensitivity calibration.

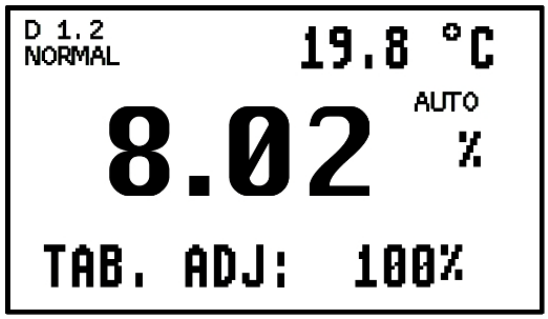
Sensitivity calibration

This calibration can be performed when the conductivity/concentration conversion table has been inserted into the configuration menu.

Sensitivity calibration allows to obtain on the display the value of the sample concentration obtained by the laboratory or known by the user.

This calibration does not change the table curve and applies the resulting percentage variation on all points of the table.

Press SENS to get the following display:



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.

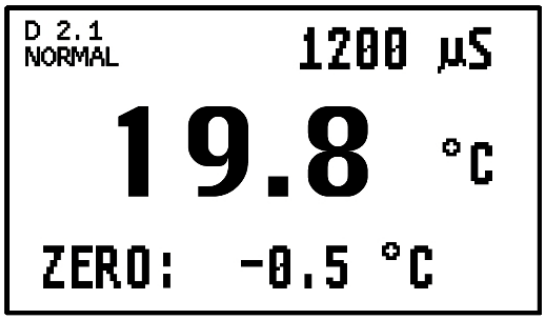
6.9.6 TEMPERATURE CALIBRATION

Temperature sensor connected

It can be done when the temperature sensor is connected to the unit.

Immerse 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
ZERO	press the key to get the following display:



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.

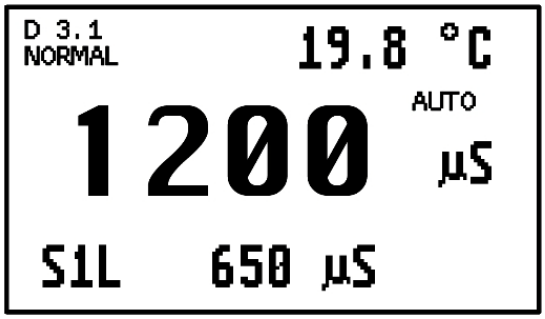
The user can reset to zero factory value as follows
start the temperature calibration, simultaneously press UP, DOWN and ENT.

Temperature sensor not connected

The temperature for the manual compensation can be changed in the setup menu, refer to the chapter "Setup (page 45)".

6.9.7 SET POINT

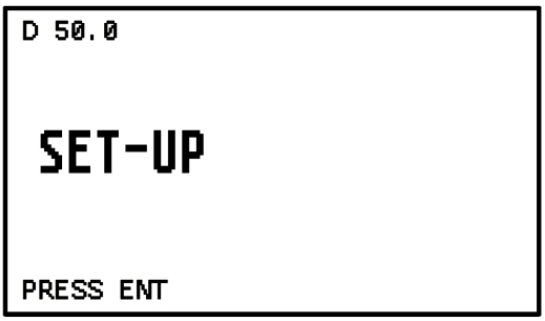
Press SET1 or SET2 to get the following display:



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

6.9.8 SETUP

Press MODE seven times (six if the resistivity measure is not active) from the display D1.0 to get to the D50.0 display.



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	Variable

Display	Contents	Meaning	Possible values
S2.3	REFERENCE TEMP. 20 °C	Reference temperature	20 / 25 °C
S2.4	TEMP.COEFFICIENT 2.20%/°C	Temperature coefficient	0.0 ÷ 3.50 %/°C (TABLE)
S3.1A	HYSTERESIS SET1 2 µS	Hysteresis of the set point 1	Variable
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
S3.5A	HYSTERESIS SET2 2 µS	Hysteresis of the set point 2	Variable
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 µS	Alarm relay minimum value	Variable
S4.2	HI ALARM 2000 µS	Alarm relay maximum value	Variable
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

Display	Contents	Meaning	Possible values
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

6.9.9 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.

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.
- Check that the cable glands are properly tightened.

6.9.10 SENSORS MAINTENANCE

Keep in mind that the instrument may provide incorrect measures due to the sensor to which adequate maintenance must be made according to the instructions in the manual.

Sensors should be inspected and cleaned regularly, more frequently in case of applications in alkaline liquids or containing fats or organic substances.

Periodically, depending on the application requirements, calibration operations are required.

6.10 INSTALLATION INSTRUCTION

6.10.1 SAFETY REQUIREMENTS

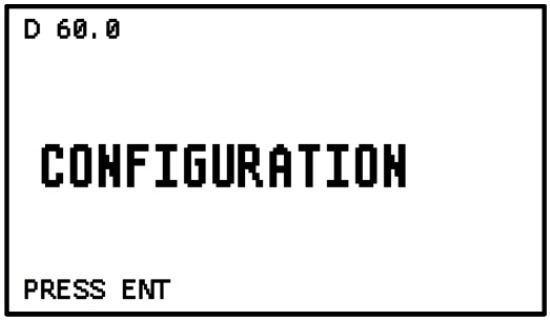
⚠ After performing the installation (see chapter "Installation (page 26)"), before turning the power on and proceed to the configuration of the instrument is recommended to do the following:

- check that the terminal 3 is grounded;
- check that all connections are correct;
- check that all connections 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.

6.10.2 CONFIGURATION

Press MODE eight times (seven if the resistivity measure is not active) from the display D1.0 to get the D60.0 display.



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 some configuration parameters may not be displayed.

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

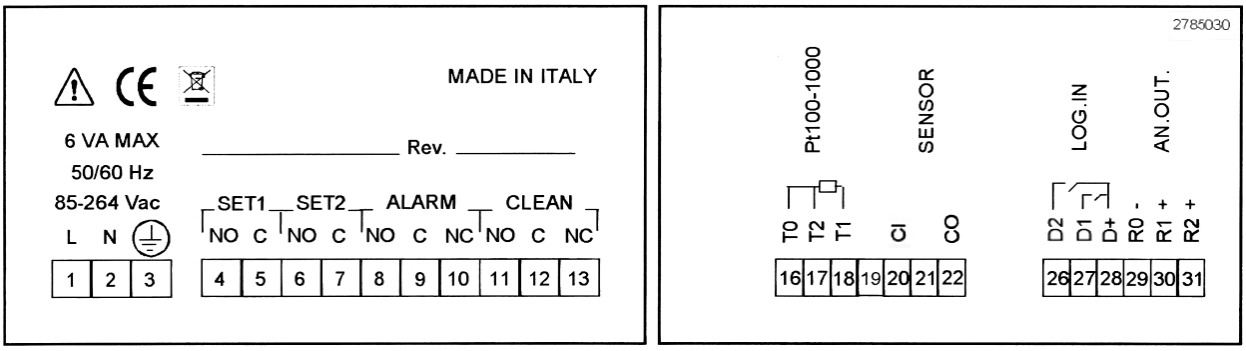
Display	Contents	Meaning	Possible values
C1.1	MEASURE TYPE CONDUCTIVITY	Mesure type	CONDUCTIVITY TDS INDIRECT
C1.2	K CELL 1.0	Sensor type selection	0.01/0.1/0.5 1.0/10
C1.3	EC SCALE 2000 µS	Full scale selection	Variable
C1.3A	TDS SCALE 1000ppm 2000 µS	TDS scale selection	Variable
C1.4A	TDS FACTOR 0.500 1/S	TDS conversion factor selection	0.450 ÷ 1.000 1/S
C1.4B	INDIRECT M. UNIT %	Indirect measuring unit selection	% / ppt / ppm / ppb / g/l /mg/l / µ/l / Bè / Custom
C1.5B	IND. CUSTOM UNIT ABCD	Custom indirect measuring unit selection	ABCD
C1.6B	DECIMAL POINT YYY.Y	Decimal point selection	YYYY / YYY.Y YY.YY / Y.YYY
C1.7B	INDIRECT SCALE 100.0 %	Full scale selection	100 ÷ 9999 digit
C1.8B	IND. MEAS. TABLE EMPTY	EC/indirect measuring table setting	Editable up to 8 points
C1.9	RESISTIVITY OFF	Resistivity measuring enabling	ON / OFF
C1.10	RT LARGE SIGNAL 2.0 s	Large filter software time setting	0.4 ÷ 50 s
C1.11	RT SMALL SIGNAL 10.0 s	Small filter software time setting	0.4 ÷ 50 s
C2.1	TEMP. SENSOR PT100	Pt100/Pt1000 temperature sensor type	PT100 PT1000
C2.2	THERMOCOMP. COEFFICIENT	Thermocompensation coefficient	COEFFICIENT TABLE
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 µS	Measure related to the analog output 1	µS (ppm) °C (°F)
C5.2	OUT1 0-20 mA	Range of the analog output 1	0-20 mA 4-20 mA
C5.3	OUT1 POINT P1 0 µS	First point of the analog output 1	Variable
C5.4	OUT1 POINT P2 2000 µS	Second point of the analog output 1	Variable
C5.5	OUT2 INPUT µS	Measure related to the analog output 2	µS (ppm) °C (°F)
C5.6	OUT2 0-20 mA	Range of the analog output 2	0-20 mA 4-20 mA
C5.7	OUT2 POINT P1 0 µS	First point of the analog output 2	Variable
C5.8	OUT2 POINT P2 2000 µS	Second point of the analog output 2	Variable
C6.1	LOGICINPUT1 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 simulated 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	16	T0 (common temperature sensor input)
2	Power supply 85/264 Vac	17	T2 (common temperature sensor input)
3	Ground	18	T1 (temperature sensor input)
4	NO Set1	19	
5	C Set1	20	Central electrode input
6	NO Set2	21	
7	C Set2	22	External electrode input
8	NO Alarm	26	Logic input 2
9	C Alarm	27	Logic input 1
10	NC Alarm	28	Common logic inputs
11	NO Autoclean	29	- Analog outputs (common)
12	C Autoclean	30	+ Analog output 1
13	NC Autoclean	31	+ Analog output 2

7.2 DIMENSIONS AND INSTALLATION

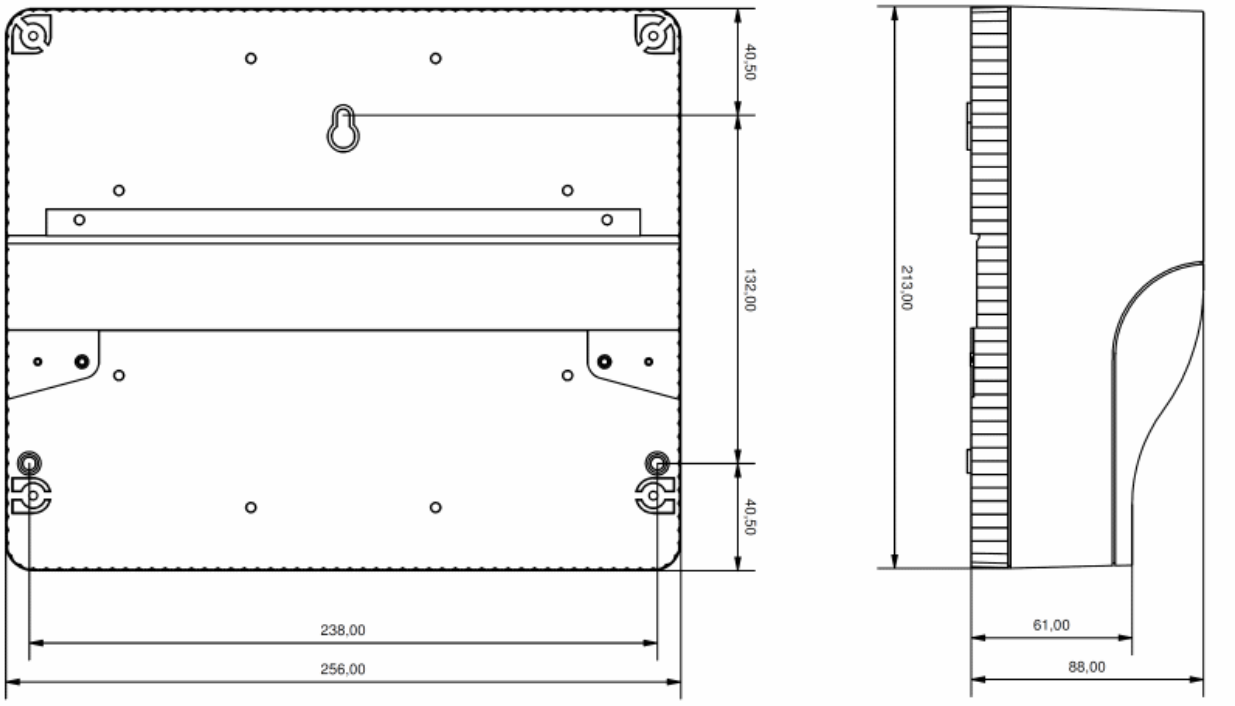


Fig. 1 Dimensions

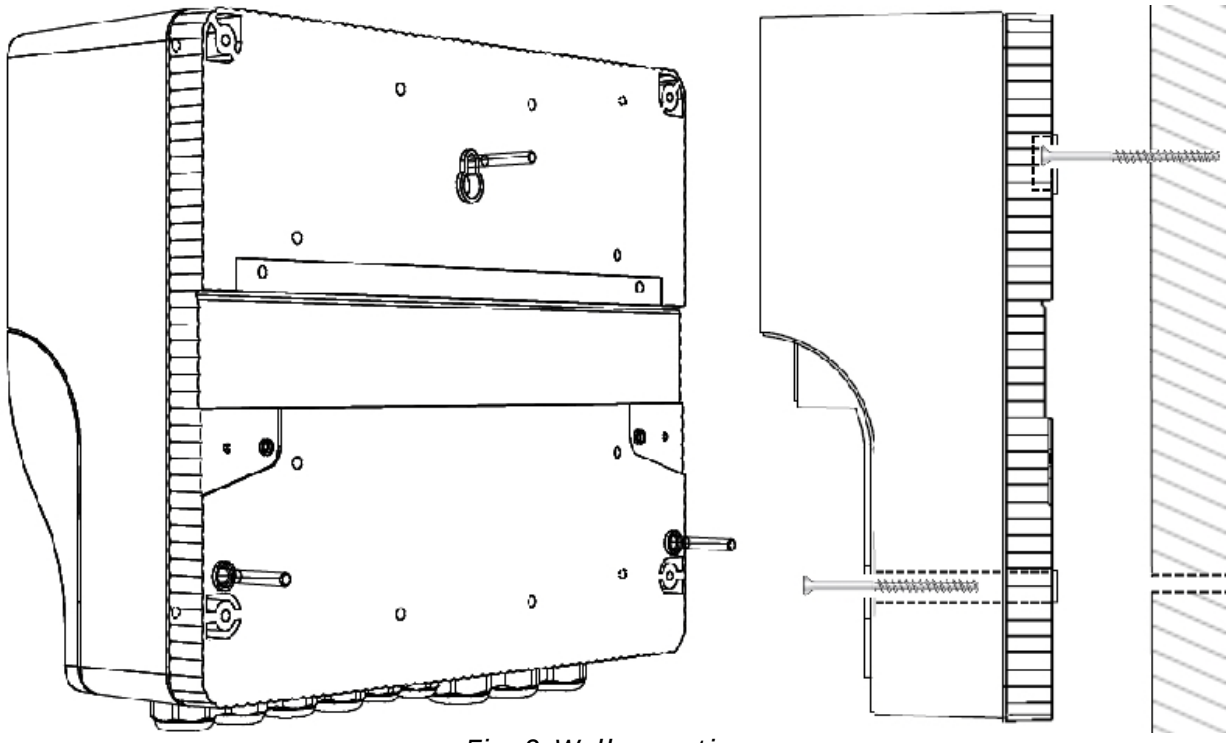


Fig. 2 Wall mounting

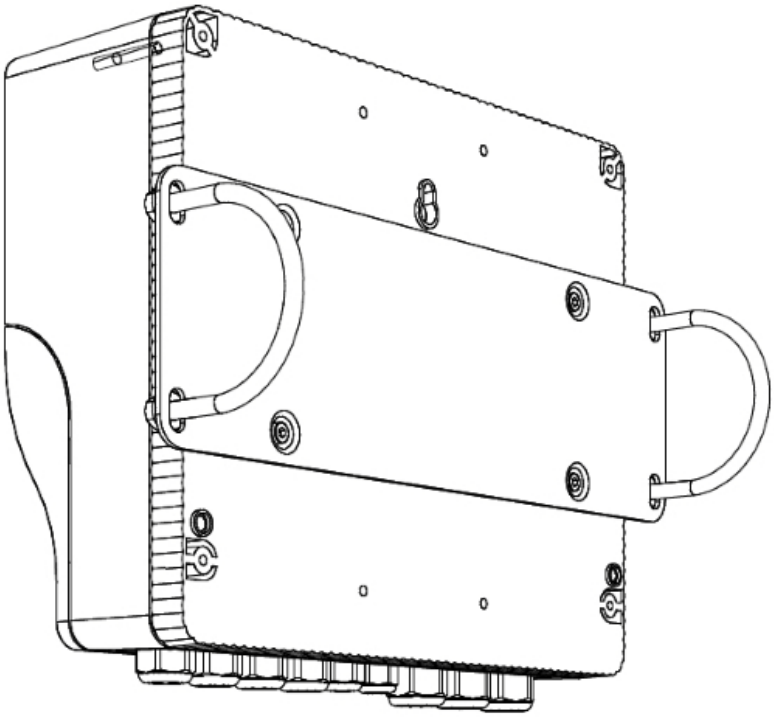


Fig. 3 Pipe mounting (horizontal or vertical)

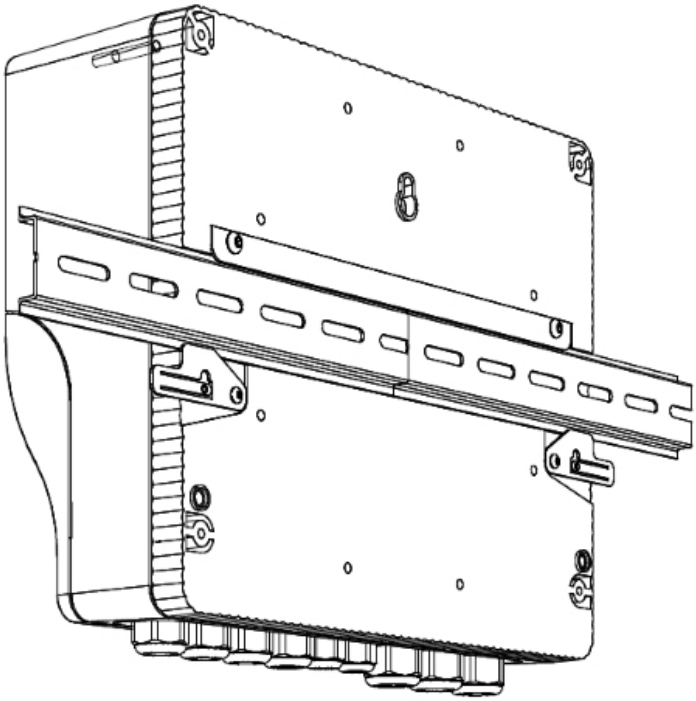


Fig. 4 Rail-DIN mounting

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.

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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
□ POWER SUPPLY
□ CALIBRATION
□ DISPLAY
□ ANALOG OUTPT
□ SET POINT
□ RELAYS CONTACTS
□ INTERMITTENT PROBLEM

DESCRIPTION OF THE DEFECT

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