Instruction manual

CL 6587

RESIDUAL CHLORINE/CHLORINE DIOXIDE/DISSOLVED OZONE CONTROLLER

Option
S/N
REP N°

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

Cod. 28006651 - 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"
- 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 free chlorine - combined chlorine - total chlorine - chlorine dioxide - dissolved ozone and other oxidizing elements consists of two main parts:

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

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

- display the measurement of free chlorine - combined chlorine - total chlorine - chlorine dioxide - dissolved ozone and other oxidizing aqueous solutions, with an appropriate sensor connected;
- display the measurement of temperature, if a temperature sensor Pt100 or Pt1000 is connected;
- perform automatic or manual temperature compensation;
- automatically adjust the values of the main measurement, if the relay outputs or analog outputs are connected to appropriate dosing pumps or valves;
- provide a min/max alarm and a checkout time alarm on the set point;
- provide two analog output for the main measuring, temperature or PID;
- activate the alarm or the hold condition by two external contacts;
- activate 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 contains accessories, upgrades and detailed specifications of each product.

Our staff is always available to help costumers 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 33)".

Maintenance staff could be more interesting in the chapters regarding:
- "Users instruction (page 33)";
- "Maintenance instructions (page 36)";
- "Warranty (page 49)";
- "Repairs (page 49)".

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;
- °C or °F temperature scale selection;
- 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 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
  - contrast and brightness of the display
- 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);
- 2 or 3 wires sensor input;
- chemical species measured;
- nominal current for ppm;
- polarization;
- measuring unit;
- scale;
- 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 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 buttons, see next paragraphs and chapters.

Inputs

The instrument is able to perform the measurement of the main parameter and temperature.

The main parameter can be measured with a 2 or 3 wires sensor depending on chemical species involved.

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 to measure free chlorine, combined chlorine, total chlorine, chlorine dioxide, dissolved ozone and other substances with custom sensors (peracetic acid, hydrogen peroxide, sulfides, sulfites, chlorine gas phase, ammonia etc.), with a choice of all possible measurement scales for the various types of sensor used.

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.

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 specification (page 15)", 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 32)" 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 during 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 43)").

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.

Configuration

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

- mode of operation (AUTO/MEASURE/SIMULATION);
- 2 or 3 wires sensor input;
- chemical species measured 2 wires cell (Cl2 F, Cl2 C, ClO2, O3, custom);
- chemical species measured 3 wires cell (Cl2 F, ClO2, O3, Cl2 T, custom);
- nominal current for ppm;
- polarization;
- measuring unit;
- scale;
- filter software (SMALL e LARGE);
- hide negative value;
- type of temperature sensor (Pt100/Pt1000);
- type of control on set point (ON-OFF/PID);
- minimum/maximum function of the set point (LO/HI);
- alarms associated with the operation time of the set point;
- alarm relay condition relay (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	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 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 sensor		2 WIRES / 3 WIRES			3 WIRES
C1.2A	Type of measure (2 wires)		Icell	Pol.	TC	
			nA	mV	%/°C	
	• Cl2 F	Free chlorine	160	-200	2.00	Cl2 F
	• Cl2 C	Combined chlorine	160	-400	2.00	
	• ClO2	Chlorine dioxide	1500	-200	2.00	
	• D O3	Dissolved ozone	160	-200	2.00	
	• ABCDE	Custom measure	variable	variable	variable	
C1.2B	Type of measure (3 wires)		Icell	Pol.	TC	
			nA	mV	%/°C	
	• Cl2 F	Free chlorine	2000	-200	2.00	Cl2 F
	• ClO2	Chlorine dioxide	2000	-200	2.00	
	• D O3	Dissolved ozone	2000	-200	2.50	
	• Cl2 T	Total chlorine	160	-400	2.00	
	• ABCDE	Custom measure	variable	variable	variable	
C1.3	Custom measure		ABCDE			ABCDE

D1.0	MAIN MEASURE			Default
C1.4	Nominal current custom	-2000 ÷ -10 / 10 ÷ 2000 nA/ppm		160 nA/ppm
C1.5	Polarization custom	-1000 ÷ 1000 mV		-200 mV
C1.6	Measuring unit	ppb-ppm / µg/l-mg/l		ppb-ppm
C1.7	Input scale	200.0 ppb / µg/l	(S1)	
		2.000 ppm / mg/l	(S2)	
		20.00 ppm / mg/l	(S3)	20.00 ppm
		200.0 ppm / mg/l	(S4)	
		2000 ppm / mg/l	(S5)	
	Icell dependent available scales			
	10 ÷ 20 nA/ppm	S2 / S3 / S4 / S5		
	21 ÷ 200 nA/ppm	S1 / S2 / S3 / S4		
	201 ÷ 2000 nA/ppm	S1 / S2 / S3		
	Scale	Resolution	Reading limits	
	200.0 ppb / µg/l	0.1	-10.0 / 210.0	
	2.000 ppm / mg/l	0.001	-0.100 / 2.100	
	20.00 ppm / mg/l	0.01	-1.00 / 21.00	
	200.0 ppm / mg/l	0.1	-10.0 / 210.0	
	2000 ppm / mg/l	1	-100 / 2100	
D1.1	Zero	±20 % of full scale current		0 nA
D1.2	Sensitivity	12.5 ÷ 250 %		100 %
C1.8	RT Large Signal	0.4 ÷ 50.0 seconds		2.0 s
C1.9	RT Small Signal	0.4 ÷ 50.0 seconds		10.0 s
C1.10	Hidden negative values	ON / OFF		OFF

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	Temperature coefficient	0.00 ÷ 4.00 %/°C	See C1.2

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
	<u>ON-OFF regulation</u>		
D3.1	• Set point	0 ÷ full scale	0.00 ppm
S3.1A	• Hysteresis	0 ÷10 % of full scale	0.20 ppm
S3.2A	• Delay	0.0 ÷ 100.0 seconds	0.2 s
C3.3	• Function	LO / HI (Min / Max)	LO
	<u>Regulation PID</u>		
D3.1	• Set point	0 ÷ full scale	0.00 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
	<u>Regulation RELAY1 FM</u>		
S3.4B	• Pulse frequency	0 ÷ 120 pulses/minute	100 i/min
	• Pulse length	0.1 seconds	

3.1	SET POINT 1		Default
	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 / OUT1 FM / WM on RELAY2	FM
	Regulation ON-OFF		
D3.2	• Set point	0 ÷ full scale	0.00 ppm
S3.5A	• Hysteresis	0 ÷10 % of full scale	0.20 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	0 ÷ full scale	0.00 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 pulses/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	

3.2	SET POINT 2		Default
	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	-5 % ÷ 105 % full scale	-1.00 ppm
S4.2	• High value	-5 % ÷ 105 % full scale	21.00 ppm
	• Hysteresis	± 0.25 % 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
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	ppm / mg/l °C / °F	ppm
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) (ppm)	0 ÷ full scale	0.00 ppm
C5.4	Point 2 (20 mA) (ppm)	0 ÷ full scale	20.00 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	ppm / mg/l ˚C / ˚F	ppm
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) (ppm)	0 ÷ full scale	0.00 ppm
C5.8	Point 2 (20 mA) (ppm)	0 ÷ full scale	20.00 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

D7.0	AUTOCLEAN		Default
	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	
	• 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	Temperature coefficient	0.00 ÷ 4.00 %/°C	2.00 %/°C
S3.1A	Hysteresis SET1 (ON-OFF)	0 ÷10 % of FS	0.20 ppm
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	0.20 ppm
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)	-5 % ÷ 105 % full scale	-1.00 ppm
S4.2	Alarm HI (high)	-5 % ÷ 105 % full scale	21.00 ppm
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

D50.0	SETUP		Default
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
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 sensor	2 WIRES / 3 WIRES	3 WIRES
C1.2A	Type of measure (2 wires)	Cl2 F / Cl2 C / ClO2 / O3 / custom	Cl2 F
C1.2B	Type of measure (3 wires)	Cl2 F / ClO2 / O3 / Cl2 T / custom	Cl2 F
C1.3	Custom measure	ABCDE	ABCDE
C1.4	Nominal current custom	-2000 ÷ -10 / 10 ÷ 2000 nA/ppm	160 nA/ppm
C1.5	Polarization custom	-1000 ÷ 1000 mV	-200 mV
C1.6	Measuring unit	ppb-ppm / µg/l-mg/l	ppb-ppm
C1.7	Input scale	Sensor dependent	20.00 ppm
C1.8	RT Large Signal	0.4 ÷ 50.0 seconds	2.0 s
C1.9	RT Small Signal	0.4 ÷ 50.0 seconds	10.0 s
C1.10	Hidden negative values	ON / OFF	OFF
C2.1	Temperature sensor	Pt100 / Pt1000	Pt100
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
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	ppm / mg/l °C / °F	ppm
C5.2	Analog output 1 range	0-20 / 4-20 mA	0-20 mA
C5.3	Point 1 analog output 1	0 ÷ full scale	0.00 ppm

D60.0	CONFIGURATION		Default
C5.4	Point 2 analog output 1	0 ÷ full scale	20.00 ppm
C5.5	Measure on analog output 2	ppm / mg/l °C / °F	ppm
C5.6	Analog output 2 range	0-20 / 4-20 mA	0-20 mA
C5.7	Point 1 analog output 2	0 ÷ full scale	0.00 ppm
C5.8	Point 2 analog output 2	0 ÷ full scale	20.00 ppm
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	CL6587 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 47)").

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 47)".
2. Make the 3 holes required.
3. Perform steps 1-2-3-7-8 of "Mounting without a drilling template".

5.5 INSTALLATION OF THE SENSOR

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

The measures of oxidizing agents in water can depend on the sample stream. For this reason, they are placed in special overflow cell to keep the flow constant.

In case of installation in pipe you must maintain a constant flow of the sample to be measured.

The sensors whose measurement does not depend on the flow can also be installed in immersion.

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

The interruption of the 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 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 46)".

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 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 SENSORS

Two electrodes sensors

- Connect the cathode to terminal 20 marked IN.
- Connect the anode terminal 22 marked CE.

Three electrodes sensors

- Connect the cathode to terminal 20 marked IN.
- Connect the third electrode to terminal 21 marked R.
- Connect the anode terminal 22 marked CE.

Connections of the most common sensors:

Connection of the polarographic cells (CL7901 - CL7902 - OZ7901)

The two wires sensor of the above cells includes the Pt100 temperature sensor and is provided with cable whose wires are identified by their color.

- Connect the brown or orange wire (cathode) to the terminal 20 marked IN.
- Connect the white wire (anode) to the terminal 22 marked CE marked or to the terminal 21 marked R.
- Connect the red wire (Pt100) to the terminal 18 marked T1.
- Connect the black wire (Pt100 common) to the terminal 17 marked T2.
- Connect the green wire (Pt100 common) to the terminal 16 marked T0.

Connections of the potentiostatic sensor

The SZ 283 potentiostatic sensor is provided with a shielded cable with three wires: shield and two wires identified by their color.

- Connect the black wire (cathode) to the terminal 20 marked IN.
- Connect the shield (reference) to the terminal 21 marked R.
- Connect the white wire (counter electrode) to the terminal 22 marked CE.

⚠ The connection of the sensors 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 terminal blocks at a very high insulation and protection from moisture;

- keep the cell cable far from the power cables also inside the electrical panel.

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 sen-

sor Pt100 or Pt1000 as shown in chapter "Connection diagram (page 46)", 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 T1-T2) and install a jumper between 16-17 (marked T0-T1).

Three wire Pt100 / Pt1000 connection for large distances

- Connect a Pt100 / Pt1000 wire to terminal 18 marked T2.
- Connect the Pt100 / Pt1000 common wire to terminal 16 marked T0 and to terminal 17 marked T1 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 recorder N°1 to the terminal 30 marked R1 +.
- Connect the (+) of the recorder N°2 to the terminal 31 marked R2 +.
- Connect the (-) of the recorder to the terminal 29 marked R0 -.

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 then connected to actuators arranged to accept an analog current signal (the connection is same as for the recorders).

> ⚠ Do not give any power to the analog output terminals. It will damage the circuits of the instrument.

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 40)" and "Setup (page 40)").
To change the minimum/maximum (LO/HI) function of the set point, see chapter "Configuration (page 43)".

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/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 40)").

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 40)") and C6.1 ("Configuration (page 43)").
The hold or alarm function are described in 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 12 marked C : common
terminal 11 marked NO : normally open
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 OPERATING PRINCIPLES

This intrument measures the oxidizing substances in water with two types of sensors:

- two or three electrodes immersed in an electrolyte separated from the sample by a membrane selective to the substance to be measured.
- three-electrode amperometric cell, commonly called "potentiostatic sensor".

In the two electrodes cell is applied a suitable polarization voltage to the two electrodes (anode and cathode) through which flows the electric current proportional to the concentration of the oxidizers present in the solution.

In the three electrodes cell is applied a suitable bias voltage to the two electrodes (anode and the counter electrode) in contact with the sample, through which flows the electric current proportional to the concentration of the oxidizers present in the solution.

A reference electrode is used to compensate the internal electrical resistance and the oxidation-reduction potential that occur on the measuring.

The main advantages of the potentiostatic measuring technique are the following:

- a steady and accurate correlation between cell current and concentration of the dissolved oxidizers, especially to very low values;
- the measured value in water without the presence of oxidizers is practically equal to zero;
- the frequency of the instrument calibration in the field is considerably reduced.

In both types of sensor the flow of current makes a chemical reaction in proximity of the electrodes. For this reason the oxidizer must be renewed by means of a constant flow of the sample so to maintain a correct value of the measure.

The constant flow of the sample is obtained by means of a special overflow cell whose use is recommended.

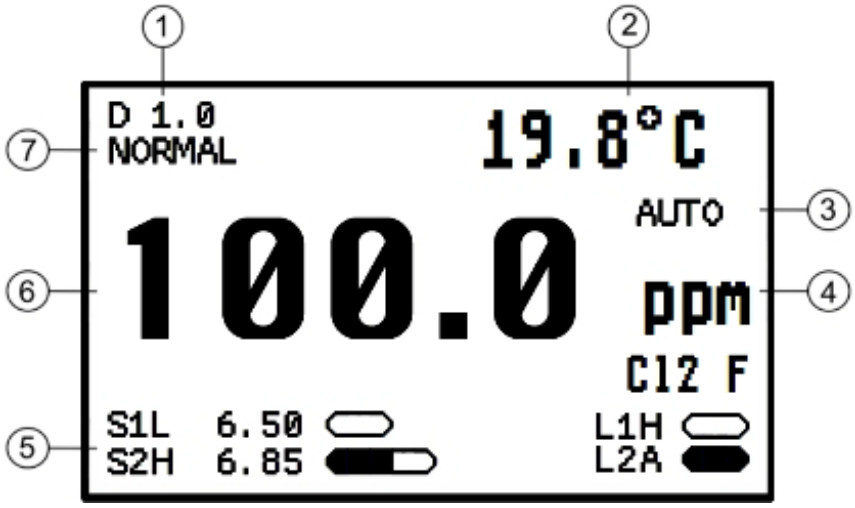
In both cases, you can make corrections (zero and sensitivity) to compensate for changes in sensor response due to the conditions of use.

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

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

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

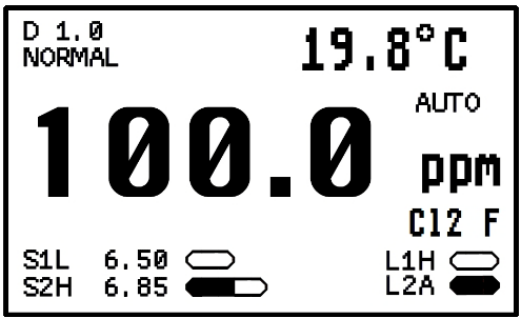
6.3 KEYBOARD

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 return the unit to the main display
v	Key "DOWN" - To modify (decrease) the displayed data
ENT	- To enter the effected changings and selections

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.

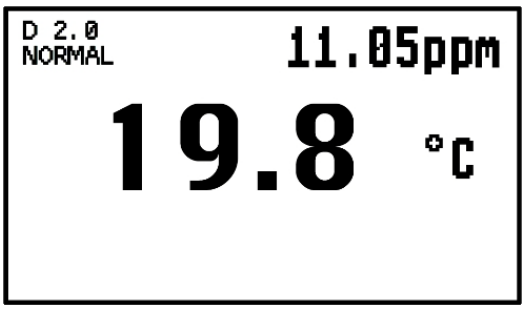


If the user has enabled the cleaning function, during the cleaning cycle will show the value of the measure and the cleaning phase in progress: CLEAN or HOLD.

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

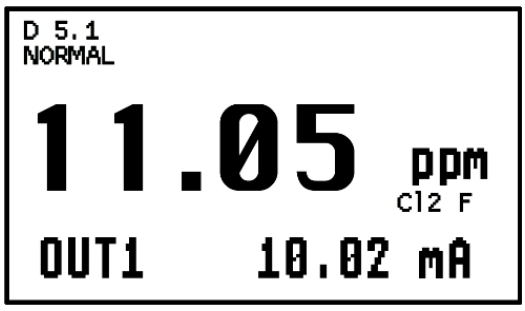
6.4.2 TEMPERATURE VALUES

Press the MODE key from the display D1.0 to visualize the temperature value.



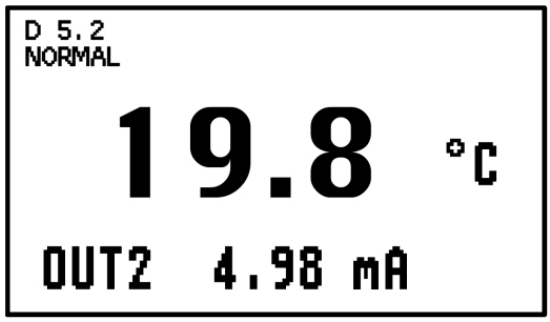
6.4.3 ANALOG OUTPUT 1 VALUES

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



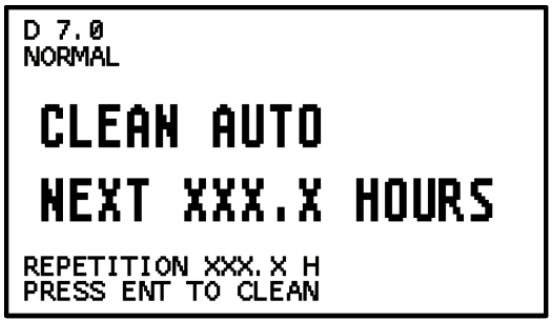
6.4.4 ANALOG OUTPUT 2 VALUES

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



6.4.5 AUTOCLEAN

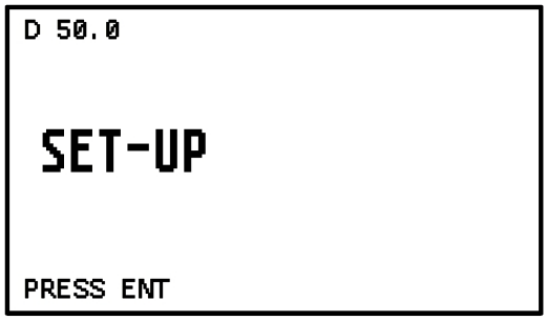
Press MODE four times from the display D1.0 to visualize the autoclean state, the remaining time to the next cycle and the repetition time as configured in the setup menu.



ENT to start a cleaning cycle.

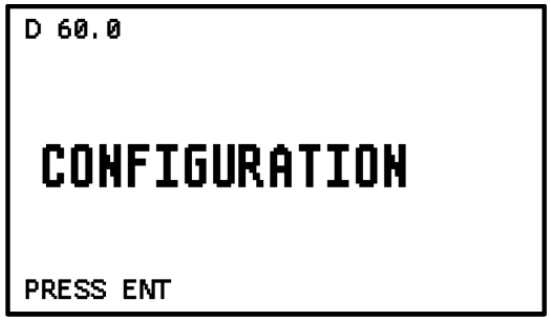
6.4.6 PARAMETERS FOR THE MAINTENANCE

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



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.



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.

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 CL6587 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.

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 40)" 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 24)", the system will work correctly and it will need just the calibration, the set points and alarm values selection.

6.5.3 CALIBRATION

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

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

All the calibration operations must be done after a proper time to permit the polarization of the sensor as described on the sensor's instruction manual.

The newly installed chlorine sensors require a few hours of operation before providing a proper measure.

During the initial phase of operation the instrument will provide a higher reading than the actual one.

It is recommended to keep the sensor polarized in water without chlorine for a few hours before proceeding with the calibration which in any case must be refined after a few days of work.

If the reservoir of the membrane type sensor is empty, it must be filled with the electrolyte provided with the sensor.

Refer to the sensor instructions.

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

- set the manual temperature value in the setup menu;
- set the correct value of temperature coefficient in the set up menu;
- install the temperature sensor in case of automatic compensation;
- wait until the sensor has reached a state of thermal equilibrium with the solution itself. This state of equilibrium can be considered achieved when the display marks stable values.

Zero calibration

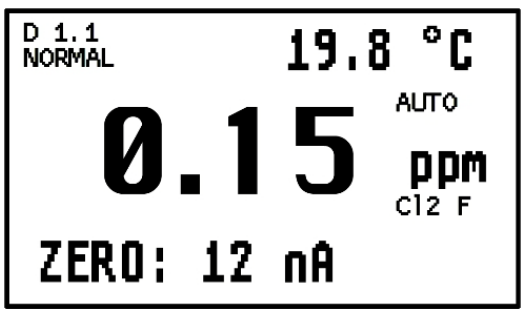
Zero calibration, if necessary, can be done sending a sample to the measuring cell without chlorine and/or other oxidants.

When it reaches the stabilization of the measurement to values close to zero it is possible to bring to zero the display by the procedure described below.

Polarographic membraned sensors, never installed or following the replacement of the membrane and/or electrolyte, can employ long times to reach the stabilization to the minimum value as the electrodes immersed in the electrolyte of the sensor should complete the process of polarization.

Potentiostatic sensors are faster in response and the zero calibration can be performed with the sensor in dry air.

Press ZERO 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.

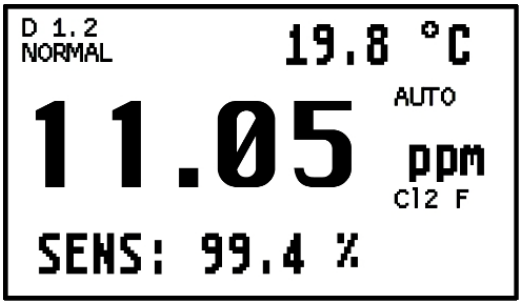
The user can reset to zero factory as follows:
start the calibration of zero, simultaneously press UP, DOWN and ENT.

Sensitivity calibration

Sensitivity calibration may be carried out only when the actual value of the concentration of the sample is known.

Normally the sample concentration is previously measured with a field photometric instrument (or method) suitable for the measurement of the sample.
You must select the photometer able to perform the measurement of the sample at the desired scale and with an adequate precision.

It's also important to carry out the calibration of sensitivity to higher values possible in order to get a good accuracy of measurement over the entire selected scale.
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.

One point calibration

In some cases it may be considered enough to calibrate only one point. In this case, it is suggested to calibrate the zero if the application measure is close to zero, as opposite you may calibrate sensitivity if the values are not less than 10% of full scale.

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 +/- 20% of full scale and deviations of the sensitivity under 12.5% or above 250% of full scale, are considered errors.

In case of these errors, it is suggested to check the sensor, replace the membrane and the electrolyte or install a new sensor.

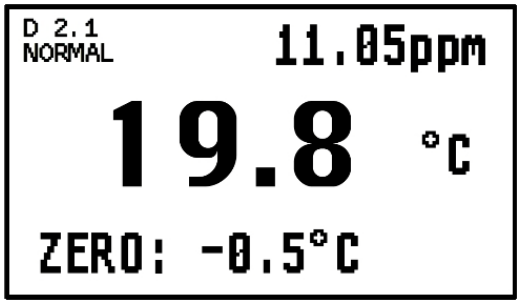
6.5.4 TEMPERATURE CALIBRATION

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.

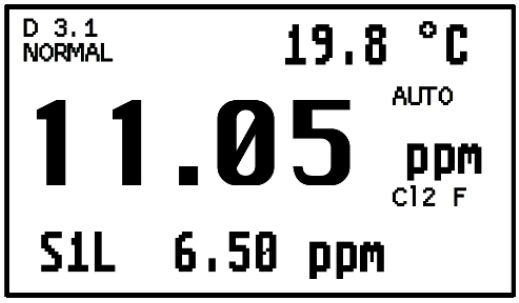
> *The reset to factory value in the main display is done as follows: start the calibration of temperature, simultaneously press the UP, DOWN and ENT.*

Temperature sensor not connected

The temperature for the manual compensation can be changed in the setup menu, refer to the chapter "Setup (page 40)".

6.5.5 SET POINT

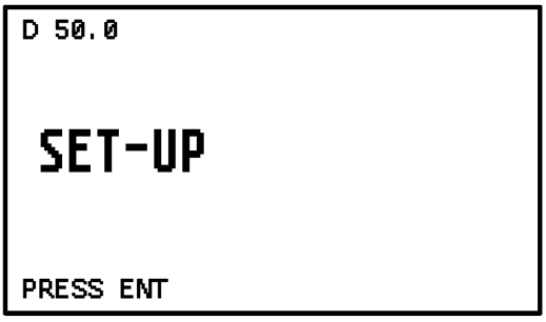
Press SET1 or SET2 to get the following display:



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

6.5.6 SETUP

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

Display	Contents	Meaning	Possible values
S2.3	TEMP.COEFFICIENT 2.00%/°C	Temperature coefficient	0.0 ÷ 4.00 %/°C
S3.1A	HYSTERESIS SET1 0.20 ppm	Hysteresis of the set point 1	Selectable
S3.2A	SET1 DELAY 0.2 s	Delaly 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	Selectable
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 0.20 ppm	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	Selectable
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 -1.00 ppm	Alarm relay minimum value	Selectable
S4.2	HI ALARM 21.00 ppm	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

Display	Contents	Meaning	Possible values
S7.1	CLEAN OFF	Autoclean function	OFF AUTOCLEAN 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

6.5.7 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.

6.5.8 SENSORS MAINTENANCE

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

The sensors 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 potentiostatic sensor with the protective cap containing a storage liquid, or tap water.

Do not use distilled water.

To store membraned sensors please refer to the sensor's instruction manual.

6.6 INSTALLATION INSTRUCTION

6.6.1 SAFETY REQUIREMENTS

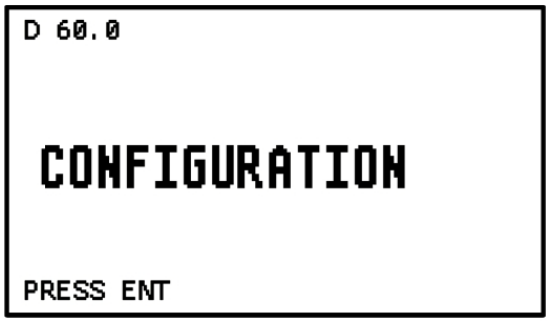
⚠ After performing the installation (see chapter "Installation (page 24)"), before turning the power on and proceed to the configuration of the instrument is recommended to do the following:

- 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.

6.6.2 CONFIGURATION

Press MODE six times from the D1.0 display 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, 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 MEASURE SIMULATION

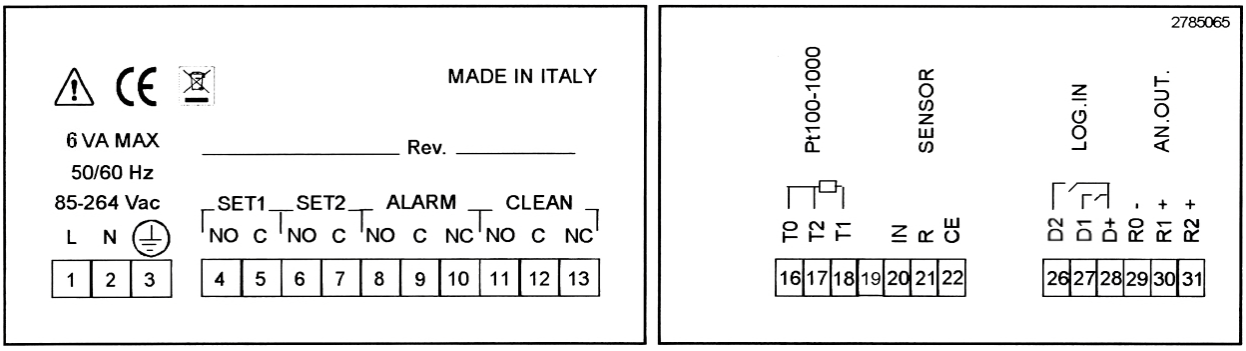
Display	Contents	Meaning	Possible values
C1.1	SENSOR WIRING 3 WIRES	Sensor type selection	3 WIRES 2 WIRES
C1.2A	2 WIRES SENSOR Cl2 F	Type of measure for 2 wires sensor	Cl2 F Cl2 C ClO2 O3 CUST
C1.2B	3 WIRES SENSOR Cl2 F	Type of measure for 3 wires sensor	Cl2 F ClO2 O3 Cl2 T CUST
C1.3	CUSTOM SENSOR ABCDE	Custom chemical species editing	Variable
C1.4	SENSOR CURRENT 160 nA/ppm	Nominal current selection	-2000 ÷ -10 / 10 ÷ 2000 nA/ppm
C1.5	POLARIZATION -200 mV	Polarization selection	-1000 ÷ 1000 mV
C1.6	MEASURE UNIT ppb-ppm	Units selection	ppb-ppm µg/l-mg/l
C1.7	MEASURE SCALE 20.00 ppm	Measure range selection	200.0 ppb µg/l 2.000 ppm mg/l 20.00 ppm mg/l 200.0 ppm mg/l 2000 ppm mg/l
C1.8	RT LARGE SIGNAL 2.0 s	Large filter software time setting	0.4 ÷ 50 s
C1.9	RT SMALL SIGNAL 10.0 s	Small filter software time setting	0.4 ÷ 50 s
C1.10	HIDDEN NEGATIVE OFF	Hidden negative value selection	ON OFF
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 RELAY1 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 RELAY2 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 ppm	Measure related to the analog output 1	ppm-mg/l °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 0.00 ppm	First point of the analog output 1	Variable
C5.4	OUT1 POINT P2 20.0 ppm	Second point of the analog output 1	Variable
C5.5	OUT2 INPUT ppm	Measure related to the analog output 2	ppm-mg/l °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 0.00 ppm	First point of the analog output 2	Variable
C5.8	OUT2 POINT P2 20.00 ppm	Second point of the analog output 2	Variable
C6.1	DIGITAL INPUT1 HOLD	Logic input 1 function	HOLD ALARM
C6.2	DIGITAL 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	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	(not used)
5	C Set1	20	Measuring electrode input (cathode)
6	NO Set2	21	Reference electrode input
7	C Set2	22	Counter electrode input (anode)
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

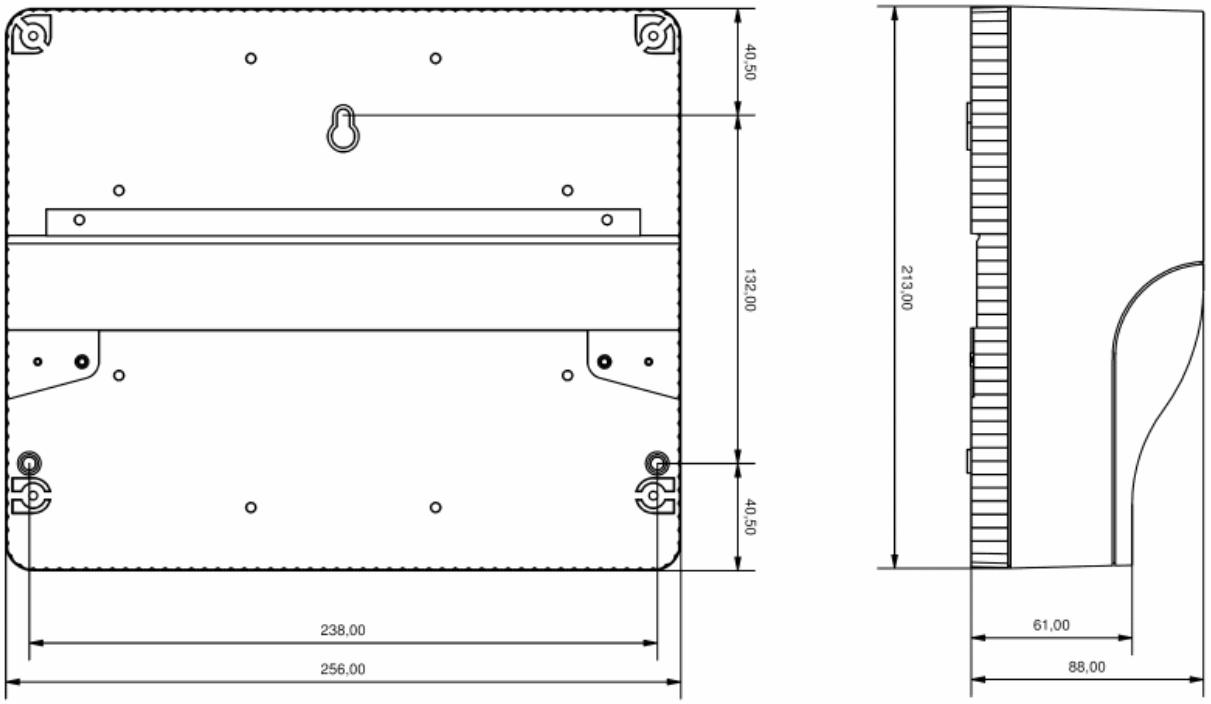


Fig. 1 Dimensions

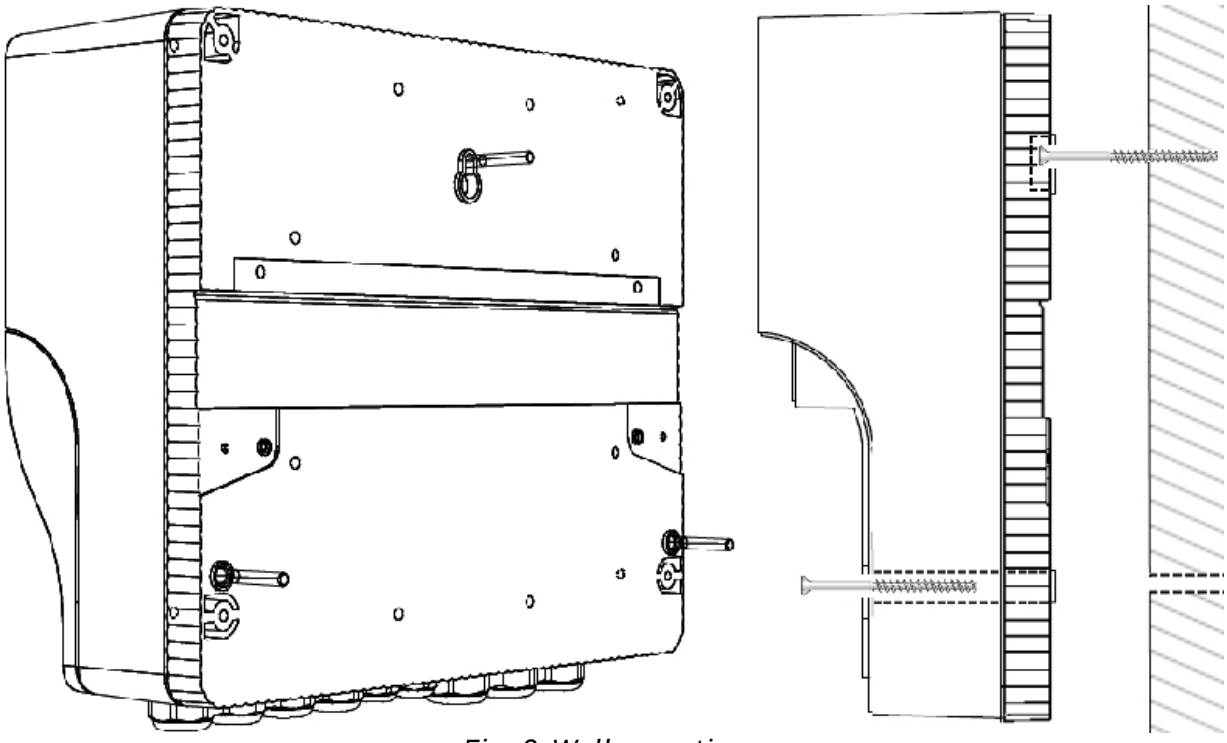


Fig. 2 Wall mounting

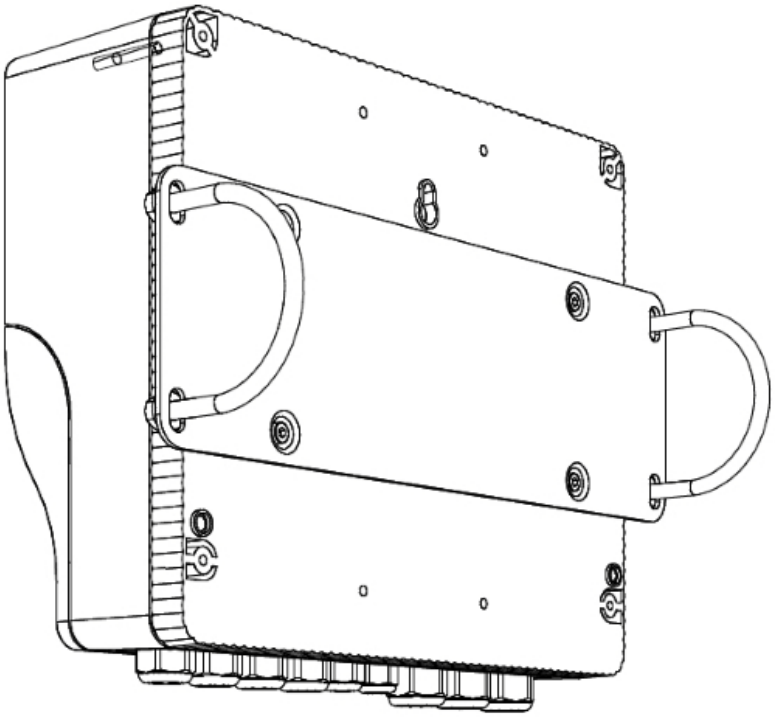


Fig. 3 Pipe mounting (horizontal or vertical)

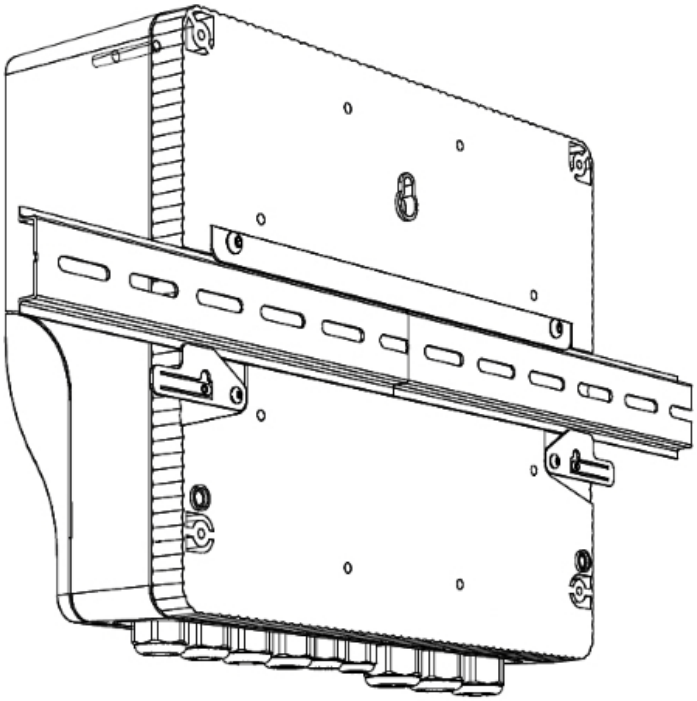


Fig. 4 Rail-DIN mounting

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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