

INSTRUCTION MANUAL

CL 7685  
RESIDUAL CHLORINE  
CHLORINE DIOXIDE - D. OZONE  
MICROPROCESSOR CONTROLLER  
\* potentiostatic \*

Range: 0/2.000/20.00 PPM  
Temperature range: -10/+110 °C  
Power supply: 110/220 Vac  
Software: R:2.6 x

Option \_\_\_\_\_  
S/N \_\_\_\_\_  
REP N° \_\_\_\_\_



Cod. 28006765 - Rev. F - 09/11

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# 1 GENERAL

This series of controllers with built-in microprocessor forms an advanced system of measurement and regulation of pH - ORP - Conductivity - Dissolved Oxygen - Chlorine in industrial processes.

These instruments are the result of all of B&C Electronics know-how built up over more than 30 years of experience in the field of industrial electrochemical analysis.

We have continually developed and updated these products keeping in mind the maximum consideration for quality, reliability, completeness of functions, simplicity of handling, and also the cost.

The computing capability and the versatility of the microprocessor are accompanied by friendly software specially designed to make the use of the instrument, the programming of its functions, routine checks and calibrations easily accessible even for an untrained operator.

The alpha-numeric backlit liquid crystal display helps the operator supplying him with all the information on functioning and on operating, while the software suggests possible steps for calibration and set-up.

The display supplies, at the same time as the measurement, an indication of present status of the output relays and of the output current.

For a higher level of checks, the display gives an indication of the operating conditions of the electrochemical sensors, the current status of the calibrations, set points and analog output.

The user friendly operation of the instrument saves the operator feats of memory and continual reference to the instruction manual.

All operations are carried out using the five key pads on the front panel, for the mode selection, the input of calibration and set point data and the setting-up. (Fig. 1)

There are no knobs or switches to manipulate in order to operate the unit. This makes the instrument rugged and more corrosion resistant.

A non-volatile EEPROM memory assures measurement parameters are maintained in the event of a power interruption.

The software is provided with a "watch-dog" check for correct functioning of the programs.

The electrical circuit is protected by a device which comes back into operation automatically following an overload or a wiring error.

## 1.1 FUNCTIONAL SPECIFICATIONS

### Input

The instrument accepts input from potentiostatic sensor for Active Chlorine, Chlorine Dioxide and D.Ozone measuring.

A second input is provided for 3 wires Pt100 Temperature sensor.

### Temperature compensation

The unit is supplied with manual or automatic Temperature compensation and Temperature information may be displayed on LCD.

The instrument detects the absence or malfunctioning of the Temperature sensor and automatically switches to manual operation mode.

### Measuring ranges

The unit provides an input range which may be selected from 0/1.999 or 0/19.99 PPM.

Auto ranging function may be activated for the measuring range 0/1.999 PPM.

Auto ranging allows the operator to calibrate the unit in the low range, against a high concentration of standard solution.

### Analog output

Either a 0/20 mA or 4/20 mA isolated output may be selected, provided for interface with computer or data loggers.

A special routine allows selection of the analog output range.

If the instrument is programmed for high range, the output may be set anywhere from 0/20.00 PPM.

If low range is selected, the output may be set anywhere from 0/2.000 PPM.

### Control relays

The monitor is equipped with two SPDT control relays.

These output relays may be used in a variety of ways, and the function of each relay is programmable by operator.

Control relays can be used in one of 3 different output modes: on/off, pulse width modulation and pulse frequency modulation.

The on/off mode of operation is used for simple control or for alarm purposes. Each control relay may be programmed for set-point, high/low, hysteresis, delay time for actuation.

The proportional mode of operation is used for more accurate control.

Each control relay may be programmed for set-point, high/low, proportional band, Frequency or Width modulation.

The full display indicates the current setting and the current status of each relay.

### Alarm relay

The unit contains a SPST relay designated as an alarm relay.

This relay may be used to warn of various conditions that might indicate operational problems. The relay will activate on either high or low concentration conditions, or on failure of the control relays to maintain proper control.

This relay may be programmed for either normal or fail-safe operation.

The software R:2.4x provides the additional function of the selectable continuous/flashing alarm and the selectable flashing frequency.

### Cleaning function

The unit contains a SPST relay designed for the auto clean cycle.

It's possible manually activate the cleaner to test its operation.

The operator can change the frequency of cleaning.

The configuration routine selects:

- auto/manual operation
- the cleaning time
- the holding time.

During cleaning and holding time:

- messages are flashing
- analog output is held constant
- set-points and alarm relays are deactivated.

### 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 mode of operation the display indicates only the concentration, the analog output is 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 mode of operation is useful for start up or for manual operation of disinfection plants.

### - Simulated operation (SIM.):

In this operating mode the users choose the displayed value by means of up/down keys.  
The unit maintains the set point, alarm and analog output parameters in order to test the plant.

The display does not indicate the measuring units (PPM) and access to calibration of the parameters is not allowed.

The message "SIM" is shown on the display, indicating the current operation mode of the instrument.

### Calibration mode

The instrument may be programmed for:

- the immediate or postponed calibration of the sensitivity
- the automatic or manual zero calibration

The immediate calibration mode of the sensitivity allows the operator to calibrate the unit immediately against a field measurement on the same sample that the sensor is measuring.

The postponed calibration mode of the sensitivity allows the operator to calibrate the unit against a laboratory measurement on the same sample that the sensor is measuring. The calibration may be performed later even if the sample concentration has changed.

In the automatic calibration mode of the zero, the unit will consider as zero the value of the sample without chlorine/ozone used to zeroing the meter.

The manual calibration mode of the zero allows the operator to make small adjustment of the readout in order to match the reading of the field comparison instrument.

### Software filter

The unit is provided with a dual programmable software filter, to be inserted when the readout is not stable.

The filter values can be selected separately for the small or large signal variations.

### Configuration

The electronics for the monitor is designed to be as flexible as possible.

A number of programming functions are provided in the Configuration menu, protected by an access number, which must be entered to allow changes in this setting.

The routine allows the programming of a custom access number.

### Front panel lock

The keys on the front panel of the monitor can be used for changing the display, for calibrations and set-point adjustments.

When the monitor is shipped, all functions are accessible.

However, the adjustment and calibration functions may be locked in order to prevent unauthorized adjustments to the instrument.

### Options

- 091.3711      Dual isolated and programmable output  
The operator may select an output for Temperature.
- 091.404      24 VAC power supply.
- 091.4143      9/36 VDC power supply.
- 091.701      RS232 isolated output  
The output sends the data (PPM,°C) to the serial port of the computer.

## 1.2 PHYSICAL DESCRIPTION

The controller enclosure is designed for surface or panel mounting.

It consists of an anodized aluminium case built according to the standard DIN 43700, with an aluminium panel coated with scratch-proof and non-corrosive polycarbonate membrane.

A transparent waterproof front door SZ 7601 can be added to the housing, in order to protect the unit from excessive moisture or corrosive fumes.

Signal and power connections are made by using two special extractable terminal blocks placed in the back of the instrument.

This makes wiring, installation and general maintenance of the probes and other devices easier.

The package is supplied complete with fixing clamps for panel-mounting.



## 2 SPECIFICATIONS

The DEFAULT values are correspondent to the factory calibration values.

Parameters marked by " \* " can be modified in the Configuration procedures.

*Default*

<b>OPERATING MODE</b>  Automatic/Measuring/Simulation	Auto
<b>MEASURING TYPE</b>  * Chlorine/Chlorine dioxide/D. Ozone	Chlorine
<b>INPUT SCALES</b>  Input range: 2.000/20.00 PPM  Display resolution at 20 °C: 1/2000 Software filter 90% RT: * LARGE signal: 0.4/20,0 s * SMALL signal: 0,4/20,0 s  Current at 20 °C: 250/5000 nA/PPM Cell sensitivity: 12.5/250% Zero auto/manual: $\pm 0.3 \mu\text{A}$ ( $\pm 0.15 \text{ ppm}$ at 20 °C) on all scales * Compensation temperature coefficient Cl/ClO <sub>2</sub> : 0/4.0 % / °C * Compensation temperature coefficient O <sub>3</sub> : 0/4.0 % / °C * Polarization voltage: adjustable	20.00    2.0 s 10,0 s  2000 nA/PPM 100% 0 $\mu\text{A}$ 2.0% / °C 2.5% / °C -200 mV
<b>TEMPERATURE</b>  Input: RTD Pt100 Connection: 2/3 wires Measuring and compensation range: -10.0/+110.0 °C Resolution: 0.1 °C Zero adjustment: +/- 2°C Manual temperature compensation: -10.0/+110.0 °C	0 °C 20 °C

<b>SET A/B</b>	
* Selectable actions: ON-OFF PFM - Pulse frequency proportional PWM - Pulse width proportional	
* Action: ON-OFF Value: 0/2.000 - 0/20.00 PPM (as selected scale) Hysteresis: 0/0.200-0/2.00 PPM (as selected scale) Delay: 0/99.9 s	SET B 0 PPM 0.2 PPM 0.0 s
* Function: HI/LO (Max/min)	LO
* Action: PFM Value: 0/20.00 PPM (as selected scale) Proportional band: 0/0.200 - 0/2.00 PPM (as selected scale ) Pulse max. Frequency: 0/120 pulse/minute Pulse width:	SET A 0 PPM 0.2 PPM  100 p/m 0.1 s
* Function: HI/LO (Max/min)	LO
* Action: PWM Value: 0/0.200 - 0/20.00 PPM (as selected scale) Proportional band: 0/0.200 - 0/2.00 PPM (as selected scale) Pulse width: 0/99.9 s Min. pulse width:	0 PPM 0.2 PPM  20.0 s 0.3"
* Function: HI/LO (Max/min)	LO
Relay Contacts: SPDT 220 V 5 A Resistive load	
<b>ALARM (RELAY C)</b>	
High value: 0/2.000 - 0/20.00 PPM (as selected scale) Low value: 0/2.000 - 0/20.00 PPM (as selected scale) Delay: 0/99.9 s	20.00 PPM 0.00 PPM 0.0 s
* Alarm on max. SA: ON/OFF	OFF
* Max. time SA: 0/60 minutes	60 min
* Alarm on max. SB: ON/OFF	OFF
* Max. time SB: 0/60 minutes	60 min
* Contact type: ACT/DEA	ACT
* Alarm type: CONT./FLASH	CONT
* Flashing frequency: LO (approx. 0.3 Hz duty cycle) ME (approx. 0.6 Hz duty cycle) HI (approx. 1.2 Hz duty cycle)	ME
Relay Contact: SPST 220 V 5 A Resistive load	

<b>CLEANING FUNCTION (RELAY D)</b>  * Action: Disable/Manual Clean/Auto+Manual Clean  Auto Clean: Repetition time: 0.1/24.0 h * Cleaning time: 0.5/60.0 s * Hold time: 0.1/20.0 minutes  Relay contacts: SPST	Disable  24.0 h 15.0 s 3.0 min.
<b>ANALOG OUTPUT Nr. 1</b>  * Current range: 0-20/4-20 mA * Point 1 corresponding to 0 mA or 4 mA RANGE 20.00 PPM: 0.00/20.00 RANGE 2.000 PPM: 0.000/2.000 TEMPERATURE: 0.0°C/50.0°C (Option 091.3711) * Point 2 corresponding to 20 mA RANGE 20.00 PPM: 0.00/20.00 RANGE 2.000 PPM: 0.000/2.000 TEMPERATURE: -10.0/+110.0 °C (Option 091.3711) Response time: 10 s for 98 % Isolation: 250 Vac Rmax: 600 Ω	0/20 mA  0.00 PPM 0.000 PPM 0.0 °C  20.0 PPM 2.000 PPM 110.0 °C
<b>ANALOG OUTPUT N°2 (Only for Option 091.3711)</b>  * Current range: 0-20/4-20 mA * Point 1 corresponding to 0 mA or 4 mA RANGE 20.00 PPM: 0.00/20.00 RANGE 2.000 PPM: 0.000/2.000 TEMPERATURE: 0.0 °C/50.0 °C * Point 2 corresponding to 20 mA RANGE 20.00 PPM: 0.00/20.00 RANGE 2.000 PPM: 0.000/2.000 TEMPERATURE: -10.0/+110.0 °C Response time: 10 s for 98 % Isolation: 250 Vac Rmax: 600 Ω	0/20 mA  0.00 PPM 0.000 PPM 0.0 °C  20.00 PPM 2.000 PPM 11.0 °C

<b>SERIAL COMMUNICATION (Option 091.701)</b>  Baud Rate: 4800 bit/s Nr. of bit: 8 bit Nr. of stop bit: 1 bit Parity: None Isolated from measure circuits Example of sent data: $\pm 20.00 \text{ PPM} \pm 50.0 \text{ }^{\circ}\text{C}$ Data sent every: 0.4 s	
<b>PARAMETERS ON CONFIG. BLOCK (See for *)</b>  Free calibration (access code not required): Keyboard Lock/Unlock LCD contrast (0/7).  Under access code number: (0) Type of measure: Cl/ClO <sub>2</sub> /O <sub>3</sub> Measuring range: 2.000/20.00 Auto ranging: On/Off LARGE software filter response time SMALL software filter response time Polarization Immediate/postponed calibration mode Temperature coefficient Input connected to the output N°1 Analog output N°1 range (0/20 4/20 mA) Point 1 corresponding to 0 mA or 4 mA Point 2 corresponding to 20 mA Input connected to the output N°2 Analog output N°1 range (0/20 4/20 mA) Point 1 corresponding to 0 mA or 4 mA Point 2 corresponding to 20 mA Action of relays A (On-Off/PFM/PWM) Function of the A (HI/LO) Action of relays B (On-Off/PFM/PWM) Function of the B (HI/LO) Alarm on max. operating time of SA Max. operating time of SA for alarm Alarm on max. operating time of SB Max. operating time of SB for alarm Alarm relay status (ACT/DEA) Alarm type Flashing frequency Cleaning function (Auto/Manual/Disabled) Cleaning time: 0.5/60.0 s Holding time: 0.1/60.0 minutes Access number: 0/999	Unlock 4  0 Cl 20.00 PPM Off 2.0 s 10.0 s - 200 mV Immed. 2.0% PPM 0/20 mA 0.00 PPM 20.00 PPM PPM 0/20 mA 0.00 PPM 20.00 PPM PFM LO On-Off LO Off 60 m Off 60 m ACT Cont ME Disabled 15.0 s 3.0 min. 0

**GENERAL SPECIFICATIONS**

Alphanumeric display: 1 line x 16 characters

Response time to 98% of value changing,  
with TC=2% / °C - T=20 °C - S=100% :

< 5 s for HI range

< 15 s for LO range

Operating temperature: 0/50 °C

Humidity: 95% without condensate

Power supply: 110/220 Volt ac +/- 10% 50/60 Hz

Isolation: 4000 V between primary and secondary (IEC 348)

Power: 5 VA max.

Terminal block: extractable

Weight: 850 g

Dimensions: 96 x 96 x 155 mm

## 3 INSTALLATION

### 3.1 PHYSICAL INSTALLATION

The controller may be installed close to the areas being monitored, or it may be located some distance away in a control area.

The enclosure is designed for panel-mounting.

It should be mounted on a rigid surface, in a position protected from the possibility of damage, excessive moisture and corrosive fumes.

The cable from the probe must be protected by a sheath and not installed near power cables.

Interruption on cables must be avoided or carried out by high insulation terminals.

When installing "in line" electrodes it is suggested to follow the specific instructions given by the sensor's manufacturer.

### 3.2 ELECTRICAL INSTALLATION

All connections within the controller are made on detachable terminal strips located on the rear side. (Fig. 2)

All power and output-recorder connections are made at the 13 pin terminal strip, while input signal connections are made at the 12 pin terminal strip.

The electrical installation consists of:

#### Connecting the power

- Connect ground to terminal 4;
- connect ac power to 1 - 2 terminals if power voltage is 110 Vac;
- connect ac power to 1 - 3 terminals if power voltage is 220 Vac;
- if 091.404 option is installed, connect 24 Vac to 1-3 terminals.

#### WARNINGS:

- Power the device by means of an isolation transformer;
- avoid mains voltage from an auto-transformer;
- avoid mains voltage from a branch point with inductive loads;
- separate power supply wires from signal cables;
- control the mains voltage value.

### Connecting the sensor

- Sensor cabling is a critical part of the whole system;
- use original cable supplied with the sensor;
- avoid interruption on the cable.
  
- Connect the White wire (Counter electrode) to the terminal 17 marked EL;
- connect the Black wire (Measuring electrode) to the terminal 18 marked IN;
- connect the shield (Reference electrode) to the terminal 19 marked R.

### Connecting alarms, pumps, valves

The output connections referred to set-point SA and set-point SB are made at terminal strip and they consist of two independent SPDT relays corresponding to regulator A and regulator B.

The output connection referred to alarm consists of SPST relay corresponding to Alarm C.

The output connection referred to auto-clean consists of SPST relay corresponding to auto clean D.

#### Control relay "A"

#### Set-point "SA"

Terminal <u>6</u>	marked	<u>C</u>	common contact
Terminal <u>5</u>	marked	<u>NO</u>	normal open contact
Terminal <u>7</u>	marked	<u>NC</u>	normal closed contact

#### Control relay "B"

#### Set-point "SB"

Terminal <u>9</u>	marked	<u>C</u>	common contact
terminal <u>8</u>	marked	<u>NO</u>	normal open contact
terminal <u>10</u>	marked	<u>NC</u>	normal closed contact

#### Alarm relay "C"

Terminal <u>12</u>	marked	<u>C</u>	common contact
Terminal <u>11</u>	marked	<u>NO</u>	normal open contact

#### Auto clean relay "D"

Terminal <u>12</u>	marked	<u>C</u>	common contact
Terminal <u>13</u>	marked	<u>NO</u>	normal open contact

### Connecting a recorder

A current output for a remote recorder or P.I.D. regulators is available on terminals 14-16.

Connect the recorder high (+) to terminal 14

Connect the recorder low (-) to terminal 16

Series connection is required for driving more loads having a total input resistance lower than 600  $\Omega$ .

If the 091.3711 dual output option is installed, a second isolated and programmable output is available between 15-16 terminals.

Output N°1 and output N°2 are isolated and selectable 0/20 or 4/20 mA.

### Connecting the RTD

The instrument has the automatic temperature compensation carried out by means of RTD Pt100.

To operate the automatic temperature compensation, connect the RTD as shown in the "connection" figure. (Fig. 2)

A three wire connection is suggested to achieve an accurate compensation over a long distance between the sensor and the controller.

#### 3-wire connection

- connect the terminal of RTD to terminal 23 of the meter;
- connect the common terminal of RTD to terminals 24 - 25 of the meter;
- the 3 wire-cable must not be interrupted on the overall length.  
If an extension is needed, the cable must be fastened to the high insulation terminal strip;
- keep the cable away from power wires.

The RTD connection as above described allows the controller to provide a digital readout of Temperature.

If the temperature sensor is not connected or damaged, the unit will operate in manual temperature compensation automatically.

#### 2-wire connection

- connect the Pt100 to terminals 23 - 24 ;
- install a jumper to terminals 24 - 25.

### Checking

Before connecting the system to the power supply:






- check that all cables are properly fastened to prevent strain on the connections
- check that all terminal-strip connections are mechanically and electrically sound.



## 4 KEYBOARD

### KEY

### FUNCTION

	<ul style="list-style-type: none"> <li>- allows the operator to go to the next Display</li> <li>- allows to go back to the main Display. The eventual new parameter values will not be memorized</li> </ul>
	<ul style="list-style-type: none"> <li>- allows the access of calibration sequences</li> </ul>
	<ul style="list-style-type: none"> <li>- allows to increase the displayed parameters</li> <li>- allows to choose between different functions</li> </ul>
	<ul style="list-style-type: none"> <li>- allows to decrease the displayed parameters</li> <li>- allows to choose between different functions</li> </ul>
	<ul style="list-style-type: none"> <li>- allows to enter the selected data and to return to the main Display <b>D0</b></li> </ul>

### 4.1 OPERATING THE SYSTEM

#### Pre-operation check

The system's controls and indicators are all located on the front panel. (Fig. 1).

The meter has a LCD display 1 indicating that unit is on.

The cards of the controllers are adjusted at the factory.

If sensors and probes have been connected correctly, as described in the above sections, the system should function correctly needing only the start up and the parameters calibration as described in the following sections.

## 5 READOUT SEQUENCES

Applying the power to the instrument the display will show the input selected for approximately 3 seconds, then will show the main display DO.

c12 meter

c1o2 meter

o3 meter

MODE  
DISP

Press  to visualize the following Display:

D0	0.700 PPM <input checked="" type="checkbox"/> A <input type="checkbox"/> B	Actual Cl/ClO2/O3 values, Set-point status/functions
D1	0.700 PPM c12	Actual Cl/ClO2/O3 values
D2	Temp: 22.0°C	Temperature value
D3	SA: 0.60 * F <input checked="" type="checkbox"/> L	Set-point A parameters
D4	SB: 0.80 * O <input type="checkbox"/> H	Set-point B parameters
D5	AL 0.0/20.0PPM	Alarm parameters
D6	CLEANING OFF	Cleaning function display
D7	01 10.0mA/1.0 pp	Input/analog output N°1 values
D7BIS	01 10.0mA/1.0 pp	Input/analog output N°2 values
D8	Configuration	Configuration display
D9	C7685 R:2.6x	Instrument code and software release

·D0·

0.700 PPM <input checked="" type="checkbox"/> A <input type="checkbox"/> B	0.700PPM MEAS	0.700 SIM <input checked="" type="checkbox"/> A <input type="checkbox"/> B
--	---------------	--

0.700PPM: actual Cl/ClO<sub>2</sub>/O<sub>3</sub> value

MEAS/SIM: mode of operation

A: set-point A state and function

☐ deactivated relay☒ the process has reached the set-point and the relay☒ activated relay

B: set-point B state and function

MESSAGEMEANINGS

" ---- "

the instrument is changing the scale

" &gt;&gt;&gt;&gt; "

the present value is over range

" &lt;&lt;&lt;&lt; "

the present value is under range

"display flashing"

the present measuring value is in alarm range or  
the set-point SA or SB are in alarm (see alarm section)

" CLEAN "

autoclean activated(relay D on)

" HOLD "

unit in Hold

CAL	to activate the mode selection procedure
MODE DISP	to go to

·D1·

0.700 PPM C12
---------------

Cl/ClO<sub>2</sub>/O<sub>3</sub> values

CAL	to activate the zero/sensitivity calibration procedure
MODE DISP	to go to

·D2·

TEMP.: 22.0°C M
-----------------

Temperature value

M: manual value

CAL
-----

to activate the temperature calibration or the manual temperature value  
selection procedures

MODE  
DISP

to go to

·D3·

SA: 0.60 \* F■L

Set-point A parameters display

0.60 : set-point value

■ : set-point actual state

\* : alarm on set point A activated

F : selected action (F=PFM - W=PWM - O=on/off)

L : selected function low/high (L-H)

CAL

to activate the programming sequences for set-point A value, hysteresis and delay time

MODE  
DISP

to go to

·D4·

SB: 0.80 \* O□H

Set-point B parameters display

0.80 : set-point value

□ : set-point actual state

\* : alarm on set point B activated

O : selected action (F=PFM - W=PWM - O=on/off)

H : selected function (L-H)

CAL

to activate the programming sequences for set-point B value, hysteresis and delay time.

MODE  
DISP

to go to

·D5·

AL 0.0/20.0PPM

Alarm parameters display

0.0 PPM: low value limit

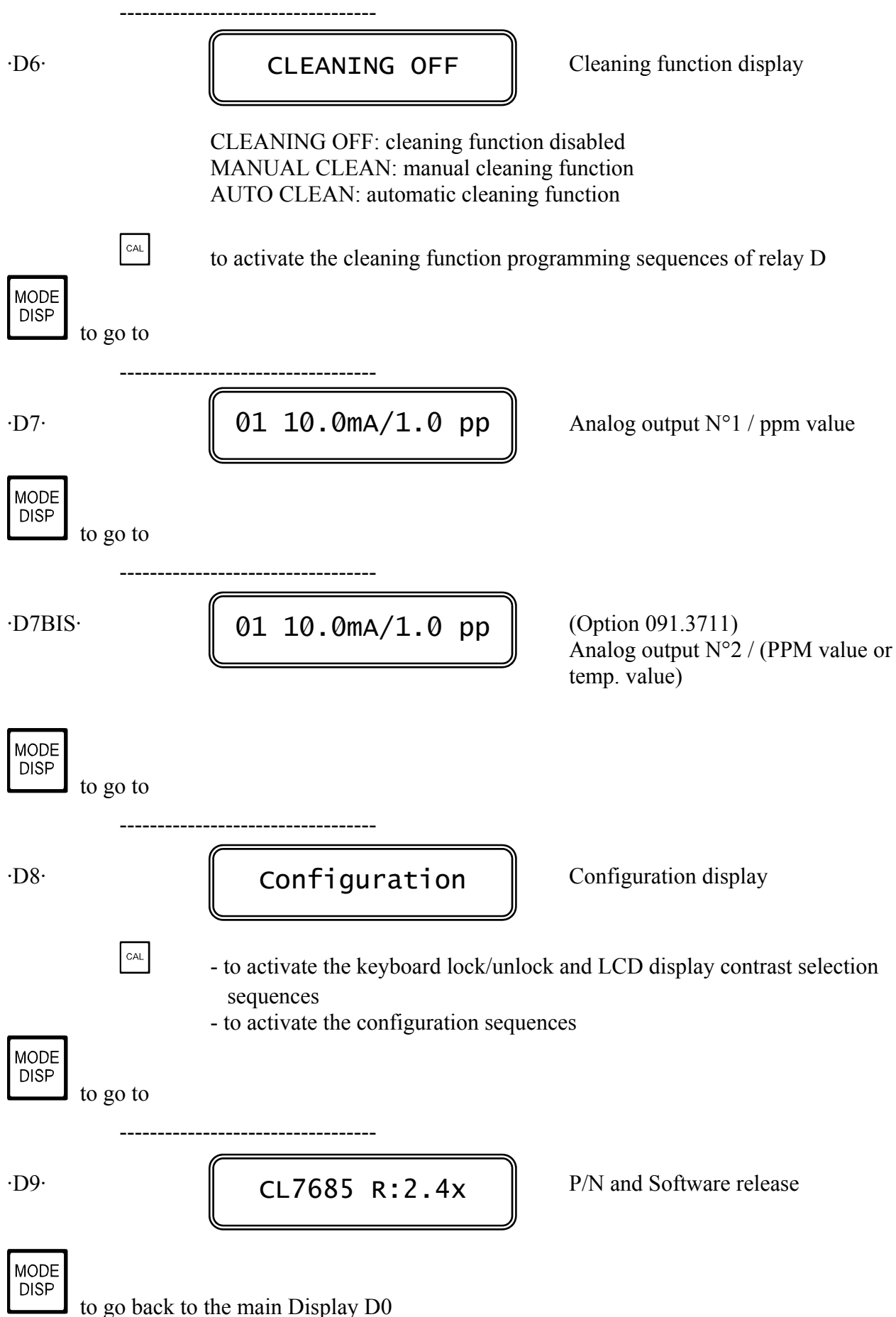
20.0 PPM: high value limit

CAL

to activate the alarm values programming sequences.

MODE  
DISP

to go to



## 6 CALIBRATION SEQUENCES

The following procedures will be available whenever the instrument has the keyboard unlocked.

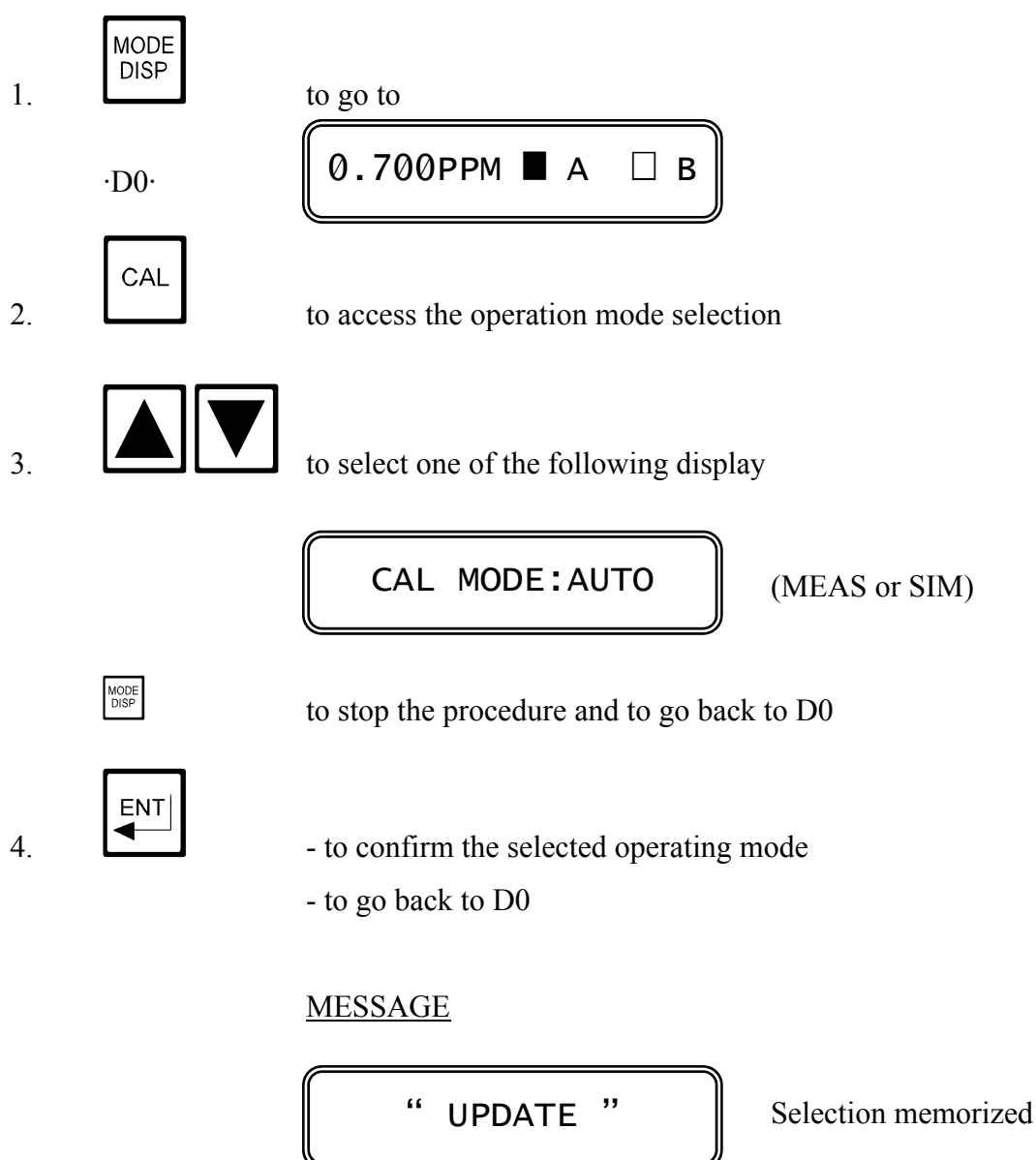
To unlock the keyboard follow the procedures mentioned in Chapter 7 "Configuration".

The following procedures allow the sensors calibration, the Set-point and alarm parameters programming.

**IMPORTANT NOTE:** During the calibration procedure the microcomputer turns the unit to the main display if no keys have been pressed within 5 minutes.

### 6.1 OPERATING MODE SELECTION


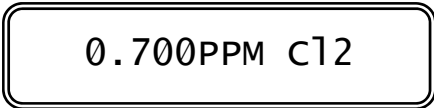

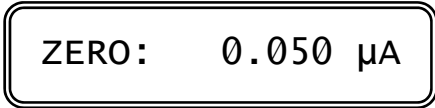



Normally the instrument works in automatic mode.






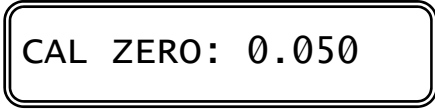
## 6.2 ZERO AND SENSITIVITY CALIBRATION





### Zero calibration

#### AUTOMATIC ZERO CALIBRATION

1.  to go to  

2.  to access the calibration sequences  
 Zero visualization
3.  - to confirm the displayed value  
 - to access the sensitivity cell visualization/calibration  
 to choose the automatic or manual zero calibration routine  


AUTO (MANUAL): current calibration routine

  to select the automatic calibration routine
4.  to confirm the automatic zero calibration routine  


0.050: current value from sensor
5. Choose one of the following actions:  
 to stop the procedure and to go back to ·D1·  
 +  +  press the three keys to turn to factory calibration



to confirm the selected zero of the cell

#### MESSAGE

#### FUNCTION

UPDATE

The calibration is accepted

#### Error message

Z > 0.30μA

Zero > 0.30μA

The above messages will last for 5 minutes



to acknowledge the error messages

NO UPDATE

Calibration not accepted

#### MANUAL ZERO CALIBRATION

1.

MODE  
DISP

to go to

·D1·

0.700PPM C12

2.

CAL

to access the calibration sequences

ZERO: 0.050 μA

Zero visualization



- to confirm the displayed value
- to access the sensitivity cell visualization/calibration

3.

CAL

to choose the automatic or manual zero calibration routine

ZERO: AUTO

AUTO (MANUAL): current calibration routine





to select the manual calibration routine



4.

to confirm the automatic zero calibration routine

CAL ZERO: 0.050

0.050: current value from sensor

5. Choose one of the following actions:



to stop the procedure and to go back to ·D1·



+



+



press the three keys to turn to factory calibration



to select the desired measuring value



6.

to confirm the desired measuring value

CAL ZERO: 0.000

0.000: new manual adjusted value

This value can be adjusted  $\pm 0.15$  PPM in order to match the value of the field comparison meter.

#### MESSAGE

#### FUNCTION

UPDATE

The calibration is accepted

#### Error message

Z > 0.30 $\mu$ A

Zero > 0.30 $\mu$ A

The above messages will last for 5 minutes

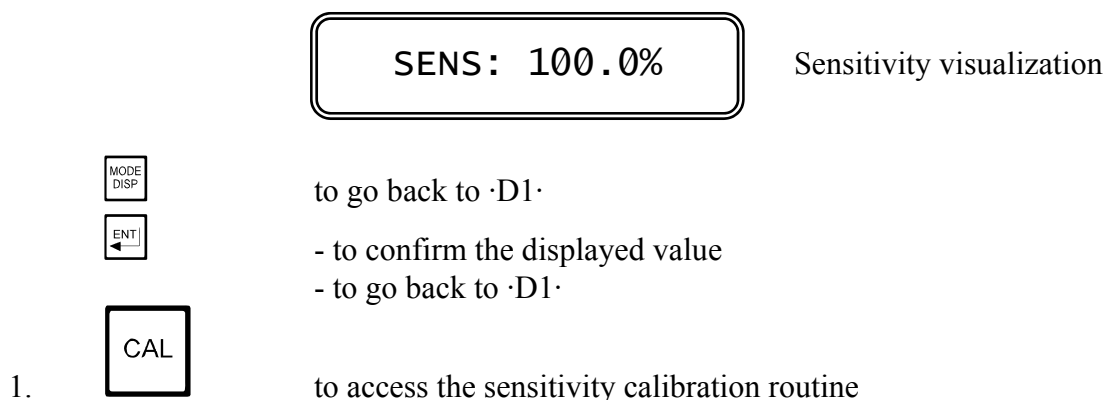


to acknowledge the error messages

NO UPDATE

Calibration not accepted

## Sensitivity calibration



The sensitivity calibration is suggested when the readout is lower/higher compared with the DPD test. This adjustment must be effected when installing the flow cell and Chlorine or D.Ozone sensor after the stabilization of the readout.

The instrument features two calibration mode: Immediate and Postponed

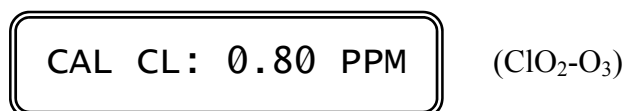
### IMMEDIATE SENSITIVITY CALIBRATION

This mode of calibration is useful when the concentration of the sample is stable and the value is known.

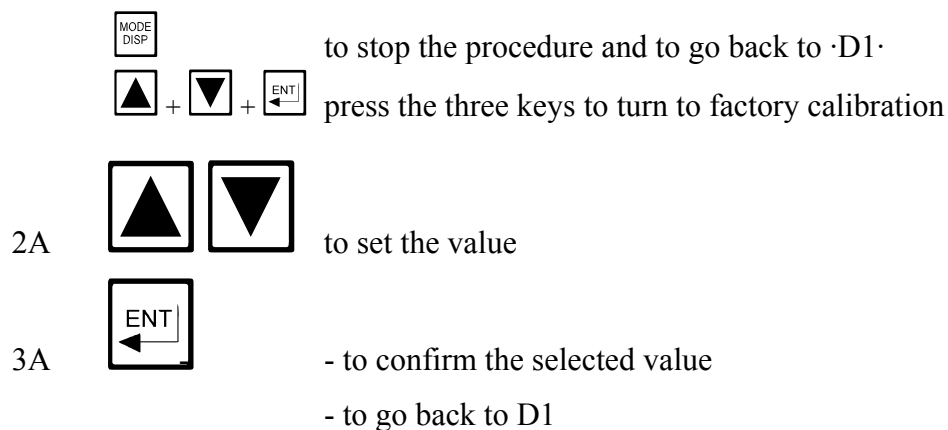
The instrument shows for a few seconds the following message:



Then it will show the measuring value:



CL 0.80: actual value



MESSAGEFUNCTION

UPDATE

The calibration is accepted

Error messages

SENS &gt; 250.0%

Sensitivity &gt; 250.0%

SENS &lt; 12.5%

Sensitivity &lt; 12.5%

The above messages will last for 5 minutes



to acknowledge the error messages

NO UPDATE

Calibration is not accepted

POSTPONED SENSITIVITY CALIBRATION

This mode of calibration is useful when the value of Chlorine ( $\text{ClO}_2/\text{O}_3$ ) on water is unstable or when an immediate test is not available.

The instrument shows for a few seconds the following message:

SAMPLE VAL. REC.

Then it will show the measuring value:

CAL CL: 0.80 PPM

( $\text{ClO}_2\text{-O}_3$ )

CL 0.80: actual value



to stop the procedure and to go back to ·D1·

to press the three keys to turn to factory calibration



2B.

to confirm the value

The instrument will show the following message:

SAMPLE V. UPDATE

After a few seconds the unit go back to D1.








When the correct Chlorine ( $\text{ClO}_2/\text{O}_3$ ) value will be known from laboratory analysis, the operator must access the sensitivity calibration following the same above procedure.

The instrument shows for a few seconds the following message:

SAMPLE V. ADJUST

Then it will show the previously stored sample value:

SAMPLE V. : 0.80

- 3B.   +  +  to stop the procedure and to go back to ·D1·  
  to press the three keys to turn to factory calibration  
 to display the Chlorine ( $\text{ClO}_2/\text{O}_3$ ) value same as the contents into the water
- 4B.  to confirm the value and to go back to ·D1·

#### MESSAGE

#### FUNCTION

UPDATE

The calibration is accepted

#### Error message

SENS > 250.0%

Sensitivity > 250.0%

SENS < 12.5%

Sensitivity < 12.5%

The above messages will last for 5 minutes

to acknowledge the error messages





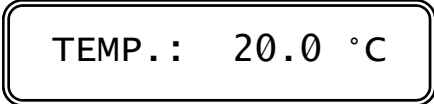









NO UPDATE

The calibration is not accepted

#### **Important note:**

*After the manual or automatic zero calibration and sensitivity calibration verify that the readout is corresponding to the comparison field instrument in order to avoid significant readout when the chlorine contents of the sample is equal to zero.*

### 6.3 TEMPERATURE CALIBRATION

1.  to go to  
 
2.  to access the calibration procedure  
  
 '>>>>' ('<<<<'): temperature value overrange  
 to stop the procedure and to go back to 'D2'  
 +  +  to press the three keys to turn to factory calibration  
  to modify the actual reading  
 to confirm and to go to the manual temperature adjustment

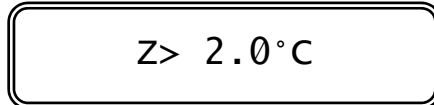
#### MESSAGE

#### FUNCTION



The calibration is accepted

#### Error messages



Zero > 2.0 °C

The above message will last for 5 minutes



to acknowledge the message



The calibration is not accepted

## Manual Temperature calibration

CAL T.M: 2.0°C



to stop the procedure and to go back to ·D2·



to modify the actual value



to confirm and to go back to ·D2·

## 6.4 SET-POINT A/B SETTING

The following procedure are suitable for both set-point A and B.

For each set-point it is possible:

- to insert the set-point value
- to insert parameters of On/Off - PFM - PWM function



to go to

·D3·

SA: 0.60 \* F ■ L

Set-point A display

Or

·D4·

SB: 0.80 \* O □ H

Set-point B display



to access the programming sequences




## Set-point adjustment


CAL SA S: 0.60

S 0.60: actual set-point value



to stop the procedure and to go back to ·D3·/·D4·

3.   to insert the set-point value
4.  - to confirm the value  
 - to go to one of the following calibration, as selected in the configuration
- A. On/Off function calibration
  - B. PFM function calibration
  - C. PWM function calibration

**NOTE:** to modify only set-point value, press  twice until "UPDATE" message

### On/Off function

The instrument will show the following display:



CAL SA I: 20


 Hysteresis calibration

I 20: actual hysteresis value



to stop the procedure and to go back to ·D3·/·D4·

- 5A.   to insert the hysteresis value

- 6A.  to confirm and to go to the delay time selection



CAL SA D: 10.0s

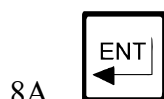
 Delay time calibration

D 10.0 s: actual delay time value



to stop the procedure and to go back to ·D3·/·D4·

- 7A.   to insert the delay time value



to confirm and to go back to ·D3·/·D4·

### MESSAGE

### FUNCTION



All the date has been memorized

## **PFM function**

The instrument will show the following display:



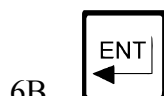
BP 0.10: actual proportional band value



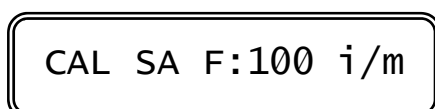
to stop the procedure and to go back to ·D3·/·D4·



to select the proportional band value



to confirm and to go to the selection of the maximum pulse frequency value



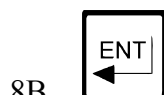
F:100 i/m: actual pulse frequency value



to stop the procedure and to go back to ·D3·/·D4·



to select the frequency value



to confirm and to go back to ·D3·/·D4·

## **PWM function**

The instrument will show the following display:



CAL SA BP: 0.10

BP 0.10: actual proportional band value



to stop the procedure and to go back to ·D3·/·D4·

5C.



to select the proportional band value

6C.



to confirm and to go to the selection of the pulse length value

CAL SA D: 5.0 s

D 5.0 s: actual pulse length value



to stop the procedure and to go back to ·D3·/·D4·

7C.



to select the pulse length value

8C.



to confirm and to go back to ·D3·/·D4·

## 6.5 ALARM SETTING

The following operations are possible:

- to select the min/max alarm value
- to select the delay time value

1.



to go to

·D5·

AL 0.0/20.0PPM

Alarm display

2.



to access the calibration sequences

CAL AL L: 0.00

Low alarm value calibration

L 0.00: actual low alarm value



to stop the procedure and to go back to ·D5·



3. to select the value



4. to confirm and to go to the high value insertion

CAL AL H: 20.00

High alarm value calibration

H 20.00: actual high alarm value



to stop the procedure and to go back to ·D5·



5. to select the value



6. to confirm and to go to the delay time selection

CAL AL D: 25.0s

Delay time calibration

D 25.0 s: actual delay time



to stop the procedure and to go back to ·D5·



7. to select the value



8. to confirm and to go back to ·D5·

MESSAGEFUNCTION

The new data have been memorized

## 6.6 CLEANING FUNCTION



to go to

·D6·



(MANUAL CLEAN/  
AUTO CLEAN)

CLEANING OFF: cleaning function disabled  
MANUAL CLEAN: manual cleaning function  
AUTO CLEAN: automatic cleaning function

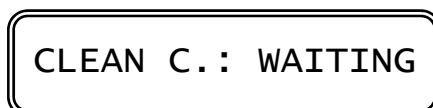


to access to the calibration sequences

(only for MANUAL CLEAN or AUTO CLEAN)

### Manual cleaning function (MANUAL CLEAN)

The instrument will show the following display:

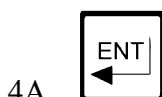


(START)

WAITING: the unit is awaiting to start a new Clean Cycle  
to stop the procedure and to go back to ·D6·



to select START or WAITING



to confirm the selection

- If START is selected the unit goes back to ·D0· and a new Clean Cycle starts.

- If WAITING is selected the unit goes back to ·D6·.

**Automatic cleaning function (AUTO CLEAN)**


24.0h: time to the next cleaning cycle




to stop the procedure and to go back to ·D6·

press the 3 keys to set to zero the time to the next cleaning cycle



3B.

to turn the unit to the WAITING/START autocleaning



(START)

WAITING: the unit is awaiting to start a new Clean Cycle



to stop the procedure and to go back to ·D6·



4B.

to select START or WAITING



5B.

to confirm the selection

- If START is selected the unit goes back to ·D0· and a manual Clean Cycle starts without modify the time of the automatic Clean Cycle.

- If WAITING is selected the unit turns to the period of repetition calibration (see steps 6B and 7B).



24.0h: period of repetition



to stop the procedure and to go back to ·D6·



6B.

to select the time value




7B.


to confirm and to go back to ·D6·

## 7 CONFIGURATION

The following operations are possible:

- keyboard locked/unlocked selection
- Display contrast selection
- access number insertion

- 

to go to Display ·D8·
- 

to access the configuration sequences




### 7.1 KEYBOARD LOCKED/UNLOCKED





Keyboard unlocked



Keyboard locked

- 


to go to ·D8·
- 


to select one of the two options (locked/unlocked)
- 

to confirm and to go to the next step


### 7.2 LCD DISPLAY CONTRAST







- 

to go to ·D8·
- 

to select the contrast from 0 to 7

2.  to confirm and to go to the access number insertion

### 7.3 ACCESS NUMBER





-  to go to ·D8·
1.   to insert the access number (when keeping the key pressed the number will scroll with 3 speed level)
2.  to confirm and to proceed with the configuration

**IMPORTANT NOTE:** any inserted number different from the right access code, will allow the visualization of the parameters and not the modification.

 Configuration inhibited

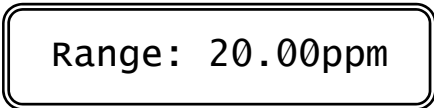
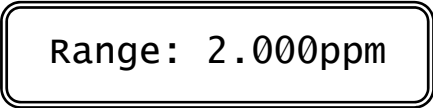
### 7.4 TYPE OF MEASURING





  

Active keys:  -   - 

### 7.5 INPUT RANGE

It's possible to select the scale 20 PPM / 2 PPM





 

Active keys:  -   - 

## 7.6 AUTORANGE





Autoranging:OFF

Autoranging:ON





Active keys:  -   - 

## 7.7 SOFTWARE FILTER

LARGE S RT: 2.0s

Active keys:  -   - 

SMALL S RT: 10.0s





Active keys:  -   - 

## 7.8 CELL POLARIZATION VOLTAGE

CAL POL.: -200mV

POL.-200 mV: actual Polarization Voltage

This polarization voltage is calibrated during the manufacturing and it may be changed by means of the internal trimmer marked BM(R14).  
Remove the back panel to adjust the trimmer, watching the readout.





Active keys:  -   - 

## 7.9 CALIBRATION MODE

MODE OF CAL:POST

MODE OF CAL:IMM





POST (IMM): postponed (immediate) calibration mode

Active keys:  -   - 

## 7.10 TEMPERATURE COEFFICIENT

CAL TC: 2.00%/°C

2.00%/°C: temperature coefficient value

Active keys:  -   - 

## 7.11 INPUT RELATED TO ANALOG OUTPUT N°1 (OPTION 091.3711)





This configuration is available only when the dual output option 091.3711 is installed.

The input corresponding to the output range is selectable as Cl2(ClO2/O3) or Temperature for the two outputs.

CAL OUT1: ppm

CAL OUT1: °C

PPM (°C): input range selected for analog output N°1





Active keys:  -   - 

## 7.12 ANALOG OUTPUT N°1 RANGE

CAL OUT1: 0/20mA





CAL OUT1: 4/20mA

0/20mA (4/20mA): range selected

Active keys:  -   - 

CAL P1: 0.000 ppm





P1: begin of range  
0.000 PPM: measuring value related to 0/4 mA

Active keys:  -   - 



CAL P2: 2.000 ppm

P2: end of range  
2.000 PPM: measuring value related to 20 mA

Active keys:  -   - 

**IMPORTANT NOTE** : if the value related to P1 is higher than the value related to P2 the analog output will be the "reverse", otherwise will be the "direct" type.





The display will show OUT2 instead of OUT1 and the operator will follow the same procedure for the output n°2 if the option 091.3711 dual output is installed.

### 7.13 INPUT RELATED TO ANALOG OUTPUT N°2 (OPTION 091.3711)

CAL OUT2: ppm

CAL OUT2: °C

PPM (°C): input selected for analog output N°2





Active keys:  -   - 

### 7.14 ANALOG OUTPUT N°2 RANGE

CAL OUT2: 0/20mA





CAL OUT2: 4/20mA

0/20mA (4/20mA): range selected

Active keys:  -   - 





CAL P1: 0.000 ppm

P1: begin of range  
0.000 PPM: measuring value related to 0/4 mA

Active keys:  -   - 

CAL P2: 2.000 ppm

P2: end of range  
2.000 PPM: measuring value related to 20 mA

Active keys:  -   - 

**IMPORTANT NOTE :** if the value related to P1 is higher than the value related to P2 the analog output will be the "reverse", otherwise will be the "direct" type.





### 7.15 SET-POINT A OPERATING MODE

SET A ACT: On/Off

SET A ACT: PWM

SET A ACT: PFM

On/Off, PWM, PFM: set-point A operating mode





Active keys:  -   - 

### 7.16 SET-POINT A FUNCTION

SET A F.: LO

SET A F. : HI

LO: minimum (relay activated for meas. below set-point)  
HI: maximum (relay activated for meas. above set-point)

Active keys:  -   - 





### 7.17 SET-POINT B OPERATING MODE

SET B ACT: ON/OFF

SET B ACT: PWM

SET B ACT: PFM

On/Off,PWM,PFM: set-point B operating mode

Active keys:  -   - 

## 7.18 SET-POINT B FUNCTION



LO: minimum (relay activated for meas. below set-point)  
 HI: maximum (relay activated for meas. above set-point)

Active keys: - -

## 7.19 ALARM ON SET-POINT A



Active keys: - -

1. Two possible alternative A or B.
- 1A. "OFF" Alarm function not activated
- 1B. "ON" Alarm function activated
- 2B. To insert the activation time for set-point A



10m: activation time

Active keys: - -

## 7.20 ALARM ON SET-POINT B







Active keys: - -

1. Two possible alternative A or B.
- 1A. "OFF" Alarm function not activated
- 1B. "ON". Alarm function activated
- 2B. To insert the activation time for Set-point B

TIME SET B: 10m

10m: activation time

Active keys:  -   - 





## 7.21 ALARM RELAY CONTACT FUNCTION

Two possible alternative:

AL RELAY: ACT

AL RELAY: DEA

ACT: active alarm = relay activated  
DEA: active alarm = relay deactivated





Active keys:  -   - 

## 7.22 ALARM TYPE

AL TYPE: CONT.

AL TYPE: FLASH

CONT: continuous contacts  
FLASH: flashing contacts

Active keys:  -   - 





## 7.23 ALARM FLASHING FREQUENCY

AL FLASH F.: LO

AL FLASH F.: ME

AL FLASH F.: HI

LO: low frequency  
ME: medium frequency  
HI: high frequency





Active keys:  -   - 

## 7.24 CLEANING FUNCTION

CAL CF:DISABLED





CAL CF:MANUAL

CAL CF:AUTO

Active keys:  -   - 





## 7.25 CLEANING TIME (RELAY D ON)

CLEANING T:15.0"

Active keys:  -   - 

## 7.26 HOLDING TIME

HOLDING T: 3.0"





Active keys:  -   - 

## 7.27 NEW ACCESS NUMBER

Change Nr.: NO

Change Nr.: YES





NO : access number changing not required  
 YES: access number changing required

Active keys:  -   - 

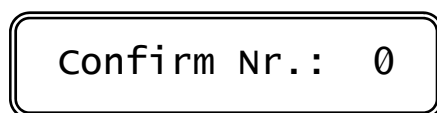
Two possible alternative A or B.





- A. "NO" The unit will go back to the Configuration Display; the operator may verify the parameter setting before leaving the Configuration sequences which is now protected by access number.
- B. "YES" The unit is now ready to the new access number selection.

New Nr.: 0

Active keys:  -   - 

The instrument ask the operator to insert again the new access number.



Active keys:  -   - 

The double insertion of the new code assure the memorization of the right code.

As soon as the new code is memorized the message "UPDATE" will appear.

Should the operator insert two different numbers, the instrument will not modify the access number and the message "NO UPDATE" will be shown.



press several time the key to verify the selected parameters selected before leaving the configuration routine.

## 8 CALIBRATION

### 8.1 ELECTRICAL CALIBRATION

Should a problem arise with the residual monitor, a sensor simulator can be used to determine if the electronic unit is working correctly.

Reset the unit to the laboratory calibration (press Keys up+down+enter as described in the parameters calibration section) and follow the steps:

- Connect to the terminals 18-25 a sensor simulator (for example OD 105.1 B&C Electronics simulator)
- Simulate the value 0 nA and read the value 0.0 PPM on the display.
- Simulate the value 2000 nA and read the value 1.00 PPM on the display.

Return the unit to the factory if these values will not be displayed.

### 8.2 CHEMICAL CALIBRATION

#### Zero cell calibration

The zero calibration is necessary when installing the system and during the initial start up in order to compensate the eventual dark current of the measuring cell.

Insert the sensor into the flow cell and adjust to the proper flow rate of distilled water.

Allow the reading to stabilize for 10 - 20 minutes prior to setting the zero calibration (it is not essential that the water be distilled, but it is important that the water is free of oxidizer).

The zero calibration must be done only after the electric zero calibration that may be effected also keeping the wet sensor out of the flow cell (in air).

#### Sensitivity calibration

Always check the zero, the proper flow rate and the stabilization of the readout prior to sensitivity calibration.

Collect a sample from the effluent or outlet of the flow cell and do a laboratory analysis to determine the chlorine ( $\text{ClO}_2/\text{O}_3$ ) concentration (DPD method is suggested).

Follow the sensitivity calibration procedure described in the calibration section.

Clean the platinum rings of the sensor by means of filter paper or similar prior to starting the calibration. (see Maintenance section)

## 9 PREVENTIVE MAINTENANCE

### Controller

Quality components are used to give the controller a high reliability.

The frequency of such maintenance depends on the nature of each particular application.

As in any electronic equipment, the mechanical components, such as switches, relays and connectors, are the most subject to damage.

### Sensor

The state of the platinum surfaces is critical for the normal operation of the system and should be inspected during the recalibration, if deviations of more than 0.2 mg/l as compared to DPD are detected.

Suggested methods for cleaning the electrode include chemical cleaning as following:

- remove the sensor from the cell,
- clean the platinum rings by dipping the sensor for 30 seconds in a 5% HCl solution,
- rinse thoroughly the sensor into deionised or tap water,
- reinstall the sensor into the cell.

The above procedure does not remove the oxide from the platinum, maintaining the regular measuring conditions for an immediate calibration.

If necessary clean the platinum rings by carefully wiping it with a soft tissue eventually soaked with metal shining reagent.

Rinse carefully and re-install the sensor into the cell.

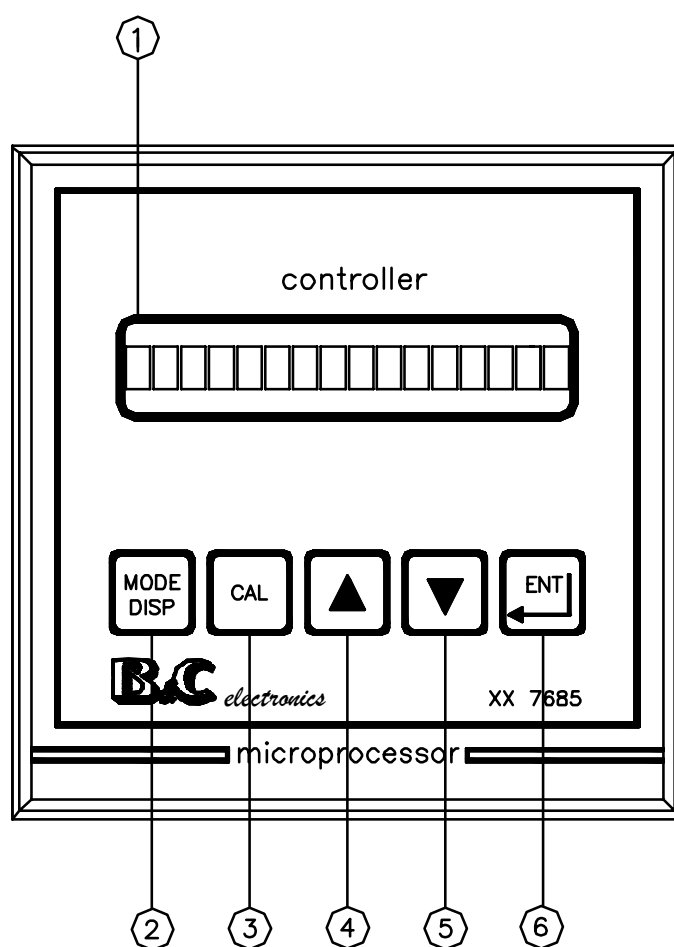
Allow the system to stabilize before calibrating.

The shining platinum will have a sensitivity 2 times more than regular, so it is necessary to maintain the sensor dipped into the water before calibrating.

This time is required for the new oxide layer generation on platinum.



## FRONT PANEL

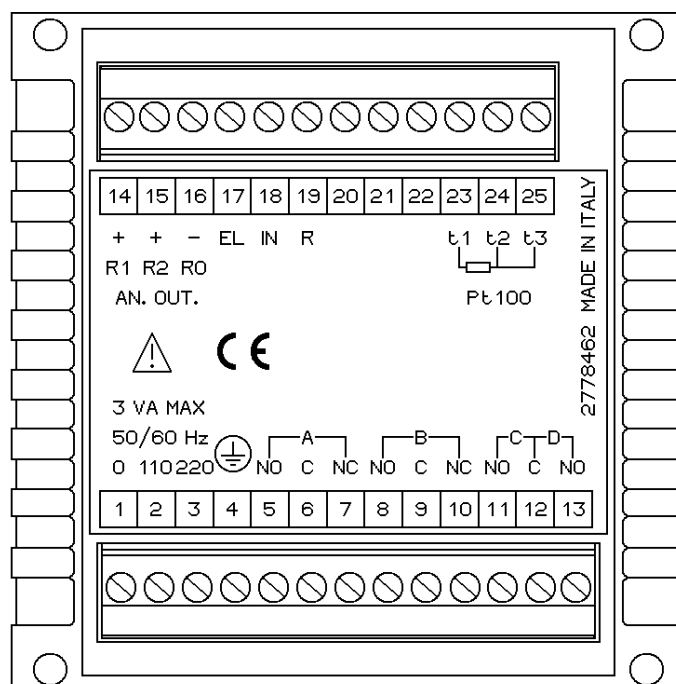


PANFRONT7685 – A4 – 1:1

1. Display
2. Mode-display key
3. Calibration key
4. Increase key
5. Decrease key
6. Enter key

Fig. 1

## REAR PANEL CONNECTIONS

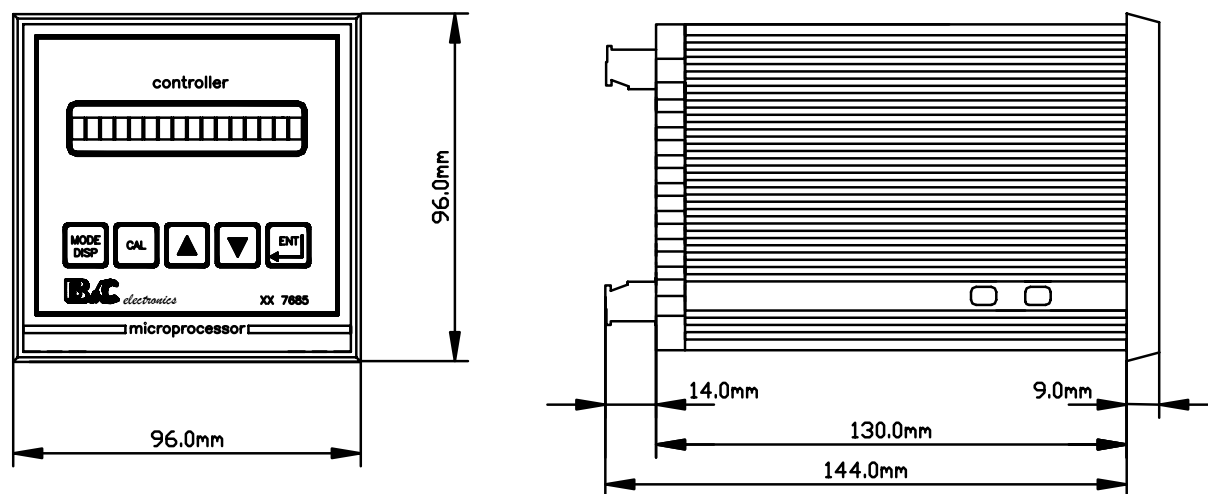


CL7685 rev.A - A4 - 1:1

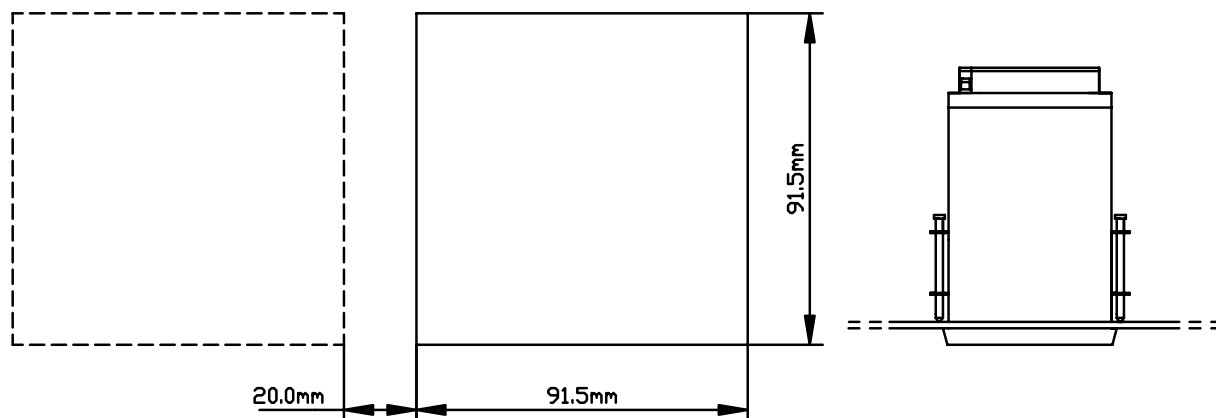
1. 2	110 V power supply
1. 3	220 V power supply
4.	Ground (power)
5. 6	A relay N.O. contacts
6. 7	A relay N.C. contacts
8. 9	B relay N.O. contacts
9. 10	B relay N.C. contacts
11. 12	C relay N.O. (alarm)
12. 13	D relay N.O. (auto clean)
14.	Recorder output channel 1 (+)
15.	Recorder output channel 2 (+) (option)
16.	Recorder output channels 1 and 2 (-)
17.	Sensor input (white)
18.	Sensor input (black)
19.	Reference electrode (shield) input
23.	Pt100 input
24. 25	Pt100 common input

Fig. 2

## DIMENSIONS



## DRILL PLAN



INGOMBRO7685 - A4 -1:2

A4 -1:4

Fig. 3

# WARRANTY CERTIFICATE

- 1) Your product is covered by B&C Electronics Warranty for 5 years from the date of shipment. In order for this Warranty to be valid, the Manufacturer must determine that the instrument failed due to defective materials or workmanship.
  - 2) The Warranty is void if the product has been subject to misuse and abuse, or if the damage is caused by a faulty installation or maintenance.
  - 3) The Warranty includes the repair of the instrument at no charge. All repairs will be completed at the Manufacturer's facilities in Carnate, Italy.
  - 4) B&C Electronics assumes no liability for consequential damages of any kind, and the buyer by accepting this equipment will assume all liability for the consequences of its use by the Customer, his employees, or others.
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## REPAIRS

- 1) In order to efficiently solve your problem, we suggest You to ship the instrument along with the Technical Support's Data Sheet (following page) and a Repair Order.
- 2) The estimate, if requested by the Customer, is free of charge when it is followed by the Customer confirmation for repair. As opposite, if the Customer shall not decide to have the instrument repaired, he will be charged to cover labour and other expenses needed.
- 3) All instruments that need to be repaired must be shipped pre-paid to B&C Electronics. All other expenses that have not been previously discussed will be charged to Customer.
- 4) Our Sales Dept. will contact You to inform You about the estimate or to offer you an alternative, in particular when:
  - the repairing cost is too high compared to the cost of a new instrument,
  - the repairing results being technically impossible or unreliable
- 5) In order to quickly return the repaired instrument, unless differently required by the Customer, the shipment will be freight collect and through the Customer's usual forwarder.

*B&C Electronics Srl - Via per Villanova 3 - 20866 Carnate (MB) - P.IVA 00729030965*  
*Tel (+39) 039 63 1721 - Fax (+39) 039 607 6099 - [info@bc-electronics.it](mailto:info@bc-electronics.it) - [www.bc-electronics.it](http://www.bc-electronics.it)*

# TECHNICAL SUPPORT

## *Data sheet*

In case of damage, we suggest You to contact our Technical Support by email or phone. If it is necessary for the instrument to be repaired, we recommend to photocopy and fill out this data sheet to be sent along with the instrument, so to help us identifying the problem and therefore accelerate the repairing process.

☐ *ESTIMATE*
☐ *REPAIR*


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COMPANY NAME

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ADDRESS

---

ZIP

---

CITY

---

REFER TO MR./MISS.

---

PHONE

---

MODEL

---

S/N

---

DATE

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Please check the operator's manual to better identify the area where the problem seems to be and please provide a brief description of the damage:

☐ SENSOR

☐ ANALOG OUTPUT

☐ POWER SUPPLY

☐ SET POINT

☐ CALIBRATION

☐ RELAY CONTACTS

☐ DISPLAY

☐ PERIODICAL MALFUNCTIONING

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➤ *DESCRIPTION*


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