UNI EN ISO 9001:2000
CERT. N. 9115 BCEL

OPERATOR'S MANUAL

OD 7685

DISSOLVED OXYGEN CONTROLLER MICROPROCESSOR BASED

Rev. C
Valid for options 091.3711 e 091.601

D.Oxygen scales: 0/200.0 %air
0/200.0 mmHg
0/20.00 PPM
0/20.00 mg/l
Temperature scales: -2/+52 °C
Power supply: 110/220 Vac

Software release: R 2.2x

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1 PRELIMINARY

The instrument structure has been designed considering the three way of use:

1) The user checks measuring values and the proper functioning of the instrument.

   The user should consult the chapters 1 - 2 - 3.

2) The user should define the operating parameters and carry out the periodic calibration.

   The user can carry out the following choices and operations:

   - operating with keyboard locked/unlocked
   - manual/automatic operating mode
   - selecting the values of Set-point, Hysteresis, and Delay time for the relay switching
   - selecting the Minimum/maximum function and the alarm Delay time
   - calibrations
   - programming the Cleaning function

3) The user should operate the functioning choice required for the system in which the instrument is used.

   After the installation the instrument should be configured for the desired functioning.

   Can be carry out:

   - selections between possible options
   - input numeric values within a fixed range

We suggest to follow the next steps:

1) in the chapter 2.3 "TECHNICAL SPECIFICATION", locate parameters marked with "*" and the corresponding factory values in the "Default" column

2) make a list of changings in order to fit with the specific application

3) insert the "Configuration" access code to:

** select the Dissolved Oxygen sensor type
** select the measuring unit
- program the two Software Filter response time
- select the calibration mode
- program the Automatic Pressure Compensation (option)
- select the input for the analog output N°1 and N°2
- select the mA output range
- program the measuring value corresponding to 0/4 and 20 mA

** select the Min/Max function for the Set-Point A and B

- program the alarm action on the activation time for Set-point A and B
- program the Max. activation time for Set-point A and B
- select the Activated/Deactivated function for relay C
- program the Cleaning function (relay D)
- select the Access number to the Configuration

(The choice of the parameters marked ** is the minimum required for the use of the instrument).

Refer to the chapter 3.4 "Configuration".

1.1 MEASURING PRINCIPLE

Polarographic method

The measurement is performed with a Polarographic sensor introduced by Clark and still represents the more practical measuring system since it allows accurate and fast measurement as well as easy calibration procedures.

The method consists of the Dissolved Oxygen diffusion through a membrane which divides the sample from an electrolytic cell with a Silver Anode and a Platinum Cathode.

A suitable polarization Voltage generates a Current flow which is proportional to the diffused Dissolved Oxygen through the membrane.

The Oxygen in the cell will be restored by the continuous diffusion through the membrane. The result is a great stability of the measurement.
Anyway the method is influenced by two physical factors: the Temperature and the sample speed.

Temperature effect

The membrane is affected by a contraction/dilatation at the Temperature variation, with the consequence of a variation of the membrane porosity.
This changing modify the diffusion speed of the Dissolved Oxygen through the membrane and consequently a different measuring.

This effect is compensated by the instrument by means of a Thermoresistance included in the D.O. sensor.

Sample speed effect

The Oxygen diffusion through the membrane will decrease the concentration close to the membrane, resulting in a reduction of the measuring value.

For this reason it is necessary to allow a continuous flow of the sample with a speed from 0,3 to 0,7 meter/second close to the membrane.

Avoid air bubbles in the sample that would affect the measuring accuracy.

1.2 MEASURING SYSTEM

The Dissolved Oxygen monitoring system consists of two parts:

- the measuring/regulating instrument which is discussed in this instruction manual
- the Dissolved Oxygen sensor

The system could be implemented with additional devices for field application:

B&C Electronics amplified sensor, Temperature sensor, recorder, remote display, ON-OFF regulators, PID regulators, sensor Cleaning devices.

Instrument

This instrument carries out the following functions:

1) Dissolved Oxygen measuring when connected to the sensor
2) manual or automatic Dissolved Oxygen regulation, if suitable devices are connected to the output relays
3) Temperature measuring, if an RTD Pt100 is connected
4) manual or automatic compensation of Temperature, Pressure, Salinity and Relative Humidity effects
5) alarm devices activation when unexpected measuring and Set-point conditions happen
6) D.O. and/or Temperature acquisition, when connected to a Recorder or a Data Logger
7) sending data via a Serial interface, if the option 091.701 "RS232" is installed
8) external device activation for the sensor Cleaning
9) Barometric Pressure measuring if the option 091.601 is installed

Sensor

For the proper functioning of the system it is necessary to use the suitable sensor for each specific application.

The sensor installation should allow a continuous contact with the sample, in a position with sufficient stirring and exchange of sample.

In some applications the use of sensor Cleaning devices is suggested.

2 SPECIFICATIONS

Performances

* Input selectable for: - High/Low Current Polarographic sensor
  - Galvanic sensor
  - Microtransmitter 080610.2

* Manual and automatic Temperature Compensation
* Automatic Barometric Pressure Compensation (option)

* Scales selectable in: % air saturation - PPM - mg/l - mmHg

* Three wires Pt100 Temperature input
* Temperature reading
* Barometric Pressure value reading (option)

* Alphanumeric LCD backlighted display
* Software Filter on measuring
* Manual and automatic operating mode

* Calibration parameters display
* Immediate/postponed manual calibration or automatic calibration in air
* Compensation of Temperature, Pressure, Relative Humidity, Salinity by memorized table

* Isolated and programmable analog output 0/20 or 4/20 mA
* Selectable input range

* Two regulators with: hysteresis, delay time and min/max function
* Alarm: programmable window and timed on set-point action
* Program for sensor cleaning devices activation

* Software:
  - 3 access levels
  - user friendly
  - keyboard lock
  - access code
  - watch-dog

* EEPROM parameter storage
* Automatic overload protection and reset
* Extractable terminal blocks
* 96X96 (1/4" DIN) housing

2.1 FUNCTIONAL SPECIFICATION

Additional specification of Release R2.1x

- Two Software Filter Time depending on the amplitude of the input signal changing
- Selectable access number to the Configuration
- Manual Temperature calibration even with sensor connected
- Sensor cleaning function
- Barometric Pressure reading (option)
- Sensor calibration in Immediate/Postponed mode
- Type of sensor and microtransmitter selection.

Input

The instrument accepts input from three sensors:

- Dissolved Oxygen sensor;
- Temperature sensor (Pt100);
- Barometric Pressure internal sensor (option).

Software Filter

The unit is provided with a programmable software filter, to be inserted when the readout is not stable.
The user may select different filter values for small and large signal fluctuations.

D.Oxygen sensor type

The following sensor type can be used:

- 3 polarographic sensor type with different Current in air;
- galvanic sensor;
- B&C Electronics amplified sensor (ST series)

An exclusive feature of the instrument allows to connect ST series sensors, amplified by the 080610.2 microtransmitter, for long distance applications.

Scales

The following D.O. measuring scales can be selected:
mmHg (partial pressure) - % (air saturation) - PPM - mg/litre.

The instrument holds the calibration data when changing the measuring scale.

Temperature compensation

The unit is supplied with manual or automatic Temperature compensation. The instrument detects of the absence or malfunctioning of the Temperature sensor and automatically switches to manual compensation.

Secondary parameters

The D.O. measuring is affected from Barometric Pressure, Salinity and Relative Humidity.

The programming of these parameters values avoids the use of the conversion tables.
As an option the automatic Barometric Pressure compensation can be implemented.

Analog output

Either a 0/20 mA or 4/20 mA programmable and isolated output may be selected, for use as an interface with computers or data loggers.
The input range corresponding to the output is programmable.

Control relays

The monitor is equipped with two SPDT control relays.

Each control relay may be programmed for set-point, high/low, hysteresis or delay time actuation.

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

Alarm relay

The unit contains a third SPDT relay designated as an alarm relay.

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

In addition this relay may be programmed for either normal or fail-safe operation.

Operating mode

The instrument is provided with 2 programmable modes of operation.

- Automatic operation:

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

- Manual operation:

This mode of operation would normally be used for control system troubleshooting.
The unit will allow the relays to be manually actuated by pushing up/down keys.

The letter "M" flashing on the display, indicates the instrument is in manual operation mode.

Calibration

The sensitivity calibration in air can be automatically performed.

The manual calibration mode can be selected in two ways:

- immediate calibration
  the user immediately adjust the measuring value

- postponed calibration
  the instrument memorizes the sample value;
  the user adjust the memorized value after the laboratory analysis

Cleaning function

The unit contains a SPST relay designated as an autoclean relay.
This relay may be used to start a manual or automatic autoclean cycle.

The user may select:
- the cleaning time
- the waiting time to turn to the normal operation
- the repetition time of the cycle

During the cleaning and waiting the unit will provide:
- flashing messages
- analog outputs in hold
- control and alarm relays deactivated

Configuration

A number of programming functions are provided in the Configuration menu and are protected by a selectable access number, which must be entered to allow changes in this setting.
The keys on the front panel of the monitor can be used for both changing the display and 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.

IMPORTANT NOTE
The factory configuration allows the immediate use of the instrument in main applications.

Options

091.3711 Dual isolated and programmable output.
Two outputs may be configured for Concentration or Temperature.

091.701 RS232 isolated output.
The output sends the data (Concentration, mV, °C) to the serial port of the computer.

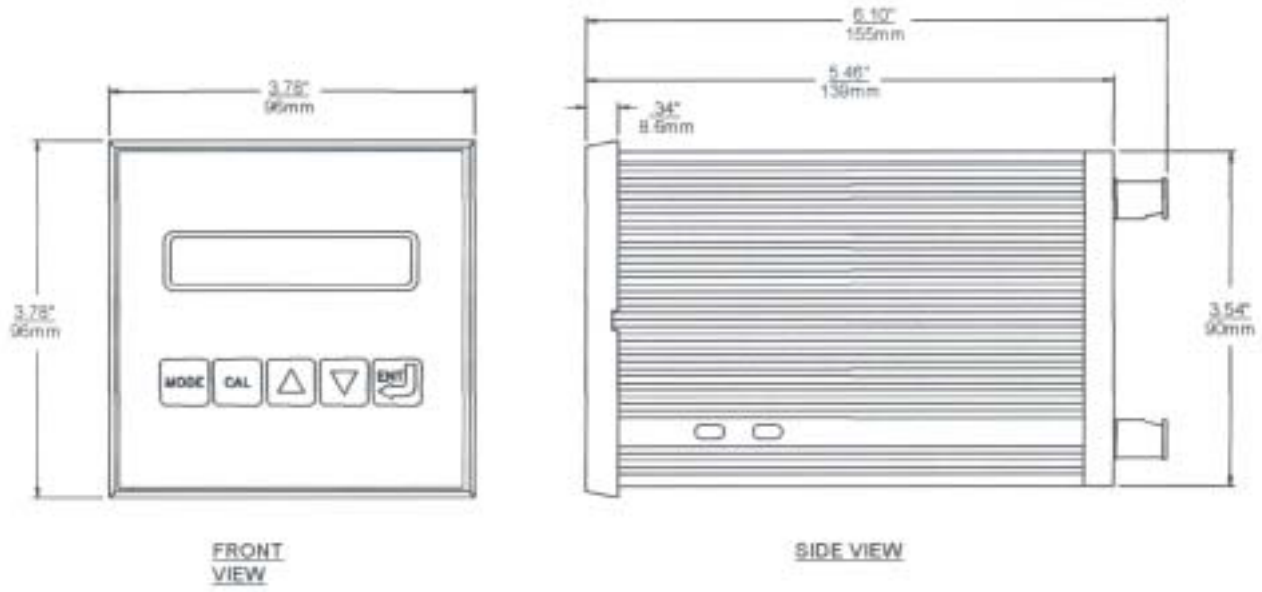
091.404 24 VAC power supply.

2.2 PHYSICAL SPECIFICATIONS

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 cable 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.



FRONT VIEW

SIDE VIEW

2.3 TECHNICAL SPECIFICATIONS

The *Default* values are corresponding to the factory calibration values.
Parameters marked by " * " can be modified in the Configuration procedures.

	OPERATING MODE	*Default*
	Automatic/Manual	Auto

	SENSOR TYPE	*Default*
*	250nA-P/45nA-P/300nA-P/30mV-G	250nA-P
*	Microtransmitter: On/Off	Off
	Input from POLAROGRAPHIC CELL 250	
	Current in air input at 20°C: 200/400 nA	250 nA
*	Thermocompensation: according to internal table/Coefficient	Table
*	TC selectable: 0/4 %/°C	2.3%
	(table arranged for SZ654.1 cell with Vpol. 675 mV)	
	Input from POLAROGRAPHIC CELL 45 nA	
	Current in air input at 20°C: 25/75 nA	45 nA
*	Thermocompensation: according to internal table/Coefficient	Table
*	TC selectable: 0/4 %/°C	2.3%
	Input from POLAROGRAPHIC CELL 300 nA	
	Current in air input at 20°C: 170/510 nA	300 nA
*	Thermocompensation: according to internal table/Coefficient	Table
*	TC selectable: 0/4 %/°C	2.3%
	Polarization voltage: 0/1250 mV	675 mV
	Input from GALVANIC CELL 30 mV	
	Voltage in air input at 20°C: 17/51 mV	30 mV
*	Thermocompensation: according to internal table/Coefficient	Table
*	TC selectable: 0/4 %/°C	2.3%
	Software filter 90% RT:	
*	Large signal variation: 0.4/20.0 sec.	2.0 sec
*	Small signal variation: 0.4/20.0 sec.	10.0 sec
	Ref. Temp. for the Thermocompensation: 20°C	
*	Scales: % air saturation: 0/200.0 % air	% air sat
	PPM: 0/20.00 PPM	
	mg/l: 0/20.00 mg/l	
	Partial pressure O2: 0/200.0 mmHg	
	Zero regulation: (+/- 3.00 nA/30 nA) +/- 10% air/20°C	0 nA
	Sensitivity regulation: 55/170 %	100 %
	Display accuracy at 20°C: 1/1000	
	Automatic calibration (function of Temp-Press-RH)	
	Manual calibration (function of the adjusted value)	
	Signalling of the calibration value stability reached	

SECONDARY PARAMETERS	*Default*
Pressure: 500/800 mmHg	760 mmHg
Salinity (Chloride): 0/60000 PPM	0 PPM
Relative Humidity: 0/100 %	50 %

TEMPERATURE	*Default*
Input: RTD Pt100	
Connections: 2/3 wires	
Measuring and compensation range: -2/+52 °C	
Accuracy: 0.1 °C	
Zero adjustment: +/- 2°C	0°C
Manual temperature value range: 0/50°C	20°C

SET-POINT A/B	*Default*
Set value (function of the scale): 0/200.0 %	0 %
Hysteresis (function of the scale): 0/20.0 %	0 %
Delay time: 0.0/99.9 Sec.	0 Sec.
* Function: HI/LO (Max/Min)	LO
Relay contact: SPDT 220V 5Amp resistive	

ALARM (CONTACT C-D)	*Default*
Low value (function of the scale): 0/200.0 %	0.0 %
High value (function of the scale): 0/200.0 %	200.0 %
Delay time: 0.0/99.9 Sec.	0 Sec.
* Alarm for max. activation time on SA (Set-point A): ON/OFF	OFF
* Max. activation time for SA: 0/60 minutes	60 min.
* Alarm for max. activation time on SB (Set-point B): ON/OFF	OFF
* Max. activation time for SB: 0/60 minutes	60 min.
* Contact type (activated/deactivated): ACT/DEA	ACT
Relay contact: SPDT 220V 5Amp resistive	

CLEANING (Relay D)	*Default*
* Action: Disabled/Manual Clean/Auto+Manual Clean	Disabled
Auto Clean:	
Repetition time: 0.1/24.0h	24.0h
* Cleaning time: 0.5/60.0"	15.0"
* Hold time (hold of analog output, deactivation of Set-point A and B and Alarm C): 0.1'/20.0'	3.0'
Relay contact: SPST (N.O.)	

ANALOG OUTPUT N°1	*Default*
* Input related to analog output (only for option 091.3711): PPM/°C	PPM
* Output range: 0-20/4-20 mA	0/20 mA
* Point 1 (corresponding to 0 mA or 4 mA): mmHg/%air: 0.0/200.0 PPM/mg/l: 0.00/20.00	0.0%
* Point 2 (corresponding to 20 mA): mmHg/%air: 0.0/200.0 PPM/mg/l. 0.00/20.00	200.0%
Response time: 2.5 Sec. approx. for 98 %	
Isolation: 250 Vca	
Rmax: 600 Ohm	

ANALOG OUTPUT N°2 (only for Option 091.3711)	*Default*
* Input related to analog output: PPM/°C	PPM
* Output range: 0-20/4-20 mA	0/20 mA
* Point 1 (corresponding to 0 mA or 4 mA): mmHg/%air: 0.0/200.0 PPM/mg/l: 0.00/20.00	0.0%
* Point 2 (corresponding to 20 mA): mmHg/%air: 0.0/200.0 PPM/mg/l. 0.00/20.00 Response time: 2.5 Sec. approx. for 98 % Isolation: 250 Vca Rmax: 600 Ohm	200.0%

CONFIGURATION (*)	*Default*
Free calibration (Access number not required):	
keyboard locked/Unlocked	Unlocked
LCD Display contrast (0/7)	4
Access number required:	
Sensor type	250nA-P
Microtransmitter: On/Off	Off
D.O. input scales: mmHg/%air/PPM /mg/l	% air
Thermocompensation type: Table/Coefficient	Table
Thermocompensation coefficient	2,3 %/°C
Calibration mode	Immediate
Polarization voltage of the cell	675 mV
RT Large software filter	2.0 sec
RT Small software filter	10.0 sec
Input related to analog output N°1 (Option 091.3711)	% air
Analog output N°1 range	0/20 mA
Point 1 (x mA minimum)	0.0
Point 2 (x mA maximum)	200.0
Input related to analog output N°2 (Option 091.3711)	% air
Analog output N°2 range (Option 091.3711)	0/20 mA
Point 1 (x mA minimum) (Option 091.3711)	0.0
Point 2 (x mA maximum) (Option 091.3711)	200.0
Relay A function	LO
Relay B function	LO
Alarm for max. activation time on SA	OFF
Max. activation time for SA	60 m
Alarm for max. activation time on SB	OFF
Max. activation time for SB	60 m
Alarm relay contact function	ACT
Cleaning function	Disabled
Cleaning time	15.0 sec
Hold time	3.0 min
Configuration access code number: 0/999	0

GENERAL SPECIFICATION

Alphanumeric display: 1 line x 16 character
Acquisition time: 0,1"
Updating time for main measure: 0,4"
Operating Temperature: 0/50 °C
Ambient Humidity: 95% without condensation

Power supply: 110/220 Vac +/- 10% 50/60 Hz
Isolation: 4000 Volt between primary and secondary (IEC 348)
Power consumption: 5 VA max.
Terminal boards: extractable
Net weight: 850 gr.
Housing: DIN 43700 96 x 96
Dimension: 96 x 96 x 155 mm.

3 SOFTWARE DESCRIPTION

3.1 KEYBOARD

KEY FUNCTION

MODE DISP	- it allows the operator to go to the next Display - it allows to go back to the main Display. The eventual new parameter values will not be memorized
CAL	- it allows the access of calibration sequences
▲	- it allows to increase the displayed parameters - it allows to choose between different functions
▼	- it allows to decrease the displayed parameters - it allows to choose between different functions
ENT	- it allows to enter the selected data and to return to the main Display **D0**

3.2 READOUT SEQUENCES

Applying the power to the instrument the display will shows for 3 seconds the type of cell selected, then will shows the main Display (D0).

250nA-P nominal Current value for Polarographic cell
(45nA-P) " "
(300nA-P) " "
(30mV-G) nominal Voltage value for Galvanic cell

Press MODE DISP to visualize the following Display:

D0	XXX %airM ■AL□ BH	Dissolved Oxygen value, set-point status/functions
D1	xxx.x%air xx.x°C	Dissolved Oxygen and Temperature values
D2	P:xxx sal: xxxxx	Barometric Pressure and Salinity values for the compensation
D3	TEMP.: xx.x°CM	Temperature value
D4	SA:xxx %air* ■ LO	Set-point A parameters
D5	SB:xxx %air* ■ HI	Set-point B parameters
D6	AL xxx/xxx %air	Alarm Parameters
D7	CLEANING OFF	Cleaning function
D8	01 xx.xmA/xxx %a	Analog output Nr.1 /input values
D8BIS	02 xx.xmA/xxx %a	Analog output Nr.2 /input values
D9	Configuration	Configuration Display
D10	OD7685 R2.2x	Instrument code and Software release

(D0) 

Dissolved Oxygen value, set-point status/functions

xxx %air (PPM) (mg/l) (mmHg) D.Oxygen value and measuring unit
(>>>>) value higher than the full scale (over range)
(<<<<) value is negative (under range)
(flashing) system in alarm

(M flashing) manual operating mode

□A relay A deactivated
(▬A) relay A with delayed activation
(■A) relay A activated

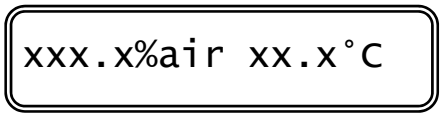
□B relay B deactivated
(▬B) relay B with delayed activation
(■B) relay B activated

L relay programmed for min. function (LO)
H relay programmed for max. function (HI)

MESSAGE	**MEANING**
"CLEANING"	cleaning cycle activated
"HOLDING"	holding time cycle

CAL to activate the procedure of the manual/automatic mode selection.

MODE DISP to go to

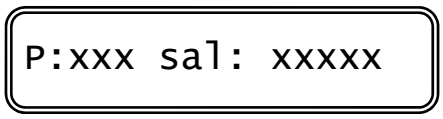
(D1) 

Dissolved Oxygen and Temperature values

xxx.x %air Dissolved Oxygen value (with one more digit) and measuring unit selected
xx.x°C Temperature value

CAL to activate the calibration sequence.

MODE DISP to go to

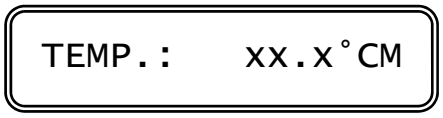
(D2) 

Barometric Pressure and Salinity values of the sample

p: xxx Barometric Pressure value (mmHg)
sal: xxxxx Salinity value of the sample (PPM)

CAL to activate the secondary parameters calibration sequence.

MODE DISP to go to

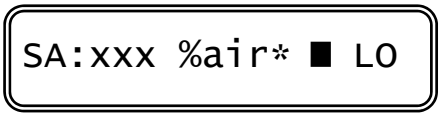
(D3) 

Temperature value

xx.x Temperature value
M only in manual Temperature

CAL to activate the Temperature calibration or the procedure of the manual Temperature value selection.

MODE DISP to go to

(D4) 

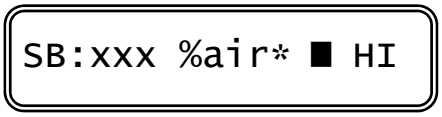
Set-point A parameters

SA set-point A parameters
xxx %air set-point value in % of air
■ set-point A status (relay activated)
LO selected function (minimum)
* alarm function on Set-point A is selected

CAL to activate the Set-point value, Hysteresis and Delay time programming sequences.

MODE DISP

to go to

(D5) 

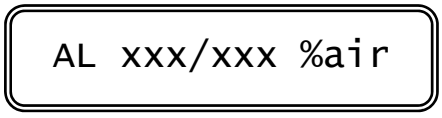
Set-point B parameters

SB	set-point B parameters
xxx %air	set-point value in % of air
■	set-point B status (relay activated)
HI	selected function (maximum)
*	alarm function on Set-point B is selected

CAL to activate the Set-point value, Hysteresis and Delay time programming sequences.

MODE DISP

to go to

(D6) 

Alarm parameters

AL	Dissolved Oxygen values alarm (% air)
xxx	low alarm value
xxx.x	high alarm value

CAL to activate the Alarm value programming sequences.

MODE DISP

to go to

(D7) 

Cleaning function

OFF	cleaning function disabled
(ON)	cleaning function enabled

MANUAL CLEAN manual cleaning activation
(AUTO CLEAN) automatic cleaning activation

CAL to activate the Cleaning function programming sequences.

MODE DISP

to go to

(D8) `01 xx.xmA/xxx %a` Analog output N°1 value and input measuring value

01 analog output N°1
xx.xmA: Current value output in mA
xxx %air input measuring value in % of air (PPM, mg/l, mmHg)

MODE DISP

to go to

(D8BIS) `02 xx.xmA/xxx %a` Analog output N°2 value and input measuring value

02 analog output N°2
xx.xmA: Current value output in mA
xxx %air input measuring value in % of air (PPM, mg/l, mmHg, °C)

MODE DISP

to go to

(D9) `Configuration` Configuration display

CAL to activate the Configuration sequences.

MODE DISP

to go to

(D10) `OD7685 R2.2x` Instrument P/N and Software Release

OD7685 instrument Part Number
R2.2x software release installed

MODE DISP

to go back to the main Display (D0)

3.3 CALIBRATION SEQUENCES

The following procedures are accessible only if the Keyboard is unlocked.

To unlock the keyboard follow the instruction of the Chapter 3.4 "Configuration".

Following procedures allow the operator to perform the sensors calibration and the Set-point/Alarm parameters programming.

The sequence (1, 2, ...) helps the operator to following the regular calibration sequence.

IMPORTANT NOTE: during the calibration procedure the microprocessor turn the unit to the main display if no keys have been pressed within 5 minutes (30 minutes for ISE calibration sequences)

3.3.1 Manual/automatic mode

Normally the instrument works in automatic mode.
Follows this procedure only to switch the instrument operating mode.

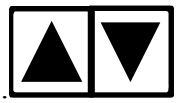
1. MODE DISP to go to

(D0)

2. CAL to access the operating mode selection

AUTO automatic mode
(MANUAL) manual mode

MODE DISP to stop the procedure

3.  to select the operating mode

4. 

to confirm the selected operating mode and to go back to (D0)

MESSAGE	**MEANING**
“ UPDATE “	the new parameter is stored and the instrument goes back to (D0)

3.3.2 Zero and Sensitivity calibration

This procedure allows to:

- visualize the Zero Current value, to confirm the value and to go to the visualization of the Sensitivity.

- access to the Zero calibration sequence

Before calibrating is necessary:

- to verify the correct programmation of the Secondary parameters in D2.

- to prepare a solution without Dissolved Oxygen if Zero calibration has to be performed.

Zero Calibration

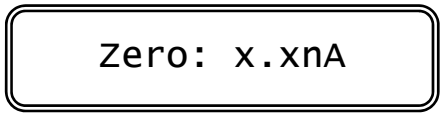
1. 

to go to

(D1) 

2. 

to access the calibration sequences.



x.x nA Zero Current value of the cell

MODE DISP to stop the procedure

ENT to end the Zero calibration procedure and to go to the Sensitivity calibration procedure (see next section)

3. CAL to access the Zero calibration procedures

```
CAL Zero:  x.x
```

x.x Current value from the cell

MODE DISP to stop the procedure

▲ + ▼ + ENT press the three key to turn to factory calibration (Zero=0)

4. ENT to end the Zero calibration procedure and to go to the Sensitivity calibration sequence.

MESSAGE	MEANING
" UPDATE "	The calibration is accepted
Error messages	
Z > 10.0%	Zero > 10.0 % ENT to stop the error message. The next message is displayed
" NO UPDATE "	The calibration is not accepted. The instrument goes back to (D1).

See Chapt. 9 if error messages turn up.

Sensitivity calibration

The Sensitivity calibration can be performed in one of the three methods:

- automatic calibration in air (procedure A)
- immediate manual calibration (procedure B)
- postponed manual calibration (procedure C)

NOTE 1
Before memorizing the calibration value the instrument check for his stability showing the flashing message 'R' (READY) until the stability is reached.

When the stability is reached, the instrument shows the steady message 'R' .

If the stability is not reached for several causes, the operator can go ahead with the procedure by pressing ENT . In this case the instrument will show for approx. 1" the message:

' Skip Stability '

NOTE 2
At the end of the Sensitivity calibration procedure the instrument will show one of the following messages:

MESSAGE	**MEANING**
" UPDATE "	the calibration is accepted

Error messages

SENS > 170.0%	Sensitivity > 170.0%
SENS < 55.0%	Sensitivity < 55.0%

The above mentioned messages remain for 5 minutes.
ENT to stop the messages readout and to show:

" NO UPDATE "	the calibration is not accepted and the instrument goes back to (D1).

See Chapter 9 if error messages turn up.

After the Zero calibration, the procedure begins with the following display:

```
SENS: xxx.x%
```

xxx.x Sensitivity value

MODE DISP to stop the procedure

ENT to end the Sensitivity calibration procedure and to go back to (D1)

1. CAL to access the selection of manual or automatic calibration mode

```
CAL O2:AUTO/air
```

AUTO (MANUAL) automatic mode calibration (manual)

MODE DISP to stop the procedure and to go back to (D1)

2. ▲ ▼ to select the calibration mode

3. ENT
- to confirm the calibration mode selected
- to go to the Sensitivity calibration sequence in automatic (section 4A.) or manual (section 4B. or 4C).

(procedure A.) AUTOMATIC SENSITIVITY CALIBRATION

It is the regular calibration method, therefore it is automatically proposed at this point of the procedure.
Refer to the Chapter 6 "Calibration".

Carry out the following operations:

- remove the cell from the sample
- make sure that the sensor is dry
- bring the sensor in air with a known Relative Humidity

```
CHECK TEMP.:x.xx
```

xx.x Temperature value

Before proceeding, check for the Temperature value stability, to avoid calibration errors.

MODE DISP to stop the procedure and to go back to (D1)

4A. ENT To access the calibration procedure

```
CAL O2: xxx.xR A
```

xxx.x Dissolved Oxygen measuring value
R measuring stability indicator
A automatic calibration procedure

MODE DISP to stop the procedure and to go back to (D1)

▲ + ▼ + ENT press the 3 keys to turn to the Sensitivity factory calibration and to go back to (D1)

5A. ENT to end the calibration procedure and to go back to (D1)

See Chapt. 9 if error messages turn up.

(procedures B. and C.) MANUAL SENSITIVITY CALIBRATION

Two type of manual calibration can be selected in the "Configuration" menu:

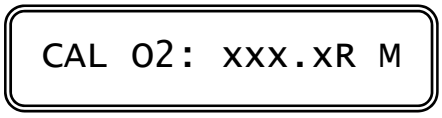
- Immediate calibration (procedure B.)
- Postponed calibration (procedure C.)

IMMEDIATE CALIBRATION

It is suitable when the D.Oxygen contents are stable or known.

The Display will show for few seconds the message:

then the following Display will be shown:



xxx.x Dissolved Oxygen measuring value
R measuring stability indicator
M: manual calibration procedure

MODE DISP to stop the procedure and to go back to (D1)

▲ + ▼ + ENT press the 3 keys to turn to the Sensitivity factory calibration and to go back to (D1)

4B. ▲ ▼ press the keys to adjust the D.O. value

5B. ENT to end the calibration and to go back to (D1).

POSTPONED CALIBRATION

It is suitable when the D.Oxygen contents are not stable or unknown.

The Display will show for few seconds the message:

```
SAMPLE VAL. REC.
```

VAL. REC. sample value memorization

```
CAL O2: xxx.xR M
```

xxx.x Dissolved Oxygen measuring value
R measuring stability indicator
M: manual calibration procedure

MODE DISP to stop the procedure and to go to (D1)

▲ + ▼ + ENT press the 3 keys to turn to the Sensitivity factory calibration and to go back to (D1)

Withdraw a sample to check the concentration:

4C. ENT to memorize D.O. value of the sample;

the following message will be displayed:

```
SAMPLE V. UPDATE
```

After few seconds the instrument goes back to Display (D1) and it is ready to continue in the normal operation.

To end the postponed Sensitivity calibration it is necessary:

- to have the correct Dissolved Oxygen value from the analyzed sample
- to select the Display (D1)
- to access again to the manual Sensitivity calibration procedure

The display will show the message:

```
SAMPLE V. ADJUST
```

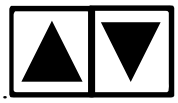
Afterwards the Display will show the previous memorized value

SAMPLE V.: xxx.x

xxx.x D.O. value to be changed according to the analyzed sample value

MODE DISP to stop the procedure and to go to (D1)

▲ + ▼ + ENT press the 3 keys to turn to the Sensitivity factory calibration

5C.  to adjust the D.O. value

6C.  to end the postponed Sensitivity calibration value and to go back to (D1)

See Chapter 9 if error messages turn up.

3.3.3 Dissolved Oxygen secondary parameters calibration

This procedure allows programming the following parameters:

- Barometric Pressure
- Salinity
- Relative Humidity
- Temperature

These parameters will be used by the instrument to access the memorized compensation table.

1. MODE DISP to go to

(D2)

```
P:xxx sal: xxxxx
```

xxx Pressure value
xxxxx Salinity value

2. CAL to access the calibration sequence

Barometric Pressure calibration

```
CAL p: xxx mmHg
```

p xxx mmHg Barometric Pressure value selected

MODE DISP to stop the procedure and to go back to (D2)

3. ▲ ▼ to program the Pressure value

4. ENT to confirm the new value and to go to the Salinity Calibration procedure

MESSAGE	MEANING
" UPDATE "	the new value has been memorized

Salinity calibration

CAL sal:xxxxxPPM

xxxxx PPM Salinity value selected

MODE DISP to stop the procedure and to go back to (D2)

5. ▲ ▼ to program the Salinity value

6. ENT to confirm the new value and to go to the Relative Humidity calibration procedure

MESSAGE	MEANING
" UPDATE "	the new value has been memorized

Relative Humidity calibration

CAL RH: xxx%

xxx% Relative Humidity value selected

MODE DISP to stop the procedure and to go back to (D2)

7. ▲ ▼ to program the Relative Humidity value

8. ENT to confirm the new value and to go back to (D2)

MESSAGE	MEANING
" UPDATE "	the new value has been memorized

Temperature calibration

This calibration should be performed with a reference Thermometer (see chapter 5.4).

1. MODE DISP to go to

(D3) TEMP.: xx.x°CM

xx.x Temperature value
M manual Temperature mode

2. CAL to access the Pt100 Zero calibration procedure

CAL T: xx.x°C

T Pt100 Zero calibration
xx.x measuring Temperature value

MODE DISP to stop the procedure and to go back to (D3)

3. ▲ ▼ to adjust the Temperature value

4. ENT to confirm the new value and to go to manual Temperature value calibration

CAL T.M.: xx.x°C

MODE DISP to stop the procedure

5. ▲▼ to program the manual Temperature value

6. ENT to confirm and to go back to (D3)

MESSAGE	MEANING
" UPDATE "	the new values has been memorized

Error messages

Z> 2.00°C	Zero PT100 > 2.00 °C This message will be shown for 5 minutes. ENT to acknowledge the error message
" NO UPDATE "	the calibration is not accepted The unit goes back to (D3)

3.3.4 Set-point A/B calibration

For each set-point it is possible:

- to insert the set-point
- to insert the hysteresis
- to insert the delay time

1. MODE DISP to go to:

(D4)
```
SA:xxx %air* ■ LO
```

(D5)
```
SB:xxx %air* ■ HI
```

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

Set value

2. CAL to access the calibration sequences

```
CAL SA S:xxx.x
```

SA Set-point A calibration
xxx.x Set-point value

MODE DISP to stop the procedures

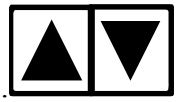
3. ▲ ▼ to insert the Set-point value

4. ENT to confirm and to go to the next step

CAL SA I: xx.x

xx.x Actual Hysteresis value

MODE DISP to stop the procedure

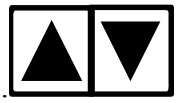
5.  to insert the Hysteresis value

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

CAL SA D: xx.xs

xx.xs Actual Delay Time value (in seconds)

MODE DISP to stop the procedure

7.  to insert the Delay Time value

8.  to confirm and to go back to (D4)/(D5)

" UPDATE "

The calibration is accepted.

3.3.5 Alarm calibration

This procedure allows to:

- select the min/max alarm value
- select the Delay Time alarm value

1. MODE DISP — press the key to go to:

(D6)

```
CAL AL L:xxx.x
```

2. CAL — to access the calibration sequence

```
AL xxx/xxx %air
```

AL L low alarm calibration
xxx.x actual low alarm value

MODE DISP to stop the procedure

3. ▲ ▼ — to insert the alarm value

4. ENT — to confirm and to go to the high alarm insertion

```
CAL AL H: xxx.x
```

AL H high alarm calibration
xxx.x actual high alarm value

MODE DISP to stop the procedure

5. ▲ ▼ — to insert the alarm value

6. ENT to confirm and to go to the Delay Time selection

```
CAL AL D: xx.xs
```

AL D Delay alarm calibration
xx.xs Delay Time value (in seconds)

MODE DISP to stop the procedure

7. ▲ ▼ to insert the Delay value

8. ENT to confirm the new value and to go back to (D6)

```
" UPDATE "
```

the calibration is accepted

3.3.6 Cleaning function calibration

1. MODE DISP to go to

(D7)

```
CLEANING OFF
```

CLEANING OFF Cleaning function disabled
(MANUAL CLEAN) Cleaning function with manual activation
(AUTO CLEAN) Automatic Cleaning function

2. CAL to access the Cleaning function parameters calibration

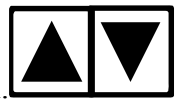
Manual clean

The following message will be shown:

```
CLEAN C.: WAITING
```

WAITING the unit is waiting to start a Cleaning cycle
(START) cleaning cycle starting

MODE DISP to stop the procedure

3A.  to select START or WAITING

4A.  to confirm the selected option

- By selecting START the instrument begins a manual Cleaning cycle and the (D0) Display will be shown
- By selecting WAITING the instrument go back to (D7)

Automatic functioning (AUTO CLEAN)

The instrument will show the waiting time for the next Cleaning cycle

```
NEXT CYCLE: xx.xh
```

xx.xh Waiting time for the next cycle (hours)

MODE DISP to stop the procedure

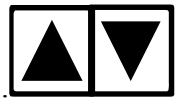
▲ + ▼ + ENT press the 3 keys to reset the waiting time.

3B.  visualization of waiting condition for the next cycle

```
CLEAN C.: WAITING
```

WAITING the unit is waiting to start a Cleaning cycle
(START) the unit begins a manual Cleaning cycle

MODE DISP to stop the procedure

4B.  to select START or WAITING

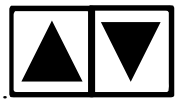
5B. 

to confirm the selected option

- By selecting START the instrument begins an extra manual cycle and then go to the (D0) Display.
- By selecting WAITING the instrument will go to the Cleaning cycle repetition Time calibration

xx.xh: Cleaning cycle repetition time (hours)

to stop the procedure

6B.  to insert the Cleaning cycle repetition time

7B. 

to confirm the new value and to go back to (D7)

3.4 CONFIGURATION

The following operations are possible:

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

1. MODE DISP to go to

(D9) Configuration

2. CAL to access the Configuration sequences

3.4.1 Keyboard locked/unlocked

KB UNLOCKED

UNLOCKED (LOCKED) Keyboard unlocked (locked)

MODE DISP to go back to (D9)

3. ▲ ▼ to select locked or unlocked

4. ENT to confirm and to go to the next step

3.4.2 LCD display contrast

This procedure allows the operator to select up to 7 different levels of Display Contrast, in a way to get a better visibility of the Display.

```
LCD contrast: x
```

x Contrast level

MODE DISP to go back to (D9)

1. ▲ ▼ to select the Contrast from 0 to 7

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

3.4.3 Access number

```
Access Nr.: 0
```

0 Access number request

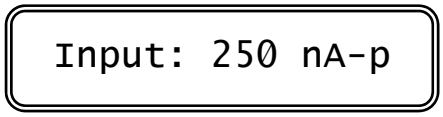
MODE DISP to go back to (D9)

1. ▲ ▼ to insert the access number (when keeping the key pressed the number will scroll with 3 speed levels)

2. ENT to confirm and to proceed with the configuration

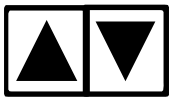
MESSAGE	MEANING
'Cal Inhibition'	a wrong number has been selected; it is only allowed the visualization of the parameters and not the modification.

3.4.4 Cell type



250nA-P (polarographic cell with 250 nA in air)
(45nA-P) (polarographic cell with 45 nA in air)
(300nA-P) (polarographic cell with 300 nA in air)
(30mV-G) (galvanic cell with 30 mV in air)

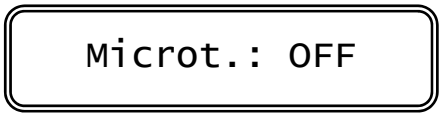
to stop the procedure


to select the cell type

to confirm and to go to the next step

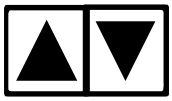
3.4.5 Microtransmitter selection

By using a sensor with microtransmitter (080610.2) the option ON has to be selected.



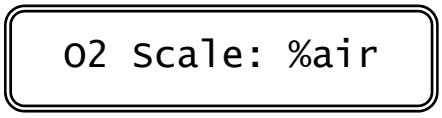
OFF Microtransmitter input disabled
(ON) Microtransmitter input enabled

to stop the procedure


to select OFF or ON

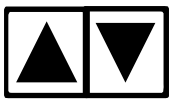
to confirm and to go to the next step

3.4.6 Measuring unit



%air scale in % of air saturation
(PPM) scale in PPM
(mg/l) scale in mg/l
(mmHg) scale in mm of Mercury

to stop the procedure

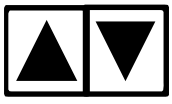

to select the measuring unit

to confirm and to go to the next step

3.4.7 Thermocompensation type

TABLE the instrument use the memorized tables
(COEFF.) the instrument use the Thermocompensation Coefficient

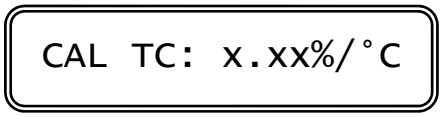
to stop the procedure


to select TABLE or COEFF.

to confirm and to go to the next step

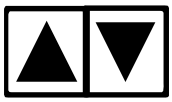
By selecting COEFF. the instrument will go to the Coefficient selection procedure.

3.4.8 Thermocompensation coefficient



x.xx Thermocompensation Coefficient value

to stop the procedure

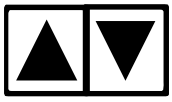

to select the Coefficient value

to confirm and to go to the next step

3.4.9 Calibration mode

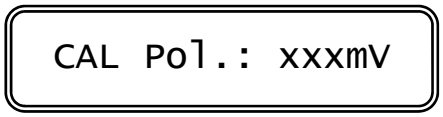
IMM Immediate calibration mode
(POST) Postponed calibration mode

to stop the procedure


to select IMM or POST

to confirm and to go to the next step

3.4.10 Polarization voltage



xxx Polarization Voltage value

Adjust the Polarization Voltage by means of the trimmer accessible removing the back panel.

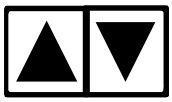
to stop the procedure

to go to the next step

3.4.11 Software filter

Large s RT Response time for wide variations
xx.xs Response time value(sec.)

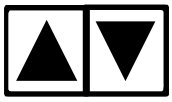
to stop the procedure


to insert the Response time value

to confirm and to go to the next step

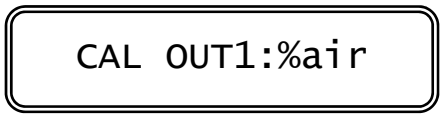
Small s RT Response time for small variations
xx.xs Response time value (sec.)

to stop the procedure

 to insert the Response time value

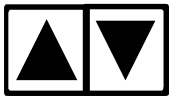
to confirm and to go to the next step.

3.4.12 Scale of the analog output n°1



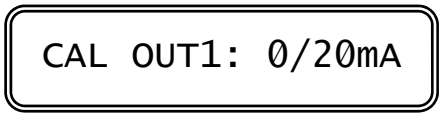
%air (PPM, mg/l, mmHg) input related to output N°1(°C)

to stop the procedure

 to select the input

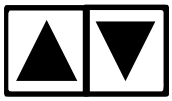
to confirm and to go to the next step.

3.4.13 Analog output n°1 range

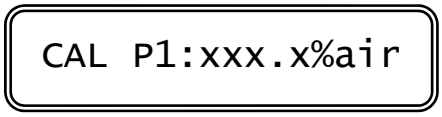


0/20mA (4/20mA) output range

to stop the procedure

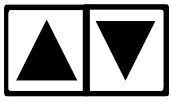
 to select the desired output range

to confirm and to go to the next step

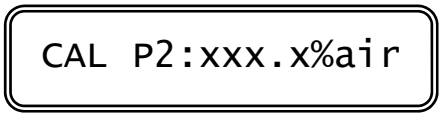


P1 begin of the range
xxx.x measuring value related to 0(4) mA.

to stop the procedure and to go back to (D9)

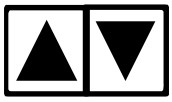

to insert the value xxx.x

to confirm and to go to the next step



P2 end of the range
xxx.x measuring value related to 20 mA.

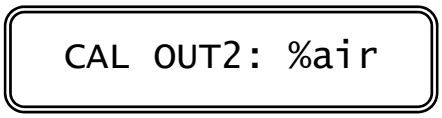
to stop the procedure


to insert the value xxx.x

to confirm and to go to the next step

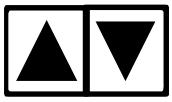
IMPORTANT NOTE: If the value related to P1 is lower than the value related to P2, the analog output will be "Direct", otherwise it will be "Reverse".

3.4.14 Scale of the analog output n°2



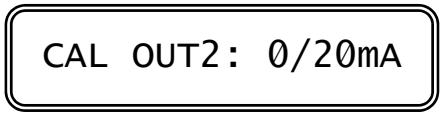
%air (PPM, mg/l, mmHg) input related to output N°2 (°C)

to stop the procedure


to select the input

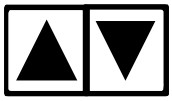
to confirm and to go to the next step

3.4.15 Analog output n°2 range

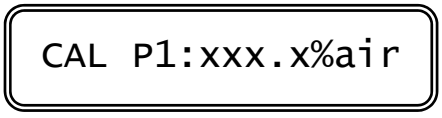


0/20mA (4/20mA) output range

to stop the procedure

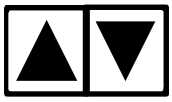

to select the output range

to confirm and to go to the next step



P1 begin of the range
xxx.x measuring value related to 0(4) mA

to stop the procedure

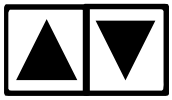
 to select the value xxx.x

to confirm and to go to the next step

```
CAL P2:xxx.x%air
```

P2 end of the range
xxx.x measuring value related to 20 mA.

to stop the procedure

 to insert the value xxx.x

to confirm and to go to the next step

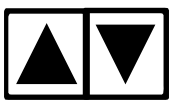
IMPORTANT NOTE: If the value related to P1 is lower than the value related to P2, the analog output will be "Direct", otherwise it will be "Reverse".

3.4.16 Set-point A function

```
SET A F.: LO
```

F function
LO (HI) minimum (maximum)

to stop the procedure

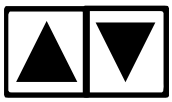
 to select the function LO or HI

to confirm and to go to the next step

3.4.17 Set-point B function

F function
LO (HI) minimum (maximum)

to stop the procedure

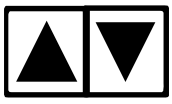

to select the function LO or HI

to confirm and to go to the next step

3.4.18 Set-point A alarm

ON (OFF) alarm enabled (disabled)

to stop the procedure

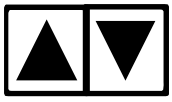

to select ON or OFF

to confirm the selected option

- by selecting OFF the alarm function is not activated.
The unit goes to the next parameter calibration.
- by selecting ON the alarm function is activated.
(when the relay B will be active longer than the time selected in the following procedure).

xx m Activation time selected (minutes)

MODE DISP to stop the procedure and to go back to (D9)


to select the time value

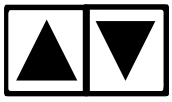
to confirm and to go to the next step

3.4.19 Set-point B alarm

```
AL SET B: ON
```

ON (OFF) alarm enabled (disabled)

MODE DISP to stop the procedure and to go back to (D9)


to select ON or OFF

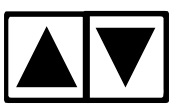
to confirm and to go to the next step.

- by selecting OFF the alarm function is not activated.
The unit goes to the next parameter calibration. - by selecting ON the alarm function is activated.
(when the relay B will be active longer than the time selected in the following procedure).

```
TIME SET B: xx m
```

xx m Activation time selected (minutes)

MODE DISP to stop the procedure


to select the time value

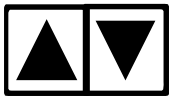
to confirm and to go to the next step

3.4.20 Alarm relay C contacts

Select one of the following Display:

ACT (DEA) relay activated (deactivated) when the alarm is active

to stop the procedure


to select ACT or DEA

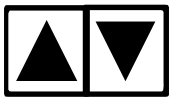
to confirm and to go to the next step

IMPORTANT NOTE: By selecting DEA, it is necessary to modify some Jumpers on the Power supply board (contact the Service Department).

3.4.21 Cleaning function

CAL CF	Cleaning function calibration
DISABLED	Cleaning function disabled
(MANUAL)	Manual cleaning function
(AUTO)	Automatic cleaning function

to stop the procedure

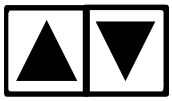

to select the cleaning function

to confirm and to go to the next step

3.4.22 Cleaning time

xx.x" Cleaning time (sec.)

to stop the procedure

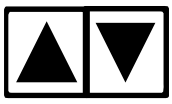

to insert the cleaning time

to confirm and to go to the next step

3.4.23 Holding time

xx.x' Waiting time between two cleaning cycle (min)

to stop the procedure


to insert the time

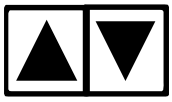
to confirm and to go to the next step

3.4.24 New access number

```
Change A Nr.:NO
```

NO (YES) access number changing not required (required)

MODE DISP to go back to (D9)

 to select NO or YES

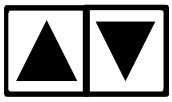
to confirm and to go to the next step

- by selecting NO the unit will go to the Configuration display
- by selecting YES the unit will go to the following display:

```
New Nr.:  xxx
```

xxx actual access number

MODE DISP to go back to (D9)

 to insert the new access number

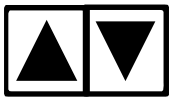
to confirm and to go to the next step

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

```
Confirm Nr.:xxx
```

xxx actual access number

MODE DISP to go back to (D9)



to insert the new access number

to confirm and to go back to the beginning of the Configuration

The double insertion of the new access number assures the memorization of the right code.
As soon as the new number 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 before leaving the Configuration routine.

press to exit from the Configuration menu.

4 INSTALLATION

Packing list

The instrument packaging contain:

- N° 1 instrument with serial number label
- N° 2 brackets for panel mounting
- N° 1 English instruction manual according to IEC N° 278 standard
- N° 1 warranty certificate with Technical Assistance card, included in the instruction manual.

Unpackagin of the instrument

1) Remove from the packaging the instruction manual containing the warranty certificate.

2) Open the packaging and remove the instrument enclosed in a plastic transparent bag.

3) Remove the transparent bag preserving the two brackets.

Storage

For long storage periods hold the instrument in a dry place.

4.1 CONTROLLER INSTALLATION

The instrument can be installed near the sensor or in a distant area, in the electrical cabinet.

The panel mounting should be made in a unbending surface, in a position protected from humidity, corrosive fumes and casual collisions.

The picture 3 shows the instrument dimensions and the panel cut-out dimensions.

- Introduce the instrument in the cutted panel.

- Mount the two fastenings on the two sides of the instrument, with the screw head turned to the back of the instrument.

- Screw on the two fastenings until a complete blockage of the housing.

In the field mounting application, the use of a protection cabinet will assure a long time reliability; it is also available a transparent wing with IP65 protection level (mod. SZ7601).

4.2 SENSOR INSTALLATION

See the instruction manual of the sensor.

4.3 ELECTRICAL CONNECTIONS

Safety rules

Before connecting the power supply to the instrument perform the followings check:

- check that the terminal 4 is connected to hearth and that all connection are all correct
- check that the connection wires are well fastened to the terminal block

---

WARNING : THE FAILURES COMING FROM ERRONEOUS CONNECTIONS ARE NOT COVERED BY WARRANTY

Refer to the back panel serigraphy, proposed again and described in Picture 2.

All the connections are made with extractable terminal blocks on the back panel.

The power connections are on the lower terminal block (13 positions).
The input and output signals are on the upper terminal block (12 positions).

Connecting the power

- terminal 4 connect to the ground
- terminals 1-2 connect to the ac power (if power is 110 V)
- terminals 1-3 connect to the ac power (if power is 220 V)

(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 heavy inductive loads
- separate power supply wires from signal ones
- control the mains voltage value
- an internal device protects the unit against power overloads. Disconnect the power and wait few minutes before powering again.
- Avoid interruption on the cable if a high insulation terminal block is not available. Keep the cable away from power wires on the overall length.

Connecting the Cell or Microtransmitter

- Use original cables suggested by the sensor manufacturer
- Avoid interruption on the cable if a high insulation terminal block is not available. Keep the cable away from power wires on the overall length.

Polarographic cell

- terminal 20 connect to the cathode (Platinum electrode)
- terminal 19 connect to the anode (Silver electrode)
- terminals 21-22 install a jumper

Galvanic cell

- terminal 22 connect to the cathode (Platinum or Silver electrode)
- terminal 21 connect to the anode (Lead electrode)
- terminals 21-22 remove the jumper

Sensor with microtransmitter

Refer to operating instruction of this special sensor.

Connecting the RTD

The Temperature readout and the automatic Temperature compensation is provided by connecting the Pt100.
If the Temperature sensor is not connected or damaged, the unit will operate in manual Temperature compensation automatically.

3-wire connection

- terminal 23 connect to the Pt100
- terminals 24 - 25 connect to the Pt100 common

2-wire connection

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

Connecting a recorder

Connect to terminals 14-16 for the 1st channel output
Connect to terminals 15-16 for the 2nd channel output (091.3711 option)

- terminal 14 connect to the terminal (+) of the recorder N°1
- terminal 15 connect to the terminal (+) of the recorder N°2
- terminal 16 connect to the terminal (-) of the two recorder

Series connection is required for driving more loads having a total input Resistance lower than 600 ohm for each channel.

Connecting alarms, pumps, valves

Regulators output are available on the instrument terminal block by means of relay contacts relating to set-point A and B.

RELAY "A" SET-POINT "SA"

terminal 6 marked C	common contact
terminal 5 marked NO	normally open contact
terminal 7 marked NC	normally closed contact

RELAY "B" SET-POINT "SB"

terminal 9 marked C	common contact
terminal 8 marked NO	normally open contact
terminal 10 marked NC	normally closed contact

RELAY "C" ALARM

terminal 12 marked C	common contact
terminal 11 marked NO	normally open contact

Arc suppressor

Install a suitable snubber between relay terminals if the relay activation causes interferences on the display. (B&C Electronics snubber SX101)

Connecting cleaning system

To activate the external cleaning device, use the following relay contacts.

RELAY "D" SENSOR CLEANING

terminal 12 marked C	common contact
terminal 13 marked NO	normally open contact

5 OPERATING THE SYSTEM

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
- check that power voltage is correct

Pre-operation check

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

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

The cards of the controllers are adjusted at the factory.

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

Quick start guide

The unit may be installed for the following purposes:

- measuring
- measuring and regulation
- measuring, regulation and recording

The instrument is shipped with factory calibration and configuration suitable for the most popular applications.

For this reason the operation may require just the following steps:

measuring

1. Connect the cell to the meter.

2. Power the instrument.
   The instrument will show the Display (D0).

3. The instrument is pre-configured for polarographic cell SZ654.1.
   Access the Configuration menu to select other cell types.
   From Display (D0) press 9 times MODE DISP to start the Configuration sequences
   Eventually select the secondary parameters.

4. The instrument is pre-arranged for automatic calibration.
   Perform the Dissolved Oxygen calibration in air.

measuring and regulation

Add the following to the preceding operations:

1. Press CAL ▲ ENT to go to the manual operation. If the automatic mode is selected, go to the step 2

2. A and B relay are configured as LOW (Minimum).
Select HIGH (Maximum) if necessary.

3. Select the Set-point, the Hysteresis and the Delay of A and B relay. From (D0) press 4 times MODE DISP to start the Set-point A selection sequence.
From (D0) press 5 times MODE DISP to start the Set-point B selection sequence.

4. The alarm on the activation time of A and B relay is deactivated.
Activate this kind of alarm if necessary.

5. Select alarm values of min/max and delay if necessary.
From (D0) press 6 times MODE DISP to start the alarm selection sequence.

measuring, regulation and recording

Add the following to the preceding operations:

1. Analog output is configured as PPM at 0/20 mA corresponding to the input scale.
Select 4/20 mA and a suitable input span if necessary.

2. If option 091.3711 is installed, follow the step 1. for the second output.
This option allows to select the analog output as °C scale.

Manual operation

When the instrument is programmed for the manual operation (see Calibration sequences) the flashing "M" will appear on the display.

Analog outputs and alarm relay will remain activated.

▲ while pressing the key, A relay will be activated.

▼ while pressing the key, B relay will be activated.

6 CALIBRATION

Zero cell calibration

The Zero cell calibration is necessary at the start up of the system, after the installation of a new cell and after the cell maintenance is done.

The calibration consists of the Zero Current compensation, setting the cell response to the standard operating condition of the instrument.

The calibration sequence consists of a Zero value visualization, in order to perform the new Zero calibration or to maintain the previous one.
Dip the sensor in a 2% of Sodium Sulphite solution. The solution should be made at the time of calibration to assure the total lack of Dissolved Oxygen during the calibration.

When the measuring is steady and close to Zero, perform the calibration following the instruction in chapter 3.3.2.

After the calibration rinse the sensor with clean water.

The Zero solution can be stored for few days in a dark bottle, without any trace of air.

Sensitivity cell calibration

This calibration can be manually or automatically performed.

In the usual application the automatic calibration in air is performed.
This method is fast and quite accurate.

Operate as follow:

- Verify that the Pressure, Salinity and Relative Humidity values selected correspond to the real values.

- Select the automatic mode calibration

- Remove the cell from water, let the Temperature value stabilize in air and press the 

key.

- verify the stability of the Dissolved Oxygen value on the Display and press the 

key for the autocalibration.
If the measured value is not steady it is necessary to evaluate if proceeding with the calibration or stopping the procedure and check the cell.

As alternative the manual calibration requires the use of a sample with a known D.Oxygen concentration.

Since it is very difficult to have this type of sample, because of some factors that influence the Oxygen concentration (Temperature, Salinity, Barometric Pressure, Oxygen concentration in air), this method is normally used for special applications.

Temperature calibration

From display (D0) press MODE DISP to access the Temperature calibration sequences.

Immerse the sensor in a liquid with a known Temperature value and verify the correspondence of the measuring.

To adjust the reading, follows the first four points of the procedure described in Chapter 3.3.3.

Electrical check

The following procedures can be used to verify the correct operation of the instrument, eventually they should be performed periodically in the calibration checks.

- turn back the instrument to Zero and Sensitivity factory calibration and proceed as follows:

Polarographic cell

- Connect to terminals 19-20 of the instrument a cell Simulator(for instance the mod. OD 105.1 of B&C Electronics)
- Simulate the value 0 nA and check for the value 0.0 on the display.
- Simulate the value 30 nA or 250 nA or 300 nA depending on the type of polarographic cell installed.
  In This condition the display will shows 100 %.

  Should the instrument measure different values send it back to B&C Electronics.

Galvanic cell

- Connect to terminals 21-22 of the instrument a mV generator.
- Simulate the value 0 mV and check for the value 0.0 on the display.
- Simulate the value 30 mV and check for the value 100% on the display.

  Should the instrument measure different values send it back to B&C Electronics.

7 PREVENTIVE MANTENIANCE

Instrument

The use of high quality electronics components, gives to the instrument a great reliability.
The maintenance frequency is depending of each application.

As for any electronic instrument the mechanical components like relays and the terminal blocks, are the parts subjected to failure.

If the instrument has been supercharged, remove the power supply for 5/10 minutes to allow the protections to be resettled.

Check that connections in the terminal blocks are clean and dry.

Sensor

The sensor maintenance is prescribed by sensors manufacturer.

Store the sensor with the membrane wet in order to avoid the electrolyte loss.

Remove deposits from the membrane by rinsing with water, eventually using detergents, to avoid the reduction of the membrane life.

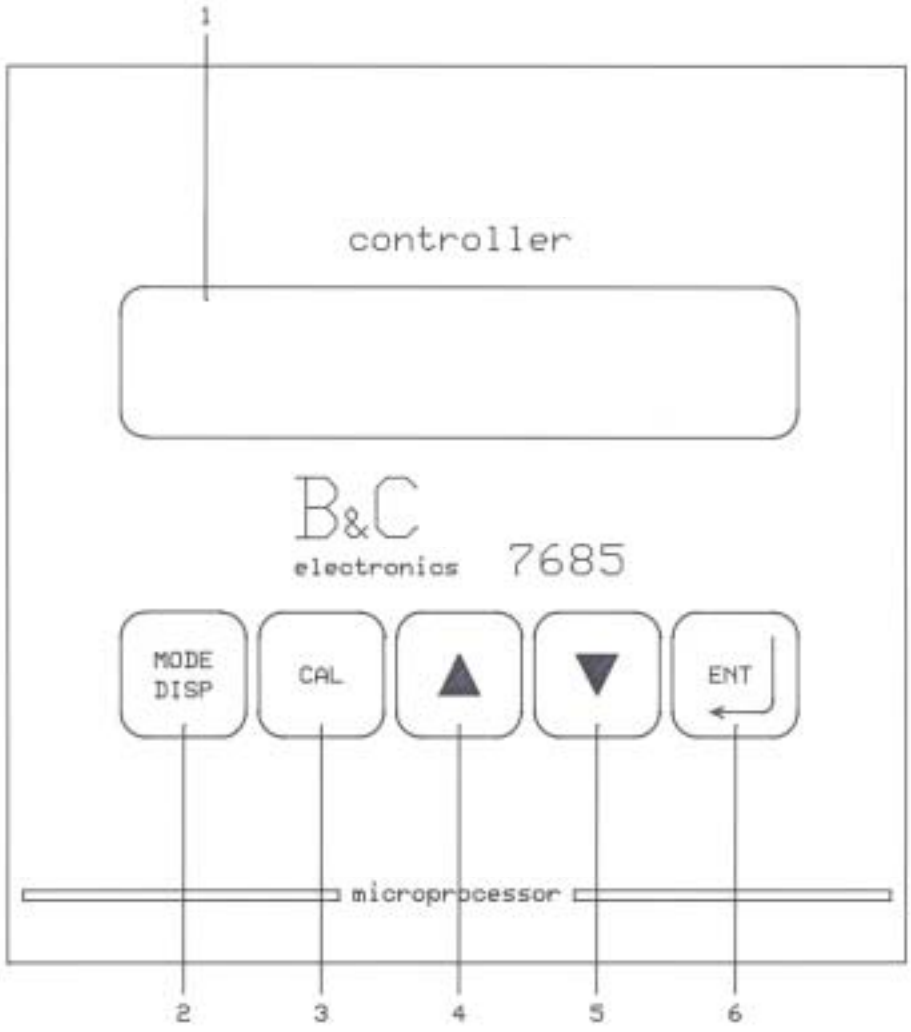
Change periodically the membrane and the electrolyte, especially when the measuring response becomes slow and the Zero Current value is too high.

Normally if the Zero value is reached in more than 30 seconds (when the cell is dipped in Zero solution) the change of the membrane and the electrolyte is suggested.

During the membrane changing, avoid any touch of the cathode which is located in the centre of the cell, close to the membrane.

The use of cleaning systems keep the sensor more efficient and reduce the membrane/electrolyte changing frequency.

DIGITAL CONTROLLER

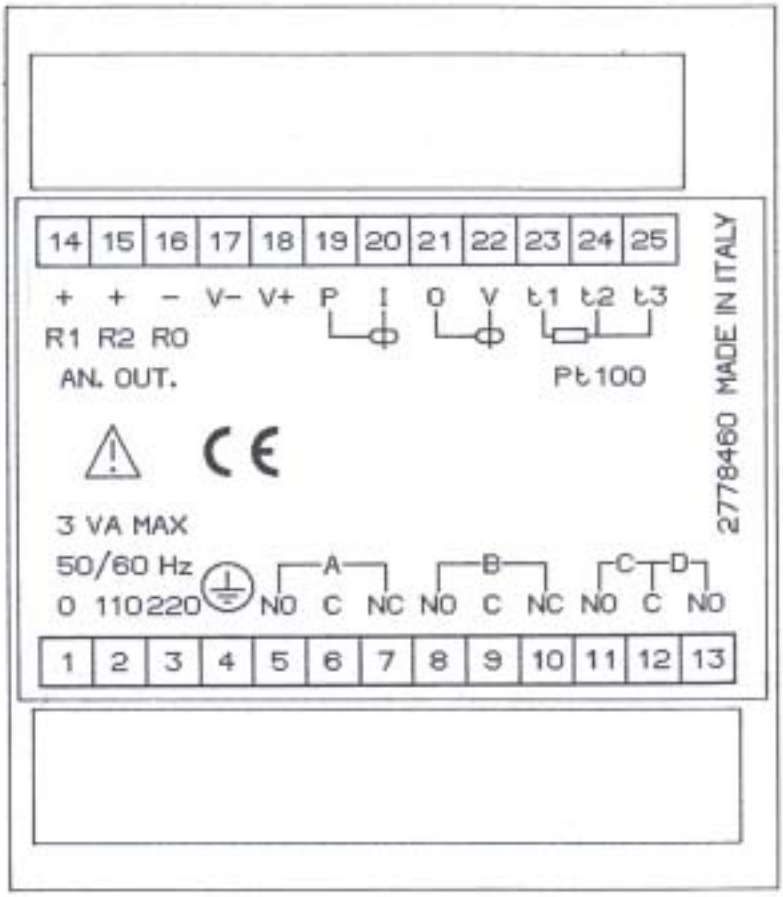


1. DISPLAY
2. MODE-DISPLAY KEY
3. CALIBRATION KEY
4. INCREASE KEY
5. DECREASE KEY
6. ENTER KEY

FIG. 1

OD 7685

CONNECTIONS DIAGRAM



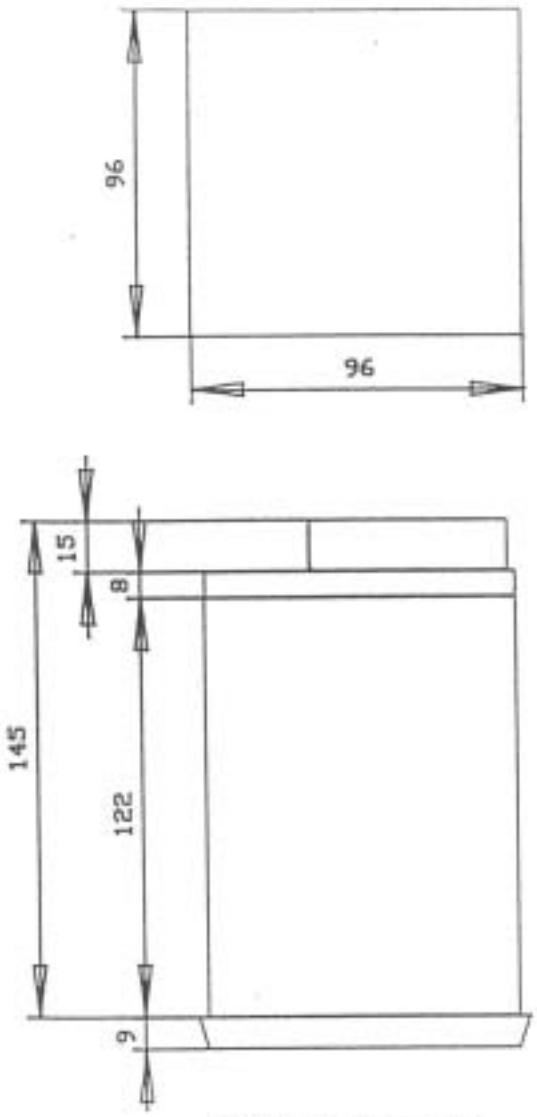
1. 2.	Power supply 110 V.
1. 3.	Power supply 220 V.
4.	Hearth
5. 6.	Relay A - contact N.O.
6. 7.	Relay A - contact N.C.
8. 9.	Relay B - contact N.O.
9.10.	Relay B - contact N.C.
11.12.	Relay C - contact N.O. (alarn)
12.13.	Relay D - contact N.O. (cleaning)
14.	Analog output N°1 (+)
15.	Analog output N°2 (+)
16.	Analog output (-) common
17.18.21.22.	Microtransmitter input
23.24.25.	Pt100 input

POLAROGRAPHIC CELL
19. Input Ag (anode)
20. Input Pt (cathode)
21.22 External jumper

GALVANIC CELL
21. Input Pb (anode)
22. Input Ag (cathode)

FIG: 2

CONTENITORE DIN 43700 MOD. 7685
BOX



PIANO DI FORATURA
DRILL PLAN

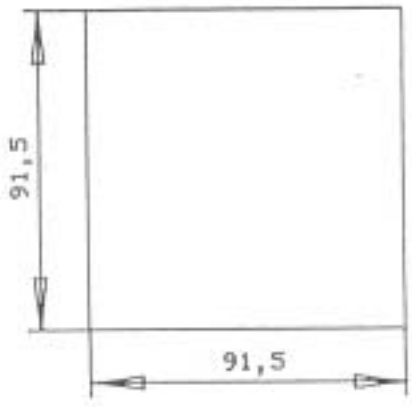


FIG. 3

8 APPENDIX Nr. 1

The instrument equipped with this option can measure the Barometric Pressure.

The measuring value can be used to access the conversion table.

The measuring sensor is installed inside the instrument.

In the Configuration procedure it is possible to disable the Pressure measurement and to use the selected manual value.

In case of sensor failure, the instrument automatically switch to manual Pressure value.

Technical specifications

Change the secondary parameters technical specification with the followings:

SECONDARY PARAMETERS	*Default*
Barometric Pressure measuring: Sensor type: absolute (40 mV/760 mmHg) Sensor sensitivity: 80%/120% Measuring range: 500/800 mmHg External Pressure measuring: Auto/Manual	100% Auto
Manual Pressure value: 500/800 mmHg	760mmHg
Salinity (Chloride): 0/60000 PPM	0PPM
Relative Humidity: 0/100 %	50%

Pressure calibration

The calibration is performed in the factory.

The operator can periodically check the calibration.

To calibrate the Sensitivity of the sensor, the operator should access to the procedures and program the correct Pressure value.

1. MODE DISP to go to

P:xxxMsal:xxxxx

xxx Pressure value
M Manual Pressure value xxxxx Salinity value

2. CAL to access the secondary parameters calibration

CAL p: xxx mmHg

xxx Barometric Pressure measuring
(>>>>>) Pressure value over the range

MODE DISP to stop the procedure

▲ + ▼ + ENT press the 3 keys to turn the Pressure to factory calibration

3. ▲ ▼ To modify the Barometric Pressure value

4. ENT to confirm and to go to the manual Pressure value calibration

MESSAGE	MEANING
" UPDATE "	data has been memorized

Error messages

S > 120%	Sensitivity sensor too high
S < 80%	Sensitivity sensor too low

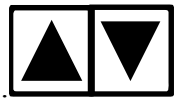
If error messages will be shown see Chapter 9

Manual Barometric Pressure value calibration

CAL p M:xxx mmHg

p M manual value
xxx manual Pressure value

MODE DISP to stop the procedure

5.  to insert the manual Pressure value

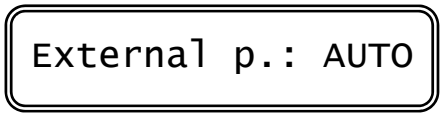
6. 

to confirm and to go to Salinity value calibration

From this point follows the procedures of chapter 3.3.3.

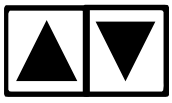
Auto/Man/Pressure configuration

Access the instrument configuration menu and press ENT until the following display:



AUTO automatic acquisition of Pressure value (MAN) manual Pressure value

MODE DISP to stop the procedure

 to select AUTO or MAN

to confirm and to go to the next step.

9 TROUBLESHOOTING

In case of problems in the functioning of the measuring and regulation system it is necessary to locate were they come from:

- wrong connections
- measuring cell maintenance
- measuring cell failure
- wrong configuration of the instrument
- instrument failure

The following table shows the possible cause and relative remedy for the main problems in the instrument use.

PROBLEMS	PROBABLE CAUSE	REMEDY
LCD extinguished	Power not connected. Over Voltage	Check the power supply. Wait 10 Sec. for the reset of the protections
Unacceptable measure	Instrument calibration. Wrong compensation value. Instrument failure	Calibrate the instrument. Check the compensation of °C-P-UR. Send back the instrument to B&C Electronics
Error messages in the Zero calibration	Cell maintenance. Cell failure	Regeneration of the cell. Change the cell.
Error messages in the Sensitivity calibration	Cell maintenance. Cell failure. Wrong type of cell selected.	Regeneration of the cell. Change the cell. Verify the configuration of the cell type.
Error messages in the Pressure calibration	Pressure sensor failure	Send back the instrument to B&C Electronics
The regulation doesn't work	Relay contacts wrong selection. Instrument failure	Verify the relay operating mode selection. Send back the instrument to B&C Electronics
Relay chattering if the measuring is close to the Set-point	Interferences on the signal	Connect to the ground the instrument and the sample. Increase the RT filter SW. Increase the Delay time. Increase the Hysteresis.
The recorder doesn't work properly	Recorder not connected or damaged. Wrong configuration of The analog output. Instrument failure.	Check the connections. Check the analog output configuration. Send back the instrument to B&C Electronics