



**NIEUWKOOP**

METEN.NL

# USER MANUAL



## ZU3020

D. OXYGEN CONTROLLER, PANEL,  
2 RELAY



TO MEASURE  TO KNOW



D. Oxygen scales:      0/200.0 %air  
                               0/200.0 mmHg  
                               0/20.00 PPM  
                               0/20.00 mg/l

Temperature scale:    -2/+52 °C

Power supply:           110/220 Vac

Software:                R2.2x

*Valid for options 091.3711 and 091.601*

Cod. 28006762

Rev. E – 11/18

## INDEX

1	GENERAL WARNINGS AND INFORMATION FOR ALL USERS.....	3
1.1	WARRANTY .....	3
1.2	AFTER SALES SERVICE .....	3
1.3	CE MARKING .....	3
1.4	SAFETY WARNINGS .....	3
2	INTRODUCTION .....	4
2.1	MEASURING PRINCIPLE.....	5
2.2	MEASURING SYSTEM.....	5
2.3	FUNCTIONAL SPECIFICATIONS .....	6
2.4	PHYSICAL SPECIFICATIONS .....	9
3	SPECIFICATIONS .....	10
4	INSTALLATION.....	14
4.1	CONTROLLER INSTALLATION.....	14
4.2	SENSOR INSTALLATION.....	14
4.3	ELECTRICAL CONNECTIONS.....	15
4.4	OPERATING THE SYSTEM.....	18
5	KEYBOARD .....	20
6	READOUT SEQUENCES .....	21
7	CALIBRATION SEQUENCES.....	27
7.1	MANUAL/AUTOMATIC MODE.....	27
7.2	ZERO AND SENSITIVITY CALIBRATION .....	28
7.3	SECONDARY PARAMETERS CALIBRATION.....	34
7.4	SET-POINT A/B SETTING .....	37
7.5	ALARM SETTING.....	39
7.6	CLEANING FUNCTION .....	40



8	CONFIGURATION.....	43
8.1	KEYBOARD LOCKED/UNLOCKED.....	43
8.2	LCD DISPLAY CONTRAST.....	43
8.3	ACCESS NUMBER.....	44
8.4	CELL TYPE.....	44
8.5	MICROTRANSMITTER SELECTION.....	45
8.6	MEASURING UNIT.....	45
8.7	THERMOCOMPENSATION TYPE.....	45
8.8	THERMOCOMPENSATION COEFFICIENT.....	45
8.9	CALIBRATION MODE.....	46
8.10	POLARIZATION VOLTAGE.....	46
8.11	SOFTWARE FILTER.....	46
8.12	INPUT RELATED TO ANALOG OUTPUT N°1 (OPTION 091.3711).....	47
8.13	ANALOG OUTPUT N°1 RANGE.....	47
8.14	INPUT RELATED TO ANALOG OUTPUT N°2 (OPTION 091.3711).....	47
8.15	ANALOG OUTPUT N°2 RANGE.....	48
8.16	SET-POINT A FUNCTION.....	48
8.17	SET-POINT B FUNCTION.....	48
8.18	ALARM ON SET-POINT A.....	49
8.19	ALARM ON SET-POINT B.....	49
8.20	ALARM RELAY C CONTACTS.....	50
8.21	CLEANING FUNCTION.....	50
8.22	CLEANING TIME (RELAY D ON).....	50
8.23	HOLDING TIME.....	50
8.24	NEW ACCESS NUMBER.....	51
9	CALIBRATION.....	52
10	PREVENTIVE MAINTENANCE.....	54
11	TROUBLESHOOTING.....	55
12	APPENDIX Nr. 1 (Valid for option 091.601).....	59
	WARRANTY CERTIFICATE.....	62
	REPAIRS.....	62
	TECHNICAL SUPPORT.....	63



# 1 GENERAL WARNINGS AND INFORMATION FOR ALL USERS

## 1.1 WARRANTY

This product is guaranteed for all manufacturing defects.

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

## 1.2 AFTER SALES SERVICE

B&C/Nieuwkoop offers to all of its Customers the following services:

- a free of charge technical assistance over the phone for problems regarding installation, calibration and regular maintenance;
- a repairing service in our Aalsmeer (Netherlands) headquarter for all types of damages, calibration or for a scheduled maintenance.

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

## 1.3 CE MARKING

This instrument is manufactured according to the following european community directives:

- 2011/65/EU "Restriction of the use of certain hazardous substances in electrical and electronic equipment"
- 2014/35/EU "Low Voltage" LV
- 2014/30/EU "Electromagnetic compatibility" EMC
  
- EN 61010-1/2011 "Low Voltage" LV
- EN 61326-1/2013 "Electromagnetic compatibility" EMC
  - Controlled electromagnetic environment
- EN 55011/2009 "Radio-frequency disturbance characteristics"
  - Class A (devices for usage in all establishment other than domestic)
  - Group 1 (Industrial equipment that do not exceed 9kHz)

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

## 1.4 SAFETY WARNINGS

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

All types of operations must be performed by authorized and trained staff.

The use of this controller must respect the parameters described in chapter "Technical specification", so to avoid potential damages and a reduction of its operating life.



## 2 INTRODUCTION

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 and 2.
- 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 carried out:
  - selections between possible options
  - input numeric values within a fixed range

We suggest to follow the next steps:

- 1) in the Chapter 2 "Specifications", locate parameters marked with "\*" and the corresponding factory values in the "Default" column
- 2) make a list of changing 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 7 "Configuration".



## 2.1 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.

## 2.2 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:

Nieuwkoop 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.

## 2.3 FUNCTIONAL SPECIFICATIONS

### R2.2x Software specification updates

- 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 types with different Current in air;
- galvanic sensor;
- Nieuwkoop B.V./B&C 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 SPST 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 adjusts the measuring value;
- postponed calibration;  
the instrument memorizes the sample value;  
the user adjusts 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.<br>Two outputs may be configured for Concentration or Temperature.   |
| 091.701  | RS232 isolated output.<br>The output sends the data (Concentration, °C) to the serial port of the computer. |
| 091.404  | 24 VAC power supply.  |
| 091.4143 | 9/36 VDC power supply.  |

## 2.4 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.



### 3 SPECIFICATIONS

The Default values are corresponding to the factory calibration values.

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

*Default*

<b>OPERATING MODE</b>	
Automatic/Manual	Auto
<b>SENSOR TYPE</b>	
* 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 O <sub>2</sub> : 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)	
Signaling of the calibration value stability reached	



<b>SECONDARY PARAMETERS</b>  Pressure: 500/800 mmHg Salinity (Chloride): 0/60000 PPM Relative Humidity: 0/100 %	760 mmHg 0 PPM 50 %
<b>TEMPERATURE</b>  Input: RTD Pt100 Connections: 2/3 wires Measuring and compensation range: -2/+52 °C Accuracy: 0.1 °C Zero adjustment: +/- 2°C Manual temperature value range: 0/50°C	0°C 20°C
<b>SET-POINT A/B</b>  Set value (function of the scale): 0/200.0 % Hysteresis (function of the scale): 0/20.0 % Delay time: 0.0/99.9 sec * Function: HI/LO (Max/Min) Relay contact: SPDT 220V 5Amp resistive	0 % 0 % 0 sec LO
<b>ALARM (CONTACT C-D)</b>  Low value (function of the scale): 0/200.0 % High value (function of the scale): 0/200.0 % Delay time: 0.0/99.9 sec * Alarm for max. activation time on SA (Set-point A): ON/OFF * Max. activation time for SA: 0/60 minutes * Alarm for max. activation time on SB (Set-point B): ON/OFF * Max. activation time for SB: 0/60 minutes * Contact type (activated/deactivated): ACT/DEA Relay contact: SPST 220V 5Amp resistive	0.0 % 200.0 % 0 sec OFF 60 min. OFF 60 min. ACT
<b>CLEANING (Relay D)</b>  * Action: Disabled/Manual Clean/Auto+Manual Clean Auto Clean: Repetition time: 0.1/24.0h * Cleaning time: 0.5/60.0" * Hold time (hold of analog output, deactivation of Set-point A and B and Alarm C): 0.1'/20.0' Relay contact: SPST (N.O.)	Disabled 24.0h 15.0" 3.0'



<b>ANALOG OUTPUT N°1</b> * Input related to analog output (only for option 091.3711): PPM/°C * Output range: 0-20/4-20 mA * Point 1 (corresponding to 0 mA or 4 mA): mmHg/%air: 0.0/200.0 PPM/mg/l: 0.00/20.00 * 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	PPM 0/20 mA 0.0%  200.0%
<b>ANALOG OUTPUT N°2</b> (only for Option 091.3711) * Input related to analog output: PPM/°C * Output range: 0-20/4-20 mA * Point 1 (corresponding to 0 mA or 4 mA): mmHg/%air: 0.0/200.0 PPM/mg/l: 0.00/20.00 * 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	<i>Default</i>  PPM 0/20 mA 0.0%  200.0%
<b>CONFIGURATION (*)</b> Free calibration (Access number not required): keyboard locked/Unlocked LCD Display contrast (0/7) Access number required: Sensor type Microtransmitter: On/Off D.O. input scales: mmHg/%air/PPM /mg/l Thermocompensation type: Table/Coefficient Thermocompensation coefficient Calibration mode Polarization voltage of the cell RT Large software filter RT Small software filter Input related to analog output N°1 (Option 091.3711) Analog output N°1 range Point 1 (x mA minimum) Point 2 (x mA maximum) Input related to analog output N°2 (Option 091.3711) Analog output N°2 range (Option 091.3711) Point 1 (x mA minimum) (Option 091.3711) Point 2 (x mA maximum) (Option 091.3711) Relay A function Relay B function Alarm for max. activation time on SA Max. activation time for SA Alarm for max. activation time on SB	<i>Default</i>  Unlocked 4  250nA-P Off % air Table 2,3 %/°C Immediate 675 mV 2.0 sec 10.0 sec % air 0/20 mA 0.0 200.0 % air 0/20 mA 0.0 200.0 LO LO OFF 60 m 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.



## 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.

### Unpackaging 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 cut panel.
- Mount the two fastening brackets on the two sides of the instrument, with the screw head turned to the back of the instrument.
- Screw on the two fastening brackets 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 cover with IP55 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 ground and that all connection are all correct
- check that the connection wires are well fastened to the terminal block

### WARNING

The failure coming from erroneous connections is not covered by warranty

Refer to the back panel printing described in Figure 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.

### 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 <u>6</u> marked <u>C</u>	common contact
terminal <u>5</u> marked <u>NO</u>	normally open contact
terminal <u>7</u> marked <u>NC</u>	normally closed contact

**RELAY "B"          SET-POINT "SB"**

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

**RELAY "C"          ALARM**

terminal <u>12</u> marked <u>C</u>	common contact
terminal <u>11</u> marked <u>NO</u>	normally open contact

Arc suppressor

Install a suitable snubber between relay terminals if the relay activation causes interferences on the display. (Nieuwkoop snubber SX101)

Connecting cleaning system

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

**RELAY "D"          SENSOR CLEANING**

terminal <u>12</u> marked <u>C</u>	common contact
terminal <u>13</u> marked <u>NO</u>	normally open contact



## 4.4 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  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    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  to start the Set-point A selection sequence.  
From (D0) press 5 times  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  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.



## 5 KEYBOARD

### KEY

### FUNCTION

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



## 6 READOUT SEQUENCES

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

02 meter 250nAP

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

Press  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°C	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)

XXX %airM ■AL□BH

Dissolved Oxygen value, set-point status/functions

xxx%air	D.Oxygen value and measuring
unit (PPM)	
(mg/l)	
(mmHg)	
(>>>>)	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)

MESSAGEMEANING

"CLEANING"  
"HOLDING"

cleaning cycle activated  
holding time cycle



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



to go to



-----

- (D1) xxx.x%air xx.x°C

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) P:xxx sal: xxxxx

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) TEMP.: xx.x°C

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)

SA:xxx %air\* ■ LO

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



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



to go to

(D5)

SB:xxx %air\* ■ HI

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



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



to go to

(D6)

AL xxx/xxx %air

Alarm parameters

AL	Dissolved Oxygen values alarm (% air)
xxx	Low alarm value
xxx.x	High alarm value



to activate the Alarm value programming sequences.



to go to

(D7)

CLEANING OFF

Cleaning function

OFF            cleaning function disabled  
(ON)        cleaning function enabled

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



to activate the Cleaning function programming sequences.



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)



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)



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)



## 7 CALIBRATION SEQUENCES

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

To unlock the keyboard follow the instruction of the Chapter 7 "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).

### 7.1 MANUAL/AUTOMATIC MODE

Normally the instrument works in automatic mode.

Follows this procedure only to switch the instrument operating mode.

1.  to go to  
 (D0) 
2.  to access the operating mode selection  
  
 AUTO automatic mode  
 (MANUAL) manual mode
3.  to stop the procedure  
  to select the operating mode
4.  to confirm the selected operating mode and to go back to (D0)  

<u>MESSAGE</u>	<u>MEANING</u>
	the new parameter is stored and the instrument goes back to (D0)



## 7.1 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

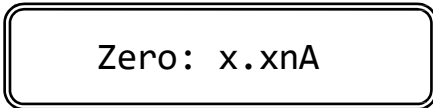
Before calibrating is necessary:

- to verify the correct programming 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




 to stop the procedure

 to end the Zero calibration procedure and to go to the Sensitivity calibration procedure (see next section)
3.  to access the Zero calibration procedures



x.x      Current value from the cell

 to stop the procedure

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



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

MESSAGEMEANING

“ UPDATE “

The calibration is accepted

Error messages

Z > 10.0%

Zero > 10.0 %



to stop the error message.

“ NO UPDATE “

The calibration is not accepted.  
The instrument goes back to (D1).

See Chapter 10 “Troubleshooting” if error messages turn up.

SENSITIVITY CALIBRATION

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


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

The selection immediate or postponed is done in the Configuration menu

**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 . 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:

MESSAGEMEANING

“ 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.



to stop the messages readout and to show:

“ NO UPDATE “

The calibration is not accepted and the instrument goes back to (D1).

See Chapter 10 “Troubleshooting” if error messages turn up.

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

SENS: xxx.x%

xxx.x      Sensitivity value



to stop the procedure



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



1.

to access the selection of manual or automatic calibration mode

CAL 02:AUTO/air


AUTO (MANUAL) automatic mode calibration (manual)



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



2.   to select the calibration mode

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

(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 8 "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.



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




4A.  to access the calibration procedure

CAL 02: xxx.xR A

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



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

   press the 3 keys to turn to the Sensitivity factory calibration and to go  
 back to (D1)

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

See Chapter 10 "Troubleshooting" if error messages turn up.





(procedures B. and C.) MANUAL SENSITIVITY CALIBRATION

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

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

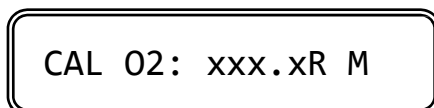
#### IMMEDIATE CALIBRATION

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



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




go

press the 3 keys to turn to the Sensitivity factory calibration and to

back to (D1)

4B.   to keys to adjust the D.O. value

5B.  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 02: xxx.xR M

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



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



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.  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






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





+ + 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 10 "Troubleshooting" if error messages turn up.

## 7.1 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.  to go to

(D2)

P:xxx sal: xxxxx

xxx  
xxxxx

Pressure value  
Salinity value

2.  to access the calibration sequence

### Barometric Pressure calibration

CAL p: xxx mmHg

p xxx mmHg Barometric Pressure value selected



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

3.   to program the Pressure value



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

MESSAGEMEANING

“ UPDATE “

the new value has been memorized

Salinity calibration


CAL sal:xxxxxPPM

xxxxx PPM Salinity value selected



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

5.   to program the Salinity value

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

MESSAGEMEANING

“ UPDATE “

the new value has been memorized

Relative Humidity calibration



CAL RH: xxx%

xxx% Relative Humidity value selected



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



7.   to program the Relative Humidity value

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

MESSAGEMEANING

“ UPDATE “

the new value has been memorized

Temperature calibration

This calibration should be performed with a reference Thermometer.

1.  to go to

(D3)

TEMP.: xx.x°C

xx.x Temperature value  
M manual Temperature mode

2.  to access the Pt100 Zero calibration procedure


CAL T: xx.x°C

T Pt100 Zero calibration  
xx.x measuring Temperature value



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

3.   to adjust the Temperature value



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

CAL T.M.: xx.x°C





to stop the procedure

5.   to program the manual Temperature value

6.  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.



to acknowledge the error message

“ NO UPDATE “

The calibration is not accepted  
The unit goes back to (D3)

## 7.4 SET-POINT A/B SETTING

For each set-point it is possible:

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

1.  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.  to access the calibration sequences




CAL SA S:xxx.x

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



to stop the procedures

3.   to insert the Set-point value



4.  to confirm and to go to the next step


CAL SA I: xx.x

xx.x Actual Hysteresis value



to stop the procedure

-   to insert the Hysteresis value



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


CAL SA D: xx.xs

xx.xs Actual Delay Time value (in seconds)



to stop the procedure

-   to insert the Delay Time value

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




“ UPDATE “

The calibration is accepted.

## 7.5 ALARM SETTING


This procedure allows to:

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

1.  press the key to go to:

(D6)



AL xxx/xxx %air


2.  to access the calibration sequence

CAL AL L:xxx.x

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

-  to stop the procedure

3.   to insert the alarm value

4.  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





to stop the procedure

5.



to insert the alarm value

6.



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)



to stop the procedure



to insert the Delay value

7.



to confirm the new value and to go back to (D6)

“ UPDATE “

the calibration is accepted

## 7.6 CLEANING FUNCTION

1.



to go to

(D7)

CLEANING OFF

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

2.



to access the Cleaning function parameters calibration

Manual clean



The following message will be shown:

CLEAN C.: WAITING

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



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)



to stop the procedure



 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



to stop the procedure

4B.   to select START or WAITING



5B.



option

to confirm the selected

- 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

REPETITION: xx.xh

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)



## 8 CONFIGURATION

The following operations are possible:

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

1.  to go to  
(D9) 
2.  to access the Configuration sequences

### 8.1 KEYBOARD LOCKED/UNLOCKED



Unlocked (Locked)    Keyboard unlocked (locked)



to go back to (D9)

3.   to select locked or unlocked

4.  to confirm and to go to the next step

### 8.2 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.






x    Contrast level



to go back to (D9)



1.   to select the Contrast from 0 to 7
2.  to confirm and to go to the access number insertion




### 8.3 ACCESS NUMBER

Access Nr.: 0

0 Access number request



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.  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.

### 8.4 CELL TYPE

Input: 250 nA-p

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)

Active keys:  -   - 



## 8.5 MICROTRANSMITTER SELECTION

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

Microt.: OFF

OFF  
(ON)

Microtransmitter input disabled  
Microtransmitter input enabled

Active keys:  -   - 

## 8.6 MEASURING UNIT

02 Scale: %air

%air

(PPM)

(mg/l)

(mmHg)

scale in % of air saturation

scale in PPM

scale in mg/l

scale in mm of Mercury

Active keys:  -   - 

## 8.7 THERMOCOMPENSATION TYPE

TERMOC.: TABLE

TABLE

(COEFF.)

the instrument use the memorized tables

the instrument use the Thermocompensation Coefficient

Active keys:  -   - 

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

## 8.8 THERMOCOMPENSATION COEFFICIENT

CAL TC: x.xx%/°C

x.xx

Thermocompensation Coefficient value

Active keys:  -   - 



## 8.9 CALIBRATION MODE

MODE OF CAL: IMM.

IMM Immediate calibration  
mode (POST) Postponed calibration  
mode


Active keys:  -  -  - 

## 8.10 POLARIZATION VOLTAGE

CAL Pol.: xxxmV

xxx Polarization Voltage value

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

Active keys:  -  -  - 

## 8.11 SOFTWARE FILTER





Large s RT:xx.xs

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

Active keys:  -  -  - 

Small s RT:xx.xs

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

Active keys:  -  -  - 



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

CAL OUT1:%air

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

Active keys:  -   - 

## 8.13 ANALOG OUTPUT N°1 RANGE

CAL OUT1: 0/20mA

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

Active keys:  -   - 

CAL P1:xxx.x%air

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

Active keys:  -   - 

CAL P2:xxx.x%air

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

Active keys:  -   - 

**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".

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

CAL OUT2: %air

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

Active keys:  -   - 





## 8.15 ANALOG OUTPUT N°2 RANGE

CAL OUT2: 0/20mA

0/20mA (4/20mA) output

range Active keys:  -   - 

CAL P1:xxx.x%air

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

Active keys:  -   - 

CAL P2:xxx.x%air

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

Active keys:  -   - 

**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".

## 8.16 SET-POINT A FUNCTION

SET A F.: LO

F function  
LO (HI) minimum (maximum)

Active keys:  -   - 

## 8.17 SET-POINT B FUNCTION

SET B F.: LO

F function  
LO (HI) minimum (maximum)

Active keys:  -   - 



## 8.18 ALARM ON SET-POINT A

AL SET A: ON

ON (OFF) alarm enabled (disabled)

Active keys:  -   - 

- 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 A: xx m

xx m Activation time selected (minutes)

Active keys:  -   - 

## 8.19 ALARM ON SET-POINT B

AL SET B: ON

ON (OFF) alarm enabled (disabled)

Active keys:  -   - 

- 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)

Active keys:  -   - 



## 8.20 ALARM RELAY C CONTACTS

Select one of the following Display:

AL RELAY: ACT

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

Active keys:  -   - 

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

## 8.21 CLEANING FUNCTION

CAL CF:DISABLED




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

Active keys:  -   - 

## 8.22 CLEANING TIME (RELAY D ON)

CLEANING T:xx.x''

xx.x'' Cleaning time(sec.)

Active keys:  -   - 

## 8.23 HOLDING TIME

HOLDING T:xx.x'

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

Active keys:  -   - 



## 8.24 NEW ACCESS NUMBER

Change A Nr.: NO

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

Active keys:  -   - 

- 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

Active keys:  -   - 

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

Confirm Nr.: xxx

xxx            actual access number

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.



## 9 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 6.2 "Zero and Sensitivity calibration".

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  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 6.3. "Secondary parameters calibration".

### 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 Nieuwkoop B.V.).
- 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 Nieuwkoop B.V.

#### 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 Nieuwkoop B.V.



## 10 PREVENTIVE MAINTENANCE

### 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 reset of the protections.

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.



## 11 TROUBLESHOOTING

In case of problems in the functioning of the measuring and regulation system it is necessary to locate where 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.

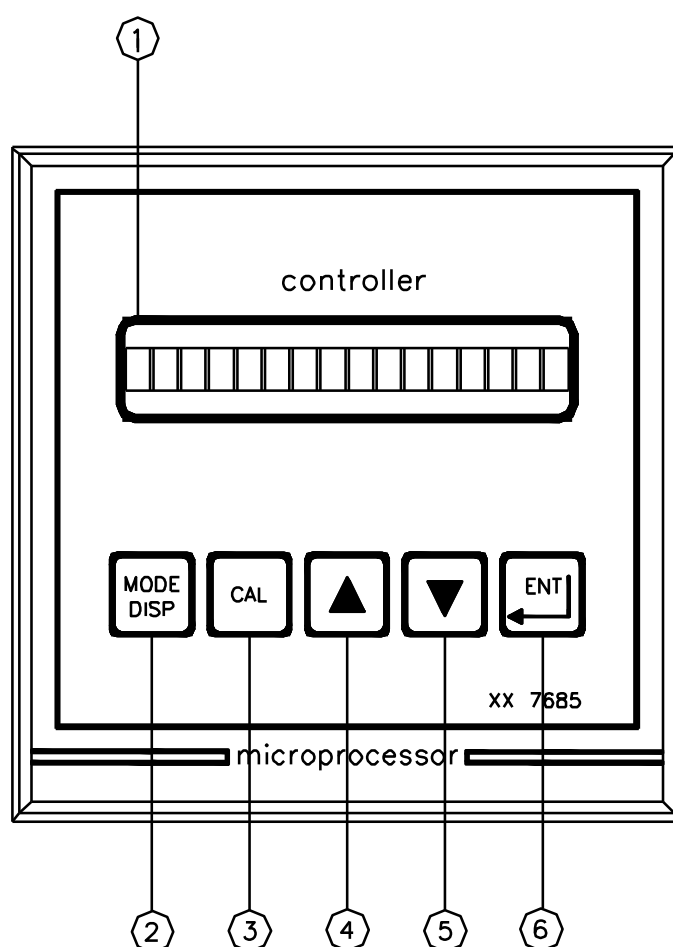
<b>PROBLEM</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
LCD extinguished	Power not connected. Over Voltage	Check the power supply. Wait 10 Sec. for the reset of the protections
Unacceptable measure	Instrument calibration Wrong compensation value. Instrument failure	Calibrate the instrument. Check the compensation of °C-P-UR. Send back the instrument to Nieuwkoop
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 Nieuwkoop
The regulation doesn't work	Relay contacts wrong selection. Instrument failure	Verify the relay operating mode selection. Send back the instrument to Nieuwkoop
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 Nieuwkoop
------------------------------------	--	---

### FRONT PANEL



PANFRONT7685 – A4 – 1:1

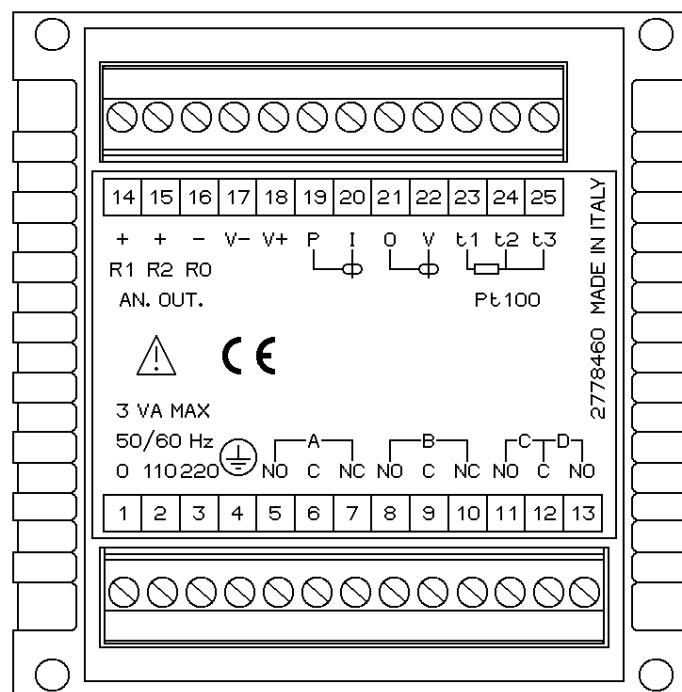
1. Display
2. Mode-display key
3. Calibration key



4. Increase key
5. Decrease key
6. Enter key

Fig. 1

## REAR PANEL CONNECTIONS



OD7685 rev.A - A4 - 1:1

- |                     |                                   |
|---------------------|-----------------------------------|
| 1.2.                | Power supply 110 V                |
| 1.3.                | Power supply 220 V                |
| 4.                  | Ground                            |
| 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. (alarm)    |
| 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

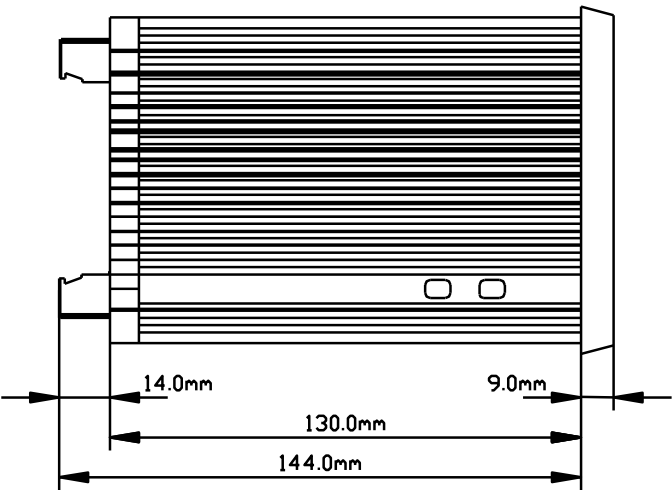
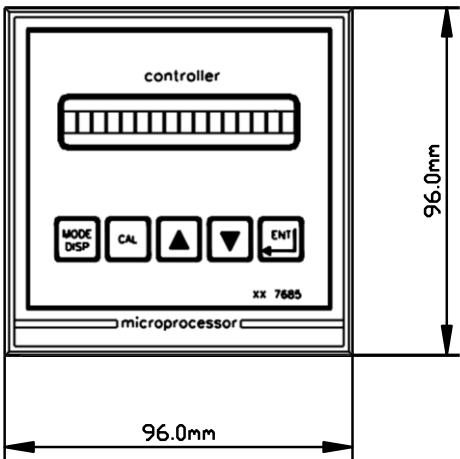
GALVANIC CELL

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

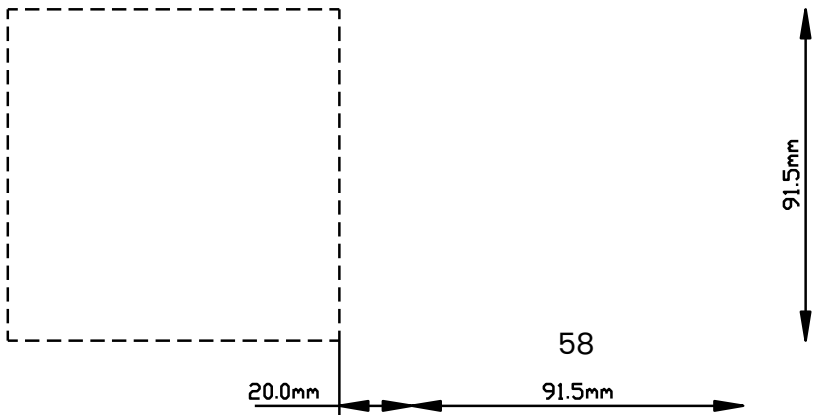
21. Input Pb (anode)
22. Input Ag

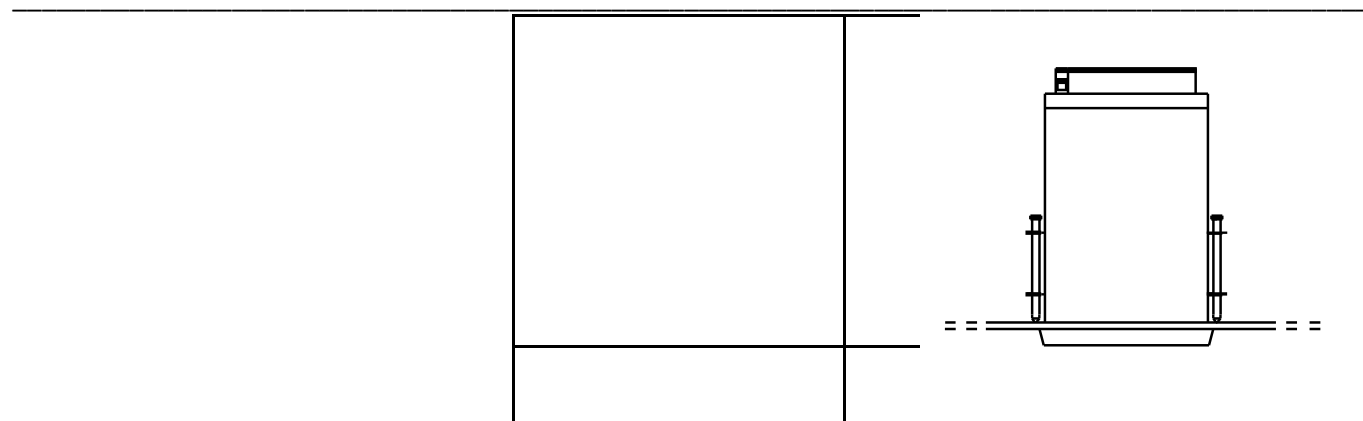
Fig. 2

DIMENSIONS



DRILL PLAN





INGOMBRO7685 – A4 – 1:2

A4 – 1:4

Fig. 3



## 12 APPENDIX NR. 1 (VALID FOR OPTION 091.601)

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:

*Default*

SECONDARY PARAMETERS	
Barometric Pressure measuring:	
Sensor type: absolute (40 mV/760 mmHg)	
Sensor sensitivity: 80%/120%	100%
Measuring range: 500/800 mmHg	
External Pressure measuring: Auto/Manual	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.



to go to



xxx  
M

Pressure value  
Manual Pressure value xxxxx Salinity value



2.



to access the secondary parameters calibration

xxx  
(>>>>)

Barometric Pressure measuring  
Pressure value over the range



to stop the procedure



press the 3 keys to turn the Pressure to factory calibration



to modify the Barometric Pressure value



3.

to confirm and to go to the manual Pressure value calibration

MESSAGEMEANING

data has been memorized

Error messages

Sensitivity sensor too high

Sensitivity sensor too low

See Chapter 10 "Troubleshooting" if error messages turn up.

Manual Barometric Pressure value calibration




p M  
xxx

manual value  
manual Pressure value




to stop the procedure



2.   to insert the manual Pressure value
3.  to confirm and to go to Salinity value calibration





From this point follows the procedures of Chapter 6.3. "Secondary parameters calibration"

#### Auto/Man/Pressure configuration

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

External p.: AUTO

AUTO automatic acquisition of Pressure value (MAN) manual Pressure

value Active  -   - 



# WARRANTY CERTIFICATE

- 1) Your product is covered by Nieuwkoop B.V./B&C 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 Aalsmeer, The Netherlands.
  - 4) Nieuwkoop B.V./B&C 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.
- 

## 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 Nieuwkoop B.V. 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.





# 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**

COMPANY NAME

ADDRESS

ZIP

CITY

REFER TO MR./MISS.

PHONE

MODEL

S/N

DATE

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

➤ **DESCRIPTION**

.....

.....

.....



---

.....

.....

.....

.....

.....

.....

.....



TO MEASURE  TO KNOW

**Nieuwkoop BV**

Aalsmeerderweg 249 -S

1432 CM AALSMEER

0297 325836

[info@nieuwkoopbv.nl](mailto:info@nieuwkoopbv.nl)

[www.meten.nl](http://www.meten.nl)



**NIEUWKOOP**