NIEUWKOOP

METEN.NL

# USER MANUAL


## EC3020

CONDUCTIVITY CONTROLLER

MICROPROCESSOR BASED

TO MEASURE = TO KNOW

| | |
|---|---|
| Conductivity scales | : from 0/0.2000 µS tot 0/40.00 S |
| Temperature scale | : -10/110 °C |
| Power supply | : 110/220 Vac |
| Software | : R 2.1x |
| Valid also for option | : P/N 091.3713 |

Cod. 28003763
Rev. D – 10/18

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# 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

Nieuwkoop B.V./B&C 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 CE marking is placed on the packaging and on the S/N label of the instrument.

## 1.4 SAFETY WARNINGS

It is important to underline the fact that electronic instruments are subject to 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.

# 2 GENERAL

The Conductivity meter is used to detect specific Conductivities of liquids and to control the contents of the salt or the ionic concentrations of liquids.

In the case of low concentrations, all salts break into ions and the measurement of Conductivity indicates the salt contents or ionic concentration. There is a linear dependence of the Conductivity on the concentration or on the salt contents.
In the case of higher concentrations the linearity is disturbed by incomplete dissociation.
The concentration is achieved by the Conductance curve.

The measuring of Conductivity is done by means of two electrodes completely surrounded by the liquid. The electrodes must have definite dimensions and arranged locations.
During the measurement of Conductivity the anions and the cations undertake the necessary transport of the Current.

In order to prevent the polarization, measuring is done by alternating Current.
The Temperature of the test solution may cause considerable error in this measurement, since, as a result of the rising Temperature, the activity of the ions increases, while the contents of the ionic concentration remains constant.
A reference Temperature of 20 °C was selected in order to compare various measurements.
The effects of varying Temperatures on Conductivity may be compensated by a RTD immersed in the test solution, connected to the meter.
Each solution has its own Temperature variation, therefore the automatic Temperature compensation of our Conductivity meter is continuously variable in the range between 0.0 / 3.5 %/°C.
By means of this automatic Temperature compensation the measured value of Conductivity which the solution has at 20 °C is indicated.

The meter supplies the measurement cell with the required alternating Current and shows the measured value on the display. All indicating scales are linear, while the readings are determined by selecting the various measuring ranges and the various constants K of the cells.
The adjustment of the cell constant value provides a correct reading of the Conductivity.

A 4-Electrode Conductivity System or an Electrodeless Conductivity System is suggested for measuring range over 20 mSiemens.

# 3 SPECIFICATIONS

## 3.1 FUNCTIONAL SPECIFICATIONS

Additional functions of the software R2.1x

- Possibility to select the continuous or flashing alarm.
- Possibility to select the frequency of the flashing alarm. During the flashing cycle the relay's activation is 50% of the duty cycle.
- Dual filter software for small or large signal.

Input

The unique characteristics of this instrument are:

- the automatic selection of the Frequency as a function of the scale
- the possibility to connect E.Conductivity cells for µS measuring range, preamplified 4-electrode or electrodeless cells for mS measuring range.

A second input is provided for 2 or 3 wires Pt100 RTD Temperature sensor.

Temperature compensation

The unit is supplied with Automatic or manual Temperature compensation and Temperature information may be displayed on the LCD.
The instrument detects of the absence or malfunctioning of the Temperature sensor and automatically switches to manual operation mode.

The choice of the Reference Temperature allows the operator to read on the display the E.Conductivity value referred to a selected Temperature from 10°C to 99°C.

A special software allows the unit to store manually or automatically the Conductivity/Temperature response table of the liquid, for an accurate Temperature compensation.

Measuring ranges

Scales are selectable as function of cell K (see the table on the next page)

The autoranging function, when activated by user, selects the lower/higher scale, maintaining the set point and the output parameters.

Input from 2-electrode cell

| K | 0.1 | 0.2 | 0.5 | 1.0 | 2.0 | 5.0 | 10.0 |
|---|---|---|---|---|---|---|---|
| SCALES | .2000µS | .4000µS | 1.000µS | 2.000µS | 4.000µS | 10.00µS | 20.00µS |
| | 2.000µS | 4.000µS | 10.00µS | 20.00µS | 40.00µS | 100.0µS | 200.0µS |
| | 20.00µS | 40.00µS | 100.0µS | 200.0µS | 400.0µS | 1000µS | 2000µS |
| | 200.0µS | 400.0µS | 1000µS | 2000µS | 4000µS | 10.00mS | 20.00mS |
| | 2000µS | 4000µS | 10.00mS | 20.00mS | 40.00mS | 100.0mS | 200.0mS |

Input from 080310 or 080315 microtransmitters

| K | 0.1 | 0.2 | 0.5 | 1.0 | 2.0 | 5.0 | 10.0 |
|---|---|---|---|---|---|---|---|
| SCALES | .2000mS | .4000mS | 1.000mS | 2.000mS | 4.000mS | 10.00mS | 20.00mS |
| | 2.000mS | 4.000mS | 10.00mS | 20.00mS | 40.00mS | 100.0mS | 200.0mS |
| | 20.00mS | 40.00mS | 100.0mS | 200.0mS | 400.0mS | 1000mS | 2000mS |
| | 200.0mS | 400.0mS | 1000mS | 2000mS | 4000mS | 10.00 S | 20.00 S |
| | 2000mS | 4000mS | 10.00 S | 20.00 S | 40.00 S | 100.0 S | 200.0 S |

Indirect measuring

The unit provide a readout in % - gr/lt - Bé according to a conversion table manually stored into the microcomputer.

Analog output

Either a 0/20 mA or 4/20 mA isolated output may be selected, for use as an interface with computers or data loggers.
The output Current may be set anywhere from 0 to full scale.

Control relays

The E. Conductivity 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 or 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.
The alarm type can be selected continuous or flashing. The frequency of the flashing alarm can also be selected.

Operating mode

The instrument is provided with 2 programmable modes of operations:

- 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.

Software filter

The unit is provided with a dual programmable software filter, to be inserted when the readout is not stable. It is possible to select a different response time for small or large signal variations.

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.

Keyboard lock

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.

Options

The following options are available:

| | |
|---|---|
| 091.3713 | Dual analog programmable and isolated output.<br>The operator may select an output for Temperature. |
| 091.701 | RS232 isolated output.<br>The output sends the data (E.C., °C) to the serial port of the computer. |
| 091.404 | 24 VAC power supply |
| 091.4143 | 9/36 VDC power supply. |

## 3.2 PHYSICAL SPECIFICATIONS

The controller enclosure consists of an anodized aluminium case built according to DIN 43700, with a panel coated with a polycarbonate membrane.

A transparent (IP65) waterproof front door SZ 7601 can be added to the housing, in order to protect the unit from moisture or corrosive fumes.

Connections are made by two extractable terminal blocks.
This makes wiring and general maintenance.

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

## 3.3 TECHNICAL SPECIFICATIONS

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

| | *Default values* |
|---|---|
| **OPERATING MODE** | |
| Automatic/Manual | Auto |
| **CONDUCTIVITY** | |
| * Input: from E.C Cell/Microt. 080310 /Microtr. 080315 | E.C.Cell |
| 2 electrodes cell | |
| * Cell K: 0.1/0.2/0.5/1/2/5/10 | 1.0/cm |
| * Input scale: | 2000µS |
| 080310 and 080315 microtransmitters | |
| * Cell K: 0.1/0.2/0.5/1/2/5/10 | 1.0/cm |
| * Input scale: | 2000mS |
| Autoranging: On/Off | Off |
| Software filter 90% RT | |
| * LARGE signal variations: 0.4/20.0 s | 2.0 s |
| * SMALL signal variations: 0.4/20.0 s | 10.0 s |
| * Indirect measuring: ON/OFF | OFF |
| * Indirect measuring unit: % g/l Bè | % |
| * ATC Temperature reference: 10°/99°C | 20°C |
| * ATC: Table/Coefficient | Coeff |
| * Temperature coefficient: 0/5.00 %/°C | 2.2% |
| Sensitivity: 60/160 % | 100 % |
| Zero adjustment: +/- 10% | 0 % |
| Display resolution at 20°C: 1/1000 | |

| **TEMPERATURE** | |
|---|---|
| Input: RTD Pt100 2/3 wires | |
| Measuring and compensation range: -10/+110 °C | |
| Resolution: 0.1 °C | |
| Zero adjustment: +/- 2°C | 0°C |
| Manual Temperature compensation: -10/110°C | 20°C |

| **SET-POINT A/B** | |
|---|---|
| Set point value: 0/2000 (1000/4000) | 0 |
| Hysteresis: 0/20 (10/40) | 0 |
| Delay: 0.0/99.9 Sec. | 0 Sec. |
| * Function: H/L (Max/Min) | L |
| Relay contacts: SPDT 220V 5Amp. Resistive load | |

| **ALARM (C-D contacts)** | |
|---|---|
| Low: 0/2000(1000/4000) | 0 |
| High: 0/2000(1000/4000) | 2000 |
| Delay: 0.0/99.9 Sec. | 0 Sec. |
| - Alarm on max. activation time of SA/SB: ON/OFF | OFF |
| - Max. activation SA/SB: 0/60 minutes | 60 min. |
| Relay contacts: SPDT 220V 5Amp. Resistive load | |
| - Relay activation: ACT/DEA | ACT |
| - Alarm type: CONT./FLASH | CONT. |
| - Alarm flashing frequency: | |
| LO (approx. 0.3 Hz D.C. 50%) | ME |
| ME (approx. 0.6 Hz D.C. 50%) | |
| HI (approx. 1.2 Hz D.C. 50%) | |

| **ANALOG OUTPUT Nr. 1** | |
|---|---|
| - Input related to the output (option 091.3713): EC/°C | E.C. |
| - Output range: 0-20/4-20 mA | 0/20 mA |
| - Point corresponding to 0 or 4 mA: 0/2000 (1000/4000) | 0 |
| -10/110°C | -10.0°C |
| - Point corresponding to 20mA: 0/2000 (1000/4000) | 0 |
| -10/110°C | -10.0°C |
| Response time: 2.5 Sec. for 98 % | |
| Isolation: 250 Vca | |
| Load: 600 Ohm max | |

| | |
|---|---|
| **ANALOG OUTPUT Nr. 2** (option 091.3713) | |
| - Input related to the output: EC/°C | E.C. |
| - Output range: 0-20/4-20 mA | 0/20 mA |
| - Point corresponding to 0 or 4 mA: 0/2000 (1000/4000) | 0 |
| -10/110°C | -10.0°C |
| - Point corresponding to 20mA: 0/2000 (1000/4000) | 0 |
| -10/110°C | -10.0°C |
| Response time: 2.5 Sec. for 98 % | |
| Isolation: 250 Vca | |
| Load: 600 Ohm max | |

| | |
|---|---|
| **CONFIGURATION PARAMETERS(*)** | |
| Keyboard locked/unlocked | unlocked |
| LCD contrast (0/7) | 4 |
| Access number: | 0 |
| Sensor type | CELL |
| Cell K | 1.0 |
| Input scale | 2000µS |
| Autoranging | OFF |
| RT software filter Large: | 2.0 s |
| RT software filter Small: | 10.0 s |
| Indirect measuring display | OFF |
| Indirect measuring unit | % |
| ATC Temperature reference | 20 °C |
| ATC type | Coeff |
| ATC table parameters | |
| Starting Temperature (0/100°C) | 0°C |
| Temperature step (-20/20°C) | 10°C |
| Overtime (1/60') | 15' |
| Temperature coefficient | 2,2 %/°C |
| Input related to output Nr. 1 | Cond. |
| Analog output range | 0/20 mA |
| Point 1 (x mA min) | 0µS |
| Point 2 (x mA max) | 2000µS |
| Input related to output Nr. 2 | Cond. |
| Analog output range | 0/20 mA |
| Point 1 (x mA min) | 0µS |
| Point 2 (x mA max) | 2000µS |
| A relay function | LO |
| B relay function | LO |
| Alarm on max. activation time for SA | OFF |
| Max. activation time for SA | 60 m |
| Alarm on max. activation time for SB | OFF |
| Max. activation time for SB | 60 m |
| Alarm relay status | ACT |
| Alarm type | Cont. |
| Alarm flashing frequency | ME |
| Access number to configuration (0/999) | 0 |

**GENERAL SPECIFICATION**

Alphanumeric display: 1 line x 16 characters
Acquisition time: 0,4 sec. approx.
Operating Temperature: 0/50 °C
Humidity: 95% without condensation
Power supply: 110/220 Volt ac +/- 10% 50/60 Hz
Isolation: 4000 Volt between primary and secondary (IEC 348)
Power consumption: 5 VA max.
Terminal blocks: extractable
Net weight: 850 gr.
Housing: DIN 43700 96 x 96
Dimensions: 96 x 96 x 155 mm.

# 4 INSTALLATION

## 4.1 PHYSICAL INSTALLATION

Controller

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

The enclosure is designed for panel-mounting.
It should be mounted on a rigid surface, in a position protected from the possibility of damage or excessive moisture or corrosive fumes.

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

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

Cell

The Conductivity cell must be mounted properly if the system is to operate accurately and efficiently.

It must meet the following requirements:

- the sample in the cell must be representative of the whole solution
- the solution must circulate continuously through the cell
- the flow velocity in the cell must not be so high as to cause cavitation
- the position and orientation of the cell must not trap air-bubbles near the electrode area.
- sediments must not accumulate within the electrode area.
- in all dip cell installations the water must be continuously agitated.
- electrodeless cell must be installed in 100 mm pipes minimum.

Keep the cable away from power wires on the overall length. This cable too must not be interrupted on overall length.

If interruption is necessary, the extension cable must be fastened to the high insulation terminal strip.

## 4.2 ELECTRICAL INSTALLATION

The electrical installation consists of:

- connecting the power supply to the meter
- connecting the electrode or the probe to the meter
- connecting alarms, pumps, valves if necessary
- connecting the monitor output to the recorder or similar devices if required
- connecting other optional accessories (RTD P.I.D. regulators)

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

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

Connecting the power

- connect ground to terminal 4
- connect ac power to 1 - 2 terminals if power voltage is 110 V
- connect ac power to 1 - 3 terminals if power voltage 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

The unit is automatically turned off by an overload protection which comes back into operation after 2 or 3 minutes.

Connecting the cell

In this operation the input must be selected in mode CELL
(see Conductivity parameters calibration section)

Cell cabling is a critical part of the whole system.

- use a low noise coax cable on overall length between sensor and input terminals of the meter
- avoid interruption on the cable. If interruption is necessary, the extension cable must be fastened to the high insulation terminal strip.
- keep the cable away from power wires on the overall length
- connect the 2-electrodes cell to the terminals 20-22.
- connect the eventual shield to the terminal 21

Connecting microtransmitter

In this operation the input must be selected in mode MICROTRANSMITTER (See Input Calibration section and the instruction for this special probe).

Connecting alarms, pumps, valves

The output connections referred to set-point 1 and set-point 2 are made at terminal strip and they consist of two independent SPDT free voltage relays corresponding to Regulator A and Regulator B . The output connection referred to alarm consists of SPDT free voltage relay corresponding to Alarm C/D

Regulator "A"

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

Regulator "B"

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

Alarm "C/D"

terminal 12 marked C : common contact
terminal 11 marked NO : normal open contact
terminal 13 marked NC : normal closed contact

Connecting a recorder

A current output for a remote recorder or P.I.D. regulators is available on terminals 14-16. Connect the recorder high to terminal 14 and connect the recorder low to terminal 16. Series connection is required for driving more loads having a total input Resistance lower than 300 Ohm.

If the 091.3713 dual output option is installed, a second isolated and programmable output is available between 15-16 terminals.
Output N°1 and output N°2 are isolated and selectable 0/20 or 4/20 mA.

Connecting the RTD

The instrument has the automatic Temperature compensation carried out by means of RTD Pt100. The Temperature sensor has to be installed in the same solution being measured, close to the cell in the pipe-line or in the tank.
To operate the automatic Temperature compensation, connect the RTD as shown in the "connection" figure.

3-wire connection

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

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

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

2-wire connection

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

Checking:

Before connecting the system to the power supply:

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

# 5 OPERATING THE SYSTEM

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 unit is on.

The cards of the controllers are adjusted at the factory.

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

# 6 SOFTWARE DESCRIPTION

## 6.1 KEYBOARD

| KEY | FUNCTION |
|---|---|
| MODE DISP | - it allows the operator to go to the next Display<br>- 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<br>- it allows to choose between different functions |
| ▼ | - it allows to increase the displayed parameters<br>- it allows to choose between different functions |
| ENT | - it allows to enter the selected data and to return to the main Display **D0** |

## 6.2 READOUT SEQUENCES

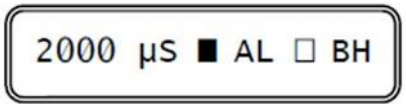
Applying the power to the instrument the display will show the following display for 3 seconds then will show the main display ·D0·.

Press MODE DISP to visualize the following Displays:

| | | |
|---|---|---|
| D0 | 2000 µS ■ AL □ BH | Current E.C. values, set-point status and function |
| D1 | 10.00 g/l | Indirect measuring value (if selected) |
| D2 | 2000 µS TR:25° | Current E.C. and Reference Temperature values |
| D3 | TEMP.: 22.0°CM | Current Temperature value |
| D4 | SA: 1000 µS*■ LO | A set-point parameters |
| D5 | SA: 1000 µS*□ LO | B set-point parameters |
| D6 | AL 1000 /2000 µS | Alarm parameters |
| D7 | 01 20.0mA/2000 µ | Current input/output N°1 values |
| D7BIS | 02 20.0mA/2000 µ | Current input/output N°2 values |
| D8 | Configuration | Configuration |
| D9 | C7685R:2.1x | P/N and Software release |

---

·D0·




EC current value, A/B relays status and min/max function

■ : relay activated
□ : relay deactivated
◓ : relay activation delayed
A/B : relay A and B
L/H : Low/High (min/max)

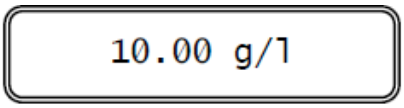
| MESSAGE | MEANINGS |
|---|---|
| " >>>>> " | the present value is over range |
| "flashing" | the present value is in alarm |

CAL to activate the operating mode selection (manual/automatic)

MODE DISP to go to

---

·D1·




g/l, Bè, % display

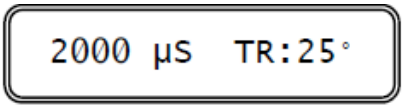
| MESSAGE | MEANINGS |
|---|---|
| " >>>>> " | the present value is over range |
| " ----- " | EC scale is not related to the conversion table |

CAL to activate the indirect measuring Sensitivity calibration sequences

MODE DISP to go to

---

·D2·

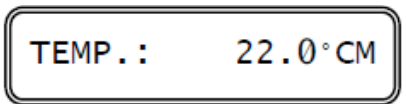



EC and reference Temperature display

CAL to activate the Zero and Sensitivity calibration sequences

MODE DISP to go to

---

·D3· 

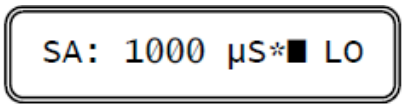

Temperature display or manual value for compensation

M: manual value selected

CAL to activate the Temperature calibration sequences or to program the manual temperature compensation value

MODE DISP to go to

---

·D4· 

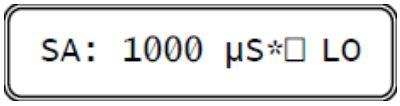

Display of Set-point A value, relay status and min/max relay function

*: timer alarm activated on set-point A

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

MODE DISP to go to

---

·D5· 


Display of Set-point B value, relay status and min/max relay function

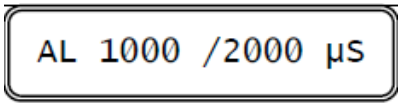
*: timer alarm activated on set-point B

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

MODE DISP to go to

---

·D6·



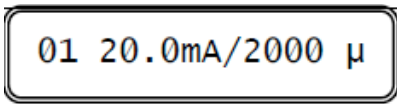

Min/max alarm values display

CAL to activate the programming sequences of min/max value alarm and delay time for relay C.

MODE DISP to go to

---

·D7·

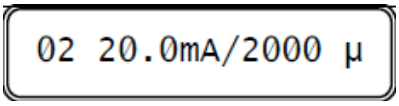



Display of analog output N°1 value and the related Conductivity value

MODE DISP to go to

---

·D7BIS·

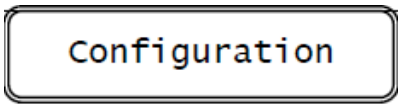



Display valid only for 091.3713 option
Display of analog output N°2 value and the related Conductivity or Temperature values

MODE DISP to go to

---

·D8·



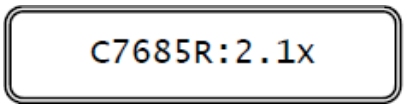

Configuration display

CAL to activate the programming sequences of keyboard lock/unlock, display contrast and instrument configuration

MODE DISP to go to

---

·D9·




Display of instrument code and Software release

MODE DISP to go back to ·D0·

## 6.3 CALIBRATION SEQUENCES

The following instruction allows the calibrations of the sensor, the set point and the alarm parameters.

The calibration sequences are accessible only in "KEYBOARD UNLOCKED" condition (see "Configuration parameters" chapter).

Press the [CAL] key to access the calibration sequences from each related display D0/D8.

To operate a calibration press again the [CAL] key.

Press the [ENT] key to end a calibration sequence.

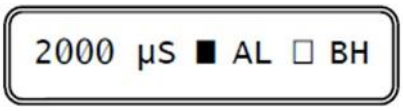
Press the [MODE DISP] key to interrupt a calibration sequence.

### 6.3.1 MANUAL AUTOMATIC OPERATING SELECTION

Normally the unit operates in automatic mode.

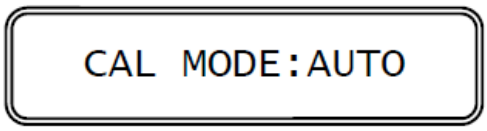
Follow this procedure only to select MANUAL or AUTOMATIC mode.

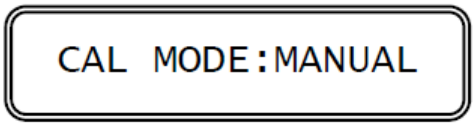
1. [MODE DISP] to go to

   ·D0· 
   

2. [CAL] to select the operating mode MAN/AUT

3. [▲][▼] to select one of the following display

   [MODE DISP] to stop the procedure and to go back to ·D0·

4. [ENT] - to confirm the operating mode selected
   - to go back to ·D0·

| MESSAGE | FUNCTION |
|---|---|
| " UPDATE " | the selected mode has been memorized |

**IMPORTANT NOTE:** the next calibration routines have the same procedure so only the active keys will be shown. The "UPDATE" message will be displayed any time a data has been memorized.

The error messages will be displayed for about 5 minutes.
Press the ENTER key to acknowledge the error messages, the "NO UPDATE" message will appear.

## 6.3.2 INDIRECT MEASURING CALIBRATION

The access to this sequence is possible only if the indirect measuring visualization has been previously selected in the configuration menu.

The calibration allows to relate a conductivity value with the concentration in % - gr/l - Bè of a solution.

This calibration can be made in two different ways (A or B sequences):

A. modifying the sensitivity value (50.0%/200.0%)
B. modifying the indirect measuring value

A. Sensitivity curve modification

1. MODE DISP to go to

·D1· 10.00 g/l

2. CAL to access calibration

CAL S: 100.0 %

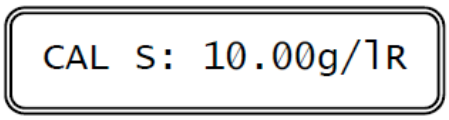
3. In alternative proceed with A or B sequences

3B. ENT to access the Sensitivity calibration via measuring value modification (see sequence B)

3A. ▲ ▼ to insert the desired Sensitivity value

4A. ENT to confirm the value and to go back to ·D1·

B. Indirect measuring value modification

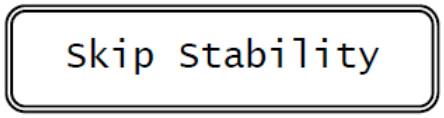



CAL S: Sensitivity curve calibration

The "R" flashing message (READY) means instability of the measuring value. During the flashing it is not possible any modification of the values.

If the stability is not reached ("R" always flashing), pressing the ENT key the operator can proceed with the next step.

In this case the display will show the message:




now it is possible to insert the desired measuring value.

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

4B. ▲ ▼ to modify the indirect value

5B. ENT to confirm the value

| MESSAGE | FUNCTION |
|---|---|
| UPDATE | data has been memorized |
| S > 200% | Sensitivity > 200% |
| S < 50% | Sensitivity < 50% |

## 6.3.3 ZERO AND SENSITIVITY CALIBRATION

The zero calibration acts automatically over the 5 measuring ranges related to the cell constant K selected.

The sensitivity calibration can be made in two different ways (A or B sequences):

A. modifying the Sensitivity value in %
B. modifying the displayed Conductivity value

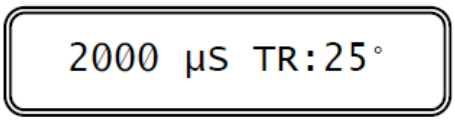
**NOTE**: - Press the [CAL] key to access the calibration sequences and to display the parameter value to be calibrated.

- Press the [CAL] key again to access the parameter calibration routine.

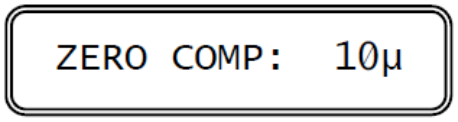
- Press the [MODE DISP] key to stop the sequences, the display will change to ·D2·.

Zero calibration

1. [MODE DISP] to go to

·D2· 

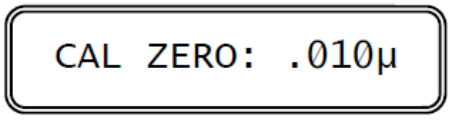

2. [CAL] to access the calibration sequences




Zero visualization

[ENT] to stop the zero calibration and change to the sensitivity calibration sequence (next chapter)

3. [CAL] to calibrate the zero value




.010µ: Conductivity actual value

The unit will automatically calibrate the zero over the 5 Conductivity ranges verifying the stability of the measure.

4. Choose one of the following action:

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

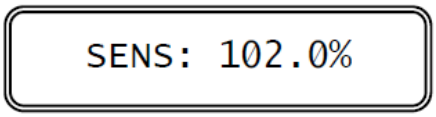
ENT to go automatically in the next scale

▲ + ▼ + ENT press the 3 keys simultaneously to insert the factory zero calibration value

| MESSAGE | FUNCTION |
|---|---|
| UPDATE | data has been memorized |
| Z> 10% ON 1 | Zero > 10% on scale 1 (1/5) |

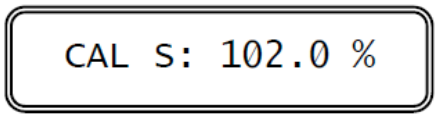
The unit goes to the Sensitivity calibration sequences

Sensitivity calibration




Actual Sensitivity value

1. CAL to access the Sensitivity calibration




2. In alternative proceed with A or B sequences

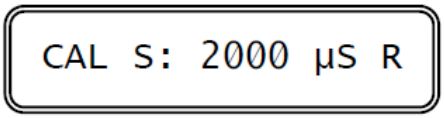
2B. ENT to enter the sensitivity value and to go to the calibration sequence through the insertion of a Conductivity value (see B procedure)

A. Sensitivity value insertion

2A. ▲ ▼ to insert the value

3A. ENT to confirm the value and to go back to ·D2·

B. Conductivity value insertion

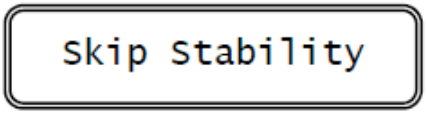



2000 µS: Actual Conductivity value

The "R" flashing on the display means that the unit is checking the stability of the measure
During the flashing it is not possible to change the value.

If the stability is not reached ("R" always flashing), pressing ENT he operator can proceed.

In this case the unit will show the message:




3B. ▲ ▼ to modify the Conductivity value

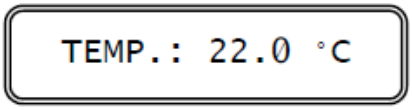
4B. ENT to enter the new Sensitivity value

| MESSAGE | FUNCTION |
|---|---|
| UPDATE | data has been memorized |
| S > 160.0% | Sensitivity > 160%. |
| S < 60.0% | Sensitivity < 60% |

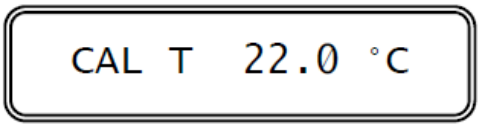
## 6.3.4 TEMPERATURE CALIBRATION

1. MODE DISP to go to

·D3·



2. CAL to access the Temperature calibration sequence




'>>>>>'('<<<<<'):Temperature value over range

MODE DISP to stop the procedure and to go back to ·D3·

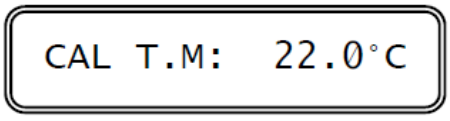
▲ + ▼ + ENT press the 3 keys to reset the factory calibration

3. ▲ ▼ to modify the value

4. ENT to confirm and to calibrate the manual Temperature value

| MESSAGE | FUNCTION |
|---|---|
| " UPDATE " | data has been memorized |
| Z> 2.0°C | Zero > 2.0 °C |

Manual Temperature calibration




MODE DISP to stop the procedure and to go back to ·D3·

1. ▲ ▼ to modify the Temperature value

2. ENT to confirm and to go back to ·D3·

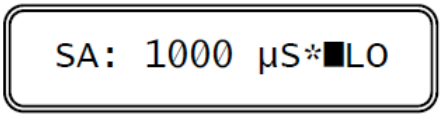
## 6.3.5 SET-POINT A/B PARAMETER CALIBRATION

The following procedure are suitable for both Set Point A and B.

In this routine, for each set point it is allowed:

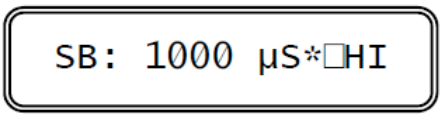
- to insert the Set point value
- to insert the hysteresis value
- to insert the delay time ( the delay time act whenever the measure goes over the set point value + hysteresis)

1. MODE DISP to go to

·D4· 

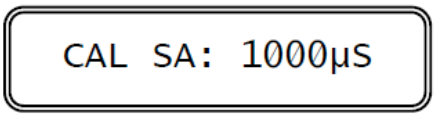
Set-point A display

or

·D5· 

Set-point B display

2. CAL to access the calibration sequences



Set-point A value calibration

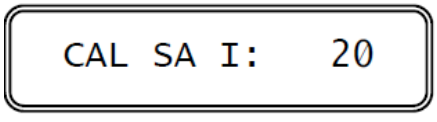
S 1000 µS: actual set-point value

MODE DISP to stop the procedure and to go back to ·D4·/·D5·

3. ▲ ▼ to modify the set-point value in the range 0/2000 (1000/4000)

4. ENT to confirm the value and to go to the hysteresis value calibration

**Note:** press ENT key twice to modify only the set-point value, the UPDATE message will be shown



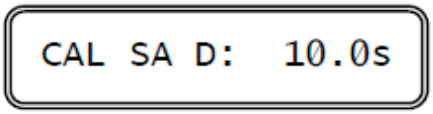
Hysteresis

calibration I 20: actual hysteresis value

MODE DISP to stop the procedure and to go back to ·D4·/·D5·

5. ▲ ▼ to modify the hysteresis value

6. ENT to confirm and to go to the delay time value calibration




Delay time value calibration

D 10.0 s: actual delay time value

MODE DISP to stop the procedure and to go back to ·D4·/·D5·

7. ▲ ▼ to modify the delay value in the range 0/99.9 sec.

8. ENT to confirm and to go back to ·D4·/·D5·

Only in this moment the new set-point configuration will be memorized in the microcomputer permanent memory.

| MESSAGE | FUNCTION |
|---|---|
| UPDATE | data has been memorized |

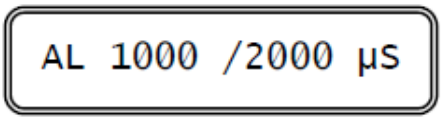
## 6.3.6 ALARM PARAMETER CALIBRATION

In this display it is allowed:

- to insert the min/max alarm threshold
- to insert the delay time value for the alarm
-

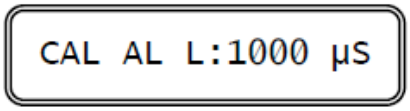
1. MODE DISP to go to

·D6·




Alarm display

2. CAL to access the calibration procedure



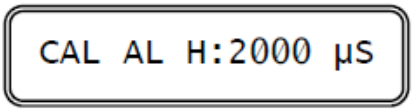

Min value calibration

L 1000 µS: actual min value

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

3. ▲ ▼ to insert the desired value

4. ENT to confirm and to go to the max value calibration



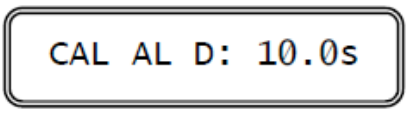

Max value calibration

H 2000 µS: actual max value

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

5. ▲ ▼ to insert the desired value

6. ENT to confirm and to go to the delay calibration




Delay time calibration D

10.0 s: actual delay time value

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

7. ▲ ▼ to insert the desired value

8. ENT to confirm and to go back to ·D6·

| MESSAGE | FUNCTION |
|---|---|
| " UPDATE " | data has been memorized |

**IMPORTANT NOTE:** if any key will not be pressed within 5 minutes the microcomputer will abort the previous configuration and the main display will be shown.

## 6.4 CONFIGURATION

These procedures allow the following operation:

- to lock/unlock the keyboard
- to regulate the LCD contrast
- to insert the parameter configuration access code

1. MODE DISP to go to

·D8· Configuration Configuration display

2. CAL to access the configuration procedures

### 6.4.1 KEYBOARD LOCK/UNLOCK

| KB UNLOCKED | KB LOCKED |
|---|---|
| keyboard unlocked | keyboard locked |

MODE DISP to go back to ·D8·

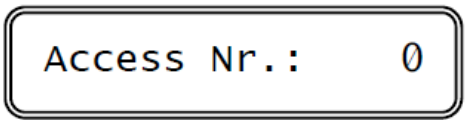
3. ▲ ▼ to lock or unlock the keyboard
4. ENT to confirm and to go to the next calibration

### 6.4.2 LCD DISPLAY CONTRAST


MODE DISP to go back to ·D8·

1. ▲ ▼ to regulate the contrast (0-7)
2. ENT to confirm and to go to the introduction of the "access number" to the parameter configuration

### 6.4.3 NEW ACCESS NUMBER

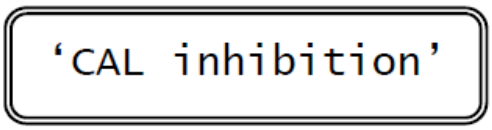



Access number request

MODE DISP to go back to ·D8·

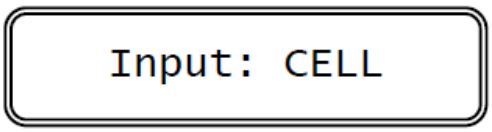
1. ▲ ▼ to insert the access number (when keeping the key pressed the numbers will scroll with 3 speed level)
2. ENT to confirm and to go to the next calibration

**IMPORTANT NOTE:** any inserted number which is different from the right access code will allows only the display of the parameter and not the calibration.




Calibration inhibited

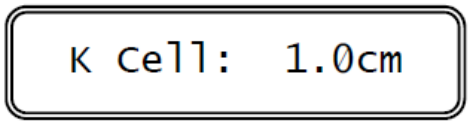
### 6.4.4 CONDUCTIVITY SENSOR TYPE




(µT 080310/µT 080315)

Active keys: MODE DISP - ▲ ▼ - ENT

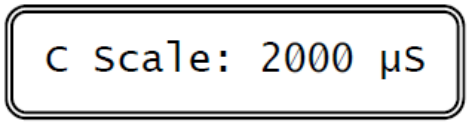
### 6.4.5 CELL CONSTANT




(see Scale/K cell table)

Active keys: MODE DISP - ▲ ▼ - ENT

### 6.4.6 MEASURING SCALE




(see Scale/K cell table)

Active keys: MODE DISP - ▲ ▼ - ENT

### 6.4.7 AUTORANGE


Active keys: MODE DISP - ▲ ▼ - ENT

### 6.4.8 SOFTWARE FILTER


x.xs: large software filter (seconds)

Active keys: MODE DISP - ▲ ▼ - ENT


xx.xs: small filter software (seconds)

Active keys: MODE DISP - ▲ ▼ - ENT

## 6.4.9 INDIRECT MEASURE


Active keys: MODE DISP - ▲ ▼ - ENT

- selecting:

ON the instrument visualize the memorized table (see next chapter)
OFF the instrument goes to the next calibration in the configuration routine

Indirect measure table

One of the following information of the memorized table will be shown.

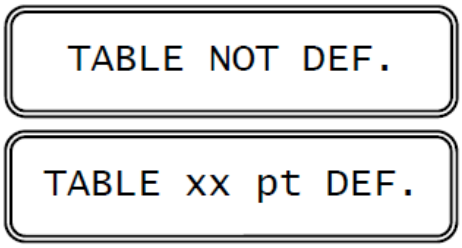


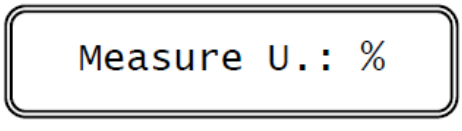

Table not defined

Table defined with xx point (from 2 to 10)

MODE DISP to stop the procedure and to go back to ·D8·

ENT to go to the next calibration procedure (Reference Temp.)+

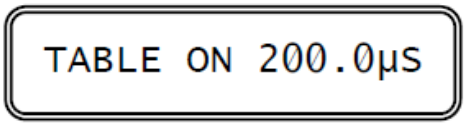
1. CAL to access the measuring unit selection




Indirect measuring unit

2. ▲ ▼ to select the unit (%, g/l, Bè)
3. ENT -to confirm the unit selected
   -to cancel the previous memorized table if unit has been changed
   -to visualize the first table point inserted or to be inserted

**Note:** if the memorized table is defined in a Conductivity range different from the selected one, the instrument will give the message:




Memorized table range

MODE DISP to stop the procedure and to go to the beginning of the procedure

The table will remain memorized and available whenever the correct Conductivity range will be selected.

ENT to cancel the memorized table and to insert the new one.

Insertion of the table points

The first point is fixed with 0µS/0% (gr/lt - Bè).

The operator will insert/change a pair of values Conductivity/indirect measure (from 0.00 to 99.99) for each table point (from 2 to 10 points) that the program will show consecutively.

The instrument will consider wrong:
- the indirect measuring value that do not increase with the Conductivity
- the consecutives values different less than 10 Conductivity units (range 200.0µS - difference between two points < 1.0).

The first point not yet defined will be remarked with the message:

POINT xx NOT DEF: (xx point not defined)

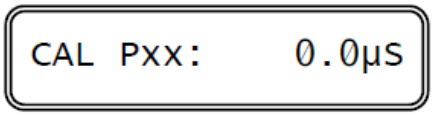
During the sequence will appear one of the following display whenever a point is defined or to be defined.


MODE DISP to delete the procedure (see suitable chapter following)

1. ENT to go from point 0 to point 1

ENT to confirm the Conductivity value and to visualize the indirect measure. If the point is not defined, the acquisition will stop and the instrument will check the validity of the inserted points.

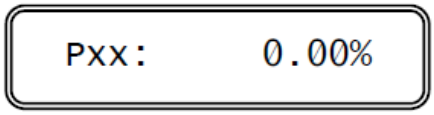
2. CAL to insert/change the Conductivity value




MODE DISP to exit from the procedureand visualizevalues

3. ▲ ▼ to modify the Conductivity value

4. ENT to confirm the Conductivity value and to go to the visualization of the corresponding indirect measure

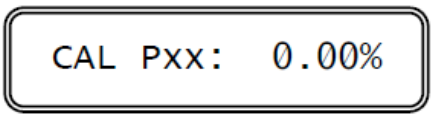



MODE DISP to delete the procedure (see suitable chapter following)

ENT
-to confirm the displayed value
-to go to the next point (from 2 to 9)
-at point nr.10 the introduction will be over and the instrument will check the validity of the table.

To finish the insertion repeat the procedure from point 1 on.

5. CAL to insert/change the indirect measuring value




MODE DISP to stop the indirect value introduction and to go to the visualization of the Conductivity value.

▲ ▼ to modify the indirect measuring value

6. ENT -to confirm the display value
-to go to the next point (from 2 to 9)
-at point nr.10 the introduction will be over and will check the validity of the table

Deletion of the table acquisition

1. MODE DISP press the key during the Conductivity/indirect measure display.
The instrument ask for confirmation of being deleted


2. In alternative proceed with A or B sequences.

2A. ENT to delete the table and to start again the procedure

2B. MODE DISP to abort the procedure and to go back to the visualization of the Conductivity/indirect value

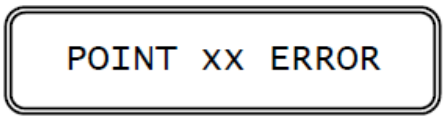
Check of the table validity

During the validity check of the table points the instrument will show the following message:


1. If the inserted table is proper, will be automatically memorized:


ENT to stop the message and to go to the visualization of the number of memorized points

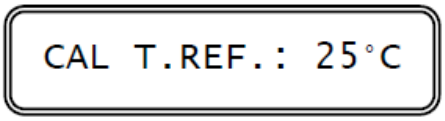
2. If the inserted table has any error, the following message will be displayed:



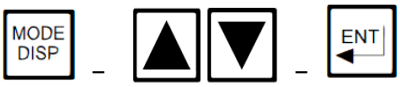

xx: number of the not correct point


to go back to the visualization of the table points

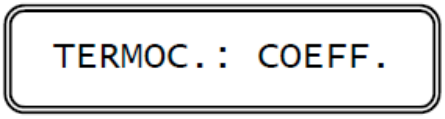
### 6.4.10 REFERENCE TEMPERATURE



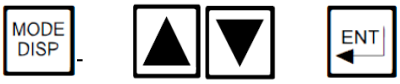

Ref .Temperature value

Active keys: 


### 6.4.11 THERMOCOMPENSATION TYPE




(TABLE)

Active keys: 


Select COEFF. to thermocompensate with Coefficient. The insertion of the coefficient will be the next procedure.

Select TABLE to thermocompensate with a table to be inserted manually or automatically.

### 6.4.12 TABLE OF THERMOCOMPENSATION

The instrument is able to compensate the Temperature effect on the Conductivity values by means of a table with 2 to 10 points, manually or automatically memorized.

This table is memorized in the selected range but it is suitable for all the measuring range.

Manual insertion: The operator must know the Temperature/Conductivity corresponding value of the table and insert them in the microcomputer manually.

Automatic insertion: The instrument automatically acquire the Temperature/Conductivity corresponding values of the table.

At the beginning of the procedure one of the following display will be shown.

| | |
|---|---|
| TABLE NOT DEF. | Internal table not defined or not valid |
| TABLE xx pt DEF. | Internal table defined in xx points. (xx from 2 to 10) |

MODE DISP to stop the procedure and to go back to ·D8·

ENT to go to the next calibration routine (analog output)

If the table is not defined when leaving the procedure, the instrument will use the Coefficient to thermocompensate.

1. CAL to select the automatic or manual acquisition of the thermocompensation table.

| | |
|---|---|
| MANUAL ACQ. | AUTOMATIC ACQ. |

MODE DISP to stop the procedure and to go back to the beginning

2. ▲ ▼ to select the manual or automatic acquisition
3. ENT to confirm and to go to the acquisition procedure

<u>Manual insertion of the table</u>

The operator has to insert the Temperature/Conductivity corresponding values.

- Temperature value: from 0.0°C to 100.0 °C
- Conductivity value: from 0 to 60000 in the selected range

(referring to scale - Es. 600.00 µS).

Any error in the table will be displayed, in order to be immediately corrected and memorized in the table.

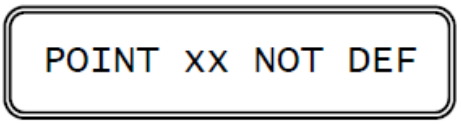
Tables same as following will not be memorized:

- with Conductivity values decreasing when Temperature values increasing
- with two consecutive points having less than 1.0 °C difference.

To insert/modify the table, the instrument acts the scrolling of the points which define it.

The first point not defined will be displayed with the message:
'POINT xx NOT DEF' (xx point not defined)

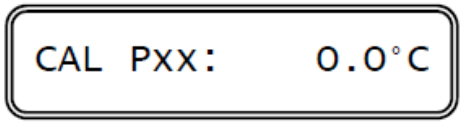
During the sequence one of the following display will appear whenever a point is defined or has to be defined.


MODE DISP to go to the delete procedure (see suitable chapter following)

ENT to confirm the Temperature value and to go to the Conductivity value display.
If the point is not defined, the acquisition will stop and the instrument will check the inserted point validity.

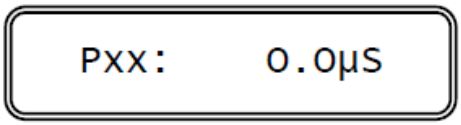
1. CAL to insert/modify the Temperature value




MODE DISP to stop the procedure and to go back to theTemperaturevalue visualization 2.

▲ ▼ to modify the Temperature value

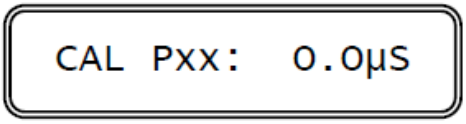
3. ENT to confirm and to go to the visualization of the corresponding Conductivity value




MODE DISP to go to the delete procedure (see suitable chapter following)

ENT -to confirm the value and to go to the next step (from 2 to 9)
-when reached point 10 the procedure is finished and the validity check will start
Repeat from point 1 on to finish the procedure

4. CAL to insert/modify the Conductivity value




MODE DISP to delete the Conductivity value insertion and to go to the Temperature value visualization

5. ▲ ▼ Conductivity value insertion

6. ENT -to confirm the value and to go to the next step (from 2 to 9)
-when reached point 10 the procedure is finished and the validity check will be made

Deletion of the table acquisition

1. MODE DISP press the key when visualizing the Conductivity/Temperature values.
The instrument will ask for confirmation of being deleted


2. In alternative proceed with A or B sequences

2A. ENT to delete the table and to start again the procedure

2B. MODE DISP to abort the procedure and to go back to the Conductivity/Temperature values visualization

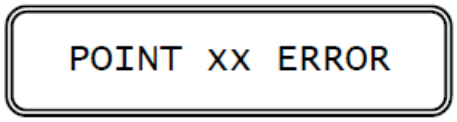
Check of the table validity

During the validity check of the table points the instrument will shows the following message:


1. If the table is correctly inserted, will be automatically memorized


to acknowledge the message and to visualize the number of the memorized points

2. If the table inserted has any error, the instrument will show the following message:




xx: number of the wrong point

to go back to table points visualization

Automatic acquisition of the table

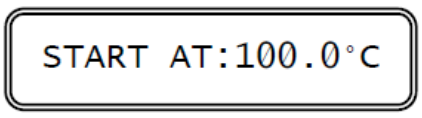
- verify the selected Conductivity range is suitable
- insert the following parameters:

A. Starting acquisition Temperature value

B. Temperature span between two table points (positive for increasing Temperature, negative for decreasing Temperature)

C. Maximum waiting time for the acquisition of the next point (to define the table acquisition end)

A. Starting acquisition Temperature value insertion




to stop the procedure and to go back to the beginning

1. ▲ ▼ to select the starting Temperature value
2. ENT to confirm and to go to the next step

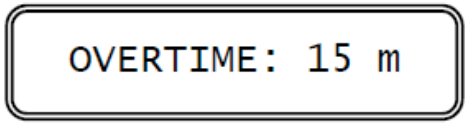
B. Temperature span insertion


MODE DISP to stop the procedure and to go back to the beginning

3. ▲ ▼ to select the Temperature span
4. ENT to confirm and to go to the next step

**Note:** - If the Temperature interval is > 0°C, the acquisition of the table will be made when heating the solution to be measured.
- If the Temperature interval is < 0°C, the acquisition of the table will be made when cooling the solution to be measured.

C. Maximum acquisition time between two points insertion




MODE DISP to stop the procedure and to go back to the beginning

5. ▲ ▼ to select the max. acquisition time
6. ENT to confirm; the following message will appear for 2 seconds


Starting acquisition

The automatic acquisition of the table points will start.

Operating suggestions

The operator should evaluate the heating/cooling speed and the possible solution evaporation during the acquisition time.

A. Acquisition during the heating

1A. Cool the solution to a Temperature value of min. 2.0°C below the starting value (to start the acquisition at 10.0°C the Temperature solution should be below 8.0°C, than heated)

2A. insert a Temperature span > 0.0°C (Es. 10°C).

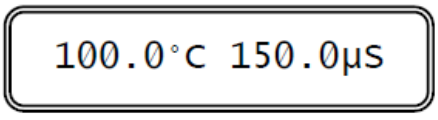
B. Acquisition during the cooling

1B. Heat the solution to a Temperature value of min. 2.0°C above the starting value (to start the acquisition at 100.0°C
the Temperature solution should be above 102.0°C, than cooled)

2B. insert a Temperature span < 0.0°C (Es. -10°C).

Acquisition start

After the "START ACQ." message, the acquisition will start.




Temperature and Conductivity values

The two measuring values are flashing.

In case of any error during the acquisition, a message will be shown alternatively with the two measuring values.

| ERROR MESSAGES: | MEANINGS: |
|---|---|
| NO TEMPERATURE | Temp. over range -11/111°C o sensor not connected |
| COND. TOO HIGH | Conductivity too high. Verify the selected Conductivity Range |
| POINT xx STORED | Memorization |

xx: number of the memorized point (1/10)

The points memorization will be regular only after the table validity check.

The memorization table could be end in different ways:

1) The instrument has memorized 10 different points of the table.

2) From the last acquisited point is elapsed a time higher than the "OVERTIME" selected.

3) Further to an inversion in the Temperature value changing.
(Example: during the heating acquisition, the Temperature value has began to decrease)

4) After operator input (see keys functions).

Deletion of the table acquisition:

1. MODE DISP to abort the acquisition

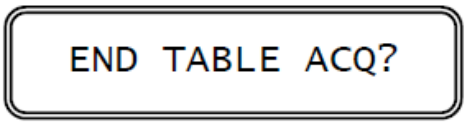
ABORT TABLE ACQ?

2A. ENT to delete the table acquisition and to start again the procedure or

2B. MODE DISP to abort the procedure and to go to the beginning of the table automatic acquisition (Temperature/Conductivity visualization).

Table acquisition end:

1. ENT to end the acquisition and to go to the validity check of the inserted points



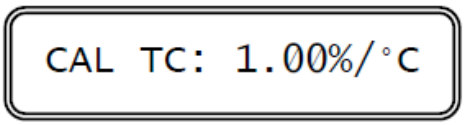

End acquisition request

2A. ENT to confirm the acquisition end and to check the points inserted validity

or

2B. MODE DISP to abort the procedure and to go to the Temperature/Conductivity visualization

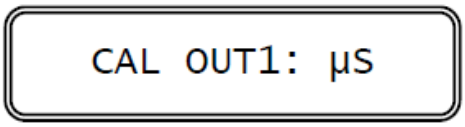
### 6.4.13 THERMOCOMPENSATION COEFFICIENT




1.00%/°C: actual coefficient value

Active keys: MODE DISP - ▲ ▼ - ENT

### 6.4.14 INPUT RELATED TO THE ANALOG OUTPUT N°1 (091.3713 OPTION)




(°C)

µS: input related to output N°1

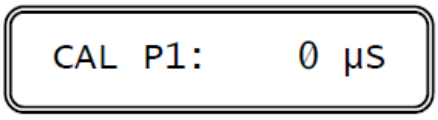
Active keys: MODE DISP - ▲ ▼ - ENT

**NOTE:** the 091.3713 option allows to select the Temperature for the analog output N°1.

## 6.4.15 ANALOG OUTPUT N°1 RANGE

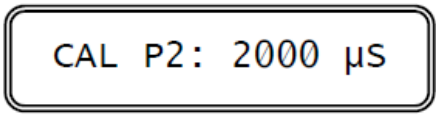

0/20mA (4/20mA): actual output range

Active keys: MODE DISP – ▲ ▼ – ENT




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

Active keys: MODE DISP – ▲ ▼ – ENT



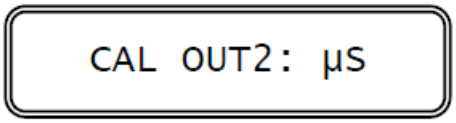

P2: end of range
2000µS: measuring value related to 20 mA

Active keys: MODE DISP – ▲ ▼ – ENT

**NOTE 1:** If the measuring value related to P1 is greater than the value related to P2, the analog output will be the "Reverse" type

**NOTE 2:** When the 091.3713 option is installed, the next step is the second analog output parameters calibration

## 6.4.16 INPUT RELATED TO THE ANALOG OUTPUT N°2 (091.3713 OPTION)




(°C)

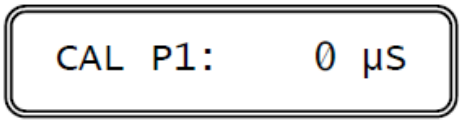
µS: input related to output N°2

Active keys: MODE DISP – ▲ ▼ – ENT

## 6.4.17 ANALOG OUTPUT N°2 RANGE

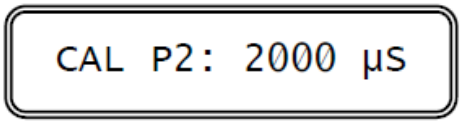

0/20mA (4/20mA): actual output range

Active keys: MODE DISP - ▲ ▼ - ENT




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

Active keys: MODE DISP - ▲ ▼ - ENT




P2: end of range
2000µS: measuring value related to 20 mA

Active keys: MODE DISP - ▲ ▼ - ENT

**IMPORTANT NOTE:** if the measuring value related to P1 is greater than the one related to P2, the analog output will be the "Reverse" type

## 6.4.18 SET POINT A FUNCTION


LO: relay activated when measure is below the set-point value
HI: relay activated when measure is above the set-point value

Active keys: MODE DISP - ▲ ▼ - ENT

## 6.4.19 SET POINT B FUNCTION


LO: relay activated when measure is below the set-point value
HI: relay activated when measure is above the set-point value

Active keys: MODE DISP - ▲ ▼ - ENT

## 6.4.20 ALARM ON SET-POINT A

One of the following selectable display will appear


Active keys: MODE DISP - ▲ ▼ - ENT

Two possible alternatives A or B are allowed:

Selecting:

1A. "OFF" the alarm is not activated and the alarm calibration on set-point B will be selected.

or

1B. "ON" the alarm on set-point A is activated and the display will change to the set-point A activation time.

2B. set-point A activation time


10m: actual activation time

Active keys: MODE DISP - ▲ ▼ - ENT

## 6.4.21 ALARM ON SET-POINT B


Active keys: MODE DISP - ▲ ▼ - ENT

Two possible alternatives A or B are allowed:

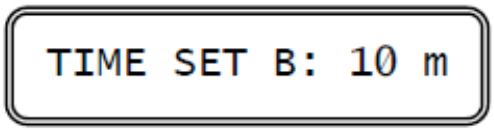
selecting:

1A. "OFF" the alarm is not activated and the display will change to alarm status.

or

1B. "ON". the alarm on set-point B is activated and the display will change to set-point B activation time

2B. set-point B activation time




10m: selected activation time

Active keys: MODE DISP - ▲ ▼ - ENT

## 6.4.22 RELAY ALARM STATUS

One of the following selectable option will be displayed.


ACT: alarm condition = relay activated DEA:

alarm condition = relay deactivated

Active keys: MODE DISP - ▲ ▼ - ENT

## 6.4.23 TYPE OF ALARM

Select between the following displays:


CONT: continuous contacts


FLASH:flashing contacts

Active keys: MODE DISP - ▲ ▼ - ENT

## 6.4.24 FLASHING ALARM FREQUENCY

Select between the following displays:

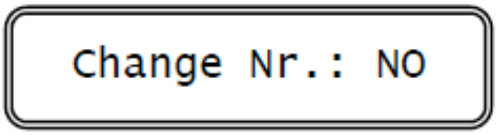

LO:low frequency

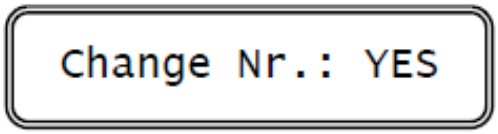

ME: medium frequency


HI:high frequency

Active keys: MODE DISP - ▲ ▼ - ENT

## 6.4.25 NEW ACCESS NUMBER




NO : Access number changing not required
YES: Access number changing required

Active keys: MODE DISP - ▲ ▼ - ENT

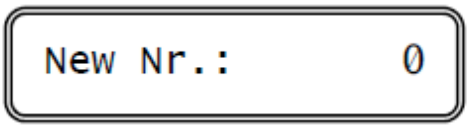
Two possible alternatives A or B are allowed:

selecting:

A. "NO" the instrument go back to the beginning of the Configuration routine; the operator should verify the parameter configured before leaving the Configuration routine which is protected by the access code number.

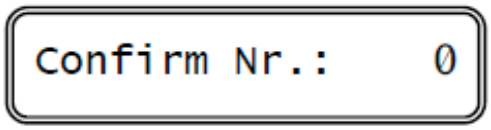
or

B. "YES" the instrument will allow the new access number insertion.




Active keys: MODE DISP ▲ ▼ ENT

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




Active keys: MODE DISP - ▲ ▼ - ENT

The double insertion of the new code assure the memorization of the right code, avoiding the insertion of two different access number.

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

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

ENT Press several time the key to verify the parameter selected before leaving the Configuration routine.

# 7 NORMAL OPERATION

To operate the system, simply power the unit and observe the measured Conductivity of the solution on the meter.
Always select the range that provides the maximum definition.
Select the Set-point A, the Set-point B and the alarms to the setting required for each particular application (see Set-point calibration and alarm sections)

Before measuring it is suggested to consider the following:

a) the Conductivity range of the sample
b) the value of the "K" constant of cell
c) Temperature compensation (by Table or Coefficient)

## 7.1 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.

## 7.2 MANUAL TEMPERATURE COMPENSATION

The manual compensation is in alternative to the automatic compensation.
Do not install the RTD and select the Temperature value and the Temperature coefficient value (see Temperature and Temperature compensation section).

## 7.3 TEMPERATURE COEFFICIENT

When the TC is known, follow the step 1.

When the TC is unknown, follow the step 2.

1. If the Temperature coefficient is known, set the value following the procedure specified in the Configuration section.

2. If the Temperature coefficient is unknown follow the compensation by the Temperature/Conductivity table memorization.

# 8 CALIBRATION

## 8.1 ELECTRICAL CALIBRATION

The following procedures can be used to verify that the system is operating satisfactorily, and it can be repeated periodically to check that the meter is remaining in calibration:

- connect a Conductivity Simulator to terminals 20 - 22 of the controller
- simulate Conductivity values over the entire scale of the meter
- turn the unit to the factory calibration (see calibration section)

For the customer's convenience it follows the equivalence table between the Electric Resistance (Ohm) and the E. Conductivity (Siemens) according to the relation:

$$\textbf{1 Siemens} = \frac{\textbf{1}}{\textbf{1}\ \boldsymbol{\Omega}}$$

| R Ω | 1 MΩ | 100 kΩ | 10 kΩ | 1 kΩ | 100 Ω | 10 Ω |
|---|---|---|---|---|---|---|
| C siemens | 1 µS | 10 µS | 100 µS | 1000 µS | 10 mS | 100 mS |

## 8.2 CHEMICAL CALIBRATION

Zero calibration

When the cell is installed and connected to the meter a "Zero" calibration may be required in order to compensate the residual Conductivity of the connecting cable. Keep the cell clean and dry and adjust the Zero in order to reach 0000 on the display (see Zero calibration section)

Cell constant adjustment

If the cell constant value (K) is not exactly K = 1.00 (see the value marked on the cell) or is unknown, the meter must be calibrated in order to match the meter with the cell. The calibration is carried out by the following procedure and by S.C.S. (Standard Conductivity Solution):

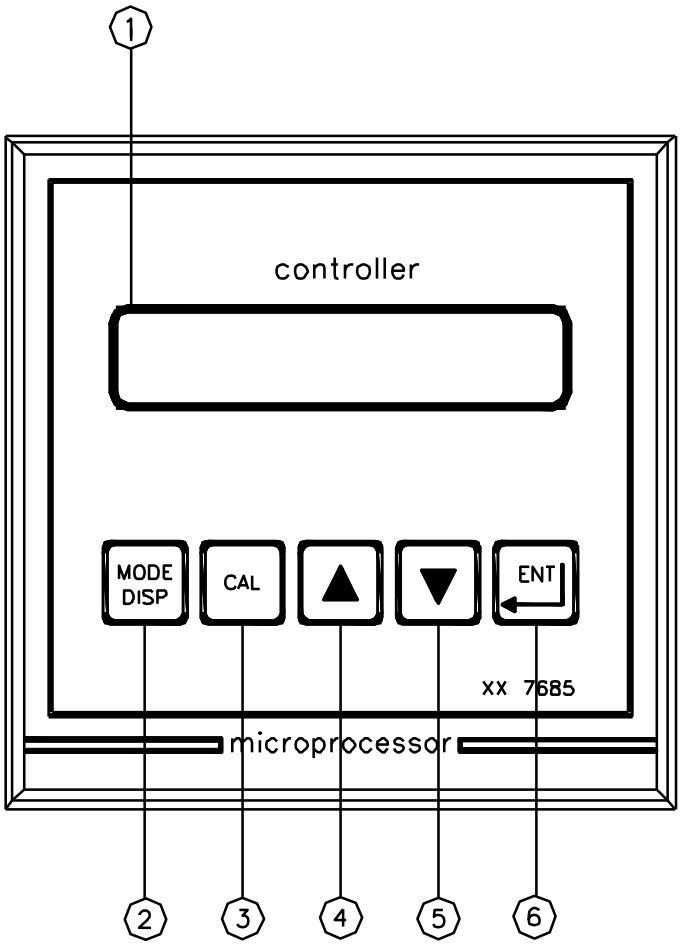
- prepare a standard KCl solution (see tables)
- immerse the cell and Temperature sensor into the solution and adjust the Sensitivity to the standard Conductivity value (see Sensitivity adjustment section)

## 8.3 STANDARD CONDUCTIVITY SOLUTIONS

| **KCL CONCENTRATION** | **1 N** | **0.1 N** | **0.01 N** |
|---|---|---|---|
| Temperature °C | | | |
| 0 | 65.410 | 7.150 | 0.776 |
| 5 | 74.140 | 8.220 | 0.896 |
| 10 | 83.190 | 9.330 | 1.020 |
| 15 | 92.520 | 10.480 | 1.147 |
| 16 | 94.410 | 10.720 | 1.173 |
| 17 | 96.310 | 10.950 | 1.199 |
| 18 | 98.220 | 11.190 | 1.225 |
| 19 | 100.140 | 11.430 | 1.251 |
| 20 | 102.070 | 11.670 | 1.278 |
| 21 | 104.000 | 11.910 | 1.305 |
| 22 | 105.940 | 12.150 | 1.332 |
| 23 | 107.890 | 12.390 | 1.359 |
| 24 | 109.840 | 12.640 | 1.386 |
| 25 | 111.800 | 12.880 | 1.413 |
| 26 | 113.770 | 13.130 | * |
| 27 | 115.740 | 13.370 | * |
| 28 | * | 13.620 | * |
| 29 | * | 13.870 | * |
| 30 | * | 14.120 | * |

- KCl normal solution:
  prepare by dissolving 74.59 grams. of Research Grade Potassium Chloride in 1 litre of distilled water.
- Values are in µSiemens （µmhos/cm.）.
- Low Conductivity standard solutions are not steady.
- The accuracy of the calibration depends on the purity of the water and the purity of the dissolved salt.

FRONT PANEL

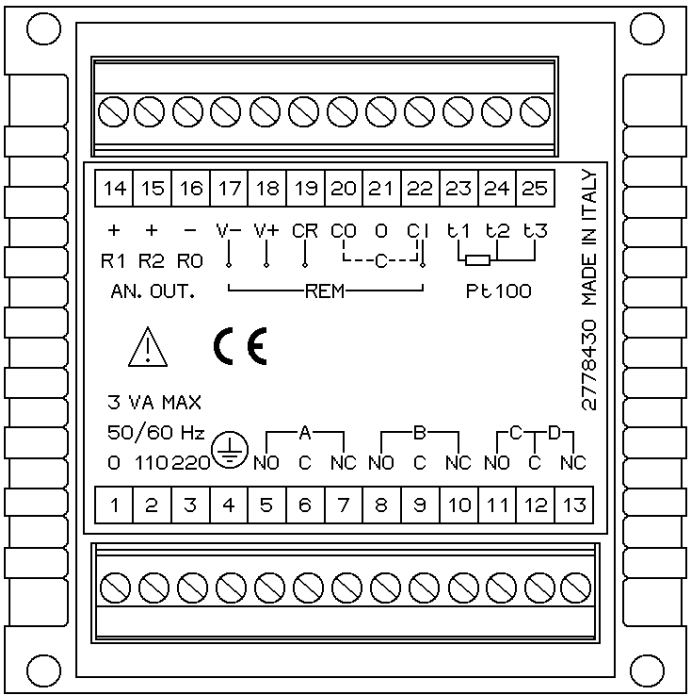



PANFRONT7685 – A4 – 1:1

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

Fig. 1

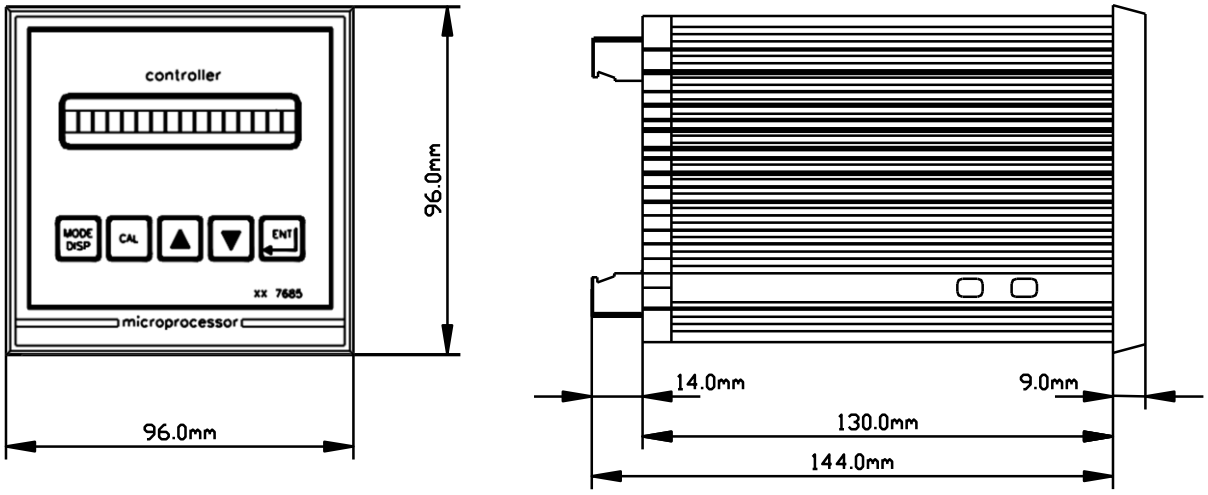
## REAR PANEL CONNECTIONS



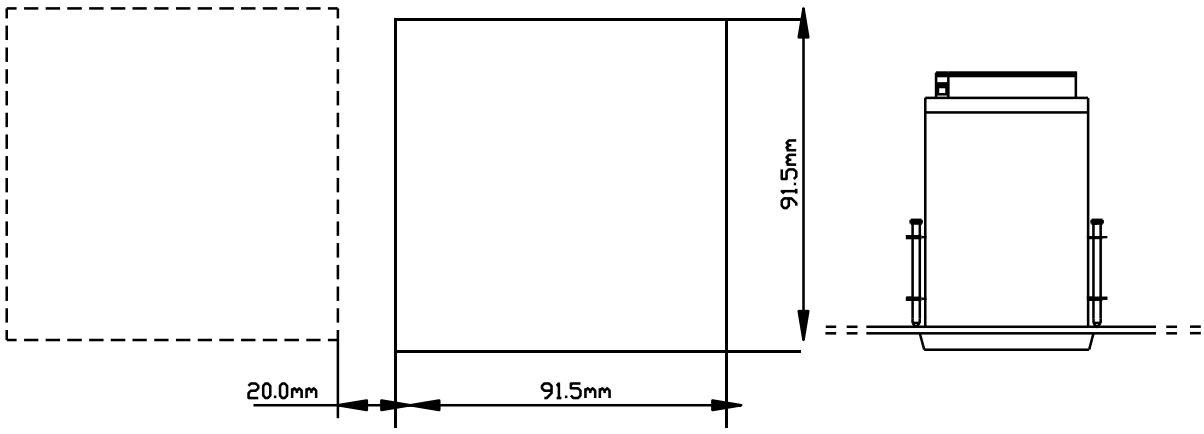

| | |
|---|---|
| 1. 2 | 110 V power supply |
| 1. 3 | 220 V power supply |
| 4. | Ground (power) |
| 5. 6 | A relay N.O. contacts |
| 6. 7 | A relay N.C. contacts |
| 8. 9 | B relay N.O. contacts |
| 9. 10 | B relay N.C. contacts |
| 11. 12 | C relay N.O. contacts (option) |
| 12. 13 | D relay N.C. contacts alarm |
| 14. | Recorder output channel 1 (+) |
| 15. | Recorder output channel 2 (+) (option) |
| 16. | Recorder option channels 1 and 2 (-) |
| 17.18.19.21.22 | In/Out microtransmitter |
| 20.22 | Input cell |
| 23. 24. 25 | Input temperature compensation |

Fig. 2

## DIMENSIONS




## DRILL PLAN



# 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. assumes no liability for consequential damages of any kind, and the buyer by accepting this equipment will assume all liability for the consequences of its use by the Customer, his employees, or others.

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## REPAIRS

1. In order to efficiently solve your problem, we suggest You to ship the instrument along with the Technical Support's Data Sheet (following page) and a Repair Order.

2. The estimate, if requested by the Customer, is free of charge when it is followed by the Customer confirmation for repair. As opposite, if the Customer shall not decide to have the instrument repaired, he will be charged to cover labour and other expenses needed.

3. All instruments that need to be repaired must be shipped pre-paid to 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
□ POWER SUPPLY
□ CALIBRATION
□ DISPLAY
□ ANALOG OUTPUT
□ SET POINT
□ RELAY CONTACTS
□ PERIODICAL MALFUNCTIONING

➢ *DESCRIPTION*

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TO MEASURE = TO KNOW

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NIEUWKOOP