



NIEUWKOOP

USER MANUAL



PH3030

PH AND ORP CONTROLLER



TO MEASURE  TO KNOW



pH range : 0/14.00 pH
 ORP range : -1000/+1000 mV
 Temperature range : -11/+110 °C
 Power supply : 110/220 Vac

Software : R2.1x

Cod. 28001764

Rev. C

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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 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.

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 FEATURES

*Dual input from:

- pH electrode (Glass or Antimony)
- ORP electrode

*Input from Pt100

*Alphanumeric back-lighted LCD

*pH/mV/Temperature readout

*Dual software filter

*Operating mode: automatic and manual

*Calibration parameters display

*Set-point and alarm conditions display

*Automatic or manual Temperature compensation

*Dual isolated output: 0/20 mA or 4/20 mA selectable
 pH/ORP/°C selectable

*Dual Set-points (pH/ORP selectable)

with selectable action:

- ON/OFF
- PFM proportional Pulse Frequency Modulation
- PWM proportional Pulse Width Modulation with hysteresis, delay and min/max programmable functions

*Min/max and Set-points timing alarm relay

*Relay for autoclean cycle

*Software:

- 3 access levels
- user friendly
- one input switching On/Off
- automatic buffer solutions recognition
- keyboard lock
- watch-dog

*EEPROM parameter storage

*Automatic overload protection and reset

*Extractable terminal blocks

*96X96 (1/4" DIN) housing



3 SPECIFICATIONS

3.1 FUNCTIONAL SPECIFICATIONS

Input

The instrument accepts input from a glass or Antimony pH electrode and from an ORP electrode. A third input is provided for 3-wire Pt100 Temperature sensors.

Software filter

The unit is provided with 2 programmable software filters, for small and large signal changing, to be inserted when the readout is not stable.

Input selection

pH or ORP input may be switched off.

Readout, relay actions, and alarm are not available for the deactivated input. The dual analog output will be selectable for Temperature and the active input.

Temperature compensation

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

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

Dual 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 0/14.00 pH or -1000/+1000 mV or -10/+110 °C

Control relays

The monitor is equipped with two SPDT control relays.

Each control relay may be programmed for set-point, high/low, hysteresis or delay time actuation. Functions On/Off - proportional Pulse Frequency Modulation - proportional Pulse Width Modulation are selectable.

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

Alarm relay

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

This relay may be used to warn of conditions that may indicate operational problems.

The relay will activate on either high/low value conditions (pH and ORP), or on failure of the control relays to maintain proper control.



Autoclean relay

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

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 mode

The instrument recognizes the buffer solutions for the automatic pH and the ORP calibration. Manual calibration may also be performed.

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 factory configuration has been designed in order to allow the prompt operation for the most popular applications.

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

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

91.404 24 VAC power supply.



3.2 TECHNICAL SPECIFICATIONS

The *Default* values have been selected in order to allow a prompt operation of the unit in the most popular applications.

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

OPERATING MODE	<i>Default</i>
Automatic/Manual	Auto
pH AND ORP	<i>Default</i>
* pH input: On/Off	On
* Glass pH/Antimony pH	Glass pH
pH Glass electrode:	
Slope: 59.16 mV/pH 25 °C	
mV at 7.00 pH: 0.0	
Zero: +/- 2 pH	0.00 pH
Sens: 80%/110%	100%
pH Antimony electrode:	
Slope: 50 mV/pH 25 °C	
mV at 7.00 pH: -325	
Zero: +/- 2 pH	0.00 pH
Sens: 70%/140%	100%
Measuring range: 0.00/14.00 pH	
Resolution: 0.01 pH	
* ORP input: On/Off	On
Zero: +/- 100 mV	0 mV
Sens: 80%/110%	100 %
Measuring range: -1000/+1000 mV	
Resolution: 1 mV	
Software filter 90% RT:	
* Large signal: 0.4/20.0 sec	2.0 sec
* Small signal: 0.4/20.0 sec	10.0 sec
TEMPERATURE	<i>Default</i>
Input: RTD Pt100	
Connection: 2/3 wires	
Measuring and compensation range: -10.0/110.0 °C	
Resolution: +/- 0.1 °C	
Zero adjustment: +/- 2 °C	0°C
Manual Temperature compensation: -10/110 °C	20°C



SET-POINT A	<i>Default</i>
* Input channel:pH/ORP	pH
* Selectable functions: ON/OFF PFM - Pulse frequency modulation PWM - Pulse width modulation	ON/OFF
* Function: ON/OFF Set-point (pH): 0.00/14.00 pH (Rx): -1000/1000 mV	0.00 pH 0 mV
Hysteresis (pH): 0.00/1.50 pH (Rx): 0/150 mV	0.00 pH 0 mV
Relay delay: 0.0/99.9 sec	0.0 sec
* Function: H/L (Max/Min) - pH - ORP	HI LO
* Function: PFM Set-point (pH): 0.00/14.00 pH (Rx): -1000/1000 mV	0.00 pH 0 mV
Proportional band (pH): 0.00/1.50 pH (Rx): 0/150 mV	0.15 pH 15 mV
Pulse frequency: 0/120 pulse/minute	100 i/min
Pulse width:	0.1 sec
* Function: H/L (Max/Min) - pH - ORP	HI LO
* Function: PWM Set-point (pH): 0.00/14.00 pH (Rx): -1000/1000 mV	0.00 pH 0 mV
Proportional band (pH): 0.00/1.50 pH (Rx): 0/150 mV	0.15 pH 15 mV
Pulse width: 0/99.9 Sec.	20 sec
Min. pulse width:	0.3 sec
* Function: H/L (Max/Min) - pH - ORP	HI LO
Relay contacts: SPDT 220V 5Amps Resistive load	



SET-POINT B	<i>Default</i>
* Input channel: ORP/pH	ORP
* Selectable functions: ON/OFF PFM - Pulse frequency modulation PWM - Pulse width modulation	ON/OFF
* Function: On/Off Set-point (Rx): -1000/1000 mV 0.00/14.00 pH Hysteresis (Rx): 0/150 mV 0.00/1.50 pH Relay delay: 0.0/99.9 sec	0 mV (pH): 0.00 pH 0 mV (pH): 0.00 pH 0.0 sec
* Function: H/L (Max/Min) - pH - ORP	LO HI
* Function: PFM Set-point (Rx): -1000/1000 mV 0.00/14.00 pH Proportional band (Rx): 0/150 mV 0.00/1.50 pH Pulse frequency: 0/120 pulse/minute Pulse width:	0 mV (pH): 0.00 pH 15 mV (pH): 0.15 pH 100 i/min 0.1 sec
* Function: H/L (Max/Min) - ORP - pH	LO HI
* Function: PWM Set-point (Rx): -1000/1000 mV 0.00/14.00 pH Proportional band (Rx): 0/150 mV 0.00/1.50 pH Pulse width: 0/99.9 Sec. Min. pulse width:	0 mV (pH): 0.00 pH 15 mV (pH): 0.15 pH 20 sec 0.3 sec
* Function: H/L (Max/Min) - ORP - pH	LO HI
Relay contacts: SPDT 220V 5Amps Resistive load	

ALARM (Relay C) (channels 1 and 2)	<i>Default</i>
Low pH: 0.00/14.00 pH	0.00 pH
High pH: 0.00/14.00 pH	14.00 pH
Delay: 0.0/99.9 sec	0.0 sec
Low Rx: -1000/1000 mV	-1000 mV
High Rx: -1000/1000 mV	1000 mV
Delay: 0.0/99.9 sec	0.0 sec
* Alarm on max. SA: On/Off	OFF
* Max. time SA: 0/60 minutes	60 min
* Alarm on max. SB: On/Off	OFF
* Max. time SB: 0/60 minutes	60 min
* Relay status: ACT/DEA	ACT



<p>AUTOCLEAN (Relay D)</p> <ul style="list-style-type: none"> * Action: Off/Manual Clean/Auto+Manual Clean Auto Clean (Manual): Repetition of cycle: 0.1/24.0h (only for Auto) * Cleaning time: 0.5/60.0" * Holding time: 0.1'/20.0' Relay contacts: SPST (N.O.) 	<p><i>Default</i></p> <p>Off</p> <p>24.0h</p> <p>15.0"</p> <p>3'</p>
<p>ANALOG OUTPUT Nr. 1</p> <ul style="list-style-type: none"> * Input: pH/mV/°C * Range: 0-20/4-20 mA * Point 1 (corresponding minimum mAmps): pH: 0.00/14.00 pH Rx: -1000/1000 mV °C: -10.0/110.0°C * Point 2 (corresponding to max. mAmps): pH: 0.00/14.00 pH Rx: -1000/1000 mV °C: -10.0/110.0°C Response time: 2.5 sec for 98% Isolation: 250 Vca R max: 600 Ohm 	<p><i>Default</i></p> <p>pH</p> <p>0-20 mA</p> <p>0.00 pH</p> <p>-1000 mV</p> <p>-10.0°C</p> <p>14.00 pH</p> <p>1000 mV</p> <p>110.0°C</p>
<p>ANALOG OUTPUT Nr. 2</p> <ul style="list-style-type: none"> * Input: pH/mV/°C * Range: 0-20/4-20 mA * Point 1 (corresponding to min. mAmps): pH: 0.00/14.00 pH Rx: -1000/1000 mV °C: -10.0/110.0°C * Point 2 (corresponding max. mAmps): pH: 0.00/14.00 pH Rx: -1000/1000 mV °C: -10.0/110.0°C Response time: 2.5 sec for 98% Isolation: 250 Vca R max: 600 Ohm 	<p><i>Default</i></p> <p>mV</p> <p>0-20 mA</p> <p>0.00 pH</p> <p>-1000mV</p> <p>-10.0°C</p> <p>14.00 pH</p> <p>1000 mV</p> <p>110.0°C</p>
<p>RS232 OUTPUT (option 091.701)</p> <p>Speed: 4800 bit/s Bit Nr.: 8 bit Stop bit: 1 bit Parity: None</p> <p>Sending data rate: 0.4 sec. Data format:</p> <p>±xx.xx pH ±xxxx mV ±xxx.x °C</p> <p> ...+... ...+... ...+.</p>	<p><i>Default</i></p>



CONFIGURATION (*)	<i>Default</i>
Free calibration (access code not required): Keyboard locked/unlocked: LCD contrast: (0/7)	Unlocked 4
Under access code number (0): pH input ORP input pH sensor type Large Software filter Small Software filter Input connected to the analog output N°1 output N°1 range Point 1 (for 0 or 4 mA) Point 2 (for 20 mA) Input connected to the analog output N°2 Analog output N°2 range Point 1 (for 0 or 4 mA) Point 2 (for 20 mA) Relay A channel Relay A action Relay A function Relay B channel Relay B action Relay B function Alarm on max. operating time of SA Max. operating time of SA Alarm on max. operating time of SB Max. operating time of SB Alarm relay status Autoclean function Cleaning time Holding time Access Number (0/999)	On On Glass 2.0 sec 10.0 sec pH Analog 0/20 mA 0.00pH 14.00pH ORP 0/20 mA -1000 mV 1000 mV pH On/Off HI ORP On/Off LO OFF 60 m OFF 60 m ACT Disabled 15.0 sec. 3.0 min. 0

GENERAL SPECIFICATIONS

Alphanumeric display: 1 line x 16 characters

Operating Temperature: 0/50 °C

Humidity: 95% without condensation

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

Isolation: 4,000 Volt between primary and secondary (IEC 348)

Power: 5 VA max.

Terminal block: extractable

Weight: 850 gr.

Housing: DIN 43700 96x96

Dimensions: 96 x 96 x 155 mm.



3.3 PHYSICAL SPECIFICATIONS

The controller enclosure is designed for surface or panel mounting.

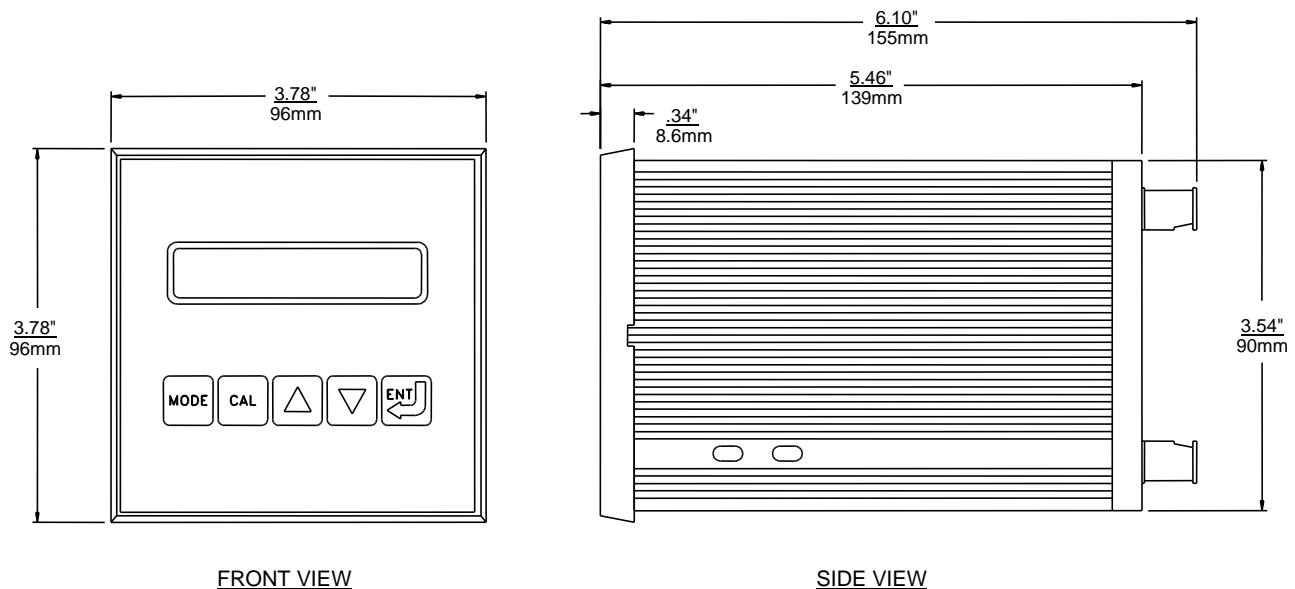
It consists of an anodized aluminium case built according to the standard DIN 43700, with an aluminium panel coated with scratch-proof and non-corrosive polycarbonate membrane.

A transparent 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.










4 SOFTWARE DESCRIPTION

4.1 KEYBOARD

KEY

FUNCTION

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



4.2 READOUT SEQUENCES

Applying the power to the instrument the display will show the selected input for approximately 3 seconds, then will show the main display (D0).

pH Glass/Rx

pH Antimony/Rx



Press  to visualize the following Display:

D0	xx.xxpH M xxxxmV	actual pH and ORP values
D1	xx.xxpH M ■ AH	actual pH value, Set-point status and function
D2	xxxxmV M □ BL	actual ORP value, Set-point status and function
D3	Z:x.xxpH S:xxx%	pH electrode parameters
D4	Z:x.xxmV S:xxx%	ORP electrode parameters
D5	TEMP.: xx.x°C	actual Temperature value
D6	SA xx.xxpH *O■ LO	Set-point A parameters
Or	SA xxxxmV *O■ LO	
D7	SB xx.xxpH *O■ HI	Set-point B parameters
Or	SB xxxxmV *O■ HI	



D8	AL x.xx/xx.xxpH	pH alarm parameters
D9	AL xxxx/ xxxxmV	ORP alarm parameters
D10	CLEANING OFF	cleaning function
D11	01 xx.xmA/ xx.xpH	analog output N°1/input values
Or	01 xx.xmA/ xxxxmV	
Or	01 xx.xmA/ xxx °C	
D12	02 xx.xmA/ xx.xpH	analog output N°2/input values
Or	02 xx.xmA/ xxxxmV	
Or	02 xx.xmA/ xxx °C	
D13	Configuration	configuration display
D14	PH7685.010 R2.1x	P/N and software release



(D0)

XX.XXpH M xxxxmV

pH/mV main Display

MESSAGE

">>>>"
 "<<<<"
 "values flashing"
 'M' flashing

MEANINGS

over range (pH>16 - mV>1100)
 under range (pH<-2 - mV<-1100)
 alarm condition
 manual operating mode selected



to activate the manual/automatic mode selection procedure



to go to

(D1)

XX.XXpH M ■ AH

pH values plus Set-point status and function

A (B): Set-point A (B)
 H (L): max. (min.)
 ■ : relay activated
 □ : relay deactivated
 ▣ : relay delayed
 M : manual operating mode (flashing)



to go back to (D0)



to go to

(D2)

xxxxmV M □ BL

ORP value plus Set-point status and function

B (A): Set-point B (A)
 L (H): min. (max.)
 ■ : relay activated
 □ : relay deactivated
 ▣ : relay delayed
 M : manual operating mode (flashing)



to go back to (D0)



MODE
DISP

to go to

(D3) Z: xxmV S:xxx% pH electrode parameters (Zero and Sens.)

x.xxpH: electrode asymmetry potential (Zero)
xxx%: electrode Sensitivity

CAL

to activate the pH Zero/Sensitivity calibration procedure

MODE
DISP

to go to

(D4) Z: xxmV S:xxx% ORP electrode parameters

xxmV: electrode asymmetry (Zero)
xxx%: electrode Sensitivity

CAL

to activate the ORP Zero/Sensitivity calibration procedure

MODE
DISP

to go to

(D5) TEMP.: xx.x °CM Temperature value

M: manual value

CAL

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



MODE
DISP

to go to

(D6)

SA xx.xxpH *O■LO

SA xxxxmV *O■LO

- SA : Set-point A parameters
- xx.xxpH (xxxmV): pH/mV Set-point value
- * : alarm on Set-point A function activated
- O : Set-point operating mode selected (O: ON/OFF W: PWM F: PFM)
- : actual Set-point A status (relay activated)
- LO : Set-point function selected (minimum)

CAL

to activate the programming sequences for Set-point value, hysteresis (or proportional band), delay time (or pulse frequency/length)

MODE
DISP

to go to

(D7)

SB xx.xxpH *O■HI

SB xxxxmV *O■HI

- SB : Set-point B parameters
- x.xxpH (xxxmV): pH/mV Set-point value
- * : alarm on Set-point B function activated
- O : Set-point operating mode selected (O: ON-OFF W: PWM F: PFM)
- : actual Set-point B status (relay activated) HI
- : Set-point function selected (maximum)

CAL

to activate the programming sequences for Set-point value, hysteresis (or proportional band), delay time (or pulse frequency/length)

MODE
DISP

to go to

(D8)

AL x.xx/xx.xxpH pH Alarm parameters

CAL

to activate the alarm values programming sequences



MODE
DISP

to go to

(D9)

AL -xxxx/ xxxxmV

ORP Alarm parameters

CAL

to activate the alarm values programming sequences

MODE
DISP

to go to

(D10)

CLEANING OFF

Cleaning function display

CLEANING OFF: Cleaning function disabled MANUAL
 CLEAN: Manual cleaning
 AUTO CLEAN: Automatic cleaning

CAL

to activate the selection of the cleaning function

MODE
DISP

to go to one of the Display A, B, C.

(D11 A)

01 xx.xmA/xx.xpH

analog output N°1/pH value

(D11 B)

01 xx.xmA/xxxxmV

analog output N°1/ORP value

(D11 C)

01 xx.xmA/xxx

analog output N°1/Temperature value 01:

selected analog output
 xx.xmA: actual analog output value
 xx.xpH (xxxxmV)(xxx°C): actual input measuring value



MODE
DISP

to go to one of the Display A, B, C.

(D12 A)

02 xx.xmA/xx.xpH

analog output N°2/pH value

(D12 B)

02 xx.xmA/xxxxmV

analog output N°2/ORP value

(D12 C)

02 xx.xmA/xxx °C

analog output N°2/Temperature value

02: analog output selected
xx.xmA : actual analog output value
xx.xpH (1000mV)(100°C): actual input measuring value

MODE
DISP

to go to

(D13)

Configuration

Configuration Display

CAL

to activate the keyboard lock/unlock and LCD Display contrast selection sequences; plus the visualization and modification of the instrument configuration parameters

MODE
DISP

to go to

(D14)

pH7685.010 R2.1x

Instrument code and software release

MODE
DISP

to go back to the main Display (D0)



4.3 CALIBRATION SEQUENCES

The following procedures will be available whenever the keyboard is unlocked.


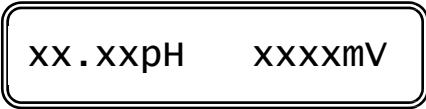



To unlock the keyboard follows the procedures mentioned in chapter 3.4.1.

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

4.3.1 Manual/Automatic mode


Normally the instrument works in automatic mode.

Follow this procedure to change the operating mode Automatic/Manual.

1.  (DO) to go to

2.  to access the operating mode selection
3.   to select one of the following Display




 to stop the procedure and to go to (DO)

4. 
 - to confirm the selected operating mode
 - to go back to (DO)

MESSAGE



the selection is memorized

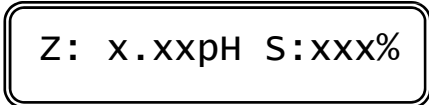



4.3.2 pH and ORP calibration


The following procedure are suitable for both pH and ORP and for this reason will be described simultaneously.

- pH calibration by automatic recognition of the buffer solutions type SZ959 (see B&C Electronics catalogue)
- ORP calibration by automatic recognition of the buffer solutions type SZ961 and SZ962 (see B&C Electronics catalogue)
- pH/ORP electrodes calibration by manual adjustment of buffer solutions values.

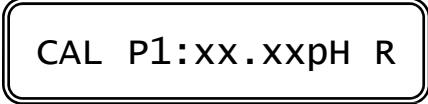
1.  to go to

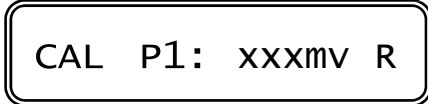
(D3) 

(D4) 

2.  to access the calibration sequences

First point adjustment (P1)





xx.xxpH (xxmV): actual measuring value

R (flashing): stability checking

The "R" message (ready) will flash until the measure stability is reached.

While flashing, keys   will not be active.

As soon as the "R" message stop flashing, the instrument will try to recognize the buffer solution in which the electrode is immersed.

If the buffer is not recognized, the "B" flashing message will appear on the Display.

If the buffer is recognized, the "B" message will stop flashing and the instrument will Display the value related to the measuring Temperature. Go to steps 4. and 5.

If the readout stability is not reached ("R" flashing), the operator may adjust manually the value in the following way:



The Display will show for 1 sec. the message:

'skip stability'



to go back to (D1) without memorization



to adjust the actual reading



- to confirm the changing
- to go to the second point calibration

NOTE 1:

pressing the key while keeping the electrode in the same buffer solution, the unit will perform the "one point" Calibration (only ZERO calibration).
The sensitivity value will not be updated.

NOTE 2:

By calibrating with the solutions SZ959 (SZ961 - SZ962) the operator may go to the last step 5. without any manual insertion of values.

Second point adjustment (P2)

CAL P2: xx.xx pH R

CAL P2: xxxmV R

Follow the same procedure as per 1st point calibration.



to go back to (D1) without memorization



to turn to factory calibration



to adjust the actual reading



- to confirm the changing
- to go back to (D1) Display

IMPORTANT NOTE: if the difference between 1st and 2nd point is less than 1 pH (or 100 mV), the unit will consider only the 1st point (ZERO adjustment).



MESSAGE

FUNCTION

"UPDATE"

The calibration is accepted.
The unit turns to (D3)/(D4).

Error messages

S > 110 %

slope > 110%

S > 140 %

slope > 140 %

S < 80 %

slope < 80 %

S < 70 %

slope < 70 %

Z>2.00pH

Z>100mV

asymmetry > 2.00 pH

asymmetry > 100 mV

The above messages will last for 5 minutes.



To acknowledge the error messages

"NO UPDATE"

The calibration is not accepted.
The unit turns to (D1).


4.3.3 Temperature calibration

1.  to goto

(D5)


TEMP.: XX.X °C







2.  to access the calibration procedure




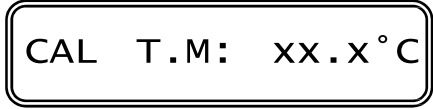
>>>>>: Temperature value over range


 to go back to (D5) without memorizing



 +   +  to turn to factory calibration

3.   to modify the actual reading

4.  to confirm and to go to the manual Temperature adjustment.



 to go back to (D5) without memorizing

5.   to modify the actual value

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

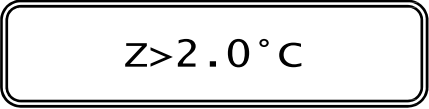
MESSAGE

FUNCTION



The calibration is accepted

Error messages



Zero > 2.0°C

The above message will last for 5 minutes

 to acknowledge the message



The calibration is not accepted.
The unit turns to (D5)



4.3.4 Set-point A/B calibration

The following procedure are suitable for both Set-point A and B.
For each Set-point it is possible:

- to insert the Set-point value
- to insert the hysteresis or Proportional band
- to insert the Delay time, the Pulse length, the Pulse frequency

1.  to go to

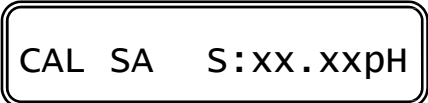

(D6)  

or


(D7)  



2.  to access the programming sequences

Set-point adjustment

SA: Set-point A adjustment
xx.xxpH (xxxmV): actual Set-point value

 to stop the procedure and to go back to (D6)/(D7)

3.   to insert the Set-point value

4.  to confirm and to go to the next step



On/Off function

CAL SA I : x.xxpH

CAL SA I : xx mv

x.xxpH (xxmV): actual hysteresis value



to stop the procedure and to go back to (D6)/(D7)



to insert the hysteresis value



to confirm and to go to the delay time selection

CAL SA D: x.xS

x.x s: actual delay time value



to stop the procedure and to go back to (D6)/(D7)



to insert the delay time value



to confirm and to go back to (D6)/(D7)

PFM proportional function

CAL SA BP:x.xxpH

CAL SA BP:xxmV

x.xxpH(xxmV): actual proportional band value



to stop the procedure and to go back to (D6)/(D7)



to select the proportional band value



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


CAL SA F:xxx i/s

xxx i/s: actual pulse frequency value



to stop the procedure and to go back to (D6)/(D7)

3.   to select the frequency value (0/120 pulse/minute)

4.  to confirm and to go back to (D6)/(D7)

PWM proportional function



CAL SA BP:x.xxpH


CAL SA BP: xx mv

x.xpH(xxmV): actual proportional band value



to stop the procedure and to go back to (D6)/(D7)

1.   to select the proportional band value

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

CAL SA D: x.xs


x.x s: actual pulse length value



to stop the procedure and to go back to (D6)/(D7)



3.   to select the pulse length value (0/99.9 seconds)

4.  to confirm and to go back to (D6)/(D7)

MESSAGE

FUNCTION

"UPDATE"


all the data has been memorized

4.3.5 Alarm calibration

Both alarms (for ph and for ORP) act on the same relay C. The


following operations are possible:

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

1.  to go to Display (D8) or (D9)

AL x.xx/xx.xxpH

AL -xxxx/ xxxxmV

2.  to access the calibration sequences



CAL AL L: x.xxpH


CAL AL L: xxxpH

AL: alarm parameters selection
x.xxpH (xxxmV): actual minimum alarm value

 to stop the procedure and to go back to (D8)/(D9)




3.   to select the value

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


CAL AL H: x.xxpH

CAL AL H: xxxmV

x.xxpH (xxxmV): actual maximum alarm value


 to stop the procedure and to go back to (D8)/(D9)

5.   to select the value.


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

CAL AL D: x.xs

x.xs: actual delay time (sec.)

 to stop the procedure and to go back to (D8)/(D9)

7.   to insert the value

8.  to confirm and to go back to (D8)/(D9)

MESSAGE

FUNCTION

“ UPDATE “

the new data have been memorized




4.3.6 Cleaning function

1.  to go to

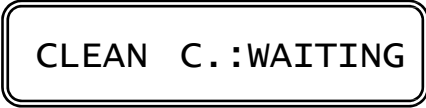
(D10)  (MANUAL CLEAN/AUTO CLEAN)

CLEANING OFF: Cleaning function disabled
 MANUAL CLEAN: Manual cleaning function
 AUTO CLEAN: Automatic cleaning function


2.  to access the calibration procedure

MANUAL CLEAN operation

The following display will appear:

 (START)

WAITING: the unit is waiting for the cleaning cycle

 to go back to (D10) without memorizing

- 3A.   select START or WAITING 4A.

 to confirm the selection

- by selecting START the unit go to (D0). The cleaning cycle will start

- by selecting WAITING the unit go back to (D10)



AUTO CLEAN operation

The display will show the waiting time to the next cycle.

NEXT CYCLE: xx.xh

xx.xh: waiting time (hour) to next cycle.



to go back to (D10) without memorizing



+



+



to reset the waiting time to next cycle

3B.



to visualize the waiting status to next cycle

CLEAN C.: WAITING

(START)

WAITING: the unit is waiting for the next cleaning cycle



to go back to (D10) without memorizing

4B.



select START or WAITING

5B.



to confirm the selected parameter

- by selecting START the unit go to (D0). A manual cleaning cycle will start

- by selecting WAITING the unit go to the repetition time of the cleaning cycle



REPETITION: xx.xh


xx.xh: repetition time (hour) of the cleaning cycle



to go back to (D10) without memorizing



6B.   select the repetition time

7B.  to confirm the selected time and turn to (D10)

IMPORTANT NOTE:




during the calibration procedure the microprocessor will turn the unit to the main Display if no keys have been pressed within 5 minutes.



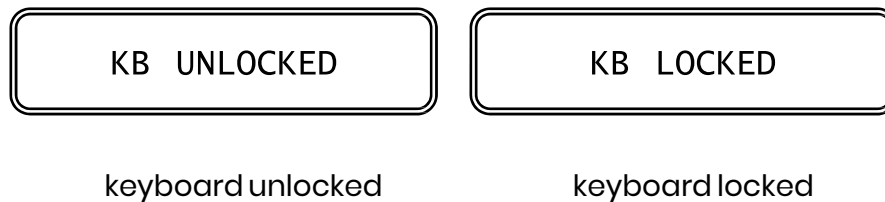
4.4 CONFIGURATION





The following operations are possible:

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

1.  to go to Display (D12)
 (D12) 
2.  to access the configuration sequences

4.4.1 Keyboard locked/unlocked



-  to go to (D12)
3.   to select one of the two options (locked/unlocked)
4.  to confirm and to go to the next step

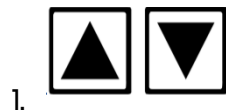


4.4.2 LCD display contrast

LCD contrast: x



to go to (D12)



to select the contrast from 0 to 7



to confirm and to go to the access number insertion

4.4.3 Access number

Access Nr.: xxx

Access number request



to go to (D12)



to insert the access number (by keeping the key pressed, the number will scroll with 3 speed level)



to confirm and to proceed with the configuration

IMPORTANT NOTE:

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

'Cal Inhibition'

Configuration inhibited



4.4.4 pH input enabled/disabled

Input pH: ON

ON/OFF: pH input enabled/disabled

By selecting OFF, the Set-point, the alarm and the analog output will be available only for the ORP input.
The pH readout will be not displayed.

Active keys:  -   - 

4.4.5 ORP input enabled/disabled

Input Redox: ON

ON/OFF: ORP input enabled/disabled

By selecting OFF, the Set-point, the alarm and the analog output will be available only for the pH input.
The ORP readout will be not displayed.

Active keys:  -   - 

4.4.6 pH electrode type

pH Input: Glass

Glass: glass electrode

Antim.: antimony electrode

 to go to (D12)



4.4.7 Software filter


Large s RT: x.xs

x.xs: response time of the Large software filter (sec.)

Active keys:  -   - 

Small s RT: xx.xs

xx.xs: response time of the Small software filter (sec.)

Active keys:  -   - 

CAL OUT1: pH Input related to analog Output n°1 (mV, °C)

pH: input selected for analog output N°1

Active keys:  -   - 

4.4.8 Analog output n°1 range

CAL OUT1: 0/20mA

CAL OUT1: 4/20mA

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

Active keys:  -   - 

CAL P1: x.xx pH




P1: begin of range
x.xx pH (mV): measuring value related to 0/4 mA

Active keys:  -   - 



CAL P2:xx.xx pH

P2: end of range
xx.xx pH (mV): measuring value related to 20 mA

Active keys:  -   - 





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

4.4.9 Input related to analog output n°2

CAL OUT2: pH

(mV, °C)

pH: input selected for analog output N°2

Active keys:  -   - 

4.4.10 Analog output n°2 range

CAL OUT2: 0/20mA

CAL OUT2: 4/20mA

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

Active keys:  -   - 



CAL P1: x.xx pH

P1: begin of range

x.xx pH (mV): measuring value related to 0/4 mA

Active keys:  -   - 

CAL P2: xx.xx pH

P2: end of range

xx.xx pH (mV): measuring value related to 20 mA

Active keys:  -   - 

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


4.4.11 Input related to set-point A

SET A: pH

SET A: mV

pH: Set-point A related to pH





mV: Set-point B related to mV

Active keys:  -   - 

4.4.12 Set-point A operating mode

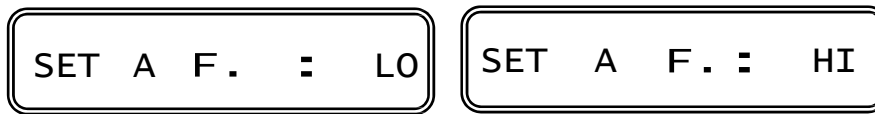
SET ACT: ON/OFF (PWM/PFM)

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

Active keys:  -   - 



4.4.13 Set-point A function







LO: Minimum (relay activated for meas. below Set-point) HI: Maximum (relay activated for meas. above Set-point)

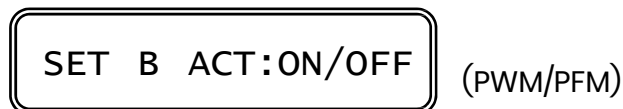
Active keys:  -   - 

4.4.14 Input related to set-point B







Active keys:  -   - 

4.4.15 Set-point B operating mode







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

Active keys:  -   - 

4.4.16 Set-point B function




LO: Minimum (relay activated for meas. below Set-point)
HI: Maximum (relay activated for meas. above Set-point)

Active keys:  -   - 



4.4.17 Alarm on set-point A







Active keys:  -   - 

1. Two possible alternatives A or B
 - 1A. "OFF" alarm function not activated
 - 1B. "ON" alarm function activated
- 2B. to insert the activation time for Set-point A



xx m: activation time (minutes)

Active keys:  -   - 

4.4.18 Alarm on set-point B







Active keys:  -   - 

1. Two possible alternatives A or B.
 - 1A. "OFF" alarm function not activated
 - 1B. "ON" alarm function activated
- 2B. to insert the activation time for Set-point B



xx m: activation time (minutes)

Active keys:  -   - 



4.4.19 Alarm relay contacts





Two possible alternatives:



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

NOTE

by selecting DEA it is necessary to modify the internal jumper on the P.C. board.

Active keys:  -   - 

4.4.20 Autoclean







DISABLED: cleaning function disabled
MANUAL: manual cleaning cycle
AUTO: automatic cleaning cycle

Active keys:  -   - 

4.4.21 Cleaning time



xx.x": cleaning time (sec.) (Relay D ON)

Active keys:  -   - 



4.4.22 Holding time

HOLDING T: x . x

x.x': holding time (minutes)

Active keys:  -   - 

4.4.23 New access number

Change A Nr.:NO Change A Nr.:yes





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

Active keys:  -   - 

Two possible alternatives A or B.




- A. "NO" The unit will go back to the (D12) Display; the operator may parameter setting before leaving the Configuration sequences now protected by access number.
- B. "YES" The unit is now ready to the new access number selection

New Nr.: xxx

Active keys:  -   - 

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

Confirm Nr.:xxx

Active keys:  -   - 



The double insertion of the new code assures the right code memorization

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

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



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



5 INSTALLATION

5.1 PHYSICAL INSTALLATION

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.

5.2 ELECTRICAL INSTALLATION

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

The electrical installation consists of: Connecting the power

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



Connecting pH and ORP electrodes

- 21 terminal connect the shield of the pH coax cable (Reference)
- 22 terminal connect the central of the pH coax cable (Glass)

- 19 terminal connect the shield of the ORP coax cable (Reference)
- 20 terminal connect the central of the ORP coax cable (Platinum)

- keep the cable away from power wires on the overall length

Connecting pumps, valves, alarms

The output referred to Set-point 1 and Set-point 2 consist of two independent SPDT relays corresponding to Regulator A and Regulator B.

The output referred to alarm consists of SPDT relay corresponding to Alarm C

Control relay "A"

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

Control relay "B"

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

Alarm relay "C"

12 terminal marked C : common contact
11 terminal marked NO : normal open contact

Connecting the auto clean

Autoclean relay "D"

11 terminal marked C : common contact
12 terminal marked NO : normal open contact



Connecting a recorder

A dual Current output for a remote recorder or P.I.D. regulators is available on terminals 14-15-16.

- 14 terminal connect to (+) of the 1st recorder
- 15 terminal connect to (+) of the 2nd recorder
- 16 terminal connect to (-) of the 1st and 2nd recorder

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

Connecting the RTD

The Temperature sensor has to be installed in the same solution being measured, close to the pH sensor in the pipe-line or in the tank.

To operate the automatic Temperature compensation, connect the Pt100 as shown in the figure 2.

3-wire connection

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

2-wire connection

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

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






6 OPERATING THE SYSTEM

The installed unit allows the following operations:

- pH and/or ORP, Temperature measuring
- the above measuring and pH/ORP control
- the above measuring/control and 2 parameters recording

The factory set-up allows a prompt operation of the unit in the most popular applications.

Measuring quick start

1. Connect the sensors
2. Power the unit. The display go to (D0)
3. Press    to go to Manual operation.
In alternative go to step 4.
4. The unit is configured for Glass pH electrode.
Go to the Configuration menu to select Antimony pH if necessary.
From (D0) press 9 times MODE to start the Configuration sequences.
5. Calibrate the pH electrode with buffer solutions
Calibrate the ORP electrode with buffer solutions if necessary.

Measuring and ON/OFF control quick start

6. Control relays A/B are configured as ON/OFF, Max. for pH, Min. for ORP. Go to configuration menu to change the set-up.
7. The alarm on the operating time of the A/B relay is deactivated. Go to configuration menu to activate this alarm if necessary.
8. Select the set-point value, the hysteresis, the delay of control relays.
From (D0) press 5 times MODE to start the calibration sequences of the set-point A.
Press 6 times to start the calibration of the set-point B.
9. Select Min/Max alarm values and the delay if necessary
From (D0) press 7 times MODE to start the calibration sequences.

NOTE: if the PFM/PWM action has been selected, at step 8. the operator should select the Band width and the Pulse Frequency/Width instead of hysteresis and delay.



Measuring/control and recording quick start

1. The analog output N°1 is configured as pH, 0/20 mA, 0/14 pH.
Go to configuration menu to select 4/20 mA, x/xx pH, mV or °C if necessary
2. The analog output N°2 is configured as ORP, 0/20 mA, -1000/1000 mV.
Go to configuration menu to select 4/20 mA, xxxx/xxxx mV, pH or °C if necessary

6.1 MANUAL OPERATION

When the instrument is programmed for the manual operation the flashing "M" will appear on the Display.

Analog outputs and alarm relay will remain activated.



while pressing the key, A relay will be activated.



while pressing the key, B relay will be activated.

6.2 MANUAL TEMPERATURE COMPENSATION

The pH manual compensation is in alternative to the automatic compensation.

Do not install the Pt100 and select the manual Temperature value.



7 CALIBRATION

To turn to the Factory calibration press    keys during the calibration procedure.

Before using the electrode and/or the pH calibration, check that the glass membrane has been stored wet.

If the protective boot results empty and the electrode is dry, immerse the electrode in a buffer solution or tap water (do not use distilled water) for 3 hours before operating. See general instruction given by the electrode manufacturer.

IMPORTANT NOTES

- 1) If the difference between point 1° and 2° is minor than 1 pH (or 100 mV), the unit will not update the sensitivity without sending error messages. The calibration will change only the zero.

For this reason we suggest to check the measuring values of the buffer solutions after the calibration.

If values are not corresponding, check the following:

- the buffer solution is polluted
- the electrode is damaged
- the unit has calibrated only the zero

- 2) Error messages warn the operator to replace the electrode.

- 3) The unit has memorized pH values of the buffer solutions mod. SZ959 (SZ961 SZ962 for ORP). The display will show those values to be entered without manual insertion.



pH calibration

The controller is supplied with a laboratory calibration corresponding to a standard pH electrode with the "zero point" at pH=7 and the "slope" 58,16 mV/pH at 20 °C.

Immerse the electrode in the buffer solution pH=7 and calibrate the zero following the point 1° calibration.

Immerse the electrode in the buffer solution pH=4 or pH=9 and calibrate the sensitivity following the point 2 ° calibration.

Temperature compensated operations need special procedure when calibrating the meter:

- check the Temperature value of the buffer solution;
- before calibrating, immerse the electrode and the Pt100 in the buffer solution and adjust the value after the Temperature sensor has reached the thermal equilibrium;
- if the buffer solution SZ959 is not used, the operator should insert the values corresponding to the Temperature of the solution.

ORP calibration

The ORP controller is supplied with a laboratory calibration by means of Vdc generator. Many applications do not require the chemical calibration by buffer solutions.

In order to calibrate the ORP electrode, follow the calibration instruction by using the buffer solutions mod. SZ 961 (mV 220) ed SZ 962 (mV 420), automatically recognized by the unit.

Temperature calibration

Immerse the Pt 100 in the sample at known Temperature value and check the corresponding readout.

Calibrate the value by following the first 4 steps of the procedure described in the chapter 4.3.3.



8 PREVENTIVE MAINTENANCE

Controller

Quality components are used to give the controller a high reliability.
The frequency of such maintenance depends of each particular application.

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

Check that all the connections are free from moisture and contamination.

Sensor

The state of the electrode's surface is critical for the normal operation of the system and should be inspected more frequently when using alkaline liquids, oil and grease containing water, and bio-applications.

Install the autoclean system and start the cleaning cycle of sensors by means of the relay D.

Suggested methods for cleaning the electrode include chemical cleaning (except hydrofluoric acid), detergent washing and air blast of high pressure air to remove contaminants from the sensor automatically.



DIGITAL CONTROLLER

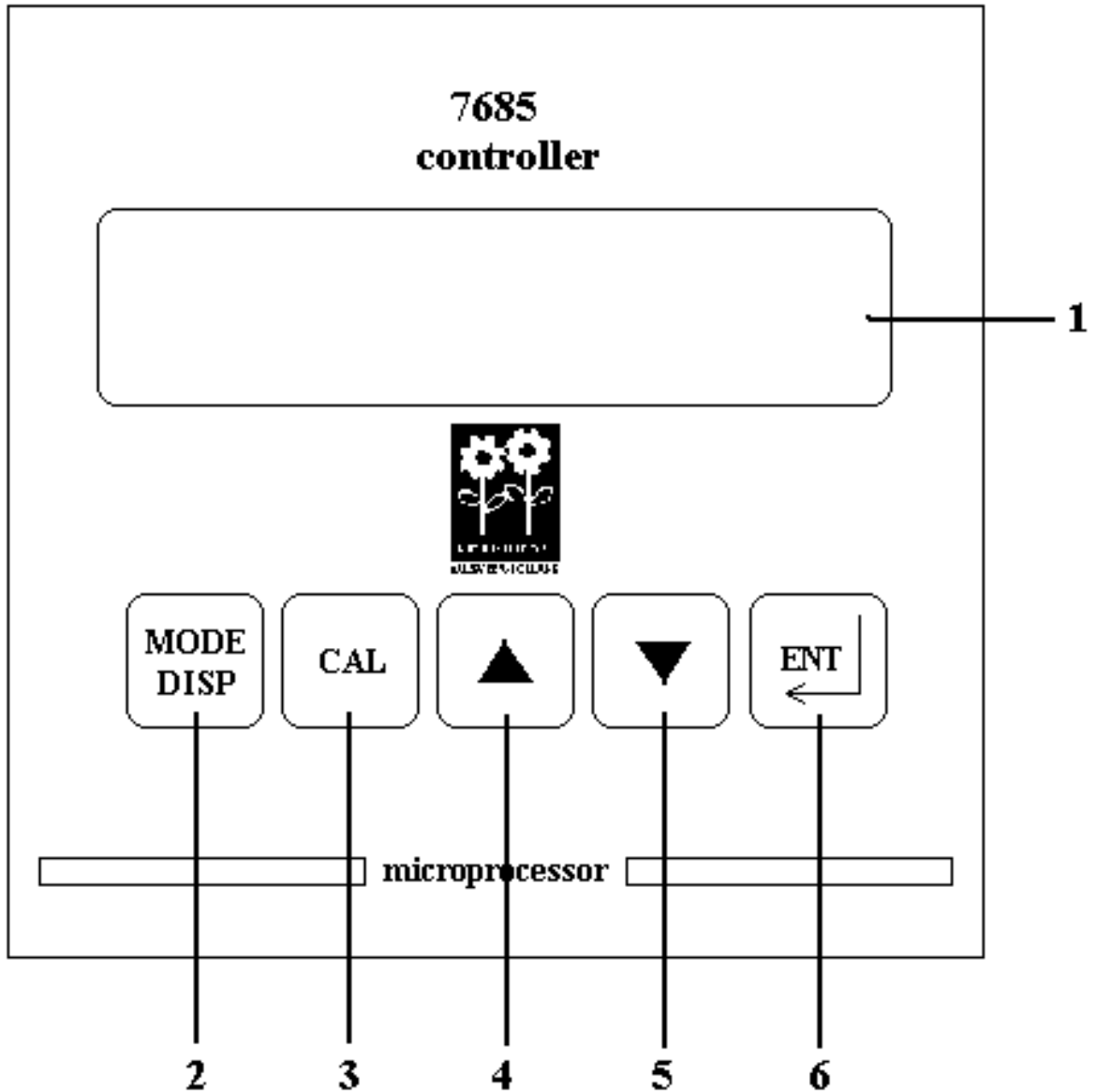


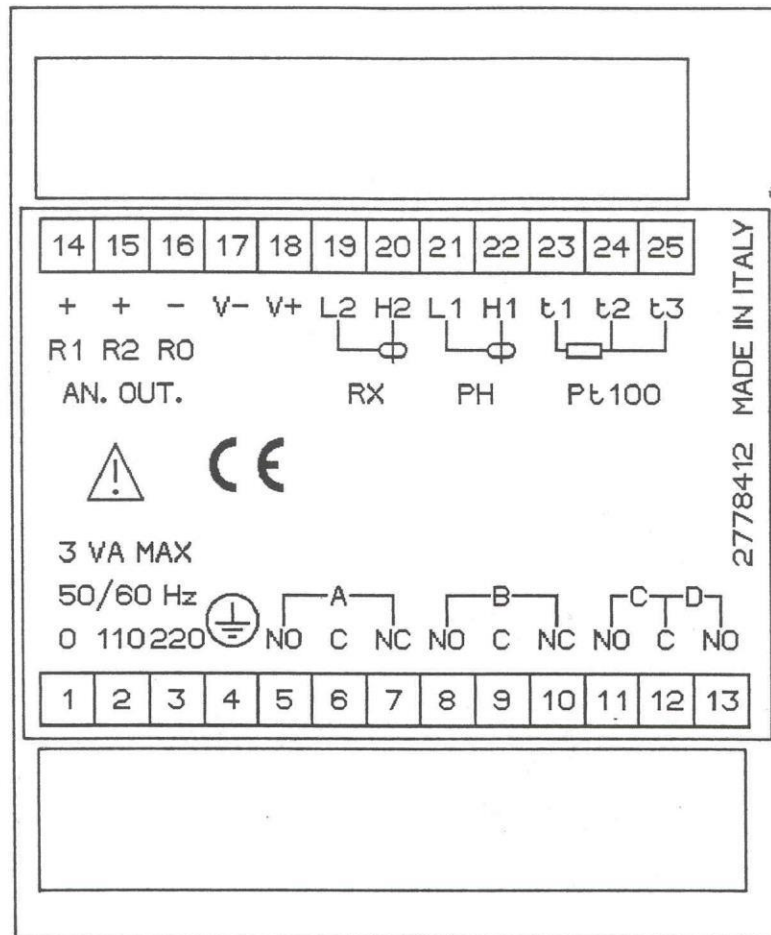
FIG.1

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



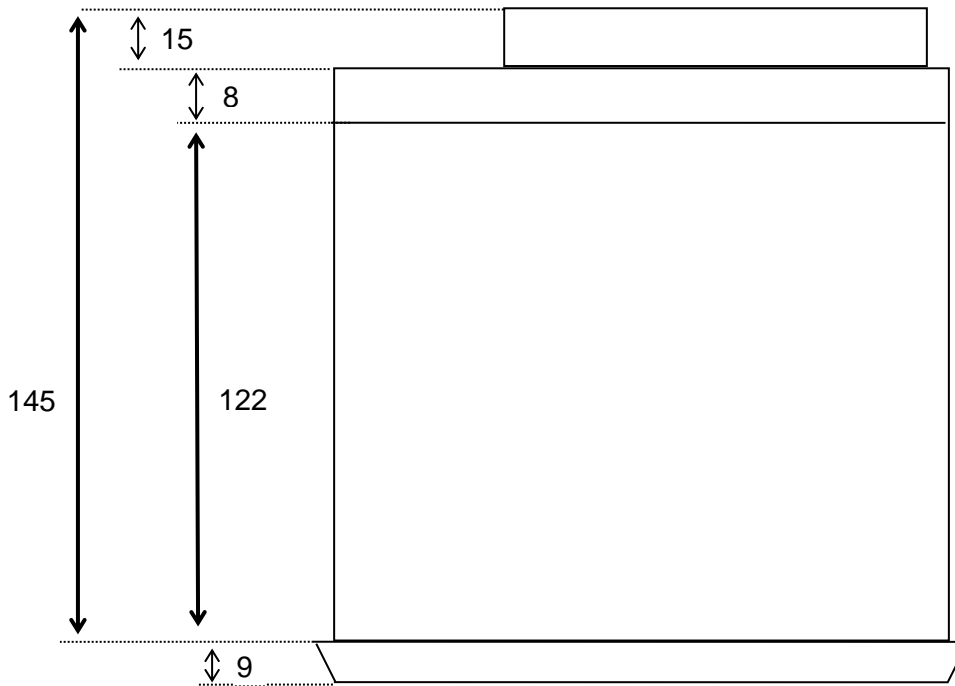
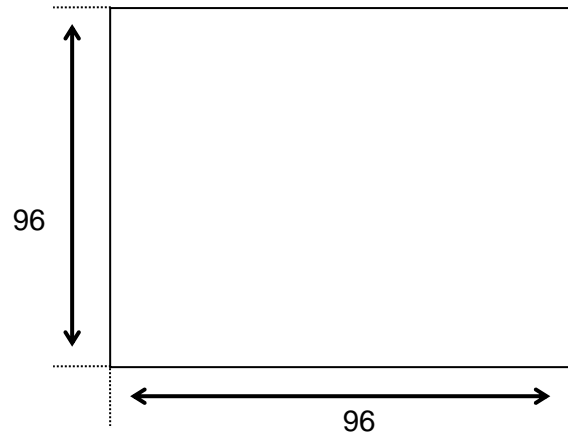
PH 7685.010

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 (alarm)
- 12. 13. D Relay N.O. contacts (cleaning)
- 14. Recorder output channel 1 (+)
- 15. Recorder output channel 2 (+)
- 16. Recorder output channels 1 and 2 (-)
- 19. ORP reference electrode
- 20. ORP Platinum electrode
- 21. pH reference electrode
- 22. pH glass electrode
- 23. 24. 25. Temperature sensor input

FIG. 2



DRILL PLAN

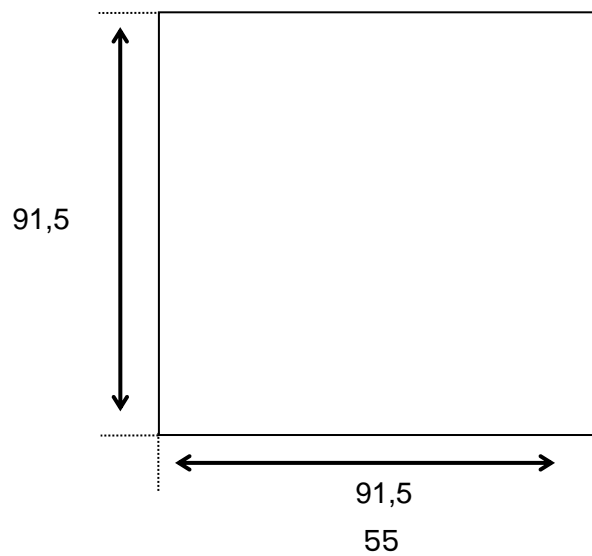


FIG. 3



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 labor and other expenses needed.
- 3) All instruments that need to be repaired must be shipped pre-paid to Nieuwkoop B.V./B&C. 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

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TO MEASURE  TO KNOW

Nieuwkoop BV

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NIEUWKOOP