NIEUWKOOP

METEN.NL

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
Valid from S/N 60262

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

1.4 SAFETY WARNINGS

It is important to underline the fact that electronic instruments are subject to accidents. For this, it is important to take all necessary precautions to avoid damages caused by malfunctions.
All types of operations must be performed by authorized and trained staff.
The use of this controller must respect the parameters described in chapter “Technical specification”, so to avoid potential damages and a reduction of its operating life.

2 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 and ORP electrode. A third input is provided for 3 wires 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 of 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	*Default*
Automatic/Manual	Auto

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

SET-POINT B			*Default*
*	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	0 mV (pH): 0.00 pH
	Hysteresis	(Rx): 0/150 mV 0.00/1.50 pH	0 mV (pH): 0.00 pH
	Relay delay:	0.0/99.9 sec	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	0 mV (pH): 0.00 pH
	Proportional band	(Rx): 0/150 mV (pH): 0.00/1.50 pH	15 mV 0.15 pH
	Pulse frequency:	0/120 pulse/minute	100 i/min
	Pulse width:		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	0 mV (pH): 0.00 pH
	Proportional band	(Rx): 0/150 mV (pH): 0.00/1.50 pH	15 mV 0.15 pH
	Pulse width:	0/99.9 Sec.	20 sec
	Min. pulse width:		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)		*Default*
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

AUTOCLEAN (Relay D)	*Default*
* Action: Off/Manual Clean/Auto+Manual Clean	Off
Auto Clean (Manual):	
Repetition of cycle: 0.1/24.0h (only for Auto)	24.0h
* Cleaning time: 0.5/60.0"	15.0"
* Holding time: 0.1'/20.0'	3'
Relay contacts: SPST (N.O.)	

ANALOG OUTPUT Nr. 1	*Default*
* Input: pH/mV/°C	pH
* Range: 0-20/4-20 mA	0-20 mA
* Point 1 (corresponding minimum mAmps):	
pH: 0.00/14.00 pH	0.00 pH
Rx: -1000/1000 mV	-1000 mV
°C: -10.0/110.0°C	-10.0°C
* Point 2 (corresponding to max. mAmps): pH:	
0.00/14.00 pH	14.00 pH
Rx: -1000/1000 mV	1000 mV
°C: -10.0/110.0°C	110.0°C
Response time: 2.5 sec for 98%	
Isolation: 250 Vca R	
max: 600 Ohm	

ANALOG OUTPUT Nr. 2	*Default*
* Input: pH/mV/°C	mV
* Range: 0-20/4-20 mA	0-20 mA
* Point 1 (corresponding to min. mAmps):	
pH: 0.00/14.00 pH	0.00 pH
Rx: -1000/1000 mV	-1000mV
°C: -10.0/110.0°C	-10.0°C
* Point 2 (corresponding max. mAmps): pH:	
0.00/14.00 pH	14.00 pH
Rx: -1000/1000 mV	1000 mV
°C: -10.0/110.0°C	110.0°C
Response time: 2.5 sec for 98%	
Isolation: 250 Vca R	
max: 600 Ohm	

RS232 OUTPUT (option 091.701)	*Default*
Speed: 4800 bit/s Bit Nr.: 8 bit Stop bit: 1 bit Parity: None	
Sending data rate: 0.4 sec. Data format:	
±xx.xx pH ±xxxx mV ±xxx.x °C |....+....|....+....|....+.....|..	

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

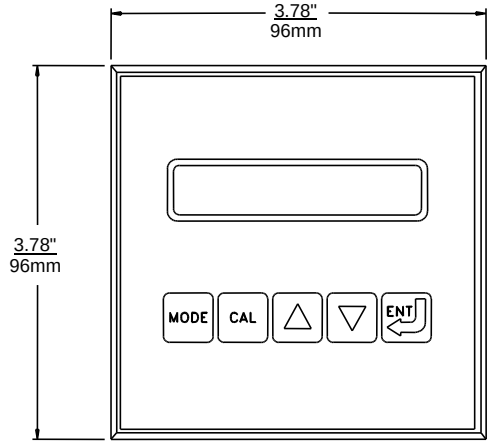
It consists of an anodized aluminium case built according to the standard DIN 43700, with an aluminium panel coated with scratch-proof and non-corrosive polycarbonate membrane.

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

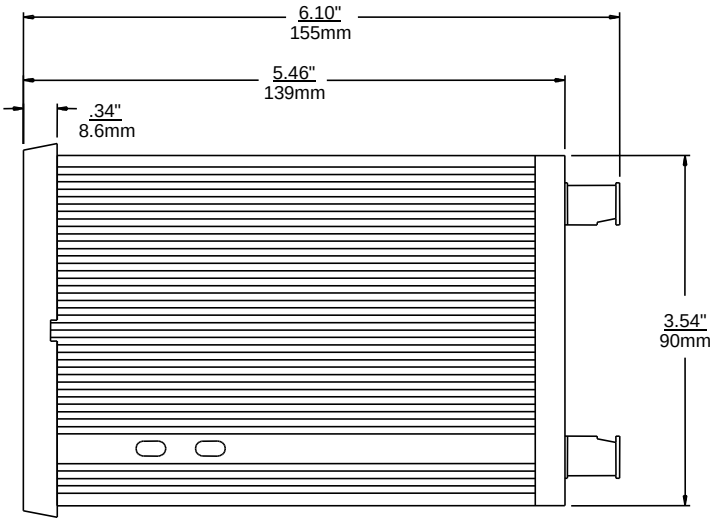
Signal and power cable connections are made by using two special extractable terminal blocks placed in the back of the instrument.

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.



FRONT VIEW



SIDE VIEW

4 SOFTWARE DESCRIPTION

4.1 KEYBOARD

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

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 MODE DISP 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°CM	actual Temperature value
D6 Or	SA xx.xxpH *O■ LO SA xxxxmV *O■ LO	Set-point A parameters
D7 Or	SB xx.xxpH *O■ HI SB xxxmV *O■ HI	Set-point B parameters

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

(D0) `XX.XXpH M xxxxmV` pH/mV main Display

MESSAGE	MEANINGS
" >>>> "	over range (pH>16 - mV>1100)
" <<<< "	under range (pH<-2 - mV<-1100)
"values flashing"	alarm condition
'M' flashing	manual operating mode selected

CAL to activate the manual/automatic mode selection procedure

MODE DISP 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)

ENT to go back to (D0)

MODE DISP 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)

ENT 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

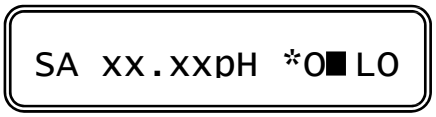
(D5) `TEMP.:  xx.x°CM` Temperature value

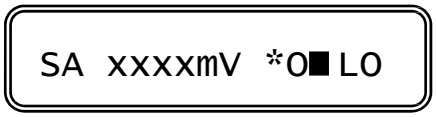
M: manual value

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

MODE DISP to go to

(D6)





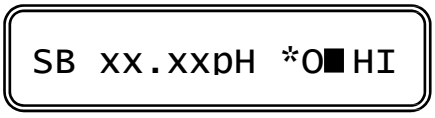
SA : Set-point A parameters
xx.xxpH (xxxxmV): pH/mV Set-point value
* : alarm on Set-point A function activated
O : Set-point operating mode selected (O: ON/OFF W: PWM F: PFM)

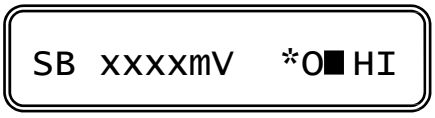
■ : actual Set-point A status (relay activated)
LO : Set-point function selected (minimum)

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)



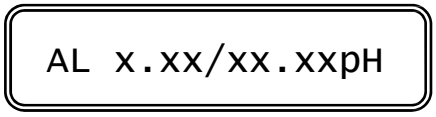


SB : Set-point B parameters
x.xxpH (xxxmV): pH/mV Set-point value
* : alarm on Set-point B function activated
O : Set-point operating mode selected (O:ON-OFF W:PWM F:PFM)
■ : actual Set-point B status (relay activated) HI
: Set-point function selected (maximum)

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)



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)

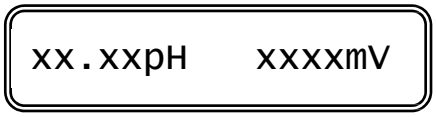
4.3 CALIBRATION SEQUENCES

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

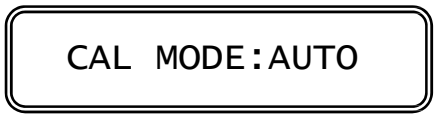
Normally the instrument works in automatic mode.
Follow this procedure to change the operating mode Automatic/Manual.

1. MODE DISP to go to (D0)



2. CAL to access the operating mode selection

3. ▲ ▼ to select one of the following Display



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

4. ENT
   - 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. MODE DISP to go to

(D3) `Z: x.xxpH S:xxx%`

(D4) `Z: xxmV :xxx%`

2. CAL to access the calibration sequences

First point adjustment (P1)

`CAL P1:xx.xxpH R` `CAL P1: xxxmv R`

xx.xxpH (xxxmV): 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:

3. ENT The Display will show for 1 sec. the message:

‘Skip Stability’

MODE DISP to go back to (D1) without memorization

4. ▲ ▼ to adjust the actual reading

5. ENT
- to confirm the changing
- to go to the second point calibration

NOTE 1:
pressing the ENT 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.xxpH R

CAL P2: xxxmv R

Follow the same procedure as per 1st point calibration.

MODE DISP to go back to (D1) without memorization

MODE DISP ▲ ▼ ENT to turn to factory calibration

6. ▲ ▼ to adjust the actual reading

7. ENT
- 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	asymmetry > 2.00 pH
Z>100mV	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 go to

TEMP.: xx.x°C

(D5)

2. CAL to access the calibration procedure

CAL T xx.x°C

>>>>>>: Temperature value over range

MODE DISP to go back to (D5) without memorizing

MODE DISP ▲ ▼ ENT to turn to factory calibration

3. ▲ ▼ to modify the actual reading

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

CAL T.M: xx.x°C

MODE DISP to go back to (D5) without memorizing

5. ▲ ▼ to modify the actual value

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

MESSAGE FUNCTION

"UPDATE" The calibration is accepted

Error messages

Z>2.0°C Zero > 2.0°C

The above message will last for 5 minutes

ENT to acknowledge the message

"NO UPDATE"	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. MODE DISP to go to

(D6) | SA XX.XXpH O■ LO | SA -XXXXmv O■ LO |

or

(D7) | SB X.XXpH O■ HI | SB -XXXmv O■ HI |

2. CAL to access the programming sequences

<u>Set-point adjustment</u>

CAL SA S:xx.xxpH	CAL SA S: xxxmv

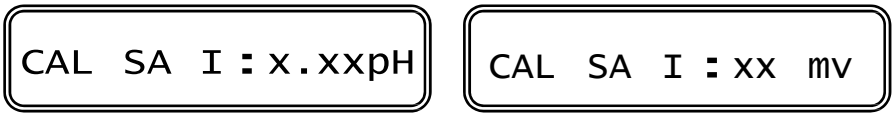
SA: Set-point A adjustment
xx.xxpH (xxxmV): actual Set-point value

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

3. ▲ ▼ to insert the Set-point value

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

On/Off function



x.xxpH (xxmV): actual hysteresis value

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

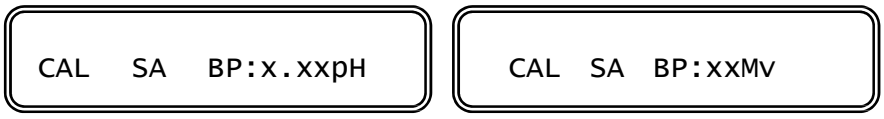
1. ▲ ▼ to insert the hysteresis value
2. ENT to confirm and to go to the delay time selection

x.x s: actual delay time value

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

3. ▲ ▼ to insert the delay time value
4. ENT to confirm and to go back to (D6)/(D7)

PFM proportional function



x.xxpH(xxmV): actual proportional band value

MODE DISP 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 maximum pulse frequency value

```
CAL SA F:xxx i/s
```

xxx i/s: actual pulse frequency value

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

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

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

PWM proportional function

```
CAL SA  BP:x.xxpH
```

```
CAL SA BP: xx mv
```

x.xxpH(xxmV): actual proportional band value

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

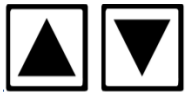
1. ▲ ▼ to select the proportional band value

2. ENT 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

MODE DISP 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. ENT 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

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

5. ▲ ▼ to select the value.

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

CAL AL D: x.xs

x.xs: actual delay time (sec.)

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

7. ▲ ▼ to insert the value

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

MESSAGE	FUNCTION
" UPDATE "	the new data have been memorized

4.3.6 Cleaning function

1. MODE DISP to go to

(D10) CLEANING OFF (MANUAL CLEAN/AUTO CLEAN)

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

2. CAL to access the calibration procedure

MANUAL CLEAN operation

The following display will appear:

CLEAN C.:WAITING (START)

WAITING: the unit is waiting for the cleaning cycle

MODE DISP to go back to (D10) without memorizing

3A. ▲ ▼ select START or WAITING 4A.

ENT 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.

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

MODE DISP to go back to (D10) without memorizing

MODE DISP + ▲ ▼ + ENT to reset the waiting time to next cycle

3B. ENT to visualize the waiting status to next cycle

(START)

WAITING: the unit is waiting for the next cleaning cycle

MODE DISP to go back to (D10) without memorizing

4B. ▲ ▼ select START or WAITING

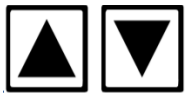
5B. ENT to confirm the selected parameter

- 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

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

MODE DISP 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. MODE DISP to go to Display (D12)

(D12) CONFIGURATION

2. CAL to access the configuration sequences

4.4.1 Keyboard locked/unlocked

KB UNLOCKED KB LOCKED

keyboard unlocked keyboard locked

MODE DISP to go to (D12)

3. ▲ ▼ to select one of the two options (locked/unlocked)

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

4.4.2 LCD display contrast

MODE DISP to go to (D12)

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

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

4.4.3 Access number

Access number request

MODE DISP to go to (D12)

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

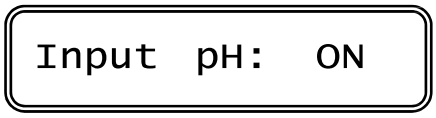
2. ENT to confirm and to proceed with the configuration

IMPORTANT NOTE:

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

Configuration inhibited

4.4.4 pH input enabled/disabled



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: MODE DISP - ▲ ▼ - ENT

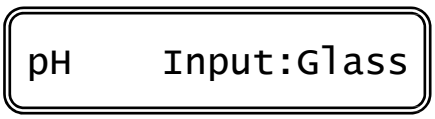
4.4.5 ORP input enabled/disabled

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: MODE DISP - ▲ ▼ - ENT

4.4.6 pH electrode type



Glass: glass electrode

Antim.: antimony electrode

MODE DISP to go to (D12)

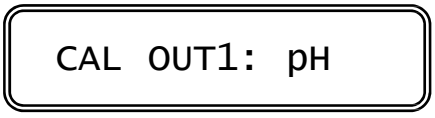
4.4.7 Software filter

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

Active keys: MODE DISP - ▲ ▼ - ENT

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

Active keys: MODE DISP - ▲ ▼ - ENT

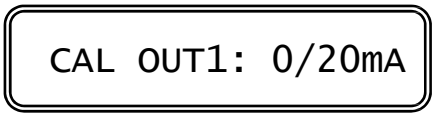


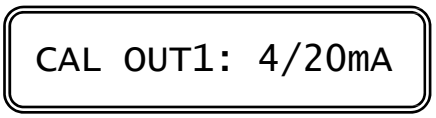
Input related to analog Output n°1 (mV, °C)

pH: input selected for analog output N°1

Active keys: MODE DISP - ▲ ▼ - ENT

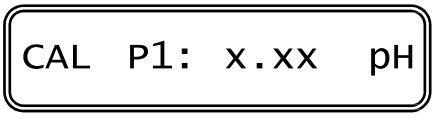
4.4.8 Analog output n°1 range





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

Active keys: MODE DISP - ▲ ▼ - ENT



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

Active keys: MODE DISP - ▲ ▼ - ENT

```
CAL  P2:xx.xx  pH
```

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

Active keys: MODE DISP - ▲ ▼ - ENT

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: MODE DISP - ▲ ▼ - ENT

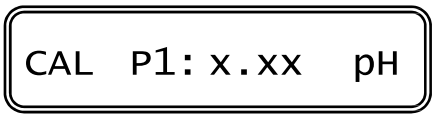
4.4.10 Analog output n°2 range

```
CAL OUT2: 0/20mA
```

```
CAL OUT2: 4/20mA
```

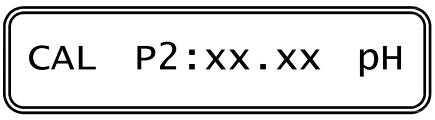
0/20mA (4/20mA): range selected

Active keys: MODE DISP - ▲ ▼ - ENT



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

Active keys: MODE DISP - ▲ ▼ - ENT

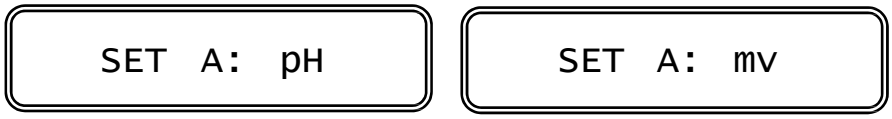


P2: end of range
xx.xx pH (mV): measuring value related to 20 mA

Active keys: MODE DISP - ▲ ▼ - ENT

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



pH: Set-point A related to pH
mV: Set-point B related to mV

Active keys: MODE DISP - ▲ ▼ - ENT

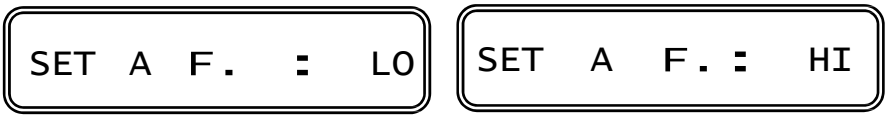
4.4.12 Set-point A operating mode

(PWM/PFM)

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

Active keys: MODE DISP - ▲ ▼ - ENT

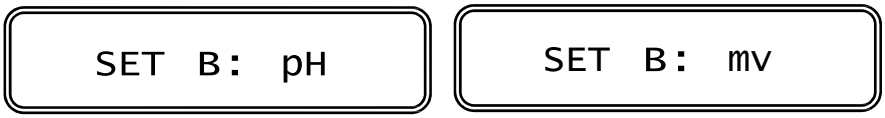
4.4.13 Set-point A function



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

Active keys: MODE DISP - ▲ ▼ - ENT

4.4.14 Input related to set-point B



Active keys: MODE DISP - ▲ ▼ - ENT

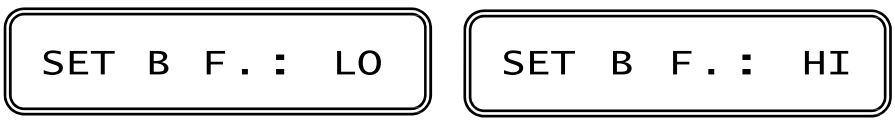
4.4.15 Set-point B operating mode

(PWM/PFM)

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

Active keys: MODE DISP - ▲ ▼ - ENT

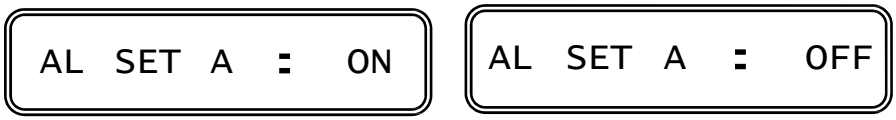
4.4.16 Set-point B function



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

Active keys: MODE DISP - ▲ ▼ - ENT

4.4.17 Alarm on set-point A



Active keys: MODE DISP - ▲ ▼ - ENT

1. Two possible alternatives A or B

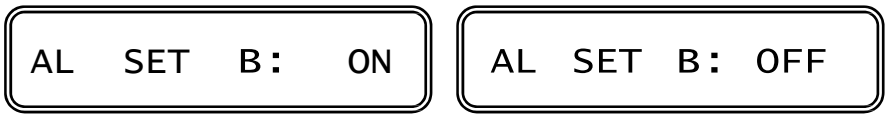
1A. "OFF" alarm function not activatec
1B. "ON" alarm function activated

2B. to insert the activation time for Set-point A

xx m: activation time (minutes)

Active keys: MODE DISP - ▲ ▼ - ENT

4.4.18 Alarm on set-point B



Active keys: MODE DISP - ▲ ▼ - ENT

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: MODE DISP - ▲ ▼ - ENT

4.4.19 Alarm relay contacts

Two possible alternatives:

AL RELAY: ACT	AL RELAY: DEA

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: MODE DISP - ▲ ▼ - ENT

4.4.20 Autoclean

CAL DF:AUTO	CAL DF:DISABLED	CAL DF:MANUAL

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

Active keys: MODE DISP - ▲ ▼ - ENT

4.4.21 Cleaning time

CLEANING T:xx.x"

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

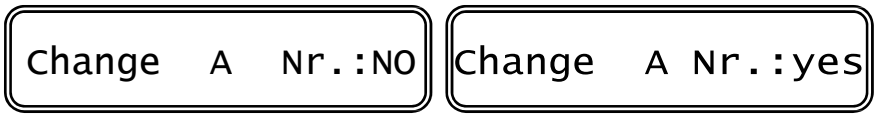
Active keys: MODE DISP - ▲ ▼ - ENT

4.4.22 Holding time

x.x': holding time (minutes)

Active keys: MODE DISP - ▲ ▼ - ENT

4.4.23 New access number



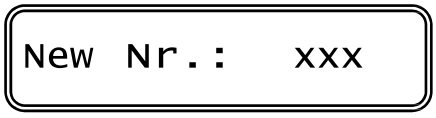
NO : access number changing not required
YES: access number changing required

Active keys: MODE DISP - ▲ ▼ - ENT

Two possible alternatives A or B.

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



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 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.

ENT 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. 1nterruption 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 terminalsconnect ac power (if power voltage is 110 V)
- 1-3 terminalsconnect 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 CAL ▲ ENT 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

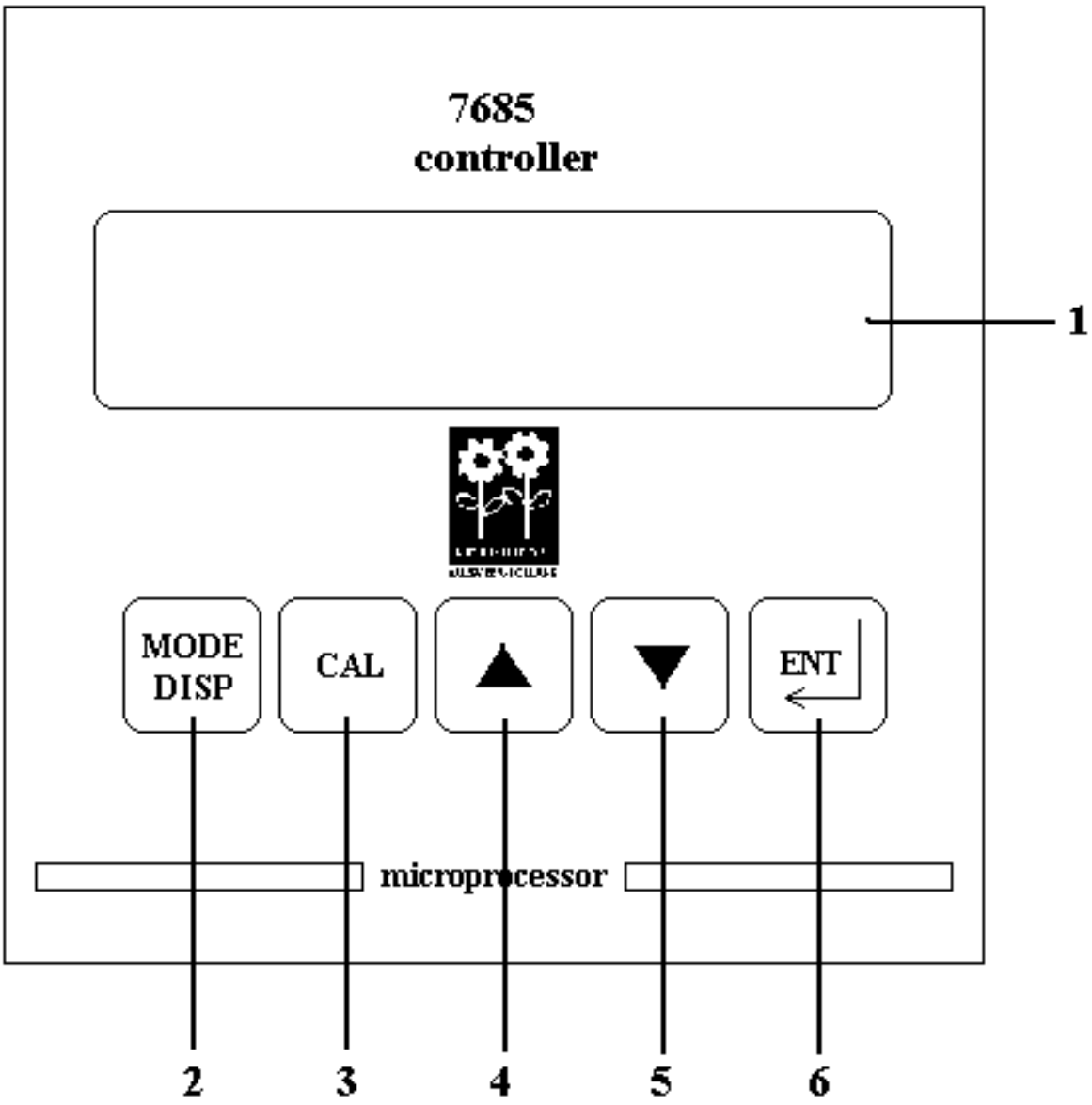


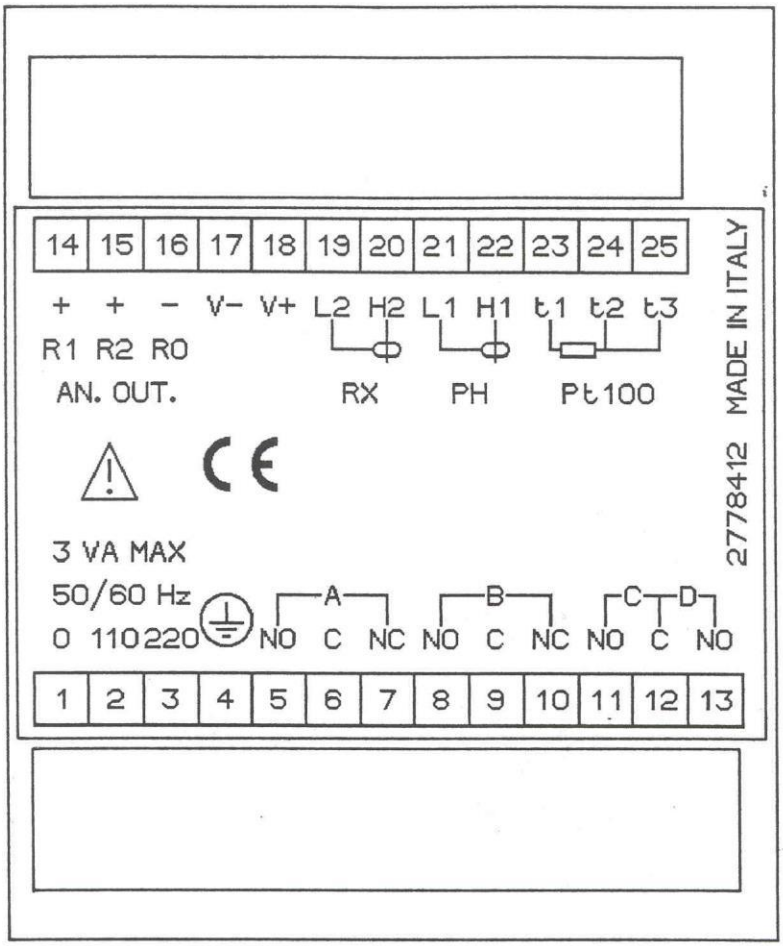
FIG. 1

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. p
23.24.25. T

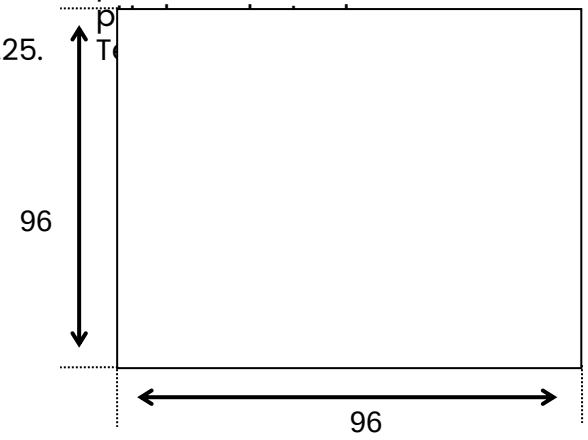
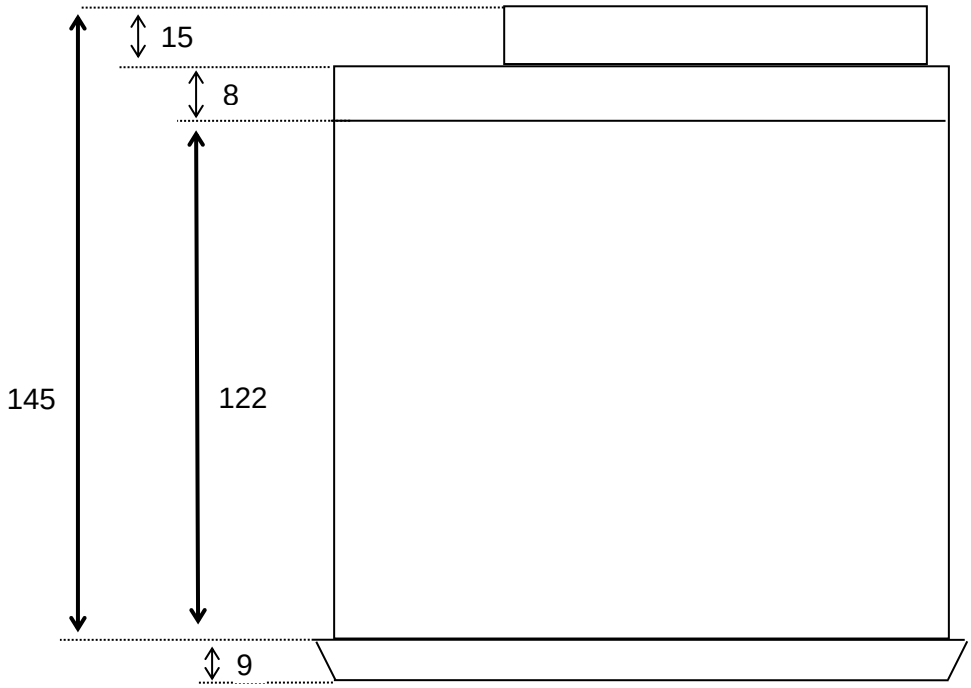


FIG. 2



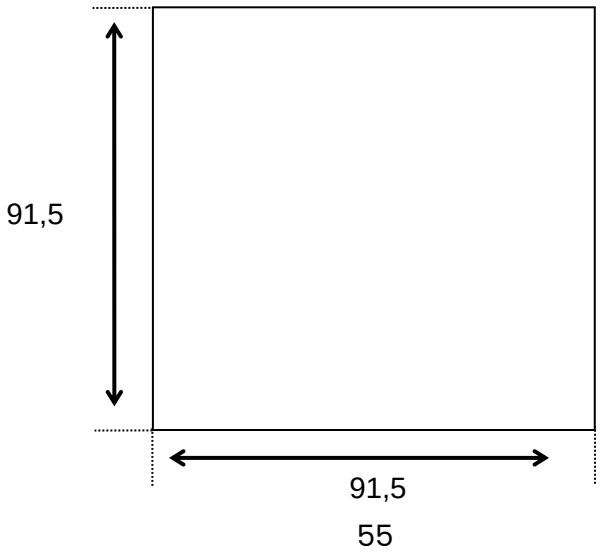


FIG. 3

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
- 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