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

OPERATOR'S MANUAL

PH 7685

pH/ORP CONTROLLER MICROPROCESSOR BASED

Rev. B
Valid from S/N 54470
Valid for Options 091.3711 and 091.211

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

Software: R2.1x

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1 FEATURES

* Input from pH electrode (Glass or Antimony) - ORP electrode
* Input from Pt100 3 wires
* Alphanumeric back-lighted LCD
* Temperature readout
* Operating mode: automatic and manual
* Calibration parameters display
* Set-point and alarm conditions display
* Automatic or manual Temperature compensation

* Isolated output: 0/20 mA or 4/20 mA selectable

* Dual set-points 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

* Software:
  - 3 access levels
  - user friendly
  - automatic/manual operating mode
  - automatic buffer solutions recognition
  - keyboard lock
  - watch-dog

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

2 SPECIFICATIONS

2.1 FUNCTIONAL SPECIFICATIONS

Input

The instrument accepts input from a glass or Antimony pH electrode or ORP electrode.

A second input is provided for 3 wires Pt100 Temperature sensors.

Microtrasmitter input

The instrument is provided with an input for amplified probes with 080102 microtransmitter.

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.

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.

Control relays

The monitor is equipped with two SPDT control relays.

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

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

Alarm relay

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

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

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

Operating mode

The instrument is provided with 2 programmable modes of operation.

- Automatic operation:

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

- Manual operation:

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

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

Calibration mode

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

Software filter

The unit is provided with a programmable software filter, to be inserted when the readout is not stable.

Configuration

A number of programming functions are provided in the Configuration menu and are protected by a selectable access number, which must be entered to allow changes in this setting.

Keyboard lock

The keys on the front panel of the monitor can be used for both changing the display and for calibrations and set-point adjustments.

When the monitor is shipped, all functions are accessible.
However, the adjustment and calibration functions may be locked in order to prevent unauthorized adjustments to the instrument.

Options

091.211	PFM - PWM proportional action.
091.3711	Dual isolated and programmable output. Two outputs may be configured for pH(ORP) or Temperature.
091.701	RS232 isolated output. The output sends the data (pH, mV, °C) to the serial port of the computer.
091.404	24 Vac power supply.

2.2 TECHNICAL SPECIFICATIONS

The *Default* values are correspondent to the factory calibration values.

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

OPERATING MODE	*Default*
Automatic/Manual	Auto

SENSOR TYPE	*Default*
* Glass pH/Antimony pH/ORP	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%
ORP electrode:	
Zero: +/- 100 mV	0mV
Sens: 80%/110%	100 %

INPUT SCALE	*Default*
pH: 0.00 / 14.00 pH +/- 0.01 pH	
ORP: -1000 / 1000 mV +/- 1 mV	
* Software filter 90% RT: 0.4/50.0 sec	2.0 sec

TEMPERATURE	*Default*
Input: RTD Pt100	
Connection: 2/3 wires	
Measuring and compensation range: -10.0/110.0 °C	
Resolution: +/- .1 °C	
Zero adjustment: +/- 2 °C	0°C
Manual Temperature compensation: -10/110 °C	20°C

SET-POINT A	*Default*
* Control functions: On/Off PFM - Pulse frequency modulation (option 091.211) PWM - Pulse width modulation (option 091.211)	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 (option 091.211)	
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 (option 091.211)	
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*
* Control functions: On/Off PFM - Pulse frequency modulation (option 091.211) PWM - Pulse width modulation (option 091.211)	On/Off
* Function: On/Off	
Set-point (Rx): -1000/1000 mV	0 mV
(pH): 0.00/14.00 pH	0.00 pH
Hysteresis (Rx): 0/150 mV	0 mV
(pH): 0.00/1.50 pH	0.00 pH
Relay delay: 0.0/99.9 sec	0.0 sec
* Function: H/L (Max/Min) - pH	LO
- ORP	HI
* Function: PFM (option 091.211)	
Set-point (Rx): -1000/1000 mV	0 mV
(pH): 0.00/14.00 pH	0.00 pH
Proportional band (Rx): 0/150 mV	15 mV
(pH): 0.00/1.50 pH	0.15 pH
Pulse frequency: 0/120 pulse/minute	100 i/min
Pulse width:	0.1 sec
* Function: H/L (Max/Min) - ORP	LO
- pH	HI
* Function: PWM (option 091.211)	
Set-point (Rx): -1000/1000 mV	0 mV
(pH): 0.00/14.00 pH	0.00 pH
Proportional band (Rx): 0/150 mV	15 mV
(pH): 0.00/1.50 pH	0.15 pH
Pulse width: 0/99.9 Sec.	20 sec
Min. pulse width:	0.3 sec
* Function: H/L (Max/Min) - ORP	LO
- pH	HI
Relay contacts: SPDT 220V 5Amps Resistive load	

ALARM (C-D contacts)	*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
* Contact type: ACT/DEA	ACT
* Alarm on max. SA: On/Off	OFF
* Max. time SA: 0/60 min.	60 min
* Alarm on max. SB: On/Off	OFF
* Max. time SB: 0/60 min.	60 min
Contacts: SPDT 220V 5Amps Resistive load	

ANALOG OUTPUT Nr. 1	*Default*
* Input: pH/mV/°C (option 091.3711)	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	-1000mV
°C: -10.0/110.0°C (option 091.3711)	-10.0°C
* Point 2 (corresponding to max. mAmps):	
pH: 0.00/14.00 pH	14.00 pH
Rx: -1000/1000 mV	1000mV
°C: -10.0/110.0°C (option 091.3711)	110.0°C
Response time: 2.5 sec for 98%	
Isolation: 250 Vca	
R max: 600 ohm	

ANALOG OUTPUT Nr. 2 (option 091.3711)	*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	1000mV
°C: -10.0/110.0°C	110.0°C
Response time: 2.5 sec per il 98%	
Isolation: 250 Vca	
R max: 600 ohm	

RS232 OUTPUT (option 091.701)	*Default*

CONFIGURATION	*Default*
Parameters indicated by asterisks " * ", may be selected in the Configuration menu.	
Free calibration (access code not required):	
Keyboard locked/unlocked:	Unlocked
LCD contrast: (0/7)	4
Under access code number (0):	
Sensor type	pH Glass
Software filter	2.0 sec
Input connected to the analog output N°1 (option 091.3711)	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 (option 091.3711)	pH
Analog output N°2 range (option 091.3711)	0/20 mA
Point 1 (for 0 or 4 mA) (option 091.3711)	0.00pH
Point 2 (for 20 mA) (option 091.3711)	14.00pH
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/DEACT)	ACT
Access number	0

GENERAL SPECIFICATIONS

Alphanumeric display: 1 line x 16 characters
Acquisition time: 0.1 sec.
Input current: < 2 pAmps (Channels 1 and 2)
Input resistance: > 10 exp 12 (Channels 1 and 2)
Operating temperature: 0/50 °C
Humidity: 95% without condensation
Power supply: 110/220 Vac +/- 10% 50/60 Hz
Isolation: 4,000 volt between primary and secondary (IEC 348)
Power: 5 VA max.
Terminal block: extractable
Weight: 850 g
Dimensions: 96 x 96 x 155 mm

2.3 PHISICAL SPECIFICATIONS

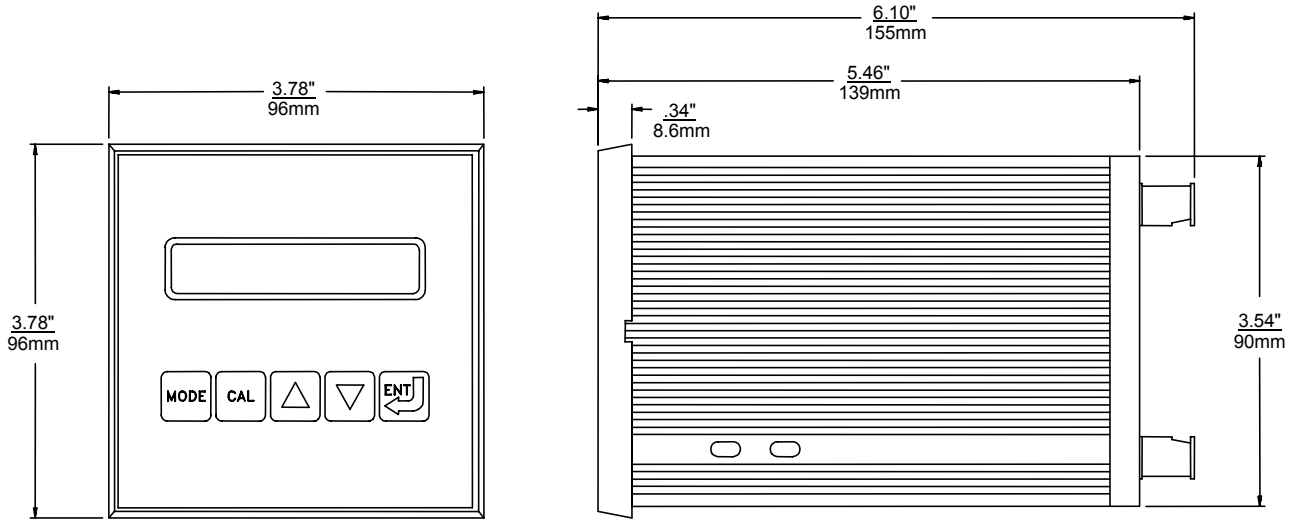
The controller enclosure is designed for surface or panel mounting.

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

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

Signal and power cable connections are made by using two special extractable terminal blocks placed in the back of the instrument.
This makes wiring, installation and general maintenance of the probes and other devices easier.

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



FRONT VIEW

SIDE VIEW

3 INSTALLATION

3.1 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.

When installing "in line" electrodes it is suggested to follow the specific instructions given by the sensor's manufacturer.

3.2 ELECTRICAL INSTALLATION

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

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

The electrical installation consists of:

Connecting the power

- connect ground to terminal 4
- connect ac power to 1 - 2 terminals if power voltage is 110 V
- connect ac power to 1 - 3 terminals if power voltage is 220 V
- if 091.404 option is installed, connect 24 VCA 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 the electrode

- as a rule the shield of the coax cable is connected to the Reference electrode and fastened to the terminal 21 "L1".
- The central shielded wire is connected to the pH glass or the ORP metal electrode and fastened to the terminal 22 "H1". (see connections diagram).
- keep the cable away from power wires on the overall length

Connecting probes with microtransmitter

See the instruction manual of the microtransmitter.

Connecting alarms, pumps, valves

The output connections referred to set-point A and set-point B are made at terminal strip and they consist of two independent SPDT relays corresponding to Regulator A and Regulator B .

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

Control relay "A"

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

Control relay "B"

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

Alarm relay "C/D"

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

Connecting a recorder

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

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

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

Output Current is 0/20 or 4/20 mA isolated.

Connecting the RTD

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

3-wire connection

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

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

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

2-wire connection

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

Checking

Before connecting the system to the power supply:

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

4 OPERATING THE SYSTEM

Pre-operation check

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

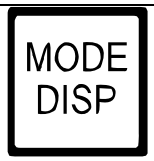
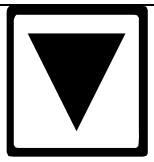
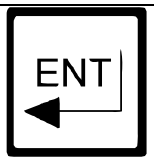
The meter has a LCD display 1 indicating that unit is on.

The cards of the controllers are adjusted at the factory.

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

5 SOFTWARE DESCRIPTION

5.1 KEYBOARD

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

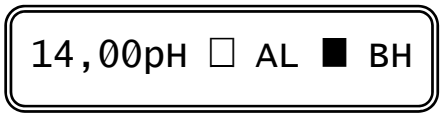
5.2 READOUT SEQUENCES

Applying the power to the instrument the display will show the input selected for approximately 3 seconds, then will show the main display ·DO·.

pHmeter Glass	Rx meter	pHmeter Antimony

Press MODE DISP to visualize the following Display:

D0	14,00pH □ AL ■ BL	Actual pH and ORP values, Set-point status/functions
D1	Z:-0,21pH S:100%	pH/ORP electrode parameters
D2	Temp: 22.0°CM	Temperature value
D3	SA 14.00pH *■ LO	Set-point A parameters
D4	SB 5.00pH *□ HI	Set-point B parameters
D5	AL 0.00/14.00pH	Alarm on input channel pH (ORP)
D6	01 20.0mA/14.0pH	Analog output N°1 parameters
D6BIS	02 20.0mA/14.0pH	Input/analog output N°2 values (option 091.3711)
D7	Configuration	Configuration display
D8	PH7685 R2.1x	Instrument code and software release

·D0· 

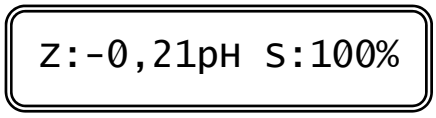
pH/mV main display and control relay status

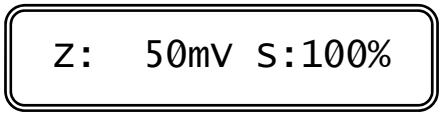
A (B): Set-point A (B)
H (L): maximum (minimum)
■ : relay activated
▬ : relay delayed
□ : relay deactivated
M : manual operating mode (flashing)

MESSAGE	MEANINGS
" >>>> "	over range pH>16 - mV>1100
" <<<< "	under range pH<-2 - mV<-1100
"values flashing"	alarm condition

CAL to activate the manual/automatic mode selection procedure

MODE DISP to go to

·D1· 

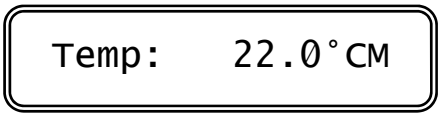


pH (ORP)electrode parameters (Zero and Sens.)

-0.21pH (50mV): electrode asymmetry potential (Zero)
100%: electrode Sensitivity

CAL to activate the pH Zero/Sensitivity calibration procedure

MODE DISP to go to

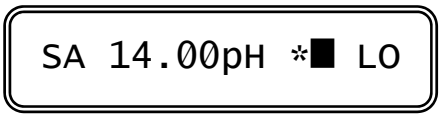
·D2· 

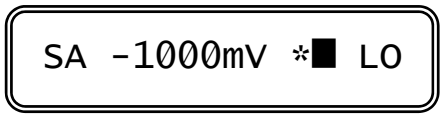
Temperature value

" M " manual value

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

MODE DISP to go to

·D3· 



SA: set-point A parameters

14.00pH (-1000mV): pH/mV Set-point value
■: actual Set-point A status (relay activated)
LO: Set-point function selected (minimum)
* : alarm on set-point A function activated

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

MODE DISP to go to

·D4· SB 5.00pH *■ HI SB 500mV *■ HI

SB: Set-point B parameters
5.00pH (500mV): pH/mV Set-point value
■ : actual set-point B status (relay activated)
HI: Set-point function selected (maximum)
* : alarm on set-point B function activated

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

MODE DISP to go to

·D5· AL 0.00/14.00pH AL -1000/1000mV

Alarm on input channel pH (ORP)

CAL to activate the alarm values programming sequences

MODE DISP to go to

·D6· 01 20.0mA/14.0pH 01 20.0mA/1000mV

Analog output N°1 parameters

01: selected analog output
20.0mA : actual analog output value
14.0pH (1000mV) (100°C): actual input measuring value

MODE DISP to go to

·D6BIS· | 02 20.0mA/14.0pH | 02 20.0mA/1000mV

Analog output N°2 parameters (option 091.3711)

02: selected analog output
20.0mA : actual analog output value
14.0pH (1000mV) (100°C): actual input measuring value

MODE DISP to go to

·D7 | 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

·D8 | PH7685 R2.1x | Instrument code and software release

MODE DISP to go back to the main Display ·DO·

5.3 CALIBRATION SEQUENCES

The following procedures will be active whenever the instrument is not in the keyboard lock condition.

To unlock the keyboard follows the procedures mentioned in chapter "Configuration".

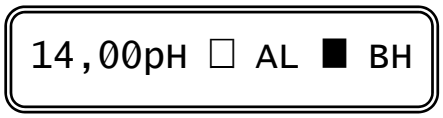
The following procedures allows the sensors calibration, the Set-point and alarms parameters programming.

5.3.1 Manual/automatic mode selection

Normally the instrument works in automatic mode.

Follow this procedure to change operating node 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

UPDATE	the selection is memorized

N O T E: The next calibrations follows the same proceeding, so only the active keys will be shown.

5.3.2 pH and ORP electrodes calibration

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

- pH electrode calibration by automatic recognition of the buffer solutions type SZ959 (see B&C Electronics catalogue)

- ORP electrode 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

·D1· `Z:-0.21pH S:100%` `Z:-  50mV S:100%`

2. CAL to access the calibration sequences

First point adjustment (P1)

`CAL P1:10.00pH R` `CAL p1:  220mV R`

10.00pH (220mV): 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.

If the readout stability will not be 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

IMPORTANT NOTE:

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.

Second point adjustment (P2)

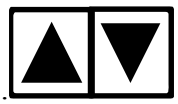
```
CAL P2: 7.00pH R
```

```
CAL p2:  500mV R
```

Follow the same procedure as per 1st point calibration.

MODE DISP to go back to ·D1· without memorization

▲ + ▼ + ENT to turn to factory calibration

6.  to adjust the actual reading

7. 

- 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 ·D1·.

Error messages

S > 110 %	slope > 110 %
S > 140 %	slope > 140 %
S < 80 %	slope < 80 %
S < 70 %	slope < 70 %
Z > 2.00 pH	asymmetry > 2.00 pH
Z > 100 mV	asymmetry > 100 mV

The above messages will last for 5 minutes.

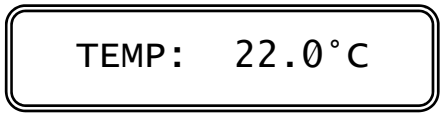
To acknowledge the error messages

NO UPDATE	The calibration is not accepted. The unit turns to ·D1·.

5.3.3 Temperature calibration

1. [MODE DISP] to go to

·D2·



2. [CAL] to access the calibration procedure

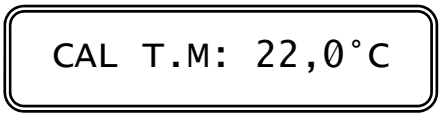
>>>>>>: Temperature value over range

[MODE DISP] to go back to ·D2· without memorizing

[▲] + [▼] + [ENT] to turn to factory calibration

3. [▲][▼] to modify the actual reading

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



[MODE DISP] to go back to ·D2· without memorizing

5. [▲][▼] to modify the actual value

6. [ENT] to confirm and to go back to ·D2·

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 ·D2·

5.3.4 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

·D3· SA 14.00pH ■ LO SA -1000mV ■ LO

or

·D4· SB 5.00pH □ HI SB 500mV ■ HI

2. CAL to access the programming sequences

Set-point adjustment

CAL SA S:14.00pH	CAL SA S: 600mV

SA: Set-point A adjustment
14.00pH (600mV): actual Set-point value

MODE DISP to stop the procedure and to go back to ·D3· (·D4·)

3. ▲ ▼ to insert the Set-point value

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

5.3.5 On/Off function

CAL SA I: 0.15pH	CAL SA I: 15mV

0.15pH (15mV): actual hysteresis value

MODE DISP to stop the procedure and to go back to ·D3· (·D4·)

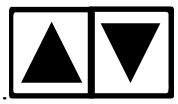
1. ▲ ▼ to insert the hysteresis value

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

CAL SA D: 5.0s

5.0 s: actual delay time value

MODE DISP to stop the procedure and to go back to ·D3· (·D4·)

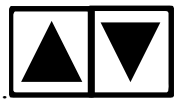
3.  to insert the delay time value

4.  to confirm and to go back to ·D3· (·D4·)

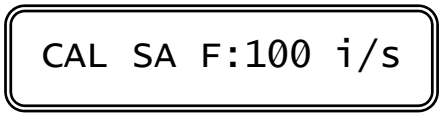
5.3.6 PFM proportional function

0.15pH(15mV): actual proportional band value

 to stop the procedure and to go back to ·D3· (·D4·)

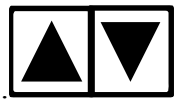
1.  to select the proportional band value

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



100 i/s: actual pulse frequency value

 to stop the procedure and to go back to ·D3· (·D4·)

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

4.  to confirm and to go back to ·D3· (·D4·)

5.3.7 PWM proportional function

CAL SA BP:0.15pH	CAL SA BP: 15mV

0.15pH(15mV): actual proportional band value

MODE DISP to stop the procedure and to go back to ·D3· (·D4·)

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: 5.0s

5.0 s: actual pulse length value

MODE DISP to stop the procedure and to go back to ·D3· (·D4·)

3. ▲▼ to select the pulse length value (0/99.9 seconds)
4. ENT to confirm and to go back to ·D3· (·D4·)

MESSAGE	**FUNCTION**
UPDATE	all the data has been memorized

5.3.8 Alarm adjustment

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

The following operations are possible:

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

1. MODE DISP to go to Display ·D5·

AL 0.00/14.00pH	AL -1000/1000mV

2. CAL to access the calibration sequences

CAL AL L: 1.00pH	CAL AL L: 100mV

AL: alarm parameters selection
1.00pH (100mV): actual minimum alarm value

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

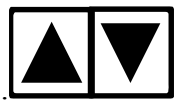
3. ▲ ▼ to select the value

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

CAL AL H: 3.00pH	CAL AL H: 250mV

3.00pH (250mV): actual maximum alarm value

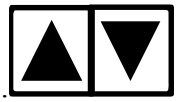
MODE DISP to stop the procedure and to go back to ·D5·

5.  to select the value.

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

1.0s: actual delay time

 to stop the procedure and to go back to ·D5·

7.  to insert the value

8.  to confirm and to go back to ·D5·

MESSAGE	**FUNCTION**
	the new data have been memorized

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

5.4 CONFIGURATION

The following operations are possible:
- keyboard locked/unlocked selection
- Display contrast selection
- access number insertion

1. [MODE DISP] to go to Display ·D7·

·D7· | Configuration |

2. [CAL] to access the configuration sequences

5.4.1 Keyboard locked/unlocked

KB UNLOCKED	KB LOCKED
keyboard unlocked	keyboard locked

[MODE DISP] to go to ·D8·

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

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

5.4.2 LCD display contrast

```
LCD contrast: 4
```

MODE DISP to go to ·D8·

1. ▲ ▼ to select the contrast from 0 to 7
2. ENT to confirm and to go to the access number insertion

5.4.3 Access number

```
Access Nr: 0
```

access number request

MODE DISP to go to ·D8·

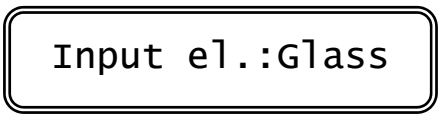
1. ▲ ▼ to insert the access number (when keeping the key pressed the number will scroll with 3 speed level)
2. ENT to confirm and to proceed with the configuration

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

```
Cal Inhibition
```

Configuration inhibited

5.4.4 pH electrode type



Glass: glass electrode
Antim.: antimony electrode
Rx: ORP electrode

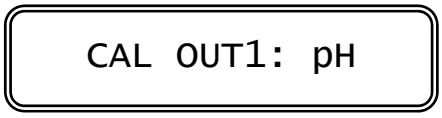
MODE DISP to go to ·D8·

Active keys: MODE DISP - ▲ ▼ - ENT

5.4.5 Software filter

Active keys: MODE DISP - ▲ ▼ - ENT

5.4.6 Input related to analog output n°1

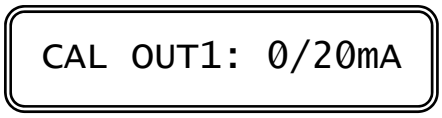


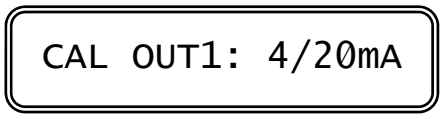
(mV, °C)

pH: input selected for analog output N°1

Active keys: MODE DISP - ▲ ▼ - ENT

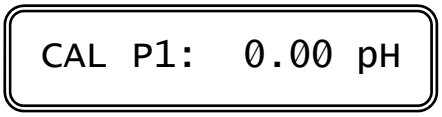
5.4.7 Analog output n°1 range





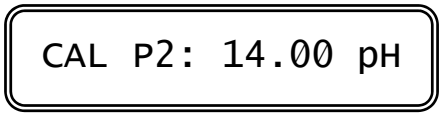
0/20mA (4/20mA): range selected

Active keys: MODE DISP - ▲ ▼ - ENT



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

Active keys: MODE DISP - ▲ ▼ - ENT

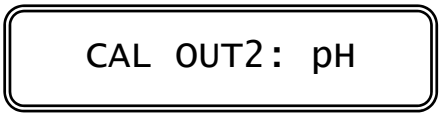


P2: end of range
14.00 pH (mV): measuring value related to 20 mA

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.

5.4.8 Input related to analog output n°2 (option 091.3711)

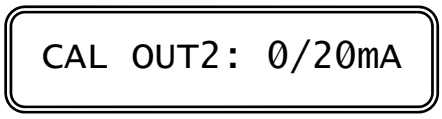


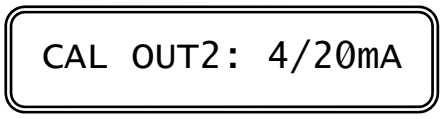
(mV, °C)

pH: input selected for analog output N°2

Active keys: MODE DISP - ▲ ▼ - ENT

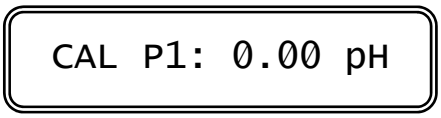
5.4.9 Analog output n°2 range (option 091.3711)





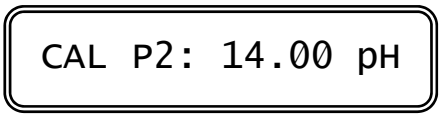
0/20mA (4/20mA): range selected

Active keys: MODE DISP - ▲ ▼ - ENT



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

Active keys: MODE DISP - ▲ ▼ - ENT



P2: end of range
14.00 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.

5.4.10 Set-point A operating mode (option 091.211)

(PWM/PFM)

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

Active keys: MODE DISP - ▲ ▼ - ENT

5.4.11 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

5.4.12 Set-point B operating mode (option 091.211)

(PWM/PFM)

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

Active keys: MODE DISP - ▲ ▼ - ENT

5.4.13 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

5.4.14 Alarm on set-point A

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 A

10m: activation time

Active keys: MODE DISP - ▲ ▼ - ENT

5.4.15 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

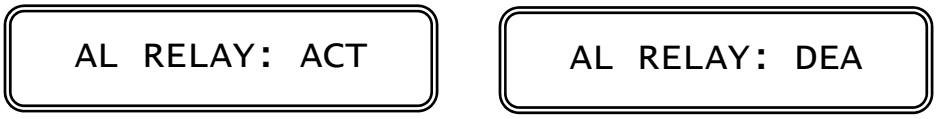
2B. to insert the activation time for Set-point B

10m: activation time

Active keys: MODE DISP - ▲ ▼ - ENT

5.4.16 Alarm relay contact function

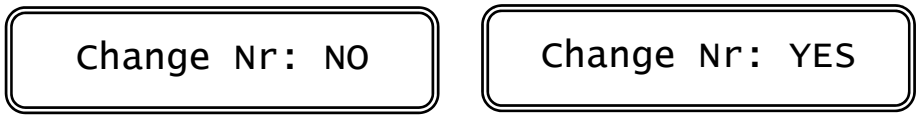
Two possible alternatives:



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

Active keys: MODE DISP - ▲ ▼ - ENT

5.4.17 New access number



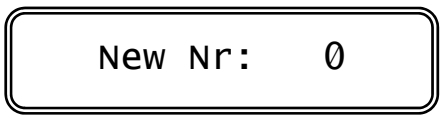
NO : access number changing not required
YES: access number changing required

Active keys: MODE DISP - ▲ ▼ - ENT

Two possible alternatives A or B.

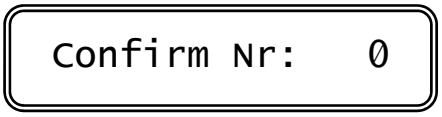
A. "NO" The unit will go back to the Configuration Display; the operator may verify the parameter setting before leaving the Configuration sequences which is now protected by access number.

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 assure the memorization of the right code.

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 selected before leaving the Configuration routine.

6 NORMAL OPERATION

To operate the system, simply power the unit and observe the measured pH or ORP of the solution on the meter.

Select the Set-point A, the Set-point B and the alarms to the setting required for each particular application (see Set-point calibration and alarm sections)

6.1 MANUAL OPERATION

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

Analog outputs and alarm relay will remain activated.

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

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

6.2 MANUAL TEMPERATURE COMPENSATION

The manual compensation is in alternative to the automatic compensation.

Do not install the RTD and select the Temperature value and the Temperature coefficient value (see Temperature and Temperature compensation section).

7 CALIBRATION

7.1 CALIBRATING THE PH-METER

The pH 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.

It is possible to turn to the Factory calibration by pressing  keys
(see Calibration Sequences).

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.

The unit recognizes the buffer solutions mod. SZ959 a pH=4 pH=7 pH=9.

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 slope following the point 2 calibration.

Temperature compensated operations need special procedure when calibrating the meter:

- the pH value has to be considered at the working Temperature of the buffer solution
- before calibrating, immerse the electrode and the RTD Pt100 in the buffer solution and adjust the value after the Temperature sensor has reached the thermal equilibrium. Check periodically the calibration.

7.2 CALIBRATING THE ORP-METER

The ORP controller is supplied with a laboratory calibration by means of Vdc generator.

It is possible to turn to the Factory calibration by pressing  keys
(see Calibration Sequences).

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.

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 for damage of the electrolytic capacitors if the meter is exposed to temperatures above 80 degree C.
- check for damage in all the electronic components if the meter is subjected to excessive voltage
- check for damage of the electronic and mechanical components if the meter is dropped
- repeat periodically the pre-operation check
- check that all the connections are free from moisture and contamination

Disconnect the power supply to the monitor before performing the following procedures:

Use moisture free air and blow out the interior of the case and terminal board connections as necessary.

Inspect the printed circuit boards for dirt and corrosion;
clean as necessary and blow dry.

Tighten all the terminal-board connections and mounting hardware

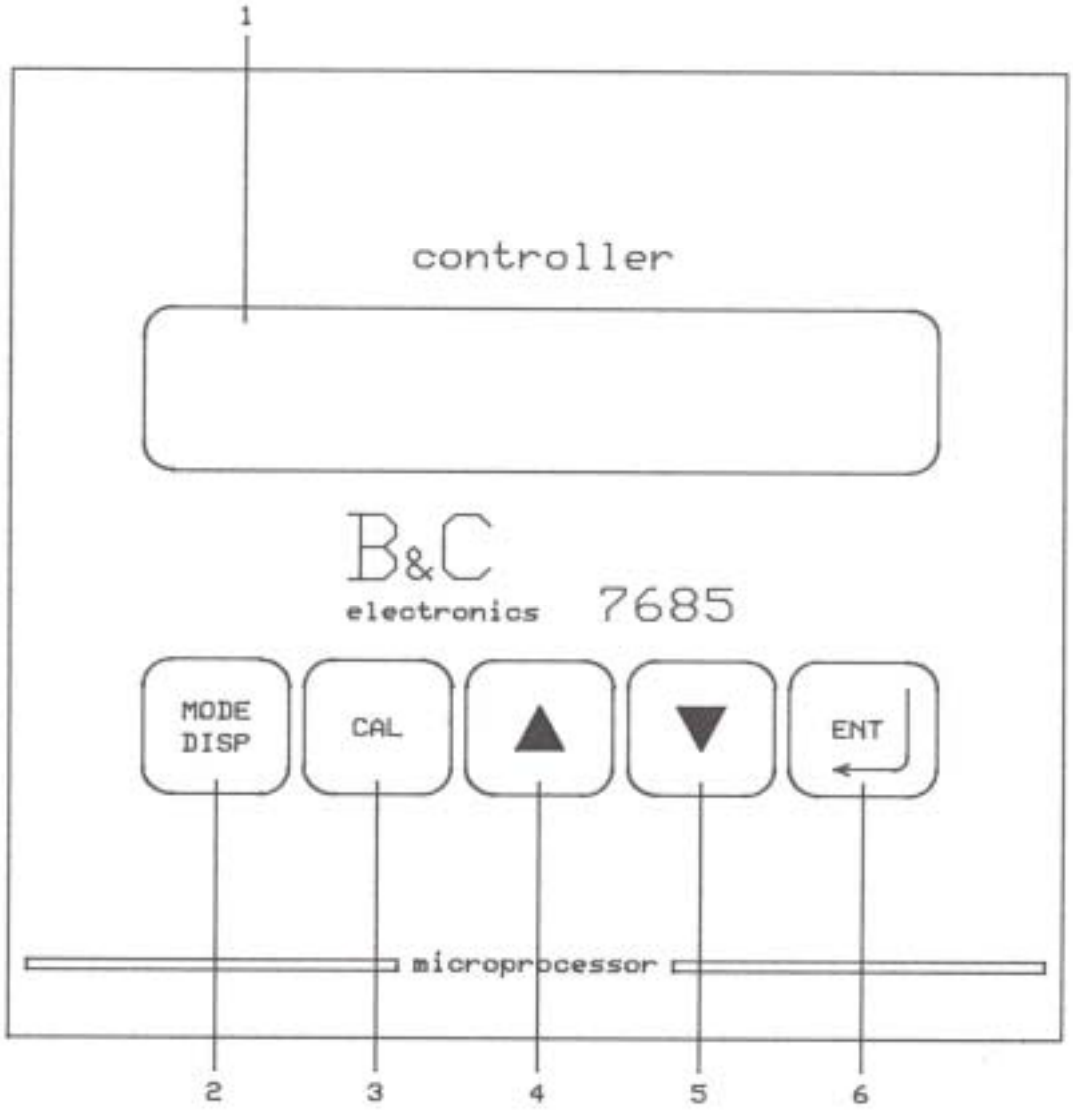
Replace the front panel circuit board or the base circuit board

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.

Suggested methods for cleaning the electrode include chemical cleaning (except hydrofluoric acid) and detergent washing.

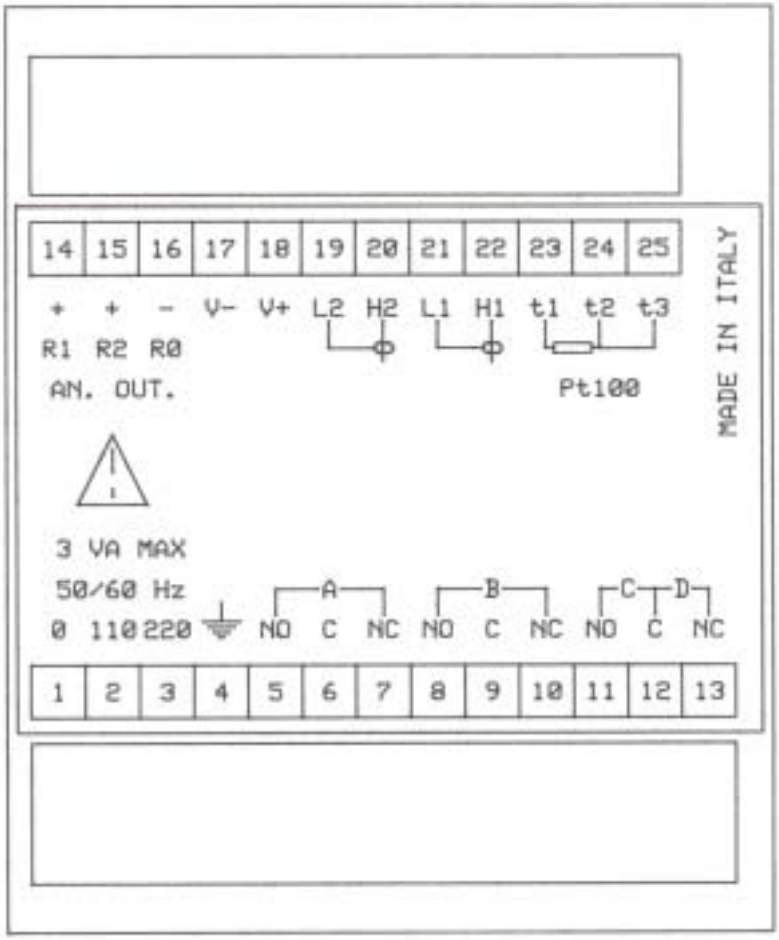
DIGITAL CONTROLLER



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

FIG. 1

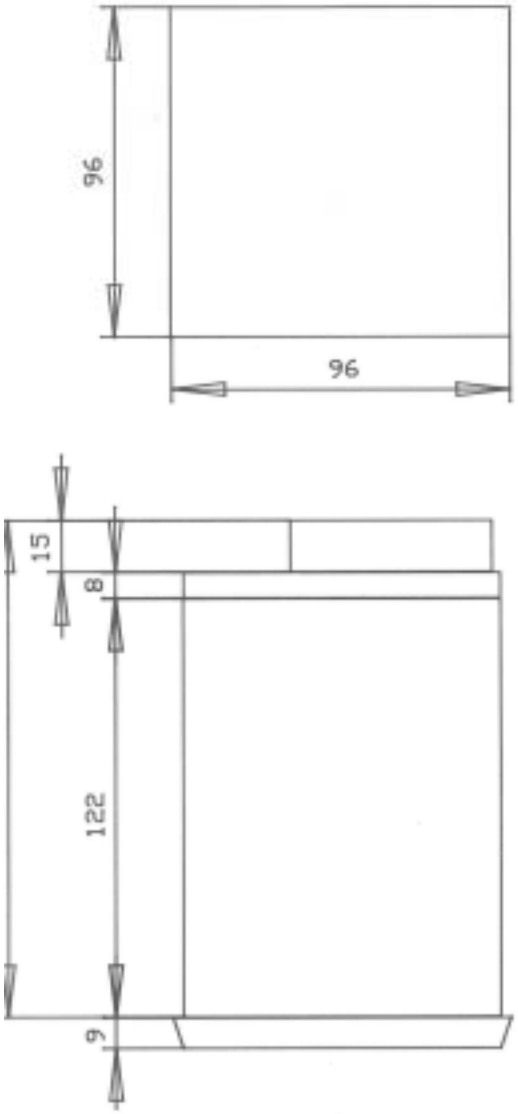
REAR PANEL CONNECTIONS
PH7685



1. 2	110 V. POWER SUPPLY
1. 3	220 V. POWER SUPPLY
4.	GROUND (POWER)
5. 6	A RELAY N.O. CONTACTS
6. 7	A RELAY N.C. CONTACTS
8. 9	B RELAY N.O. CONTACTS
9.10	B RELAY N.C. CONTACTS
11.12	C RELAY N.O. CONTACTS (OPTION)
12.13	D RELAY N.C. CONTACTS ALARM
14.	RECORDER OUTPUT CHANNEL 1 (+)
15.	RECORDER OUTPUT CHANNEL 2 (+) (OPTION)
16.	RECORDER OPTION CHANNELS 1 AND 2 (-)
17.18	OUT POWER SUPPLY FOR EXTERNAL CIRCUITS
19.	LOW INPUT (REFER.) CHANNEL 2 (OPTION)
20.	HIGH INPUT (GLASS) CHANNEL 2 (OPTION)
21.	LOW INPUT (REFER.) CHANNEL 1
22.	HIGH INPUT (GLASS) CHANNEL 1
23.24.25	INPUT TEMPERATURE COMPENSATION

FIG. 2

CONTENITORE DIN 43700 MOD. 7685
BOX



PIANO DI FORATURA
DRILL PLAN

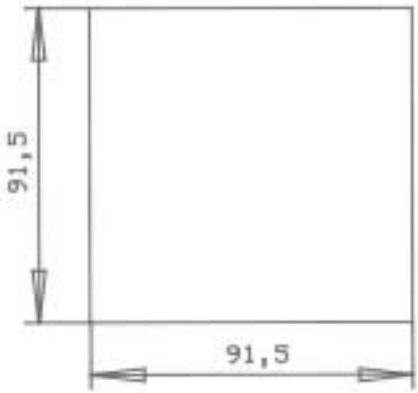


FIG. 3