# User's Guide




## *CDCN441*
## *Conductivity Analyzer*

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|---|---|

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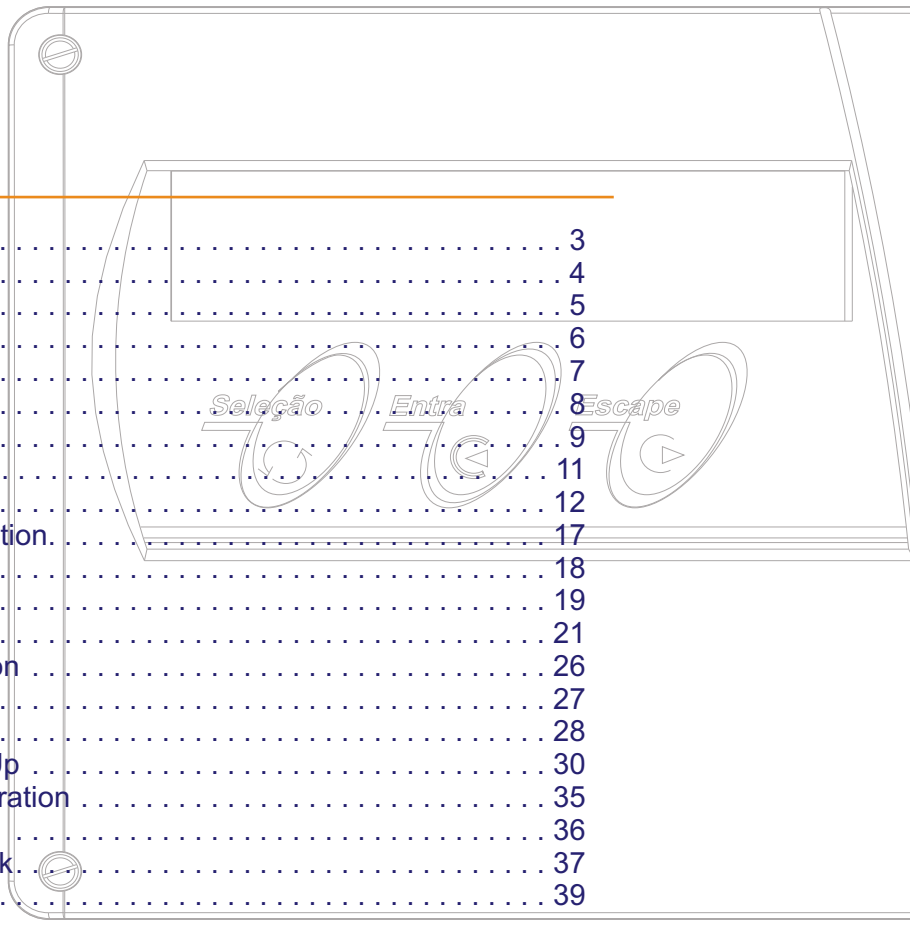
# Instruction Manual

## Conductivity Analyzer

## CDCN441




## Index

# 2. Specifications

| General | |
|---|---|
| Case Material | Cast Aluminum SAE 323 (Back) and ABS (Front Panel) |
| Finishing | Electrostatic Epoxy |
| Electrical Connection | Conexel Type Connector |
| Cable Inlet | Cable Knockout 3/8" ( 4x ) |
| Assembly | 2" Tube, Falt Surface or Panel |
| Enclosure | IP-67 |
| Power Consumption | 3.5 VA |
| Weight | 1.3 kg |
| Electrical Power | 90 to 240 VAC 50 / 60 Hz |
| Operating Temperature | 5 to 40 ºC |
| Relative Humidity | 20 to 80% |

| Analyzer | |
|---|---|
| Display | Alphanumeric 2 lines x 16 characters |
| Range Conductivity | 0.01uS/cm thru 2S/cm |
| Range Resistivity | 10 ohms x cm thru Infinity |
| Automatic Temperature Compensation | 0 to 200 ºC |
| Temperature Range | 0 to 200 ºC |
| Cell Constant | 0.01 / 0.1 / 1 / 5 / 10cm |

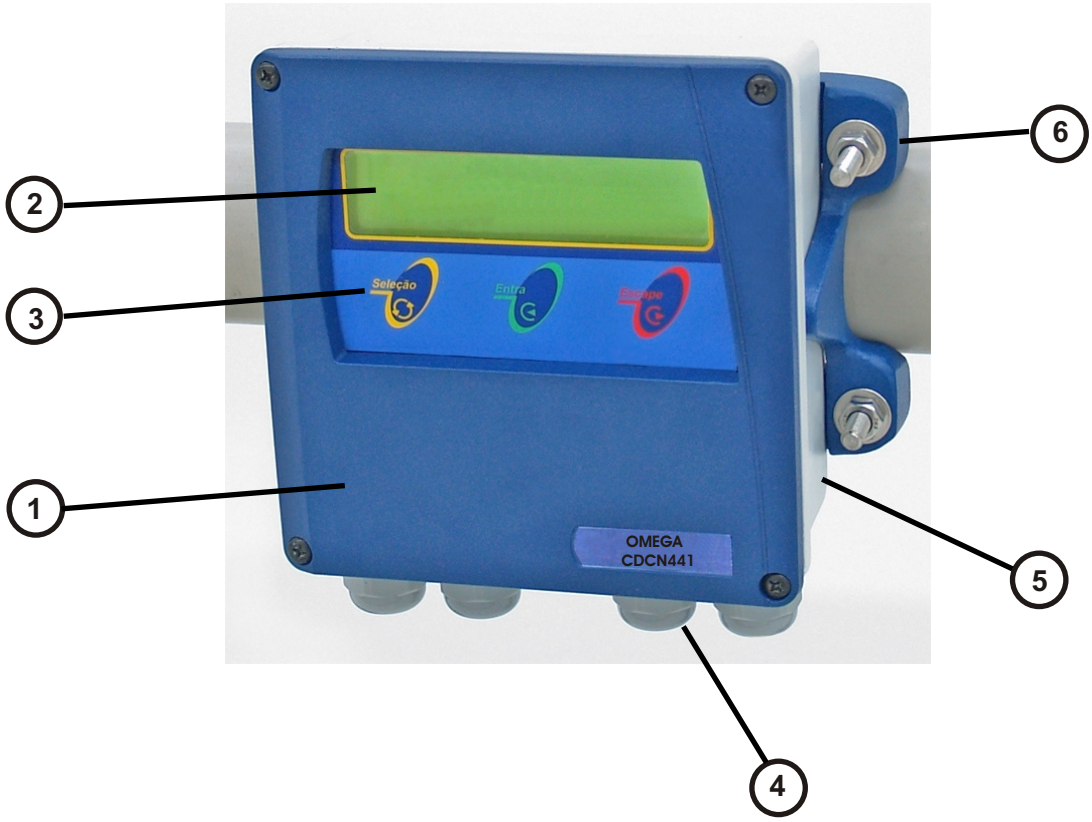
| Transmiter | |
|---|---|
| Output Signal | Analogic 4 to 20 mA with adjustable output range. Digital RS-485 with bilateral interaction thru software up to 36 equipments 2 km apart (optional). |
| Galvanic Isolation | 2000 VAC (by opto coupler) |
| Line Resistance | 600 Ohms |

| Controller | |
|---|---|
| Actuation Type | Frequency Modulation, P+Di |
| Set Point | 2 independent from 0 to 100% of scale |
| Output | 2 control ON-OFF, NO (1A, 260Vac) |
| Auto Clean Controller | ON-OFF, for Periods up to 99seconds, in intervals up to 180hours |

| Accessories | |
|---|---|
| Supplied with equipment: | Installation hardware (2x), Instruction Manual, SS 304 Clamps with nuts and washers |

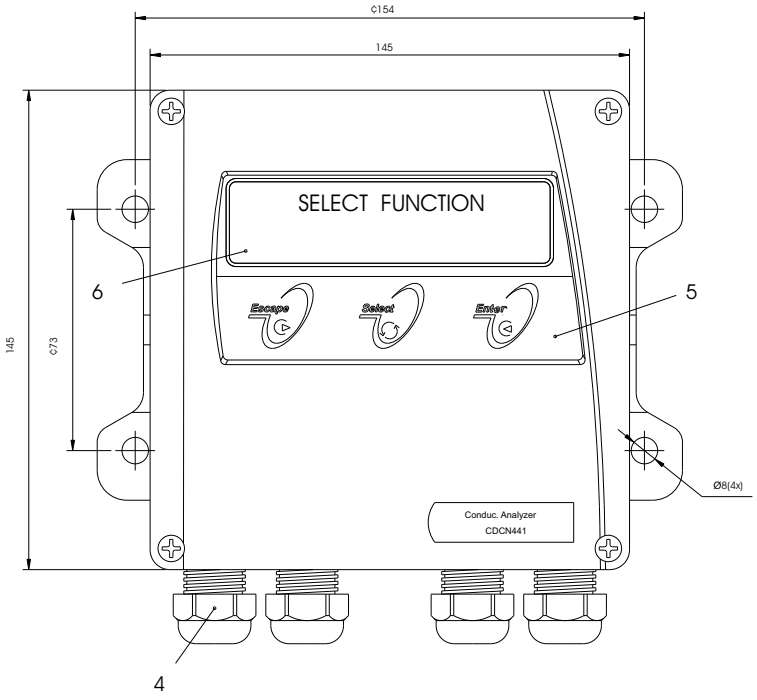
# 3. Mechanical Description

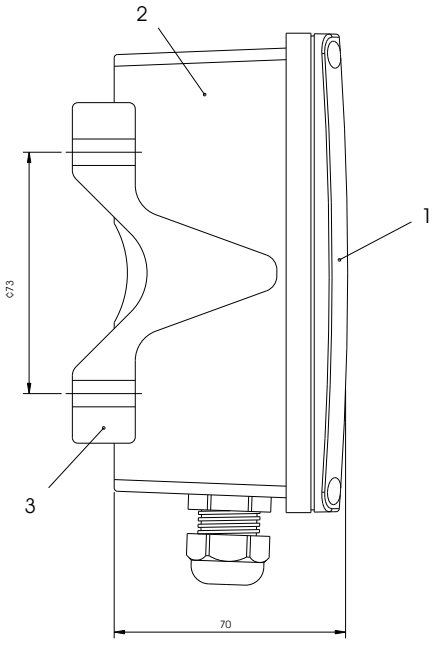
The equipment is offered in **SAE-323** aluminum case with lower oxidation level, anti corrosion treatment and electrostatic epoxy paint finishing and frontal panel in ABS. Built in small and light size, complying with **IP-68** Standard.
Under the same case you will find: Local Indicator, Analyzer, Transmitter and Controller.
The mounting of the instrument can be done on 2” Tube" or in Flat Surface or Wall Mounting.
The electrical connection is possible thru a terminal block located internally at the lower portion of
The case and the cable knockouts are located in the bottom of the case, 4x 3/8".

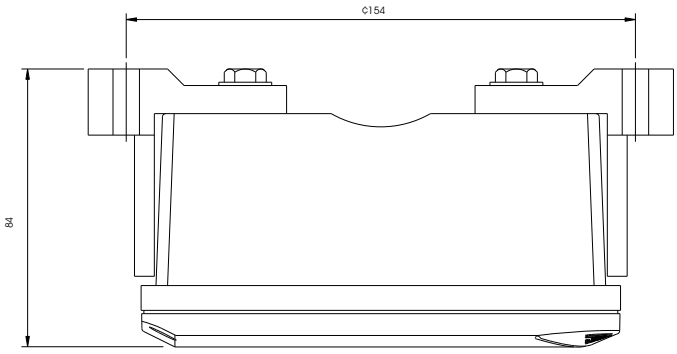



1 - Frontal panel in ABS.
2 - Display alphanumeric 2 lines x 16 characters.
3 - 3 keys Tactile Membrane Keyboard:
<SELECT> = Select the desired operation, flashing option.
<ENTER> = Enter the program commands for analysis, confirm above Selected Function.
<ESCAPE> = Move back one step at every touch or if hold for about 5 seconds to exit reading mode.
4 - Cable knockouts 4x 3/8"
5 - Aluminum Case (SAE 323).
6 - Installation Hardware for Wall Mounting, 2” tube and panel.

# 4. Dimensional



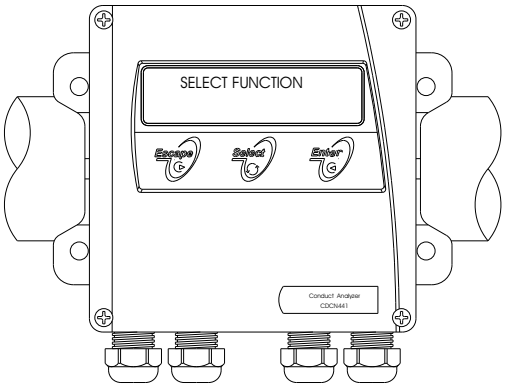

| Item | Description |
|---|---|
| 1 | Frontal Panel in ABS |
| 2 | Aluminum Case |
| 3 | Intallation Hardware for panel, Flat Surface or 2” Tube |
| 4 | Cable Knockout 3/8” |
| 5 | 3 Keys Keyboard |
| 6 | Alphanumeric Display 2lines x 16characters |

Note: Dimensions in millimeters

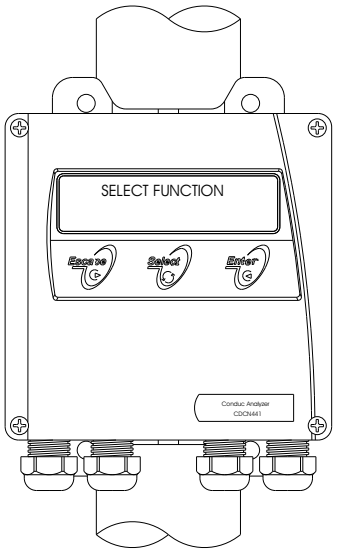
# 5. Typical Installation

The **CDCN-44I** can be installed in 3 different ways: Panel, 2” Tube and Flat Surface.
For installation purpose the instrument is offered with the following hardware: 2 Installation Support, 4 SS screws ¼" x ½", 4 SS washers ¼", 2 "U" SS clamps , 2 SS nuts and 2 SS washers ¼".
These hardware allow 3 different ways for installation, to know:
**a)** Installation in 2” tube: Uses 2 installation support + 2 "U" clamps with nuts and washers.
**b)** Installation in Panel: Uses 2 installation support ; the edges will be placed against the internal surface of the panel, 4 screws. ¼" x ½” will be used to hold it in place.
**c)** Installation in Flat Surface(Wall Mount): Uses 2 installation support and “U” clamps holes are also used to hold the instrument in place at flat surface.

2" TUBE INSTALLATION

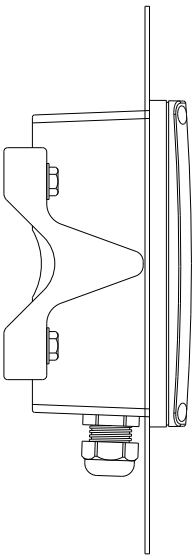



POSITION A

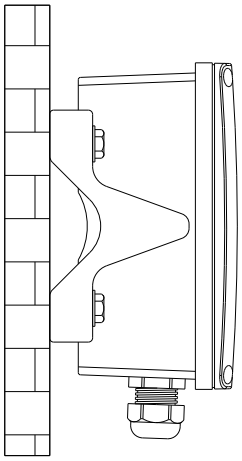



POSITION B

PANEL INSTALLATION



FLAT SURFACE INSTALLATION



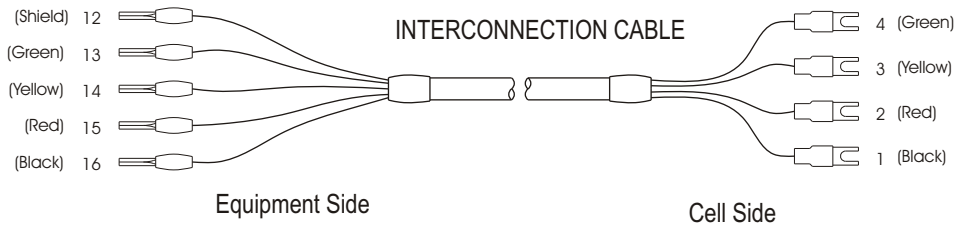
# 6. Electrical Installation

1- Remove the equipment from the box and verify for any possible damage caused during transportation;
2- Install the equipment at an strategic place, allowing easy access, exempt of vibration and vapors, follow the information supplied on page 6 (Typical Installation);
3- Avoid exposing the equipment direct to solar rays; and if necessary supply protection to the case;
4- Verify if the electrical installation is correct, and if security circuit breakers are installed and if grounding is performed correctly;
5- Proceed with the equipment installation.

## Electrical Installation

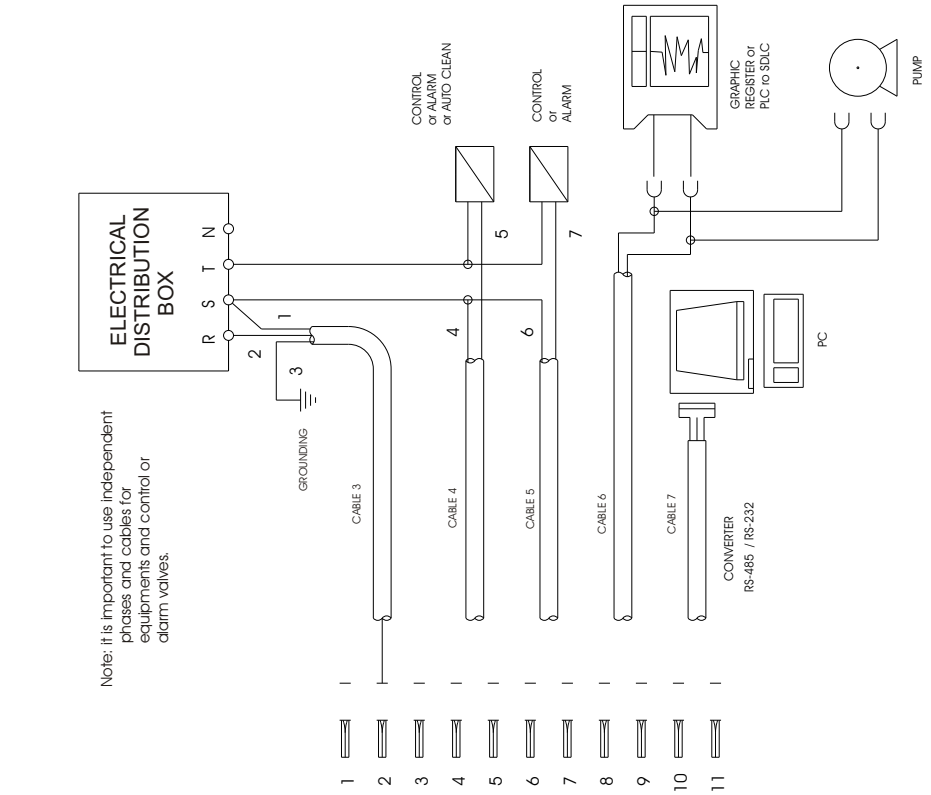
1- Remove the frontal lid of the equipment;
2- Insert the cables thru the cable knockouts, certifying that the connections are correct, verifying the identifications drawing and the electrical schematics;
3- The cables must be firmly attached to the cable knockout, avoiding humidity from being created inside the equipment and preserving IP 67 enclosure;.

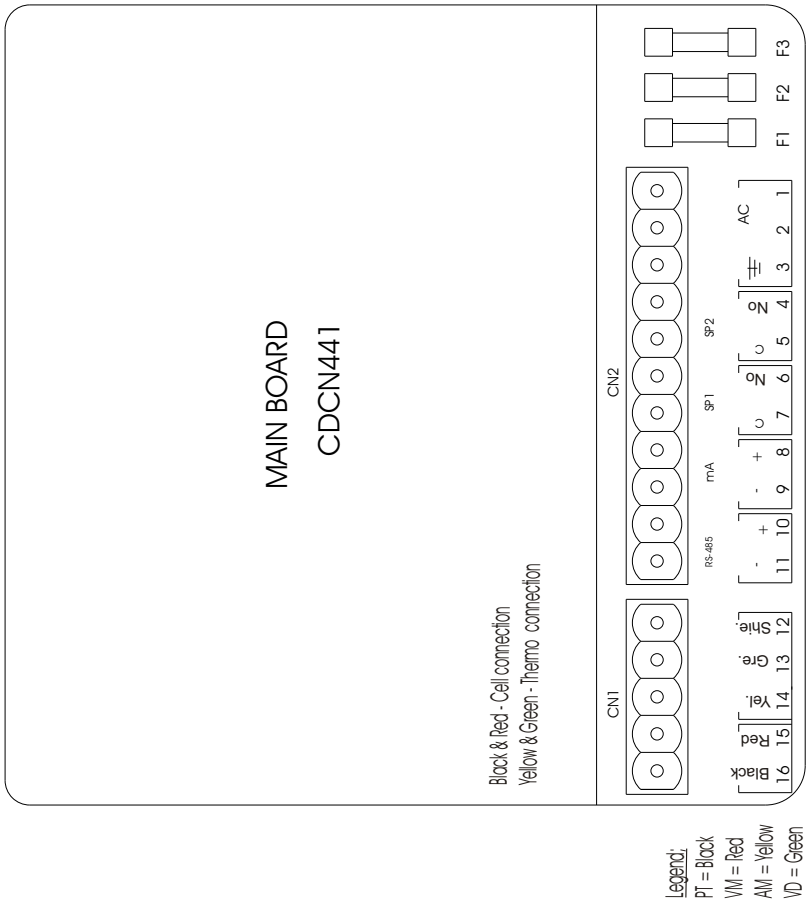
Never cut or mend the probe cables, as reading errors could occur.




(Note: above cable is not supplied with the Analyzer, only with cell!)

# 7. Electrical Schematic



# 8. Equipment Installation

## Set Up Operation

The menus are self explanatory with its respective options, that are selected by press **<SEL>** key. When the selected option flashes, press **<ENT>** key to confirm the selected option.
If a mistake is made, press **<ESC>** key to go back (one step at every touch) and modify the option, except while during Reading Mode, when **<ESC>** key needs to be held for about 5seconds in order to exit this mode.

The equipment offers a non-volatil memory (**E2PROM**), in order to store operations functions (resolution, reading, Calibration and more). Even when turned off from power, all functions chosen during set up will remain stored.

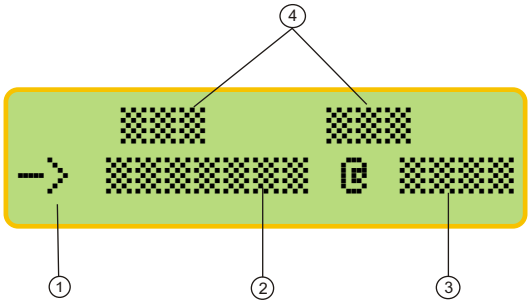
Before starting any work with the equipment, it is recommended to **verify the SET UP parameters,** to certify that you have chosen the correct options for the operation .
When at the **FUNCTION SELECT** menu, press **<SEL>** key in order to select the desired function, flashing option, then press **<ENT>** key. In order to access the **SET UP**, press **<SEL>** key until SET function flashes, then press **<ENT>** key to confirm the option chosen. A Password will be requested, press in sequence **<SEL>**, **<ENT>**, **<ESC>** then follow step by step the options shown at the screen. In case the user desires to change the flashing option, press **<SEL>** key until the desired option flashes then press **<ENT>** key to confirm the option.
In order to move to the next screen, user must press **<ENT>** key .

## Check Operation

The option Cell Check is very useful, as it allows the user to verify the cell condition. This option is self explanatory, just press **<SEL>** key until Check option flashes, then press **<ENT>** key to confirm it. Then follow The display instructions as it is self explanatory.

## Read Operation

At this operation user will have options to **CALIBRATE** and **READ**. In case the desire is to **CALIBRATE** the Cell, press **<SEL>** key until **Cal** option flashes, then press **<ENT>** key to confirm the option chosen. From this point on the program will guide the user step by step on how to proceed with the perfect calibration. In case the desire is to Read, press **<SEL>** key until option **Read** flashes, then press **<ENT>** key to confirm, then the Display show the following form:




1- The "**Prompt**" is a signal that flashes every time a reading is performed, depending upon the time between readings, that can be selected during Set Up Mode.
2- The measured value (Conductivity or Resistivity).
3- The Reference Temperature (chosen during Set Up Mode).
4- - Set Points 1 & 2 conditions.

# 8. Equipment Installation (cont.)

## Important Information

1- While at **Reading**, user can obtain other information: by pressing **<SEL>** key, it is possible to obtain Temperature or Set-Points values. Pressing **<ENT>** key, will place the equipment in **STAND BY** Mode. While in **STAND BY** the outputs will be turned off, that means, the output current will be altered to 4 mA and the contacts are NO (Normally Open). The outputs must be programmed by the user.

2- **<ESC>** key will only be recognized if pressed for a longer period of time (about 5 seconds), while at Reading Mode. This time is necessary in order for the equipment to certify that the user really wants to exit the Reading Mode.

3- In the event of a power failure, the equipment will retain initial set up as prior of being turned off, when the power returns, the outputs and the display will return to activities prior of being turned off.

4- Every time the cell is replaced by a new one, it is necessary to match the thermo compensator value with the instrument and in order to do so, place tap water into a beaker then using a thermometer, measure the Temperature of the tap water (C).

Access SET UP Mode and when prompted with question “NEW CELL?” choose YES, then confirm by choosing YES again, then adjust the temperature shown at the display in order to match the temperature of the water at the beaker, then press Enter and wait until finished.

When the instrument is shipped from factory with the instrument, the cell had been previously thermostatized and no further procedure is necessary!

# 9. Equipment Operation - Turning On

## Basic Operation

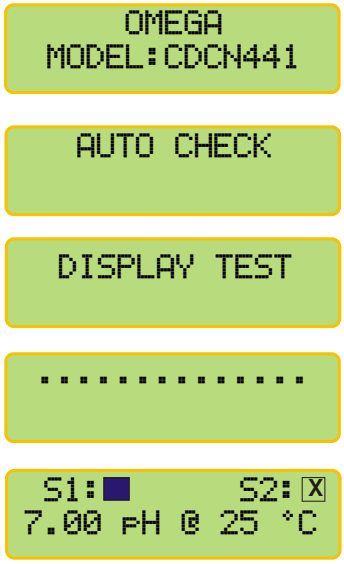
1 - The Software offers self-explanatory menus interacting with the user. The active menu is shown like and Flashing option. Press **<SELECT>** key in order to move around and pick the desired flashing option, then press **<ENTER>** key to confirm it.

2 - In case of an error, to modify the data or to go back to a prior menu, press **<ESCAPE>** key.

3 -The equipment stores every configuration in a non-volatile memory ($E^2$PROM). Even when turned off, the last working conditions will be sustained.
4- This instrument works for Temperature compensation NTC (Negative Temperature Compensation) but it can also be supplied for Pt100, Pt1000, PTC3000 and Manual. The instruments will automatically recognize if a Thermo Compensator is attached or not to the instrument!

## Turning On the equipment

1 - Connect the instrument to power . It will go straight to reading Mode. Below screens will be displayed!




Performing Auto Check for memories, EPROM and E2PROM.

Performing the Display Check

(***)Press and Hold **<ESC>** if user desires to exist the Reading Mode and access the Main Menu (page 12). This action will not halt Reading operation of the instrument, while the user performs another operation.
If the user desires to Halt the operation, first place the instrument in Stand By Mode by pressing **<ENT>** key, then press and hold **<ESC>** key to exit reading mode and access the Select Function.

Interpreting the Read menu. For S1, the ■ indicates that this contact was set as On during Set Up and it is now operating. For S2, the □ indicates that this contact was set as On during Set Up but it is not operating now and it can also be shown as X if the Contact was set to Off during Set Up.

**Note A:** Every time you see the symbols ">" and "<", that means that the user can adjust the displayed value up or down.
To increase the value pres **<SEL>** key until ">" flashes, then press **<ENT>** to confirm, then press **<SEL>** key and at every touch the value will increase by one unit.
To decrease the value press **<SEL>** key until "<" flashes, then press **<ENT>** to confirm, then press **<SEL>** key and at every touch the value will decrease by one unit.
If a mistake is made, press **<ESC>** key to return and correct the value!

# 9.1 Equipment Operation - Conductivity - Set Up

At the beginning of every operation, verify the Set Up conditions of the equipment and certify the parameters are correct for your application.

Press **<SEL>** key until **Conductivity** option flashes, then press **<ENT>** key to confirm.


Press **<SEL>** until **Set Up** flashes then press **<ENT>** key.


A Password is required in order to access the SET UP. Press in sequence **<SEL>**, **<ENT>** and **<ESC>** keys.

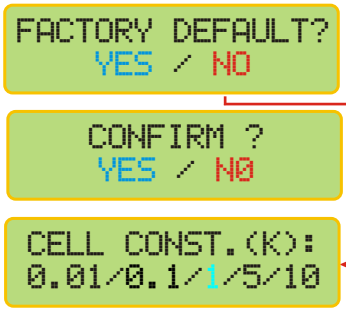

In order to select the desired language, press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm.


User can program the instrument, such as Electrode type, Resolution and more. If chosen **No**, the last configuration will remain in effect. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm.


1 Go to page 13

The Unit cannot be changed. It is default from factory.


You can calibrate the instrument as factory default. Choose **Yes** and confirm and the instrument will calibrate as factory default! This option is offered in case the user does have any other way to perform a calibration procedure.




The user will be able to choose the Cell Constant. Press **<SEL>** until the desired option flashes then confirm by presssing **<ENT>**.




The Range cannot be changed. It is default from factory, depending only on the Cell Constant chosen.


The user will be allowed to adjust the Conductivity value read at sample. Press **<SEL>** until the desired option flashes then confirm by presssing **<ENT>**.

# 9.1 Equipment Operation-Conduct.-Set Up(cont.)

User can fully adjust the Standard value. Refer to page 11 (Note A) for instructions on how to modify this value.

In order to select the desired reference temperature, press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

User can fully adjust the Reference Temperature value. Refer to page 11 (Note A) for instructions on how to modify this value.

User can fully adjust the Temperature Coefficient value. Refer to page 11 (Note A) for instructions on how to modify this value.

If chosen Manual, user will need to measure the process temperature and inform if to the instrument while at Reading Mode.

User can choose between the following Reading Modes:
Continuous - Read continuously
Average - Reads the average after time is set

User can program the time between Readings. Refer to Page 11 (Note A)for instructions on how to adjust this time.

User can program the display to show information like Barr graph, Contact, Current and more. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

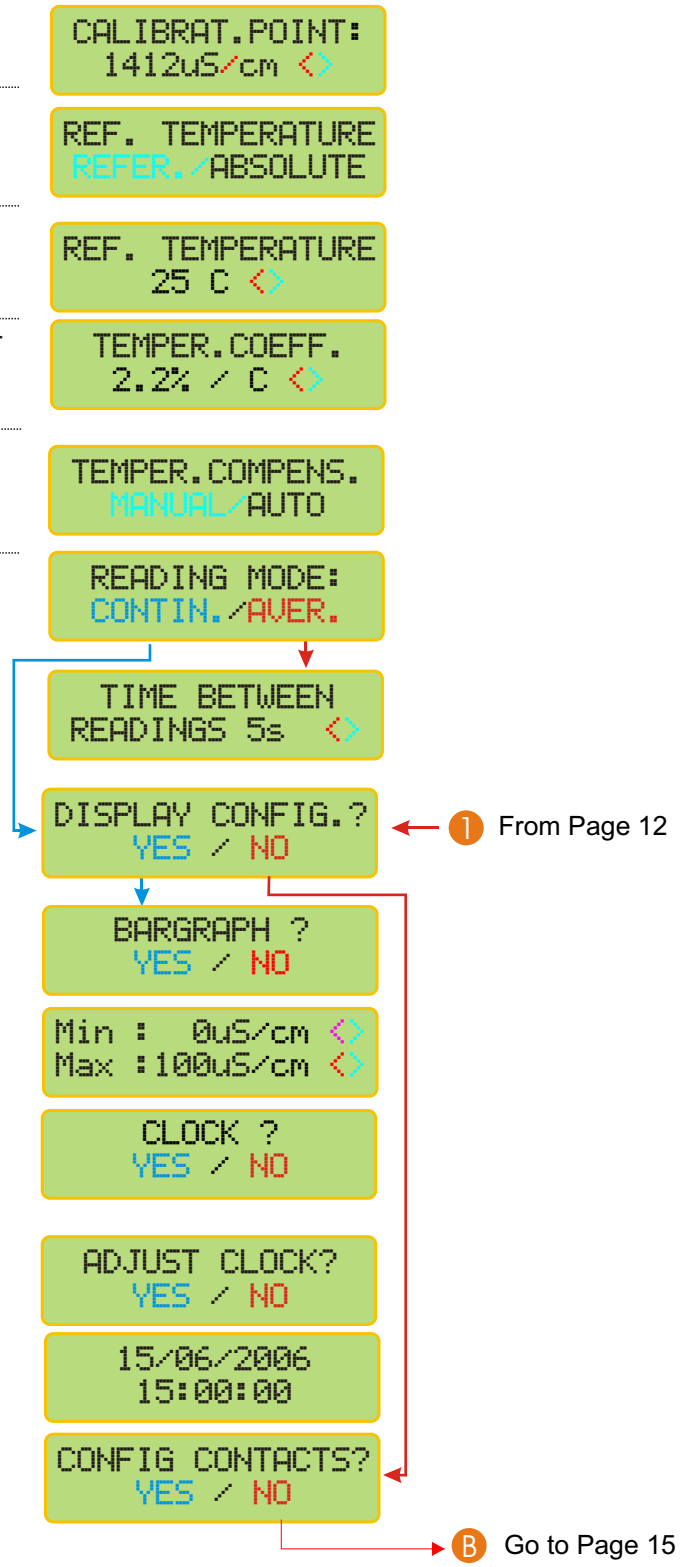
User can choose if desire to have Barr graph shown above the Reading screen. When Bar Graph is displayed, the information about Sensibility and Sample Temperature will not be displayed!
User can now adjust the Minimum and Maximum values for the Bar Graph. Refer to page 11(Note A) for instructions on how to modify this value.

User can choose to display date/clock on display, when equipment is turned off.

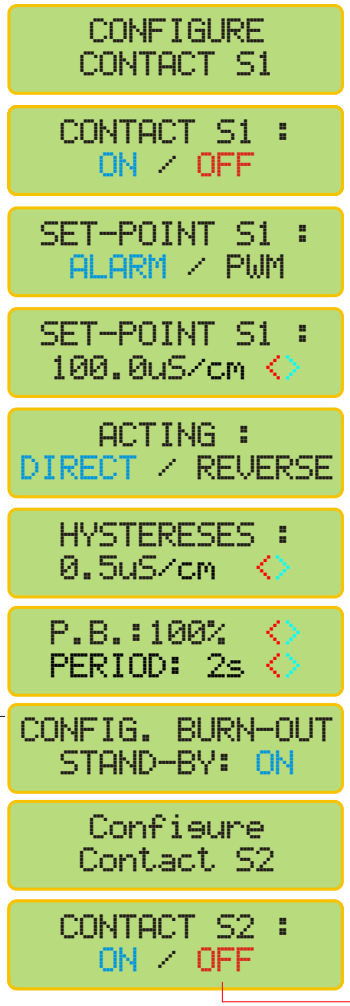
User can adjust date and clock, if desired.

Use **<SELECT>** key to change numbers and when finished, press **<ENTER>** key. If a mistake is made, press **<ESCAPE>** key to move back.

User has the option to configure Contacts SP 1, SP 2 and SP 3. Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm.



# 9.1 Equipment Operation-Conduct.-Set Up (cont.)




If user chooses Contact S1 as On, while at Reading Mode, a ■ or a □ will be displayed after the S1, indicating that this Contact is On. If user chooses Contact S1 as Off, while at Reading Mode, a [X] will be displayed after the S1, indicating that this Contact is Off.

User can program the SP 1 for Alarm or PWM. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

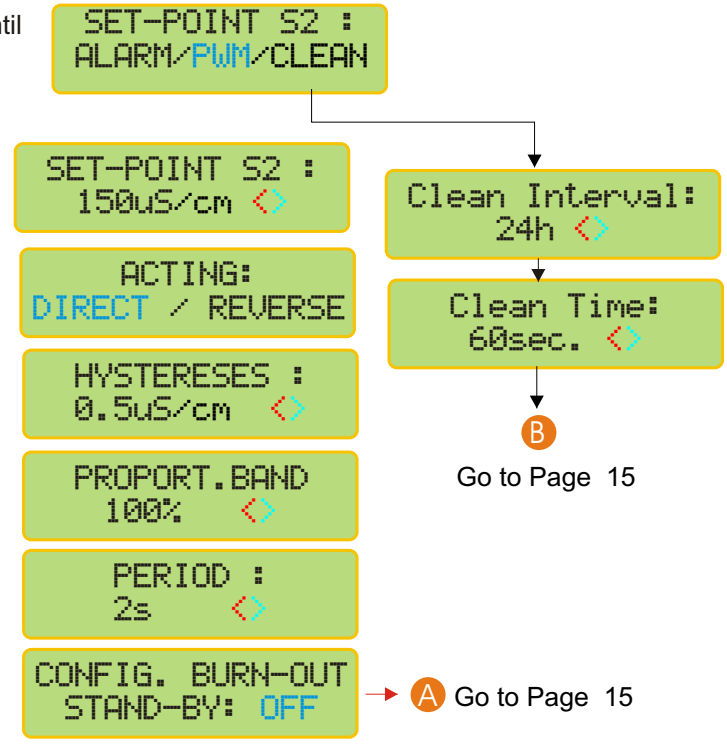
User can adjust the value for SP 1.
Refer to Page 11 (Note A)for instruction on how to modify this value.

User can choose the Acting desired.
Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm .

User can adjust the value for Hystereses, Proportional Band and Period. Refer to Page 11 (Note A) for instruction on how to adjust this value. Resolution will depend upon the Resolution chosen while at Set Up. PB and Period will be accessed only if PWM was chosen for the SP1.

For the Burn Out configuration, user will have three options as: On - Contact is going to stay On all the time, Off - contact will stay Off all the time or Hold - contact is going to follow the last situation, before going to Hold status.
Press **<SEL>** key until the desired option flashes, then press **<ENT>** to confirm.

If user chooses Contact S2 as On, while at Reading Mode, a ■ or a □ will be displayed after the S2, indicating that this Contact is On. If user chooses Contact S2 as Off, while at Reading Mode, a [X] will be displayed after the S2, indicating that this Contact is Off.




User can program the SP 1 for Alarm or PWM. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

User can adjust the value for SP 1(either Conductivity or Temperature.. Refer to Page 11 (Note A)for instruction on how to adjust this value. Resolution will depend upon the Resolution chosen while at Set Up.

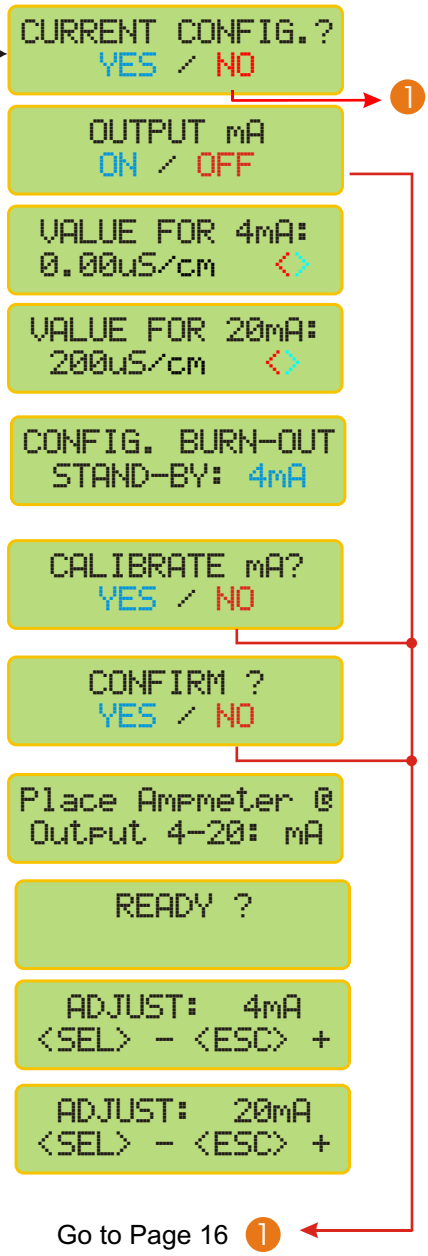
User can choose the Acting desired.
Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm .

User will be able to inform the Hystereses, Proportional Band and period. Refer to Page 11 (Note A) for instruction on how to adjust this values.
PB and Period will be accessed only if PWM was chosen for the SP 2.

For the Burn Out configuration, user will have three options as: On - Contact is going to stay On all the time, Off - contact will stay Off all the time or Hold - contact is going to follow the last situation, before going to Hold status. Press **<SEL>** key until the desired option flashes, then press **<ENT>** to confirm.

# 9.1 Equipment Operation-Conduct.-Set Up (cont.)

From Page 13 & 14 B




1 Go to Page 16

User is given the option to configure the burn out for mA when the instrument goes to Stand By mode. Press **<SEL>** key until desired option flashes(4mA, 20mA or Hold), then press **<ENT>** key to confirm.

Connect Amp Meter to output 4-20mA and it will be possible to adjust them, then press **<ENTER>** when ready.
Adjust the value as needed by pressing **<SELECT>** (to decrease) or **<ESCAPE>** (to increase) keys, so the outputs can be adjusted.
**<SELECT>** key will decrease the value and **<ESCAPE>** key will increase.

Go to Page 16 1

# 9.1 Equipment Operation-Conduct.-Set Up (cont.)

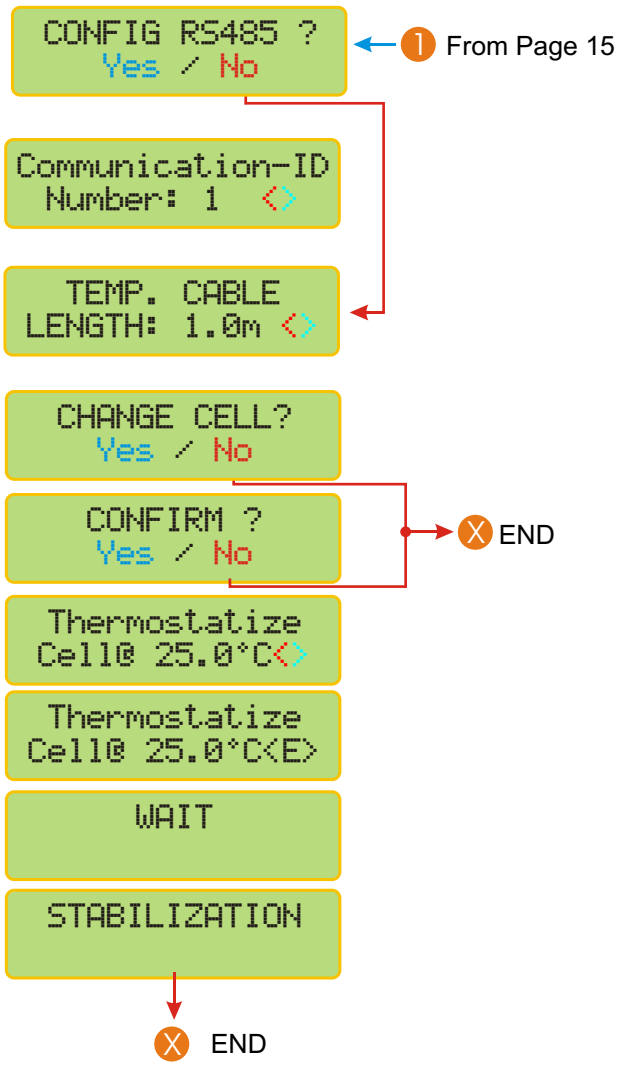
User will have the option to configure digital output RS-485 for Proprietary Protocol. Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm .

User will be able to define the instrument identification number within the network, up to 256 instruments. Refer to Page 11 (Note A) for instruction on how to adjust this value.

User will be able to inform the Temperature Cable Length. Refer to Page 10 (Note A) for instruction on how to adjust this value. From O thru 99meters.

If user is replacing the Cell of the instrument, it is necessary to adjust its temperature. If replacing the Cell, choose Yes and confirm.

First find out any sample temperature (any sample, like tap water), then adjust the temperature at the screen, to match the sample temperature being used. Refer to page 11 (Note A) for instruction on how to modify this value. Dip the Thermo into the used sample, then press **<ENTER>** key.



# 9.2 Equipment Operation - Conduct. - Calibration

Press **<SEL>** key until Conductivity flashes, then press **<ENT>** to confirm the option chosen.

SELECT FUNCTION
COND./RES./CONC.

Press **<SEL>** key until Read flashes, then press **<ENT>** to confirm the option chosen.

COND.: Read /
Set Up / Check

Press **<SEL>** key until Calibrate flashes, then press **<ENT>** to confirm the option chosen.

COND.: Read /
Calibrate

WAIT

Dip cell at Standard 1412uS/cm, like chosen during Set Up operation, based on Cell constant.

PLACE CELL
@ STD

Press **<ENT>** key when Ready!

1412uS/cm
READY ?

WAIT

CELL CONSTANT(K)
1.0cm-1

Wash electrode using plenty of water.

WASH CELL!

Press **<ENT>** key when Ready!

READY ?

Go to Sample!
Ready?

Go to Page 18

# 9.3 Equipment Operation - Conductivity - Read

Press **<SEL>** until Conductivity flashes, then press **<ENT>** to confirm.

Press **<SEL>** until Read flashes, then press **<ENT>** to confirm.

Press **<SEL>** until Read flashes, then press **<ENT>** to confirm.

When Ready, press **<ENT>** key

After the Reading is performed the following screen will be displayed. In order to place the instrument in Stand-by Model, press **<ENT>** key and press **<ESC>** key to go back. Refer to instructions on Page 11(***)
In order to advance, press **<SEL>** key

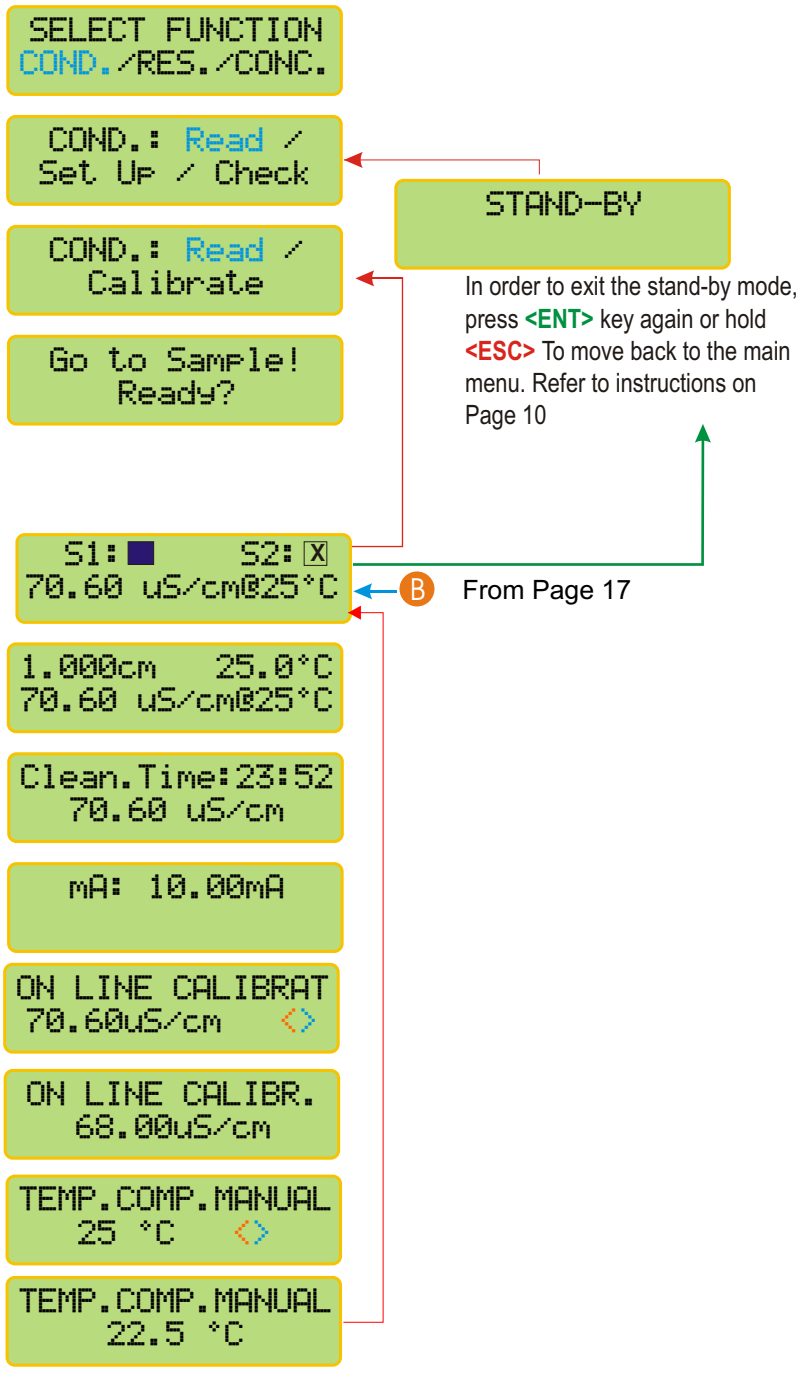
In order to advance, press **<SEL>** key

In order to advance, press **<SEL>** key

In order to advance, press **<SEL>** key

In order to adjust the value read, Press **<SEL>** key, if chosen Man, During Set Up, for On Line Calibr..

If during Set Up, user had chosen Temperature Compensation as Manual, it would be necessary to inform the process Temperature at this point. Refer to page 11 (Note A) for instructions on how to adjust this value.




In order to exit the stand-by mode, press **<ENT>** key again or hold **<ESC>** To move back to the main menu. Refer to instructions on Page 10

From Page 17

Press and hold **<ESC>** key for about 5seconds in order to exit the Readng Mode.

***Note:*** while during Reading, user can press **<ENT>** key in order to place the equipment in Stand By Mode.

# 9.4 Equipment Operation - Conductivity - Check

Press **<SEL>** until Conductivity flashes, then press **<ENT>** to confirm.

SELECT FUNCTION
COND./RES./CONC.

Press **<SEL>** until Check flashes, then press **<ENT>** to confirm.

COND. : Read / Set Up / Check

CELL CHECK

Dip Cell at Standard shown. This value depends on the Cell constant being used.

PLACE CELL @ STD
1412uS/cm

Press **<ENT>** key when Ready!

Ready?

WAIT

Wash Cell using plenty of water.

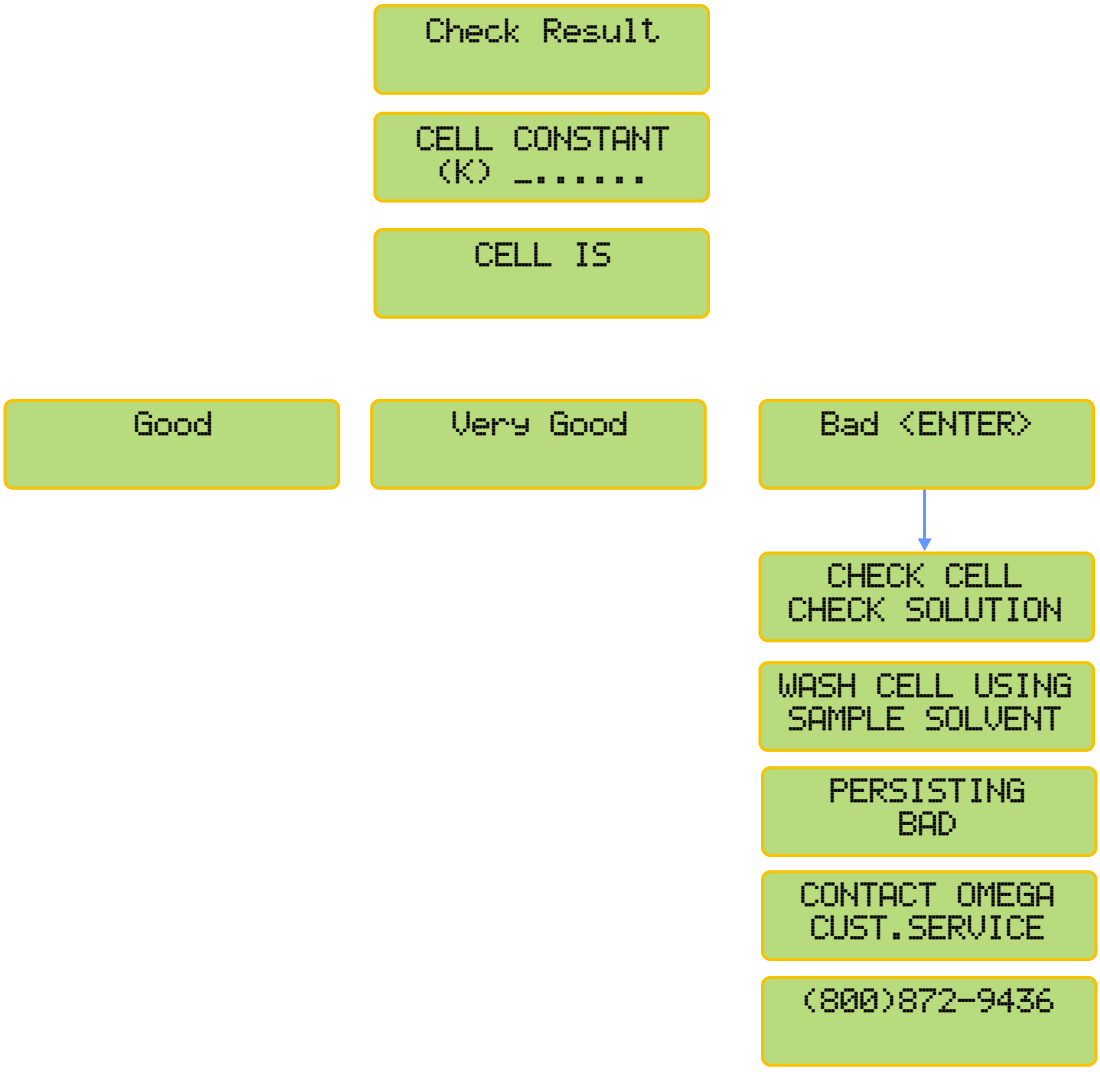
WASH CELL

Press **<ENT>** key when Ready!

READY ?

A
Go to Page 20

# 9.4 Equip. Operation - Conductivity - Check(cont.)



# 9.5 Equipment Operation - Resistivity - Set Up

At the beginning of every operation, verify the Set Up conditions of the equipment and certify the parameters are correct for your application.

Press **<SEL>** key until **Resistivity** option flashes, then press **<ENT>** key to confirm.


Press **<SEL>** until **Set Up** flashes then press **<ENT>** key.


A Password is required in order to access the SET UP. Press in sequence **<SEL>**, **<ENT>** and **<ESC>** keys.


In order to select the desired language, press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm.


User can program the instrument, such as Electrode type, Resolution and more. If chosen **No**, the last configuration will remain in effect. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm.


1 Go to page 22

The Unit cannot be changed. It is default from factory.


You can calibrate the instrument as factory default. Choose **Yes** and confirm and the instrument will calibrate as factory default! This option is offered in case the user does have any other way to perform a calibration procedure.



The user will be able to choose the Cell Constant. Press **<SEL>** until the desired option flashes then confirm by presssing **<ENT>**.


The Range cannot be changed. It is default from factory, depending only on the Cell Constant chosen.


The user will be allowed to adjust the pH value read at sample. Press **<SEL>** until the desired option flashes then confirm by presssing **<ENT>**.

# 9.5 Equipment Operation-Resistivity-Set Up(cont.)

User can fully adjust the Standard value. Refer to page 11 (Note A) for instructions on how to modify this value.

In order to select the desired reference temperature, press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

User can fully adjust the Reference Temperature value. Refer to page 11 (Note A) for instructions on how to modify this value.

User can fully adjust the Temperature Coefficient value. Refer to page 11 (Note A) for instructions on how to modify this value.

If chosen Manual, user will need to measure the process temperature and inform if to the instrument while at Reading Mode.

User can choose between the following Reading Modes:
Continuous - Read continuously
Average - Reads the average after time is set

User can program the time between Readings. Refer to Page 11 (Note A)for instructions on how to adjust this time.

User can program the display to show information like Barr graph, Contact, Current and more. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

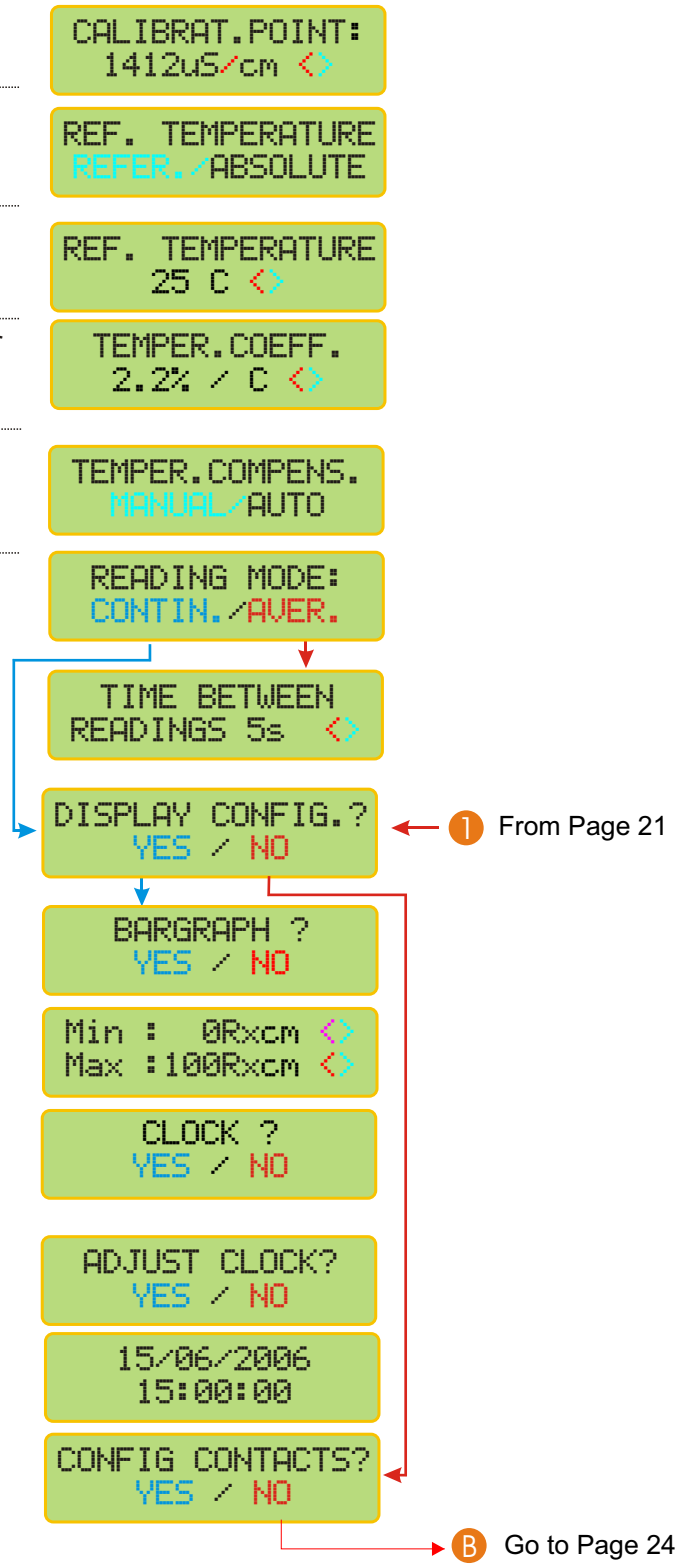
User can choose if desire to have Barr graph shown above the Reading screen. When Bar Graph is displayed, the information about Sensibility and Sample Temperature will not be displayed!
User can now adjust the Minimum and Maximum values for the Bar Graph. Refer to page 11(Note A) for instructions on how to modify this value.

User can choose to display date/clock on display, when equipment is turned off.

User can adjust date and clock, if desired.

Use **<SELECT>** key to change numbers and when finished, press **<ENTER>** key. If a mistake is made, press **<ESCAPE>** key to move back.

User has the option to configure Contacts SP 1, SP 2 and SP 3. Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm.



# 9.5 Equipment Operation-Resistivity-Set Up(cont.)

If user chooses Contact S1 as On, while at Reading Mode, a ■ or a □ will be displayed after the S1, indicating that this Contact is On. If user chooses Contact S1 as Off, while at Reading Mode, a [X] will be displayed after the S1, indicating that this Contact is Off.

User can program the SP 1 for Alarm or PWM. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

User can adjust the value for SP 1.
Refer to Page 11 (Note A)for instruction on how to modify this value.

User can choose the Acting desired.
Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm .

User can adjust the value for Hystereses, Proportional Band and Period. Refer to Page 11 (Note A) for instruction on how to adjust this value. Resolution will depend upon the Resolution chosen while at Set Up. PB and Period will be accessed only if PWM was chosen for the SP 1.

For the Burn Out configuration, user will have three options as: On - Contact is going to stay On all the time, Off - contact will stay Off all the time or Hold - contact is going to follow the last situation, before going to Hold status.
Press **<SEL>** key until the desired option flashes, then press **<ENT>** to confirm.

If user chooses Contact S2 as On, while at Reading Mode, a ■ or a □ will be displayed after the S2, indicating that this Contact is On. If user chooses Contact S2 as Off, while at Reading Mode, a [X] will be displayed after the S2, indicating that this Contact is Off.

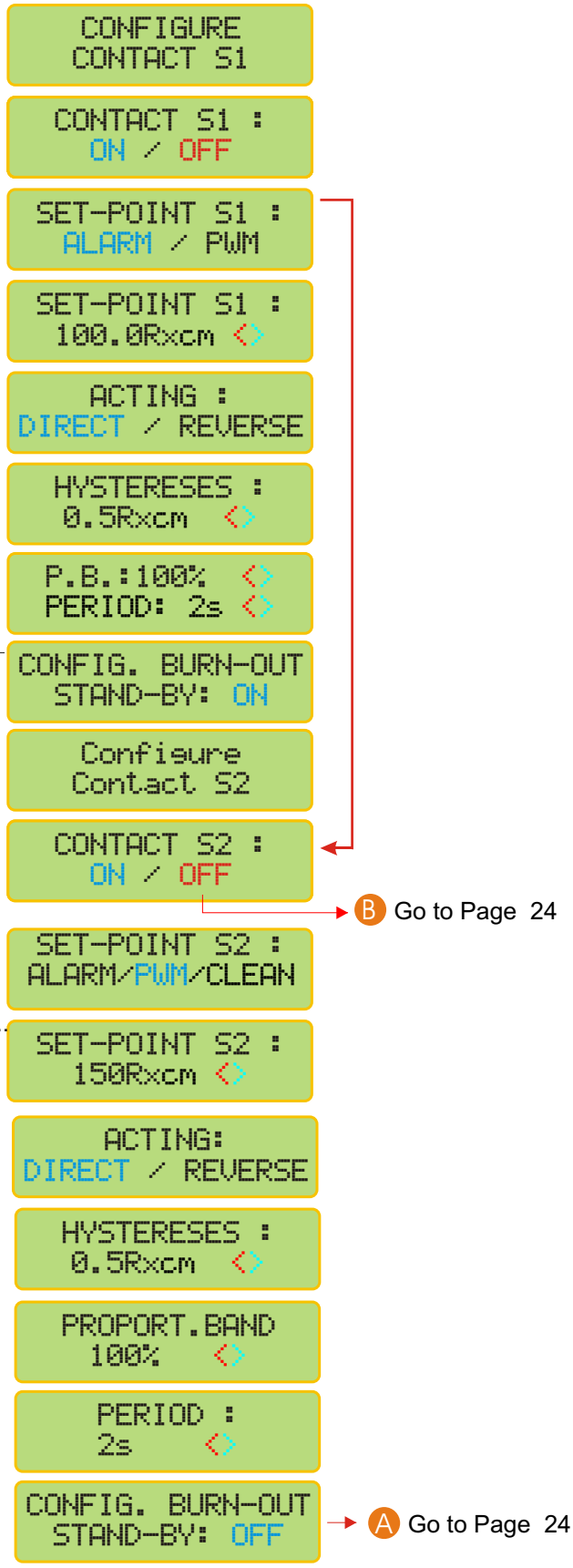
User can program the SP 1 for Alarm or PWM. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

User can adjust the value for SP 1(either Conductivity or Temperature..
Refer to Page 11 (Note A)for instruction on how to adjust this value. Resolution will depend upon the Resolution chosen while at Set Up.

User can choose the Acting desired.
Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm .

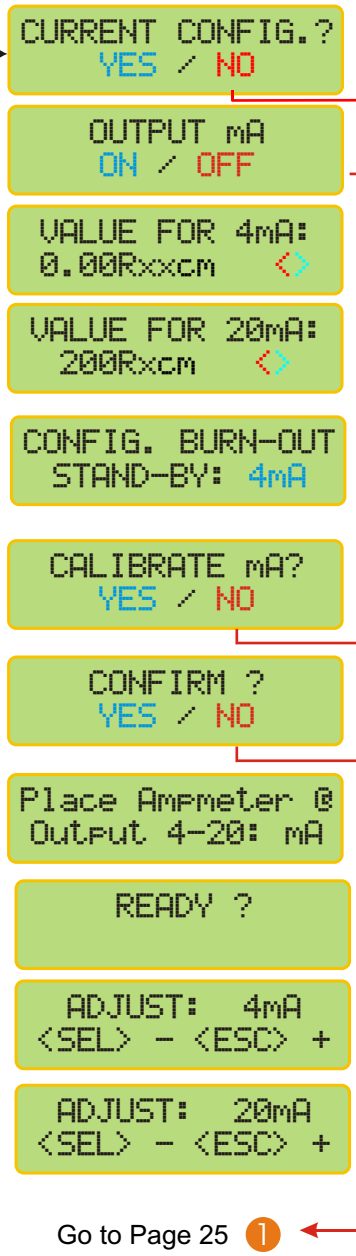
User will be able to inform the Hystereses, Proportional Band and period. Refer to Page 11 (Note A) for instruction on how to adjust this values.
PB and Period will be accessed only if PWM was chosen for the SP 2.

For the Burn Out configuration, user will have three options as: On - Contact is going to stay On all the time, Off - contact will stay Off all the time or Hold - contact is going to follow the last situation, before going to Hold status. Press **<SEL>** key until the desired option flashes, then press **<ENT>** to confirm.



# 9.5 Equipment Operation-Resistiv.-Set Up (cont.)

From Page 22 & 23 B




1 Go to Page 25

User is given the option to configure the burn out for mA when the instrument goes to Stand By mode. Press **<SEL>** key until desired option flashes(4mA, 20mA or Hold), then press **<ENT>** key to confirm.

Connect Amp Meter to output 4-20mA and it will be possible to adjust them, then press **<ENTER>** when ready.
Adjust the value as needed by pressing **<SELECT>** (to decrease) or **<ESCAPE>** (to increase) keys, so the outputs can be adjusted.
**<SELECT>** key will decrease the value and **<ESCAPE>** key will increase.

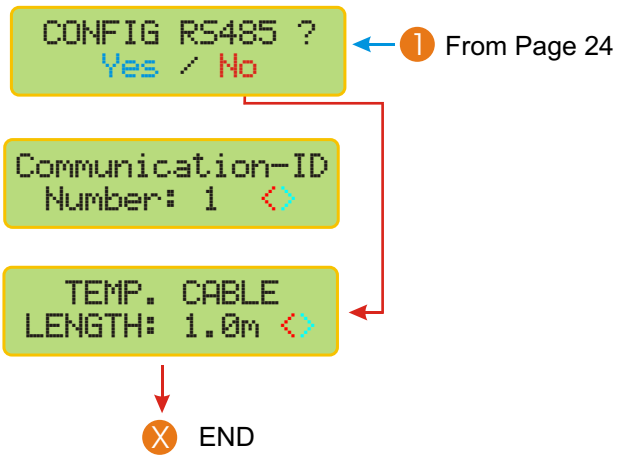
Go to Page 25 1

# 9.5 Equipment Operation-Resistiv.-Set Up (cont.)

User will have the option to configure digital output RS-485 for Proprietary Protocol. Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm .

User will be able to define the instrument identification number within the network, up to 256 instruments. Refer to Page 11 (Note A) for instruction on how to adjust this value.

User will be able to inform the Temperature Cable Length. Refer to Page 11 (Note A) for instruction on how to adjust this value. From O thru 99meters.



# 9.6 Equipment Operation - Resist. - Calibration

Press **<SEL>** key until Resistivity flashes, then press **<ENT>** to confirm the option chosen.

SELECT FUNCTION
COND./RES./CONC.

Press **<SEL>** key until Read flashes, then press **<ENT>** to confirm the option chosen.

RESIS.: Read /
Set Up / Check

Press **<SEL>** key until Calibrate flashes, then press **<ENT>** to confirm the option chosen.

RESIS.: Read /
Calibrate

WAIT

Dip cell at Standard 1412uS/cm, like chosen during Set Up operation, based on Cell constant.

PLACE CELL
@ STD

Press **<ENT>** key when Ready!

1412uS/cm
READY ?

WAIT

CELL CONSTANT(K)
1.0cm-1

Wash electrode using plenty of water.

WASH CELL!

Press **<ENT>** key when Ready!

READY ?

Go to Sample!
Ready?

1 Go to Page 27

# 9.7 Equipment Operation - Resistivity - Read

Press **<SEL>** until Resistivity flashes, then press **<ENT>** to confirm.

Press **<SEL>** until Read flashes, then press **<ENT>** to confirm.

Press **<SEL>** until Read flashes, then press **<ENT>** to confirm.

When Ready, press **<ENT>** key

After the Reading is performed the following screen will be displayed. In order to place the instrument in Stand-by Model, press **<ENT>** key and press **<ESC>** key to go back. Refer to instructions on Page 10(***)
In order to advance, press **<SEL>** key

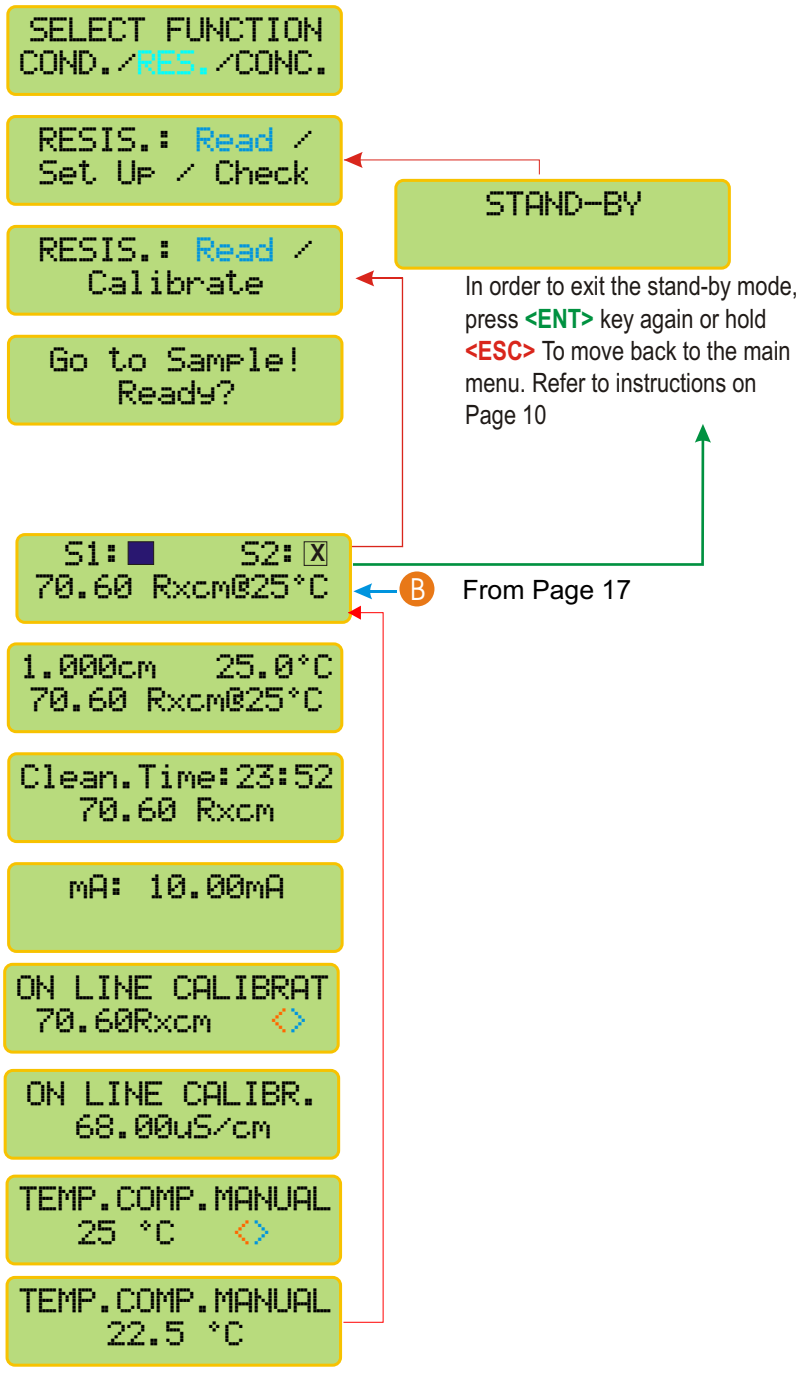
In order to advance, press **<SEL>** key

In order to advance, press **<SEL>** key

In order to advance, press **<SEL>** key

In order to adjust the value read, Press **<SEL>** key, if chosen Man, During Set Up, for On Line Calibr..

If during Set Up, user had chosen Temperature Compensation as Manual, it would be necessary to inform the process Temperature at this point. Refer to page 11 (Note A) for instructions on how to adjust this value.




In order to exit the stand-by mode, press **<ENT>** key again or hold **<ESC>** To move back to the main menu. Refer to instructions on Page 10

Press and hold **<ESC>** key for about 5seconds in order to exit the Readng Mode.

***Note:*** while during Reading, user can press **<ENT>** key in order to place the equipment in Stand By Mode.

# 9.8 Equipment Operation - Resistivity - Check

Press **<SEL>** until Resistiivity flashes, then press **<ENT>** to confirm.

SELECT FUNCTION
COND./RES./CONC.

Press **<SEL>** until Check flashes, then press **<ENT>** to confirm.

RESIS. : Read /
Set Up / Check

CELL CHECK

Dip Cell at Standard shown. This value depends on the Cell constant being used.

PLACE CELL @ STD
1412uS/cm

Press **<ENT>** key when Ready!

Ready?

WAIT

Wash Cell using plenty of water.

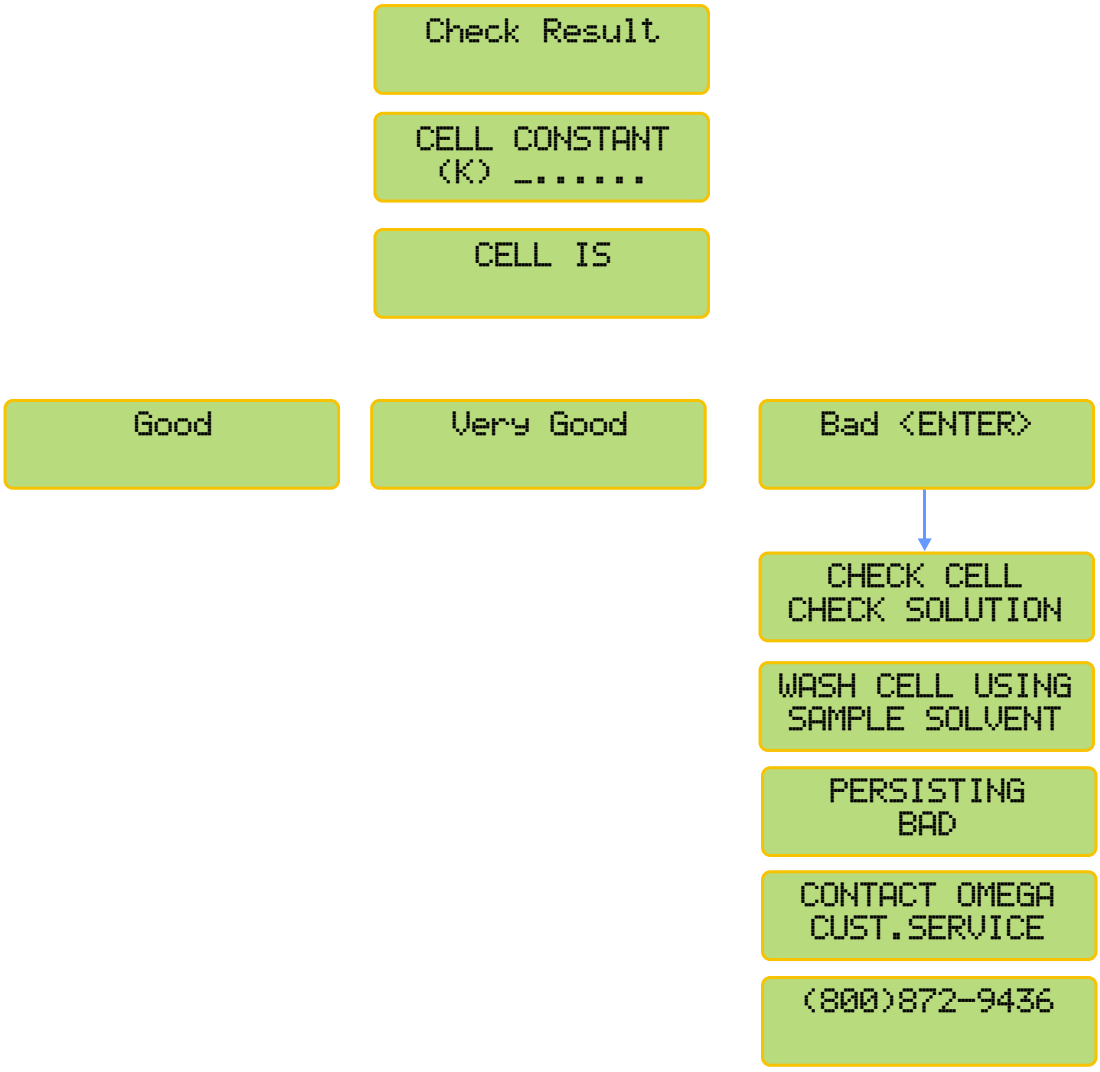
WASH CELL

Press **<ENT>** key when Ready!

READY ?


Go to Page 28

# 9.8 Equip. Operation - Resistivity - Check(cont.)



# 9.9 Equipment Operation -Concentration- Set Up

At the beginning of every operation, verify the Set Up conditions of the equipment and certify the parameters are correct for your application.

Press **<SEL>** key until **Concentration** option flashes, then press **<ENT>** key to confirm.


Press **<SEL>** until **Set Up** flashes then press **<ENT>** key.


A Password is required in order to access the SET UP. Press in sequence **<SEL>**, **<ENT>** and **<ESC>** keys.


In order to select the desired language, press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm.


User can program the instrument, such as Electrode type, Resolution and more. If chosen **No**, the last configuration will remain in effect. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm.


1 Go to page 31

The Unit cannot be changed. It is default from factory.


You can calibrate the instrument as factory default. Choose **Yes** and confirm and the instrument will calibrate as factory default! This option is offered in case the user does have any other way to perform a calibration procedure.



The user will be able to choose the Cell Constant. Press **<SEL>** until the desired option flashes then confirm by presssing **<ENT>**.


The Range cannot be changed. It is default from factory, depending only on the Cell Constant chosen.


The user will be allowed to adjust the pH value read at sample. Press **<SEL>** until the desired option flashes then confirm by presssing **<ENT>**.

# 9.9 Equipment Operation-Concentr.-Set Up(cont.)

User can fully adjust the Standard value. Refer to page 11 (Note A) for instructions on how to modify this value.

In order to select the desired reference temperature, press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

User can fully adjust the Reference Temperature value. Refer to page 11 (Note A) for instructions on how to modify this value.

User can fully adjust the Temperature Coefficient value. Refer to page 11 (Note A) for instructions on how to modify this value.

If chosen Manual, user will need to measure the process temperature and inform if to the instrument while at Reading Mode.

User can choose between the following Reading Modes:
Continuous - Read continuously
Average - Reads the average after time is set

User can program the time between Readings. Refer to Page 11 (Note A)for instructions on how to adjust this time.

User can program the display to show information like Barr graph, Contact, Current and more. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

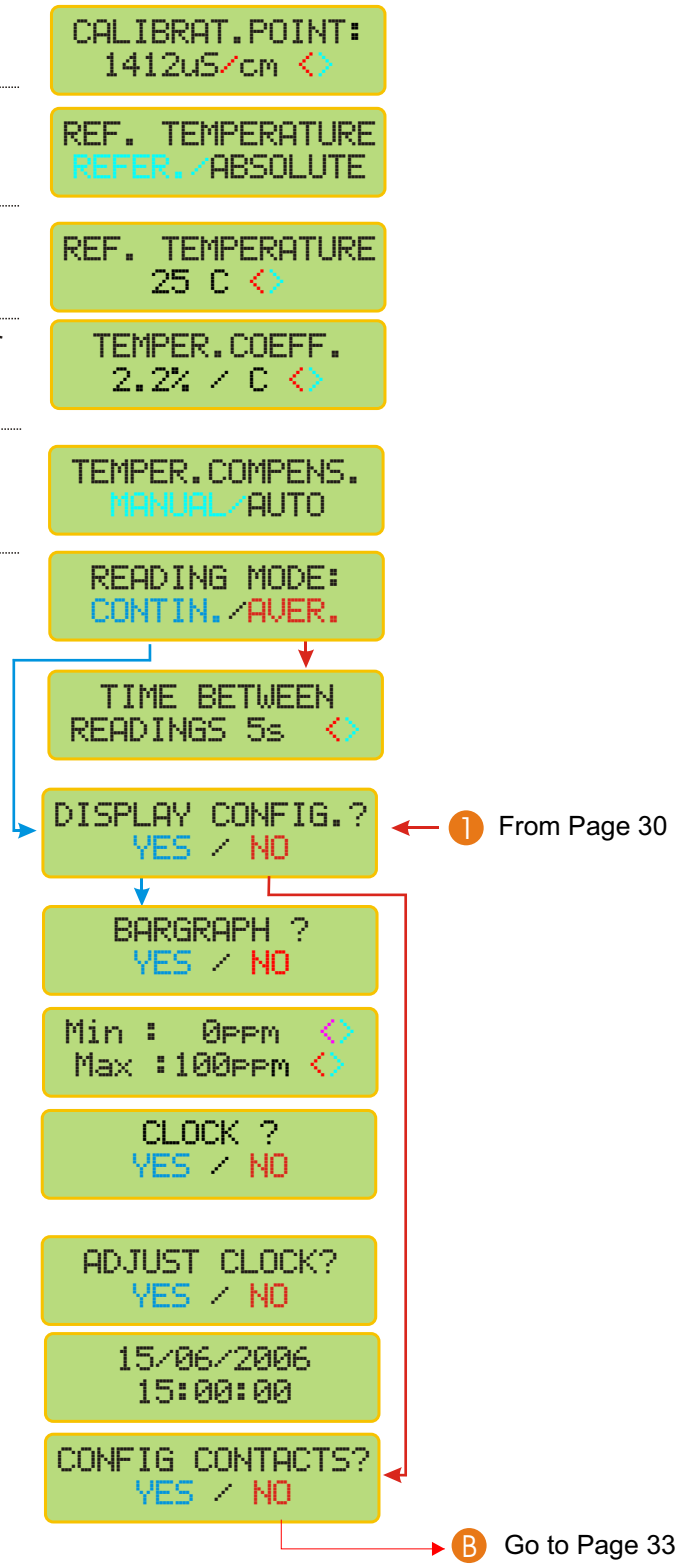
User can choose if desire to have Barr graph shown above the Reading screen. When Bar Graph is displayed, the information about Sensibility and Sample Temperature will not be displayed!
User can now adjust the Minimum and Maximum values for the Bar Graph. Refer to page 11(Note A) for instructions on how to modify this value.

User can choose to display date/clock on display, when equipment is turned off.

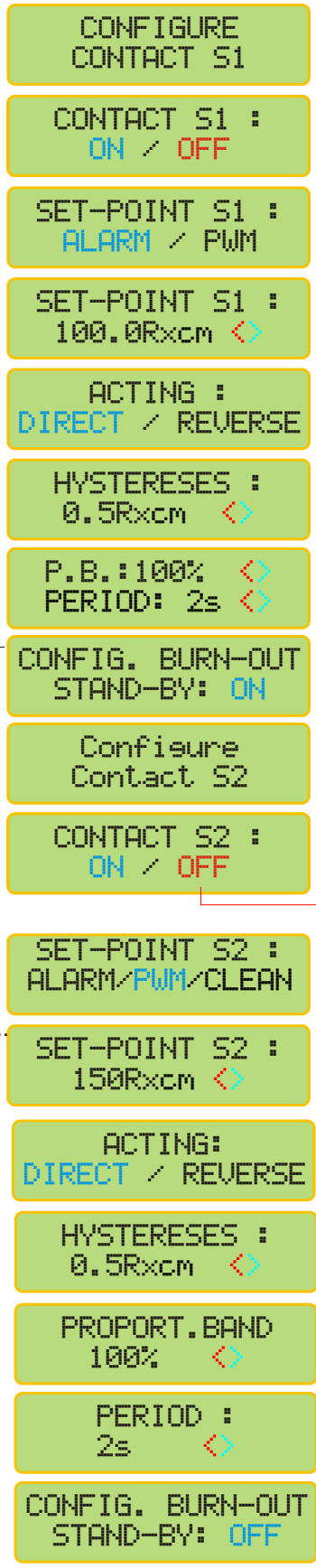
User can adjust date and clock, if desired.

Use **<SELECT>** key to change numbers and when finished, press **<ENTER>** key. If a mistake is made, press **<ESCAPE>** key to move back.

User has the option to configure Contacts SP 1, SP 2 and SP 3. Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm.



# 9.9 Equipment Operation-Concentr.-Set Up(cont.)




If user chooses Contact S1 as On, while at Reading Mode, a ■ or a □ will be displayed after the S1, indicating that this Contact is On. If user chooses Contact S1 as Off, while at Reading Mode, a [X] will be displayed after the S1, indicating that this Contact is Off.

User can program the SP 1 for Alarm or PWM. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

User can adjust the value for SP 1.
Refer to Page 11 (Note A) for instruction on how to modify this value.

User can choose the Acting desired.
Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm .

User can adjust the value for Hystereses, Proportional Band and Period. Refer to Page 11 (Note A) for instruction on how to adjust this value. Resolution will depend upon the Resolution chosen while at Set Up. PB and Period will be accessed only if PWM was chosen for the SP 1.

For the Burn Out configuration, user will have three options as: On - Contact is going to stay On all the time, Off - contact will stay Off all the time or Hold - contact is going to follow the last situation, before going to Hold status.
Press **<SEL>** key until the desired option flashes, then press **<ENT>** to confirm.

If user chooses Contact S2 as On, while at Reading Mode, a ■ or a □ will be displayed after the S2, indicating that this Contact is On. If user chooses Contact S2 as Off, while at Reading Mode, a [X] will be displayed after the S2, indicating that this Contact is Off.

B Go to Page 33

User can program the SP 1 for Alarm or PWM. Press **<SEL>** key until the desired option flashes, then press **<ENT>** key to confirm .

User can adjust the value for SP 1(either Conductivity or Temperature..
Refer to Page 11 (Note A)for instruction on how to adjust this value. Resolution will depend upon the Resolution chosen while at Set Up.

User can choose the Acting desired.
Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm .

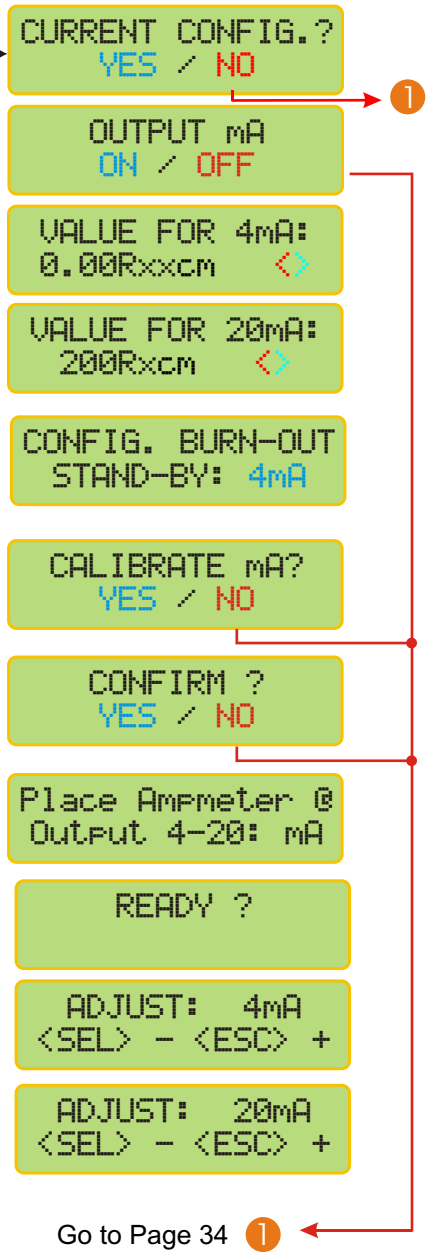
User will be able to inform the Hystereses, Proportional Band and period. Refer to Page 11 (Note A) for instruction on how to adjust this values.
PB and Period will be accessed only if PWM was chosen for the SP 2.

For the Burn Out configuration, user will have three options as: On - Contact is going to stay On all the time, Off - contact will stay Off all the time or Hold - contact is going to follow the last situation, before going to Hold status. Press **<SEL>** key until the desired option flashes, then press **<ENT>** to confirm.

A Go to Page 33

# 9.9 Equipment Operation-Concentr.-Set Up(cont.)

From Page 31 & 32 B




User is given the option to configure the burn out for mA when the instrument goes to Stand By mode. Press **<SEL>** key until desired option flashes(4mA, 20mA or Hold), then press **<ENT>** key to confirm.

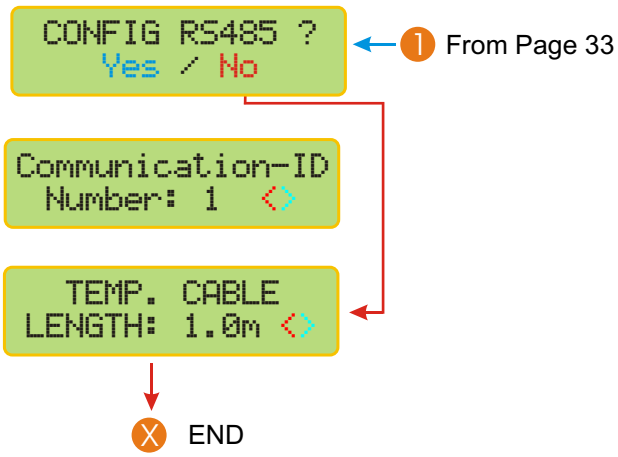
Connect Amp Meter to output 4-20mA and it will be possible to adjust them, then press **<ENTER>** when ready.
Adjust the value as needed by pressing **<SELECT>** (to decrease) or **<ESCAPE>** (to increase) keys, so the outputs can be adjusted.
**<SELECT>** key will decrease the value and **<ESCAPE>** key will increase.

# 9.9 Equipment Operation-Concentr.-Set Up(cont.)

User will have the option to configure digital output RS-485 for Proprietary Protocol. Press **<SELECT>** key to choose the desired option then press **<ENTER>** key to confirm .

User will be able to define the instrument identification number within the network, up to 256 instruments. Refer to Page 11 (Note A) for instruction on how to adjust this value.

User will be able to inform the Temperature Cable Length. Refer to Page 11 (Note A) for instruction on how to adjust this value. From O thru 99meters.



# 9.10 Equipment Operation-Concentr. - Calibration

Press **<SEL>** key until Concentrtion flashes, then press **<ENT>** to confirm the option chosen.

SELECT FUNCTION
COND./RES./CONC.

Press **<SEL>** key until Read flashes, then press **<ENT>** to confirm the option chosen.

CONC.: Read /
Set Up / Check

Press **<SEL>** key until Calibrate flashes, then press **<ENT>** to confirm the option chosen.

CONC.: Read /
Calibrate

WAIT

Dip cell at Standard 1412uS/cm, like chosen during Set Up operation, based on Cell constant.

PLACE CELL
@ STD

Press **<ENT>** key when Ready!

1412uS/cm
READY ?

WAIT

CELL CONSTANT(K)
1.0cm-1

Wash electrode using plenty of water.

WASH CELL!

Press **<ENT>** key when Ready!

READY ?

Go to Sample!
Ready?

Go to Page 36

# 9.11 Equipment Operation -Concentration - Read

Press **<SEL>** until Concentration flashes, then press **<ENT>** to confirm.

Press **<SEL>** until Read flashes, then press **<ENT>** to confirm.

Press **<SEL>** until Read flashes, then press **<ENT>** to confirm.

When Ready, press **<ENT>** key

After the Reading is performed the following screen will be displayed. In order to place the instrument in Stand-by Model, press **<ENT>** key and press **<ESC>** key to go back. Refer to instructions on Page 10(***)
In order to advance, press **<SEL>** key

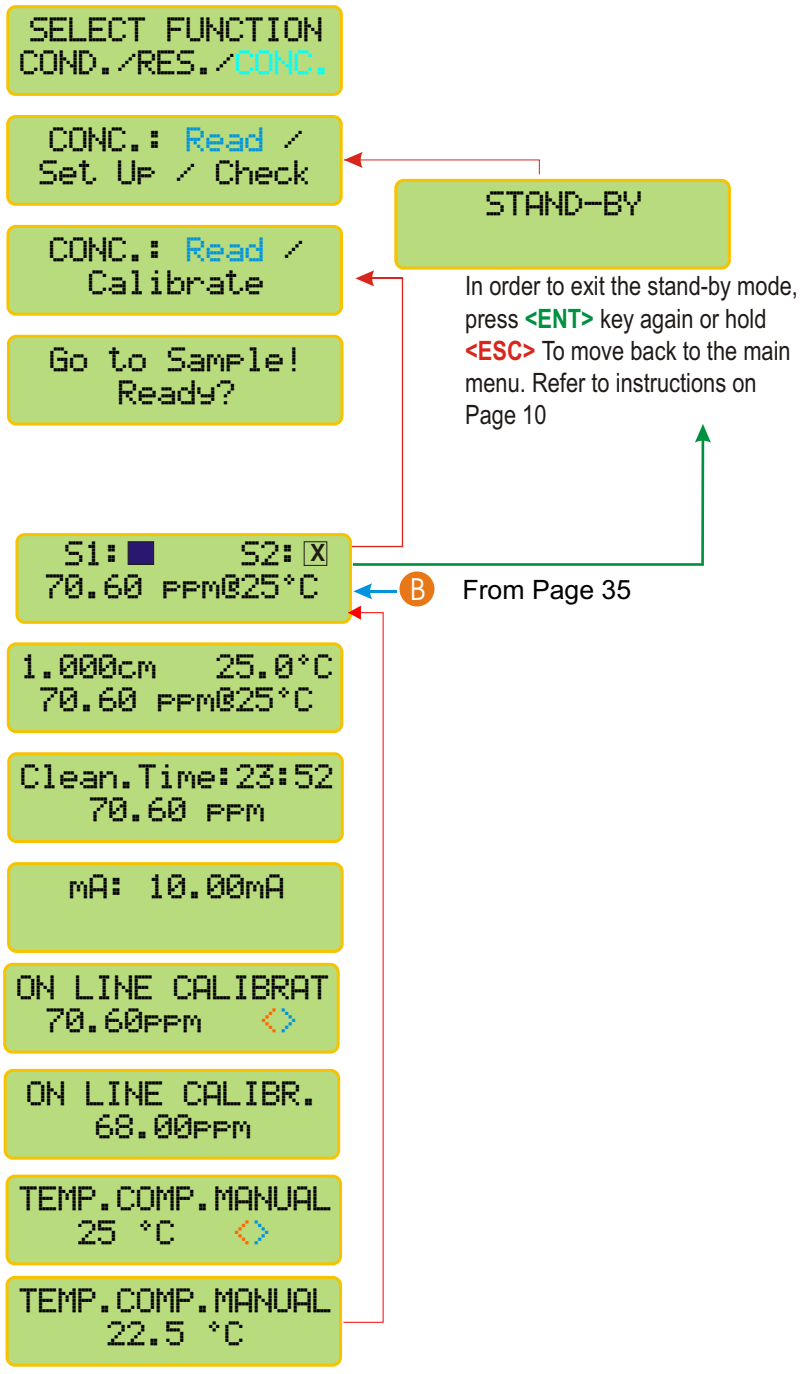
In order to advance, press **<SEL>** key

In order to advance, press **<SEL>** key

In order to advance, press **<SEL>** key

In order to adjust the value read, Press **<SEL>** key, if chosen Man, During Set Up, for On Line Calibr..

If during Set Up, user had chosen Temperature Compensation as Manual, it would be necessary to inform the process Temperature at this point. Refer to page 11 (Note A) for instructions on how to adjust this value.




In order to exit the stand-by mode, press **<ENT>** key again or hold **<ESC>** To move back to the main menu. Refer to instructions on Page 10

Press and hold **<ESC>** key for about 5seconds in order to exit the Readng Mode.

***Note:*** while during Reading, user can press **<ENT>** key in order to place the equipment in Stand By Mode.

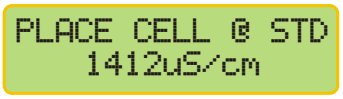
# 9.11 Equipment Operation -Concentration - Check

Press **<SEL>** until Concentration flashes, then press **<ENT>** to confirm.

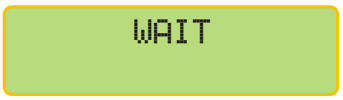

Press **<SEL>** until Check flashes, then press **<ENT>** to confirm.



Dip Cell at Standard shown. This value depends on the Cell constant being used.

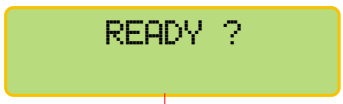



Press **<ENT>** key when Ready!


Wash Cell using plenty of water.


Press **<ENT>** key when Ready!




A
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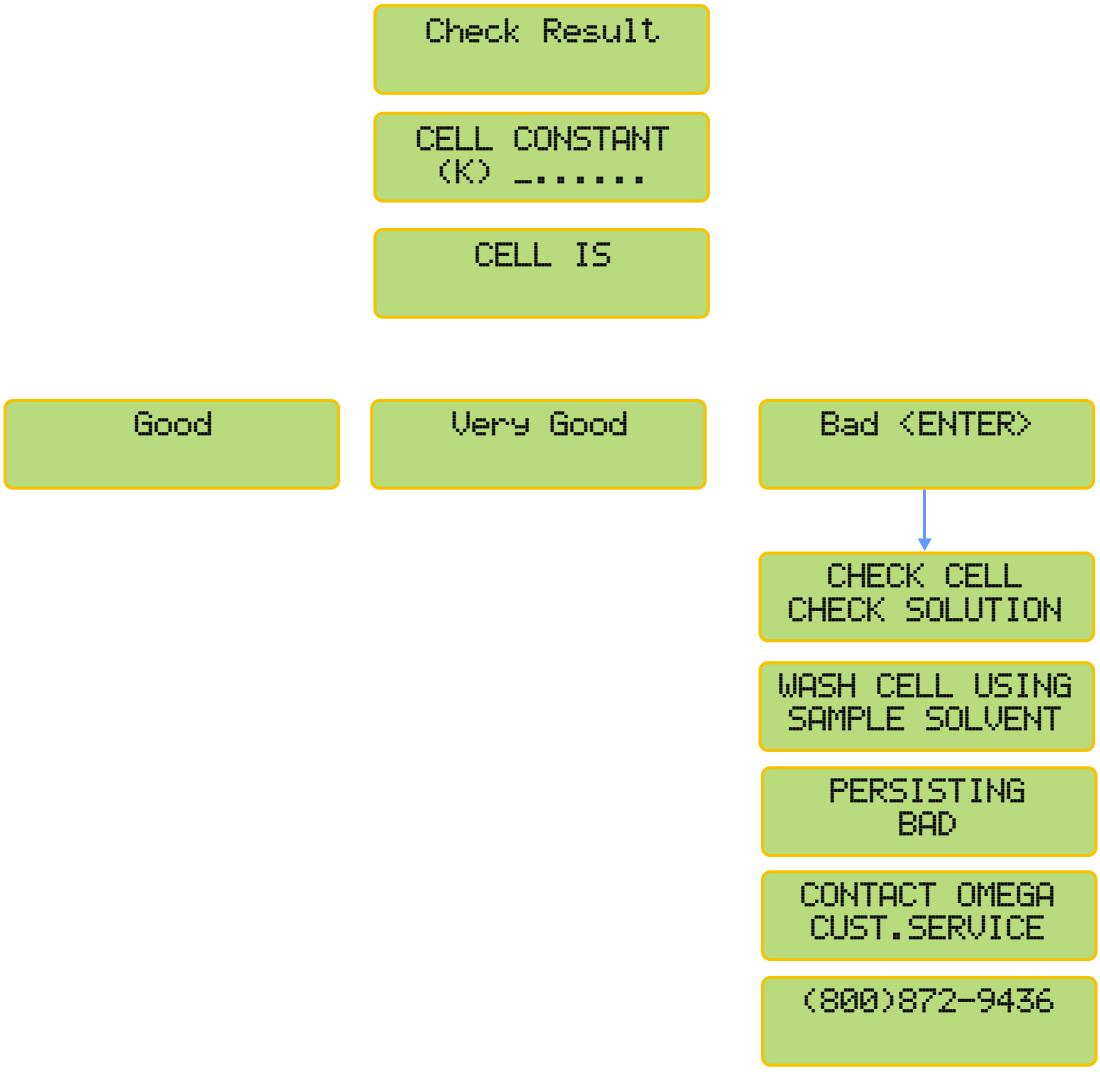
# 9.11 Equip. Operation -Concentr. - Check(cont.)



## Communication Protocol:

***1) Proprietary:***

Order:

| ESC | ID | P | CR | LF | |
|---|---|---|---|---|---|
| 0x1B | | 0x50 | 0x0D | 0x0A | Hexadecimal |

The ID is configured at the instrument from 1 to 32.

Answer:

**L >** > V V V V V V **mS/cm** C C C C C C **m A**

Example of answer for an *un-stable* value

L > 0. 02 **mS/cm** 1 2 . 0 0 **m A**

Example of answer for a *stable* value

L > > 0 . 02 **mS/cm** 1 2 . 0 0 **m A**

Note: a) When the answer comes a C instead of a L, it means that the equipment is under calibration function (is being operated in location by the user, executing the calibration operation at the instrument).
b) When the answer comes an S instead of a L, it means that the equipment is under Set Up function and it is being operated in location by the user.

***2) RS485*** – It is a "physical location", where the proprietary protocol will be "transported".

As factory default, this communication comes configured as:

Speed = 9600
Parity = none
Number of Bits = 8
Stop Bit = 1
ID = 1

## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

## RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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