easySPT

easySPT Family

User interface
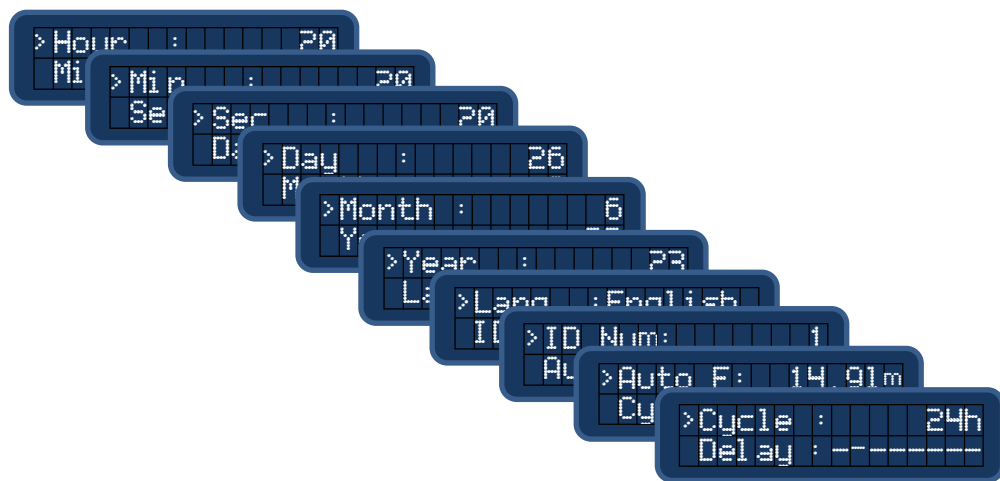
Summary

1   Control panel

1.1   General description.

In the rear of the instrument is placed the control panel where you can manage and view main operating parameters.

The rear panel can be divided into 4 main areas:
1. Display.
2. Buttons to view and modify operating parameters. Starting from the left the first three buttons are used to change parameters and navigate through the various menus. The MENU button instead allows you to move between the main menu and submenus.
3. Power button. The instrument is equipped with an automatic shutdown system and for this reason the button is only used for to start but not to stop instrument.
4. Voltage input for charging the batteries or, if you leave all batteries from "battery box", to supply the instrument.

To switch ON instrument press for same seconds the PWR button up to the display will show the message "LOADING". After you can release it. This time is necessary to avoid unwanted switch on.
Once switched on, the display will show for few seconds information about the name of the instrument, hardware / firmware versions and serial number.

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1.2   Buttons description.

1.2.1 Button ← - (DOWN)

Decrement button. It is used to:
- Decrease the suction flow. If you are in the main menu and the pump is on. The button allows you to decrease the flow rate.
- Previous sub-menu.
- Scroll "up" parameters of the selected sub-menu.
- Decrease the value of a selected parameter when in editing.

1.2.2 Button OK.

Confirmation button. It is used to:
- Switch on and switch off the instrument pump. This is done by holding pressed this button for 3 seconds in the main menu. The display will show a countdown and the new status at which that instrument will be set when timer expires. This operation will change from Start to Stop and viceversa.

```
Start pump......
..in 2 secs.....
```
```
Stop pump.......
..in 2 secs.....
```

- Enter selected sub-menu .
- Enter or exit data input. When you want to modify a parameter this button allow you to enter and exit the editing. The pression of this button to exit editing will save modifications. To avoid the saving procedure the "Menu" button can be used as an "Escape" button. By pressing "Menu" button in editing will discharge the modification.

1.2.3 Button → + (UP)

Increment button. It is used to:
- Increasing the suction flow. If you are in the main menu and the pump is on the button allows you to increase the flow rate.
- Next sub-menu.
- Scroll to the "bottom" of the parameters of the selected sub-menu.
- Increase the value of a selected parameter when in editing.

1.2.4 Button MENU

Selection button. It is used to:
- Switching between the main menu and sub-menu.
- Exit from a sub-menu.
- Discharge of a change during the input of data value.

1.2.5 UP + DOWN pressed simultaneously.

It 'a special situation that allows you to perform secondary functions depending in which menu you are. to check only one display instead of two at the opposite side.

If you are in the *Events* menu, by pressing simultaneously the two buttons you will be able to clear the event memory. A countdown message of 3 seconds will be displayed. When timer expires all event data will be deleted. If you stop the count before the expiration of 3 seconds, the deletion of events memory will not occur. When logs memory is deleted the first event sored after deletion will be a "Clear LOGS".

```
Reset logs mem..
..in 2 secs.....
```
```
000:26/06  11:21
Clear LOGS
```

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1.3 Menu map

Below you can find all menus and the related submenus

Logs >	< Config >	< Info >	< Batt.
Config	Logs Info	Config Batt.	Info

Column 1 (Logs):

```
000: 26/06  11:19
PUMP ON
```

```
001: 26/06  11:18
Start Charger
```

... (dotted)

```
050: --/--  --:--
---- Empty ----
```

```
+ & - Pressed
at the same time
```

```
001: 26/06  11:21
Clear LOGS
```

Column 2 (Config):

```
>Hour :      20
 Min  :       6
```

```
>Min  :      20
 Sec  :       6
```

```
>Sec  :      20
 Day  :      26
```

```
>Day  :      26
 Month :      6
```

```
>Month :       6
 Year  :      23
```

```
>Year  :      23
 Lang. :English
```

```
>Lang. :English
 ID Num:      1
```

```
>ID Num:      1
 Auto F:  14.91m
```

```
>Auto F:  14.91m
 Cycle :     24h
```

```
>Cycle :     24h
 Delay :---------
```

```
>Delay :---------
 Exit submenu...
```

Column 3 (Info):

```
>FW.Ver:    1.00
 HW.Ver:    2.00
```

```
>HW.Ver:    2.00
 FW.Bat:    1.15
```

```
>FW.Bat:    1.15
 HW.Bat:    2.03
```

```
>HW.Bat:    2.03
 FW.Cyc:    1.01
```

```
>FW.Cyc:    1.01
 HW.Cyc:    1.00
```

```
>HW.Cyc:    1.00
 Exit submenu...
```

Column 4 (Batt.):

```
>DC IN :  18.7 V
 Batt. :  12.8 V
```

```
>Batt. :  12.8 V
 Curr. :  0.96 A
```

```
>Curr. :  0.96 A
 Batt 1:|  11.6 V
```

```
>Batt 1:|  11.6 V
 Batt 2:|  12.1 V
```

```
>Batt 2:|  12.1 V
 Batt 3:|  12.2 V
```

```
>Batt 3:|  12.2 V
 Batt 4:|  11.8 V
```

```
>Batt 4:|  11.8 V
 Temp. :   36.7CC
```

```
>Temp. :   36.7 C
 Status:Charge
```

```
>Status:Charge
 Exit submenu...
```

1.4 Main menu

This menu provides the main operating information and is the first displayed at the start. From this menu is possible to enter secondary menus by pressing MENU button.

The messages displayed in this menu are dependent by the the following situations:

- External power supply presence.
- Electronic flow meter presence.
- "Cyclone Head" presence.
- Battery presence and status.
- Input of flow rate so set.

The display is composed of two lines of 16 character each. Normally first line displayed a message of 16 character maximum, so it's a static line.

The second line instead can display static message of maximum 16 character or a scrolling message with lots information that couldn't be possible to display in only 16 characters.

The scrolling information are composed by the following information:

In this example the second line is longer than 16 characters but it's clear that the on the screen will be displayed a "moving windows" of 16 characters with a scrolling timing of 1 second.

The measures are:

- Vin   → External power supply if present otherwise 00.0V.
- Batt   → Internal battery voltage.
- Temp   →Environment temperature (centigrade).
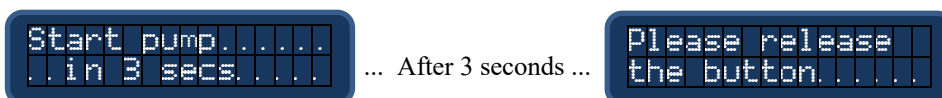- Press   → Environment pressure (millibar)

Temperature (Temp) and atmospheric pressure (Press) are visible if flow sensor is present otherwise information will be hidden. Considering that the flow sensor is always present in our instrument, if this information is hidden, it is likely that the sensor is faulty.

1.4.1 Standby

This is the main situation when pump is off, battery is charged and there isn't any failure. In this situation on the user display will be displayed the STANDBY message in the first line and in the second line the scrolling message with all necessary information. If the instrument is battery powered, no external supply is present, after some minutes will switch off to protect battery from discharge.

To switch on or off the instrument when in standby is sufficient to press, and maintain pressed, for three seconds the OK button. During wait time the display will show the following messages:

 ... After 3 seconds ...

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1.4.2　Running

With pump on instrument is in running state. The first line of the display may display the following messages according with system configuration:

```
   SAMPLING
Vin:16.7V Batt:1
```

With Cyclone head not present and flow sensor not present the display will show only a message "SAMPLING". This is an anomalous situation because at least flow sensor must be present. For this reason this situation identify a failure.

```
Flow  :  10.2L/m
Vin:16.7V Batt:1
```

With Cyclone head not present and flow sensor present the display will show the value of the flow readed from sensor.

With Cyclone Head, and flow also present, the display will show the cyclone head status. There are three possible Cyclone status:

```
Tmr 05:52  Pos:1
Fl:16.5l/m 11.2V
```
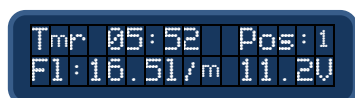
Sampling in progress. 5h and 52 minutes left before Eppendorf change.

```
Dly 0010h  Pos:1
Fl:16.5l/m 11.2V
```

Delay before start. The sampling is in standby waiting that 10h delay will expire. Typically this message is present if a day of the week is chosen but isn't the actual.

```
MOVEMENT..WAIT..
Fl:16.5l/m 11.2V
```

All time that Eppendorf drum is in movement, change of the Eppendorf, the display will show this message during all movement up to the end.

From the main menu is possible to change flow rate by pressing the + and – buttons and the first line of the display will change ,during input, as the following images:

```
Set    : 15.0l/m
Fl:16.5l/m 11.2V
```

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1.5   Secondary menus.

Secondary menus let you view and edit the instrument configuration parameters.
To enter the secondary menu, simply press the Menu button. Once inside the submenu by pressing again Menu return to main menu. By pressing ← and → buttons you can move between the submenus and with button OK is enter the selected sub-menu. The following images represent the four screens when scrolling with buttons.

Row 1 of the display will show the selected submenu that can be entered by pressing OK.
The < (minor) symbol indicates that there are others submenus on the left that you can access by pressing ←.
If < (minor) isn't present you have reached the first submenu (first picture above).
The > (major) symbol indicates that there are others submenus on the right that you can access by pressing →.
If > (major) isn't present you have reached the last menu available (last picture below).
In Line 2 you can view, if present, the previous (left) and the next (right) submenu.
Once the desired submenu has been selected press the OK button to enter.
Except for the Logs submenu, in all other cases you can find a list of parameters and a cursor, on the left, indicating the selected parameters.

1.5.1   Logs menu (Events).

Displays the last 125 events in chronological order. Each event will display the date and time in which it occurred, and the event name. The event 0 is the latest event while the 125 is the oldest. The Logs memory is "circular" and, when full, a new event will overwrite the last one.
The managed events are:

1. Power ON   Switch on instrument.
2. Power OFF   Automatic switch off.
3. Low Battery   Low Battery.
4. Start Charger   Start of battery charging.
5. Stop Charger   Stop of battery charging.
6. Pump ON   Pump On (SAMPLING)
7. Pump OFF   Pump Off (STAND-BY)
8. Watchdog Reset   For test (internal use).
9. Clear LOGS   Clearing events memory
10. Memory Initial.   For test (internal use).
11. Prot.Temp. Start   Reached a temperature of 75 °C of the "battery box"
12. Prot.Temp. Stop   End of the temperature alarm
13. I2C Comm.Problem   For test (internal use).

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A ⟶
B ⟶
C ⟵

```
000:26/06    11:29
Pump ON
```

A. Number of position in the event log from 0 to 125. 0 is the most recent.
B. Name of the event.
C. Date and time of the event

Using the buttons ← is →it is possible to move between the different stored events. When reached the last available event the display will show an empty message:
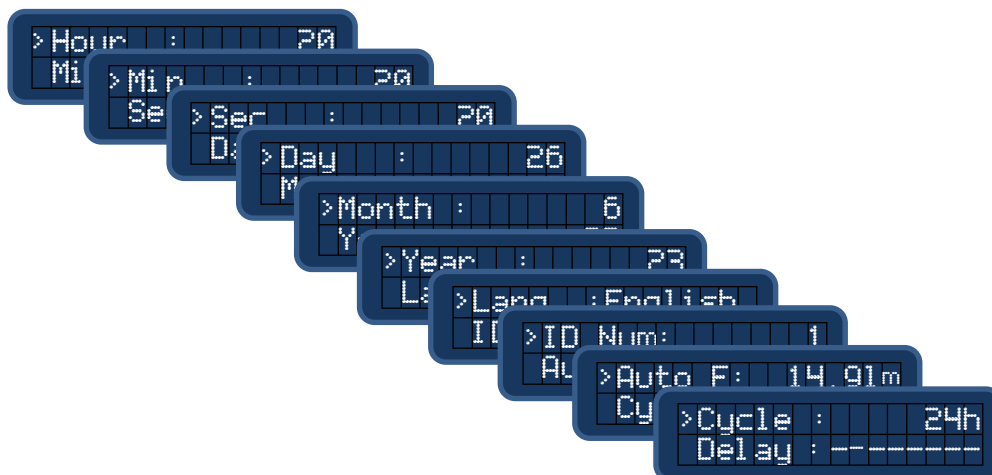
```
050:--/--    --:--
---- EMPTY ----
```

By pressing simultaneously the buttons ← is → for 3 sec the events memory will be cleared.
The Clear LOGS event will be stored as first event after cancellation

```
Reset logs mem..
..in 2 secs.....
```
⟹
```
001:26/06    11:21
Clear LOGS
```
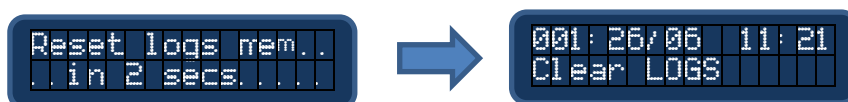
1.5.2 Configuration menu (Config).

In this menu you can view and change operating parameters. In particular:
- Date and time used for the proper storage of events.
- Language to be used (Italian and English).
- ID number to identify the instrument BLE connection.
- Flow value for automatic regulation.
- Cyclone head timing.

```
>Hour   :        20
 Min
```
```
>Min    :        20
 Se
```
```
>Ser    :        20
 D
```
```
>Day    :        26
 M
```
```
>Month  :         6
 Y
```
```
>Year   :        23
 La
```
```
>Lang   :English
 ID
```
```
>ID Num:          1
 Au
```
```
>Auto F:   14.91m
 Cy
```
```
>Cycle  :       24h
 Delay  :--------
```

Instrument is equipped by an RTC (real time clock) with a backup battery. The RTC is used by Logs and by Cyclone head timing. The first six parameters of this submenu allow the setting of RTC (remember that year start from 2000).

The Id Number parameter sets a number from 1 to 250 that allows the identification of the instrument among others present in the area. The instrument is equipped with a BLE module for wireless connection. When switched on the instrument "emits" information, beacons, with operating information. By using a Bluetooth application you can view this data. It's clear that, if the instrument is located in close proximity with others of the same type, it is necessary to be able to identify it. For this reason the ID number will be added at the end of the name as in the below image.
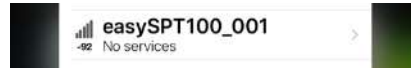
The Auto F represents the desired flow rate, typically 10 l/m, that the system tries to reach automatically. This value can be modified also from main menu when you change the flow rate using + and – button.

1.5.2.1 Cyclone head parameters (only for easySPT300 with cyclone head installed).

The Cyclone uses the same user interfaces of easySPT100, the same menu and the same buttons with some little differences.

There are two menus, under Config, that are used by easySPT300:
1. "Cycle" – Used to set the sampling hours of each Eppendorf.
2. "Delay" – The days of the week when the sampling must start.

According with these two settings there are three possible modes of operation:
1. Manual. In this mode you have to control manually the commutation of the 8s Eppendorf by using the button combination ← + OK for previous Eppendorf and OK+→ for the next Eppendorf. Sampling time is under user control. To enable this mode you have to set "Cycle" to 0 and "Delay" to "--------".
2. Automatic with immediate start. In this mode the instrument start immediately and Eppendorf are changed every "Cycle" hours. This situation is enabled if "Cycle" is > 0 and "Delay" = "--------". Every "Cycle" hours Eppendorf is changed up to the 8th Eppendorf. When the 8th Eppendorf is reached and time expires, the instrument is switched off automatically and Cyclone drum is positioned inn Extraction position.
3. Automatic with delayed start. In this mode the instrument function in the same manner as point 2 but the start is related to a selected day of the week. The instrument will start at the 00:00 of the "delay" selected day. To enable this mode you have to set "Cycle" > 0 and "Delay" with a day of the week different from "-------".

One time you have decided the modality of the Cyclone sampling you can START instrument by pressing OK buttons, in the main menu, for at least 3 seconds.
At the start you will hear a long Beeps indicating the start of Cyclone head positioning procedure. The electronic on the Cyclone head will start a search operation of the Eppendorf n.1 by rotating the drum with Eppendorf. At the end of the processes you will hear a double beep. At this point the pump will start if configured in mode1 or 2 , before explained, or will wait the selected day of the week if configured in mode 3..
ATTENTION. Do not disconnect Cyclone cable during this procedure to avoid problem and leave system to end procedure before do any operation.

The Cyclone sampler, if in automatic (2 and 3), will stop automatically at the end of the decided sampling period. However you can stop it in every moment by pressing for at least 3 secs the button OK.
When stopped you will hear a long Beep indicating the start of Cyclone drum rotation to position it in extraction position. When extraction position is reached you will hear a double beep.
ATTENTION. Do not disconnect Cyclone cable during this procedure to avoid problem and leav system to end procedure before do any operation.
Delay parameter is also used by Cyclone and represent the day of the week

The following are the two parameters and their possible values:

"Cycle" parameter

0   - System in MANUAL.
1-99   - System in AUTOMATIC. This is the sampling time for each Eppendorf.

"Delay" parameter.

Disabled. When "--------" is displayed the delayed start is disabled and the pump will start immediately when the instrument will START by pressing for at least 3 secs the OK button.


Enabled. When a day of a weeks is chosen, in the image Monday, the delayed start is enabled and the instrument will start pump at the 00:00 of the selected day.

This two parameters must be modified only when instrument is switched off otherwise the modifications will take place only at the next restart. So please, before change them, remember to switch off instrument.

The Delay functionality is useful if you need to have a complete 7 days sampling. Considering that you have 8 Eppendorf so you can cover 7 days with the possibility to use the 8th Eppendorf for the day of Eppendorf change. In nutshell considering the following procedure:

1. On Sunday I load Eppendorf in the 8 holes of the drum (7 in the drum and one in the drum extension).
2. I close the cover of the instrument.
3. In the Config menu I change Delay with value Monday. This mean that at the 00:00 of Monday the pump will start.
4. In the main screen I press the OK button for at least 3 secs

5. The display will change but pump doesn't start. On the display you can see "Dly" identifying the number of hours left before start. In the display example 37h identify 1 day and 13 hours left. Considering to start the instrument on Sunday at 12 the Dly will be 12h.
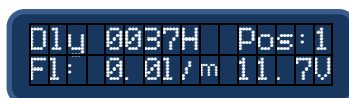
6. I leave the site where the instrument is installed. On Monday the pump will start.
7. On next Sunday I will return to the site.
8. When I will return to the site on next Sunday, the display will show Pos:8. This mean that the first 7 Eppendorf are full of sampling material so can be changed. Also the 8th Eppendorf contain the material sampled form 00:00 up to the hour we reached the site.
9. After I have extracted the first 7 Eppendorf, or changed the drum, I will put the 8th Eppendorf in position 1 of the new drum, so I don't waste sampled material, and I will put empty Eppendorf in the remaining 7 holes (the 7th is the drum extension naturally).
10. I close the instrument and I restart it by pressing the OK button for at least 3 secs.
11. Every Sunday I will reach the site to change Eppendorf allowing me a continuous and uninterruptable sampling.

Remember that this functionality is strictly related to interna RTC (Real Time Clock) so remember to correctly set it before start. Also remember that each modification at Cycle or Delay must be executed with instrument switched off.

During normal operativity the display of the instrument will inform you about :

- Eppendorf position from 1 to 8.
- Time left, in hours and minute, before next change of the Eppendorf.
- Flow rate
- And Battery level.
- Tmr   Remaining hours before next commutation.
- Pos   Drum position from 1 to 8.
- Fl   Suction flow rate expressed in litres per minutes.
- Battery Voltage.

```
Tmr 16:58   Pos:3
Fl:16.5l/m 11.7V
```

When the Tmr value reach the 00:00 the system will change Eppendorf by switching to the next available. When the 8th Eppendorf is reached, and so no others Eppendorf is available, the system stop pump a put drum in the extraction position. After 5 minutes will switch itself off.

IN MANUAL the information displayed are:

```
Tmr --:--   Pos:3
Fl:16.5l/m 11.7V
```

The remaining time is --:-- to indicate that the system is in manual and the commutation of the Eppendorf take place only with the user intervention. By pressing the described buttons combination is possible to switch Eppendorf.
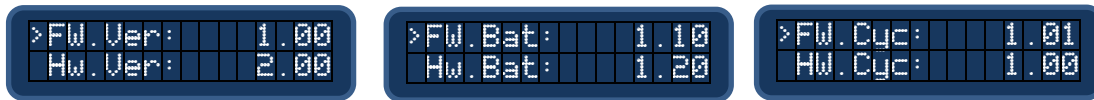
```
MOVEMENT..WAIT..
Fl:16.5l/m 11.7V
```

During any movements of the drum the display will show the message "MOVEMENT" that will remain until the end of procedure. Remember to wait the end of a commutation before made any operation on the instrument like open the cover.

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1.5.3 Information menu (Info)

The information menu shows the data relating to hardware and software versions installed.

```
>FW.Ver:    1.00        >FW.Bat:    1.10        >FW.Cyc:    1.01
 Hw.Ver:    2.00         Hw.Bat:    1.20         HW.Cyc:    1.00
```
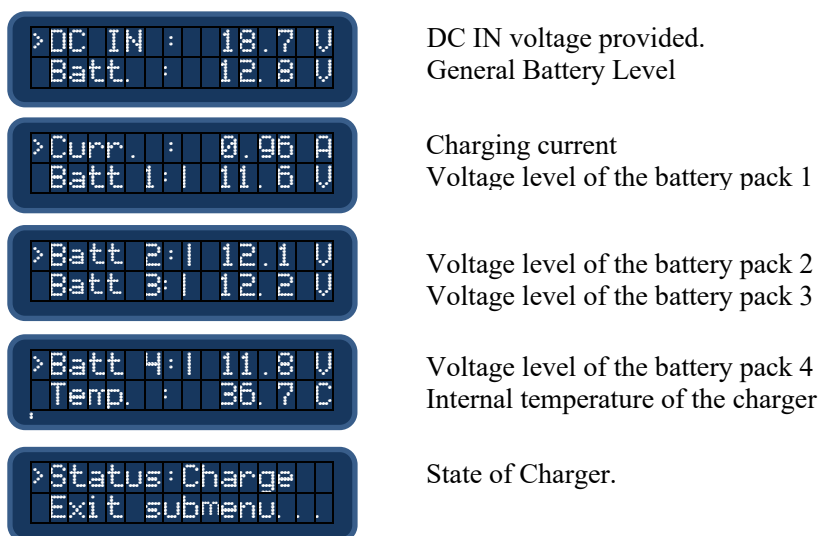
Versions of Hardware and Firmware programmed on the control panel, FW.Ver HW.Ver, the version programmed into the "battery box" (FW.Bat and HW.Bat) and the version programmed in the Cyclone Head (FW.Cyc and HW.Cyc) are reported.
This information are used mainly in case of service or repair.

1.5.4 Batteries Menu (Batt.)

This menu contains information about batteries status. The control panel read these information from internal "battery box". This operation is possible only if a voltage is provided on DC IN connector, otherwise you will see everything at 0. The information read are:

```
>DC IN :    18.7 V      DC IN voltage provided.
 Batt. :    12.8 V      General Battery Level
```

```
>Curr. :    0.96 A      Charging current
 Batt 1:|   11.6 V      Voltage level of the battery pack 1
```

```
>Batt 2:|   12.1 V      Voltage level of the battery pack 2
 Batt 3:|   12.2 V      Voltage level of the battery pack 3
```

```
>Batt 4:|   11.8 V      Voltage level of the battery pack 4
 Temp. :    36.7 C      Internal temperature of the charger
```

```
>Status:Charge          State of Charger.
 Exit submenu...
```

The status of each pack of batteries is represented by four rows "Batt 1..4".
For each battery pack the information reported are:

ID battery ←

```
>Batt 2:|   12.1 V      → Battery voltage
 Batt 3:|   12.2 V
```

⇩ Charging Bar
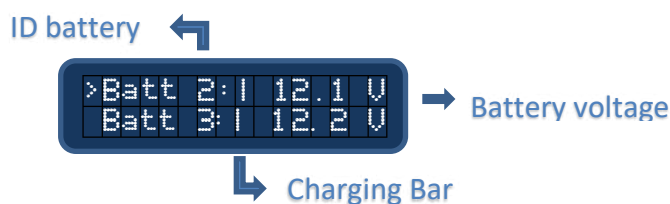
For each battery pack the "Battery voltage" field can report the following information:
- "-----"   Battery pack not present. (Image above for Batt 4)
- "11.9V"   Voltage of the battery pack. Batteries present with a voltage of 11.9V.
- "Fault"   Problems with the battery pack.

The "Charging Bar" is a bar that identifies the state of charge of a battery. It is a bar made up of five lines that can identify the following states:
- Bar in movement. Battery charging.
- Static full bar (5 lines). Battery fully charged.

- Bar completely off. No battery present.

The "Status" can have the following values:
- Charge   - Battery in charge.
- Standby   - Battery charged.

1.5.5 Special messages.

This message is displayed when the instrument restart after a switch off for low batteries voltage. It remains on the display up to the batteries voltage reach the threshold of 12V.

```
Return from LOW
Battery
```

When the instrument is switched off for a low batteries voltage, under 9V, it can restart for one of the following situation:
- A supply voltage is provided on the DC IN connector.
- Power button is pressed.

If the instrument is connected to a solar panel the problem could be that DC IN voltage grows and falls for low insolation. In this situation the instrument will switch off and on continuously discharging the batteries up to the death. To avoid that there is a software protection that each time the instrument restart will wait 30minutes, and however a batteries voltage major 10V, before start the pump. This situation is displayed with this message.

The other messages is the "LOW BATTERY".

```
! BATTERY  LOW !
CARGING
```

This message is displayed when the battery voltage decrease under 9V. When reached the possible situations are:
- A voltage is present on the DC IN connector. The message is the same of the above image. After some seconds the voltage is displayed in the second line. The message remain on the display up to the battery voltage reaches the 12V. At this point if the pump was previously on will be switched on.
- Non voltage on the DC IN connector. The message is displayed for 5 seconds and at the end the instrument will be switched off.

1.6   Special screen for Cyclone recovery (only for easySPT300)

Cyclone head is composed of two motors, one for vertical movement and other for horizontal movement. The system is a bit complex and for mechanical reasons there could be a blockage in the Eppendorf drum. To allow a system restore a special screen is provided. There are two method to access this special menu:

1. Manually by pressing the three button **DOWN+OK+UP** and maintain pressed during all startup process, release its only when menu appear.
2. Automatic. When a failure takes place during a movement the system automatically display this menu to allow a manual recover. Remember that this situation persist until the user reset the failure.

To distinguish this two situations on the display appear the FLT text in the center of the first line to indicate a failure situation so the second case.

One time inside special menus you can access up to four possible operations by pressing a combination of button. The first line is an information line. The second line report the meaning of the two buttons DOWN and UP in the different combinations. By using the two buttons OK and MENU is possible to change the meaning of the DOWN and UP buttons.

Below the four different operations, selected by OK and MENU buttons, and their meaning:

First.
Use UP e DOWN button to move drum UP and DOWN. Maintain pressed for all wanted movement.

Second by pressing, and maintain pressed, OK button.
Rotate drum Clockwise and Anticlockwise. Maintain pressed for all wanted movement.

Third by pressing MENU button.
Move the drum of one Eppendorf in increment (button UP) or decrement (DOWN)

Fourth by pressing OK+MENU.
Load position the drum in sampling Eppendorf 1. The Extract move drum in the extraction position.

The combination of buttons can be used to manually move the drums and restore cyclone functionality.
As explained above if this special menu is automatically entered due to the presence of a fault, to restore normal functionality (sampling) the user must press the two UP+DOWN buttons together to reset the fault. The FLT text disappears to confirm the fault reset. On the next restart the instrument should start normally.