COMPACT BATTERY UNIT™

CBU® 8190C

Installation, Operation & Maintenance

Version: 1.1

Revised: 30/08/2011

Contents

Notes

This manual provides instructions for the installation, commissioning, operation and maintenance of the EnerSys® Compact Battery Unit™ (CBU®) for use in telecom applications. It provides information for optimizing performance and service life. There is a separate manual for battery Installation & Maintenance and both manuals must be studied carefully.

This manual should be read immediately upon receipt of the CBU®. Warranty is valid only if the product has been installed, commissioned, operated and maintained in accordance with these instructions. Particular care must be taken during the handling and installation of lead-acid batteries (see Battery Installation & Maintenance Manual).

1 Safety Information

Get to know the product you are handling. Carefully study the battery manual and follow the instructions. Short circuit across battery terminals is dangerous.

Battery chemistry causes explosive gases, which have to be removed through tubing. Connect the tubing carefully to avoid dangerous situations.

In two string installations the voltages are not dangerous but be aware that batteries can produce very big currents.

1.1 Location of the Compact Battery Unit

The CBU® should be in a secure area with access restricted to experienced and suitably qualified personnel. This secure area can be indoors or outdoors but there should be a fence or similar enclosure to keep out unqualified personnel and animals.

Recommended operating temperature range is -40°C to +50°C and up to +70°C with limited performance.

1.2 Safety and voltages

Warning notices complying with current health & safety legislation should indicate the dangers of unauthorized access. Please check the Battery Manual.

Batteries must be installed according to the instructions given by the battery manufacturer. Use also the EnerSys® ventilation kit (Included). To some extent batteries will generate explosive gas and the tubing has to conduct the gas outside the cabinet. A tube passes through the intermediate door to which the rest of the ventilating tubing is connected.

The CBU® does not use a 115 or 230 VAC power supply. As no dangerous voltage is used the Low Voltage Directive (75 - 1500 VDC or 50 - 1000 VAC) is not required for this unit.

The CBU® uses nominally 48 VDC as a system voltage. The limits of the voltage are 45 – 60 VDC. When battery voltage drops down to 45V, cooling/heating is stopped.

If the battery string has a higher nominal voltage than 48 VDC, a separate DC/DC converter has to be used to feed the cooler. The DC/DC converter has to be installed outside the CBU® cabinet but close by.

2 Compact Battery Unit

The CBU® is used to stabilize the temperature of the batteries to optimize their service life. Lifetime of the batteries is strongly dependent on the ambient temperature. If the temperature is maintained

at 20°C in all circumstances, batteries will achieve their maximum life and charging capacity. The lifetime can be up to 7 times the lifetime without any temperature control.

The temperature is controlled by thermal insulation and regulating the temperature inside the cabinet by either warming or cooling the inside air. This is done with a special high reliability warming/cooling unit attached to the inner door. Mechanical construction of the cabinet is very special. The unit does not have a separate frame and body panels. Instead, the side, top and bottom panels bolt together to form a strong, self-supporting cabinet. As a result it can be delivered flat packed, in modules for assembly on site. This construction takes less space for transportation and storage. On site each module can be carried separately which means easier handling, particularly where access may be restricted. Although the cabinet is delivered in modules, assembly is easy and can be completed in 30 minutes with normal hand tools. The double sheet construction automatically creates a sun shield for the structure which means that all side plates are in shadow even in sunshine.

Detailed information regarding the design and specification of the CBU® can be found in the appropriate publications (visit www.enersys-emea.com or contact your local sales office for details).

The CBU® is designed to be installed in the horizontal position offering simplified front-access installation and maintenance even in the most difficult locations.

2.1 Receiving, Unpacking and Inspection

The CBU® is delivered unassembled to save space for transportation and make it easier to carry through narrow doors or to locations that are difficult to access. All items should be carefully checked against the accompanying notes to determine if any are missing.

If used in places that are difficult to access, the CBU® can be taken there piece by piece. In such cases, take particular care when carrying each item to avoid breaking the insulation, which has been pre-assembled in the factory.

If any items are missing, damaged or broken, notify the seller at once.

It is recommended that items and accessories are unpacked before commencing installation.

2.2 Care of Material

Carefully clean off all dust and packing material deposits from each item and accessory. Wipe down the items with a clean cotton cloth dampened with clean water. Do not use water to clean the cooling/warming unit as it contains sensitive electronics.

2.3 Storage and temporary storage

It is recommended that CBU® parts are unpacked, installed and commissioned as soon as possible after receipt. However, if this is not possible, store all the parts in a clean and dry environment at a temperature as moderate as the climate will allow.

3 Assembling

See “Assembly Instructions for CBU® 8190C” that is supplied with all cabinets.

3.1 Grounding

The grounding point of the CBU® is in the inside door, on the right hand side. Outer and inner doors, battery rack and outside grounding cables must be connected to this point.

The grounding network must be a star configuration. Avoid any loops as they may cause disturbance in equipment.

3.2 Batteries

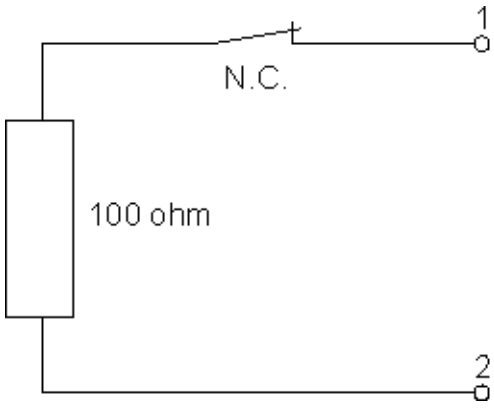
Batteries should be installed according to the manufacturer's instructions. Pass incoming cables through the cable intake and connect the electrical supply for the controller to the battery terminals (48 VDC)

3.3 Cable Connections

To make the power connection attach the black wires to the + (positive) terminal of the battery string and the blue wires to the – (negative) terminal of the battery string. A 15 A fuse must be fitted in the positive wire NOTE: This fuse is supplied with the CBU® but is not fitted in the cable before delivery.

Figure 1 shows the alarm circuitry. There are two separate alarm circuits, one for the door alarm and one for the alarm, which is initiated by specific system conditions. Both alarm circuits are similar and operate on the 'normally closed' principle. When the controller is working and there is no alarm, the relay contact is open thus the alarm activates even when the voltage is lost. If only one alarm line is available, both alarms can be connected in parallel. Alternatively, if the door alarm is not needed it can be omitted.

The circuitry has an end of line resistor of 100 ohms, which means that both short circuit and open circuit malfunction can be recognized.



Connector type:
Molex Microfit 3
43045-0200
Mates with
Molex Microfit 3
43025-0200 Shell
43030 female crimp terminal
cable AWG 20 - AWG 30

Fig. 1. Alarm circuitry.

3.4 Screw Terminal Option for Alarms.

There is available an option for having alarm terminals connected to screw terminal block inside the cabinet. With this option there is a ready made cable from the controller through the intermediate door preinstalled to the terminal making cabling easier at the site.

The alternatives for connecting alarms are as follows:

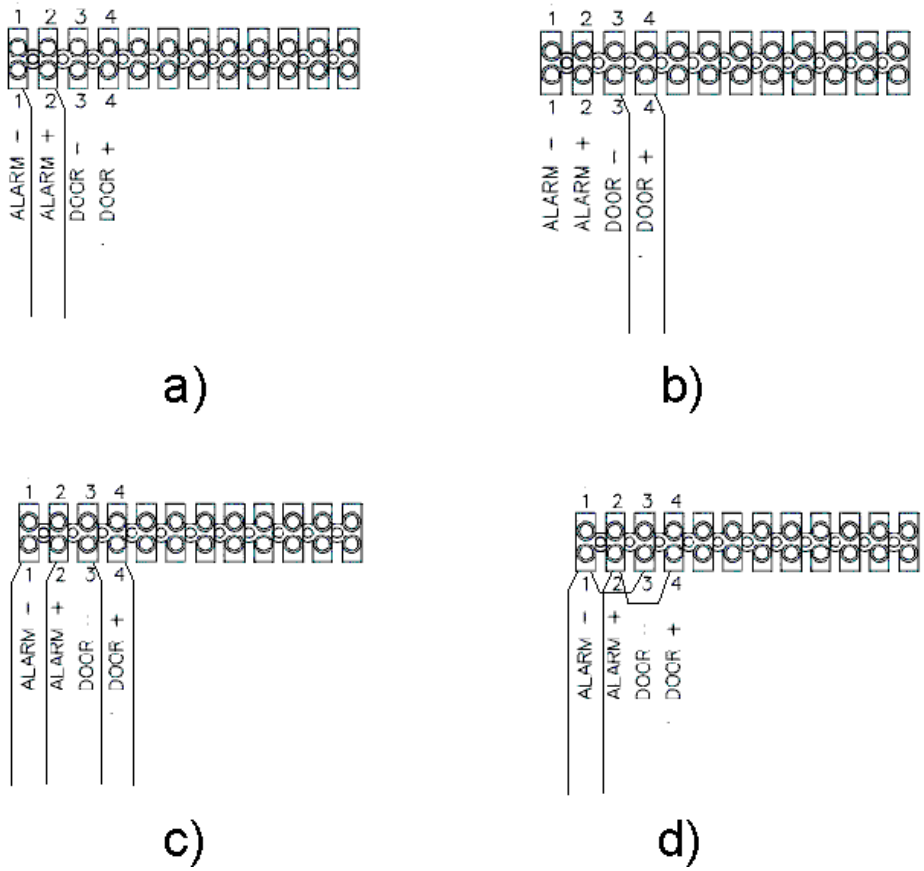


Fig. 2. Alternative connections with Screw Terminal Option for Alarms.

Alternative a) is for having alarm for all but the door. Alternative b) is door alarm only. Alternative c) is for separate alarms for the door and other alarms.

Alternative d) is used when only one alarm circuit can be connected at the site, but also the door alarm should be recognized. Here both alarms from CBU®8190C are in parallel. Be ware of the 100

ohm end resistor (Fig. 1) in series with the alarm relays. Thus if both alarms are simultaneously valid in the alternative d) a total resistor of 50 ohm is present.

Internal cabling (for information only).

The factory fitted cabling is shown in Figure 3

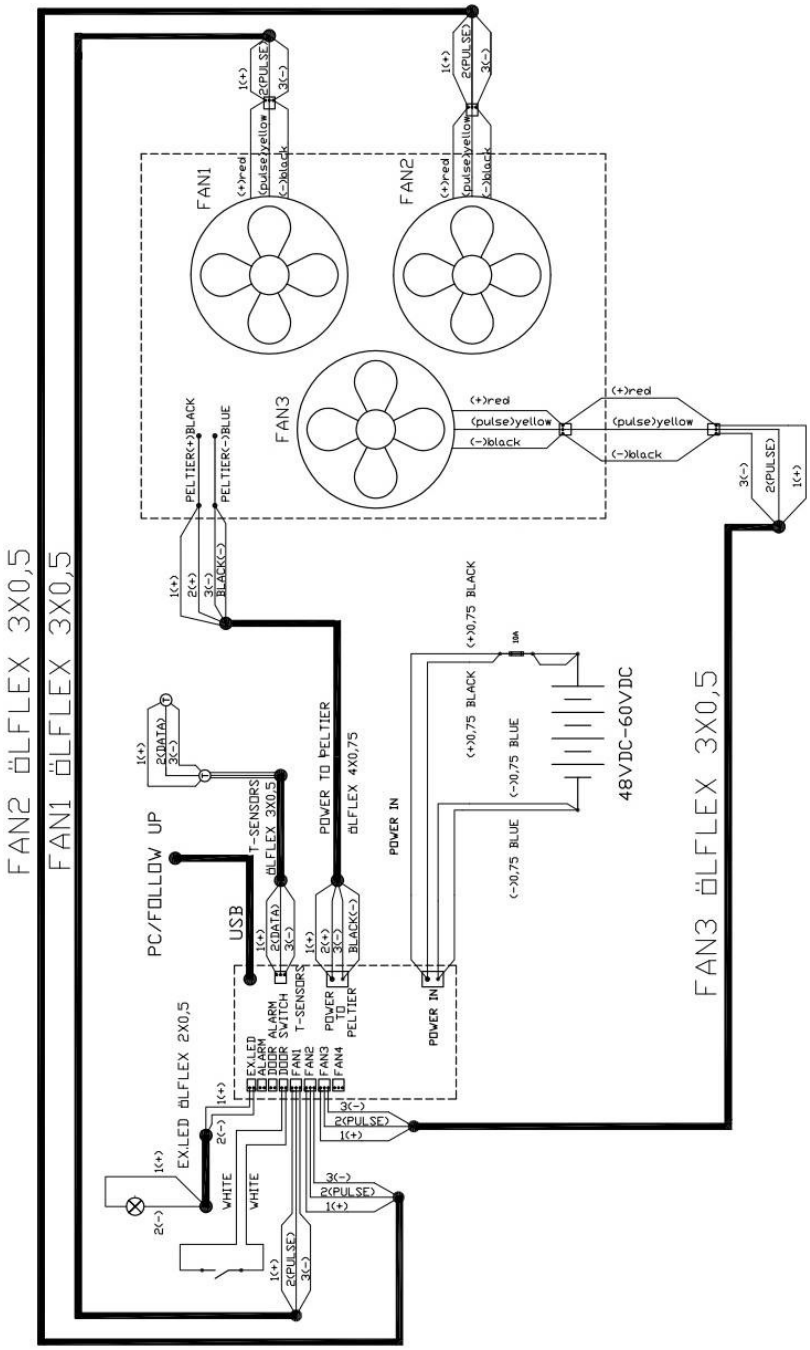
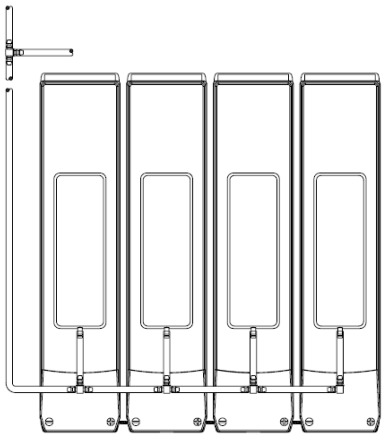


Fig. 3. CBU® connection diagram. The only connections that have to be made on site, are to the batteries and, where required, to the alarms.

3.5 Ventilation tubing



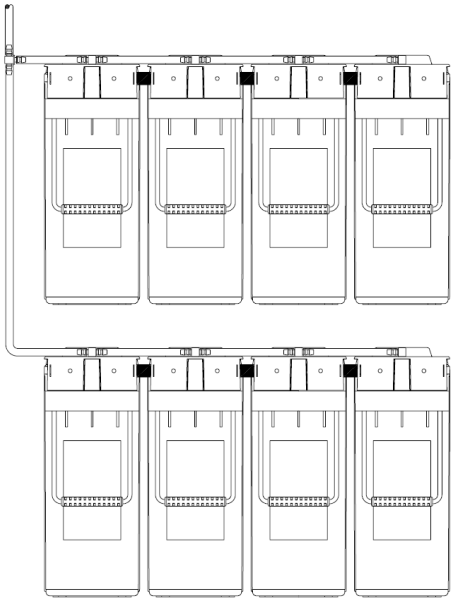


Fig. 4. Venting kit assembly for 48 V battery stringFig. 5 Venting kit assembly for 2 x 48 V battery strings

Fasten the ventilation tubing as shown in Figures 4 & 5. Connect the tube coming from the inner door to the tube coming from the batteries.

NOTE: Condensation inside the cabinet

The almost hermetical design of CBU® cabinet prevents typical condensation water issues. This requires that insulators be correctly installed, that they are free of defects and that seals against inner door are undamaged.

3.6 Commissioning

When the CBU® is assembled and batteries are installed inside the cabinet the CBU® can be tested. But first, carry out the final checks listed below. When doing commissioning , always connect Laptop to the CBU's Controller, run "Follow Up" program and set RTC (Real time clock).

3.7 Check List.

Grounding has been completed according to assembling instructions.

Voltage is nominal 48 VDC.

Batteries are installed according to the Installation & Maintenance Manual.

Ventilation tubing installed and connected to the door tube.

Cables and tubes are secured and there are no risks of them being jammed when the door is closed.

Now the 15A fuse can be installed (see section 6.3).

When the cabling is completed and the feeding cables are connected as shown in Figure 3 CBU® Connection Diagram, the unit will start to work immediately. The user can see how it works by using the program “Follow-up” which should be installed on a laptop. Connect the cable from controller to the laptop's USB-port. Start the program and the Real Time Window will be displayed on the screen (see chapter settings). It is to recommend that factory settings are not changed until after everything has been tested satisfactorily. Even then it is highly recommended that the factory settings are used. However, the facility to change settings does exist for testing alarms, for example. The tolerance range can be reduced but it must be remembered that this will result in an increased power demand on the battery and should be returned to the manufacturer's recommended setting as soon as the alarm test has been completed.

4 Operation

The controller, which is fastened to the intermediate door, has the following LED lamps and cables.

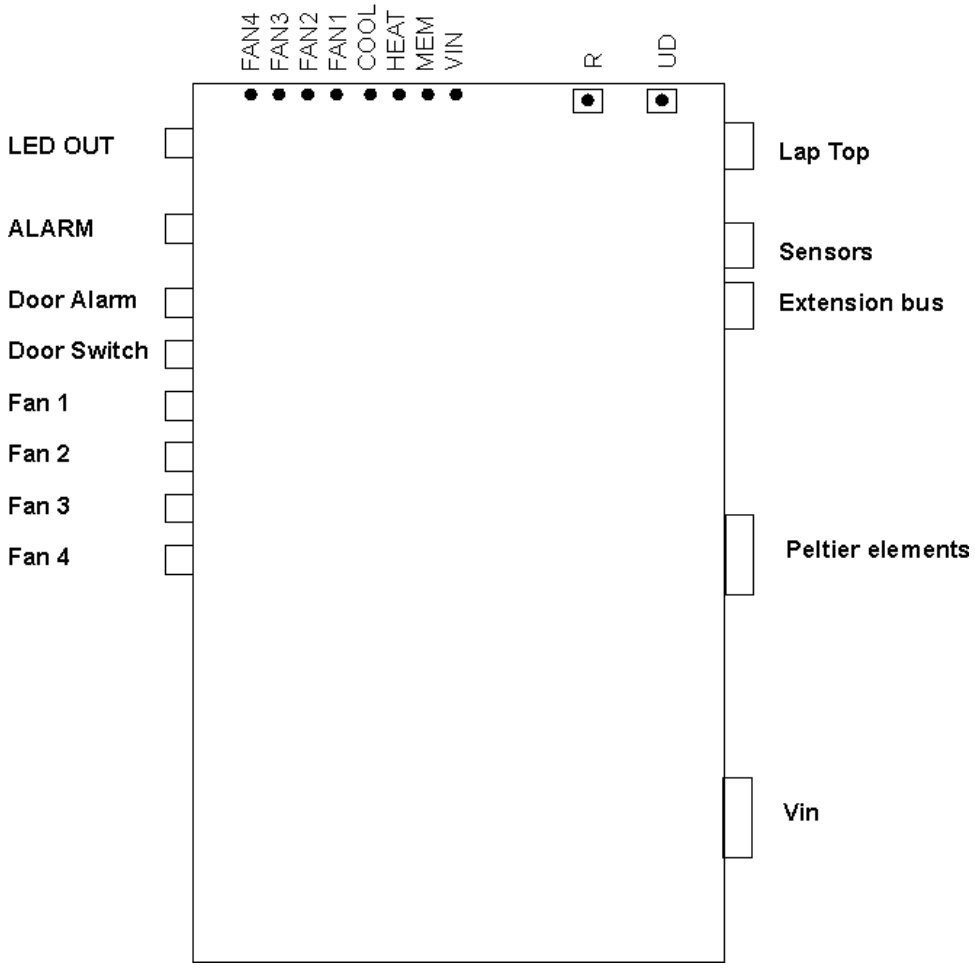


Fig. 6. Controller with cables and LED lamps

Not all cables are needed. Normally there are only 3 fans, one inside and two outside. Led lamps are:

VinOn indicates that the correct voltage is available at the CBU®. It blinks if there is an alarm. The function of the LED is identical to the one, which is on the door.

VinOn indicates that the correct voltage is available at the CBU®. It blinks if there is an alarm. The function of the LED is identical to the one, which is on the door.

Mem.....Future use

Heat ..... On when CBU® is heating the inside air.

Cool.....On when CBU® is cooling the inside air

Fan 1 .....On when Fan 1 is in use and it is running properly. Blinking indicates a fault.

Fan 2 .....On when Fan 2 is in use and it is running properly. Blinking indicates a fault.

Fan 3 .....On when Fan 3 is in use and it is running properly. Blinking indicates a fault.

Fan 4 ..... For future use

Cables are as follows:

Laptop..... To be connected to a laptop to analyze the operation of the CBU®.
Sensors..... Temperature sensors are daisy chained to this connector.
Extension bus.....When several cooler/heaters are connected in parallel (to discuss this special ..... feature please contact your EnerSys® representative)
Peltier elements..... Cable to the Peltier elements for cooling and heating
Vin .....Incoming voltage from the batteries – 48 VDC nominal.
LED Out..... LED cable to the front door.
Alarm.....Alarm (output) cable to supervisor unit.
Door Alarm ..... Separate alarm (output) from the door to the supervisor unit.
Door Switch .....Cable to the door switch (input within the CBU®).
Fan 1 .....Cable to Fan 1 including tachometer signal.
Fan 2 .....Cable to Fan 2 including tachometer signal.
Fan 3 .....Cable to Fan 3 including tachometer signal.
Fan 4 .....Cable to Fan 4 including tachometer signal (future use).
.

4.1 Cooler/Heater

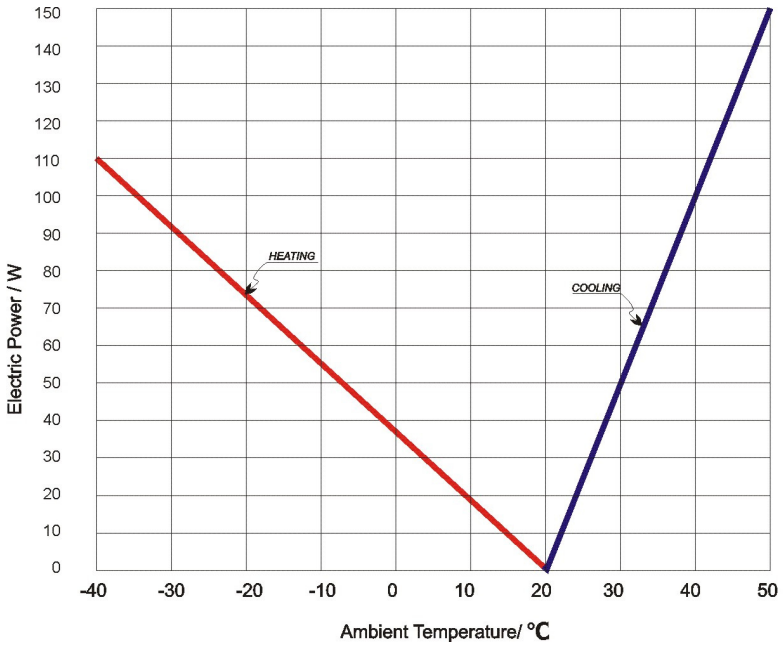


Fig. 7. Typical electric power of the Cooler/Heater unit. The power can be bigger (maximum 450 W) for a limited time during the start up or when charging.

As can be seen in Figure 7 the power taken from the -48 VDC supply provided by the batteries depends on the ambient temperature i.e. outside the cabinet. The reason for this is that heat flows in or out of the cabinet depending on the difference between the inside and the outside temperatures. For example, if the outside temperature is 50 ℃ the cooler is taking 150 W from the -48 VDC supply. The power can be up to 3 times bigger for a limited time when charging or in the start up of the Unit. (see also settings 9.2.2)

When batteries are float charged and the inside temperature has reached the set point temperature typical power taken from the batteries is according to Figure 7. This means that the CBU® is taking a small portion of the charger current. Normally this is insignificant.

During the float charge, the heat generated from the batteries is insignificant so it has practically no effect on the inside temperature. However, when the batteries are charged after a discharge there will be a significant heating effect, which causes the temperature to rise for a limited time.

It can bee seen from the curve in Figure 7 that when the outside air is 20 ℃ the unit is practically taking no power from the batteries.

4.2 Follow-Up and Settings

The CBU® temperature is set in the factory at 20°C±2°C. If this recommended setting is used, there is no need to consult the laptop “Follow-Up” program. However, the Real Time Clock does not display the current time. If an alarm activates, an adjustment must be made for the difference

between the displayed time and the actual time to record when the alarm actually happened. For example, if the service man is on site and can see that the RTC is 10 days and 1 hour late, he must add 10 days and1 hour to the alarm time to arrive at the correct alarm time.

Real time values of the Unit and settings of the controller can been seen by connecting the USB cable between the controller's "laptop" port (see Figure 6.) and the laptop. The "Follow-Up" software has to be installed before connecting the Controller to the laptop! See installation instructions in section "Program Installation". When software is installed it can be started by double clicking the appropriate icon. The following screen appears; see Figure 9.

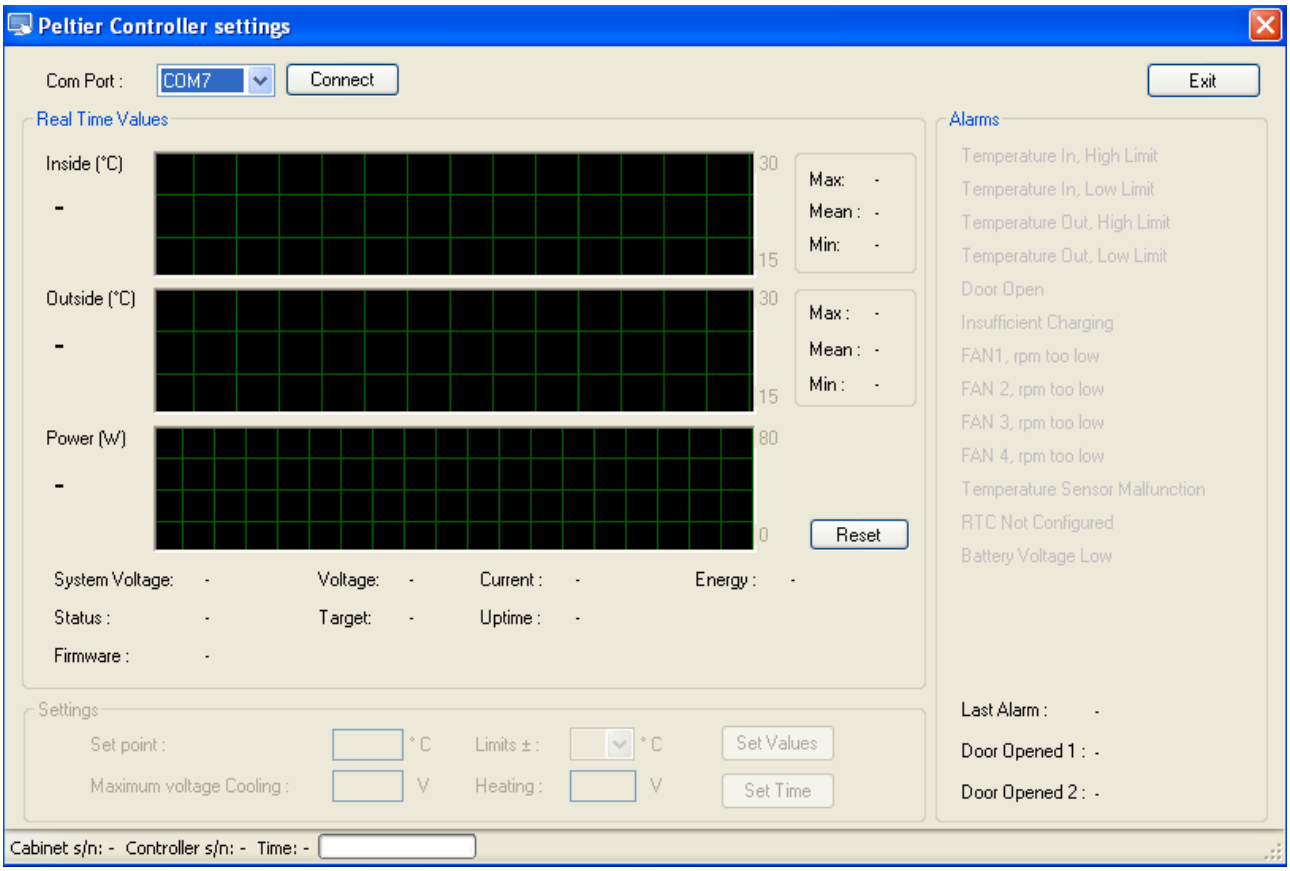


Fig. 8. When starting the "Follow-Up" program, this window appears. The program finds the correct USB port when the cable is connected. Then the user clicks the Connect button and the following window is shown.

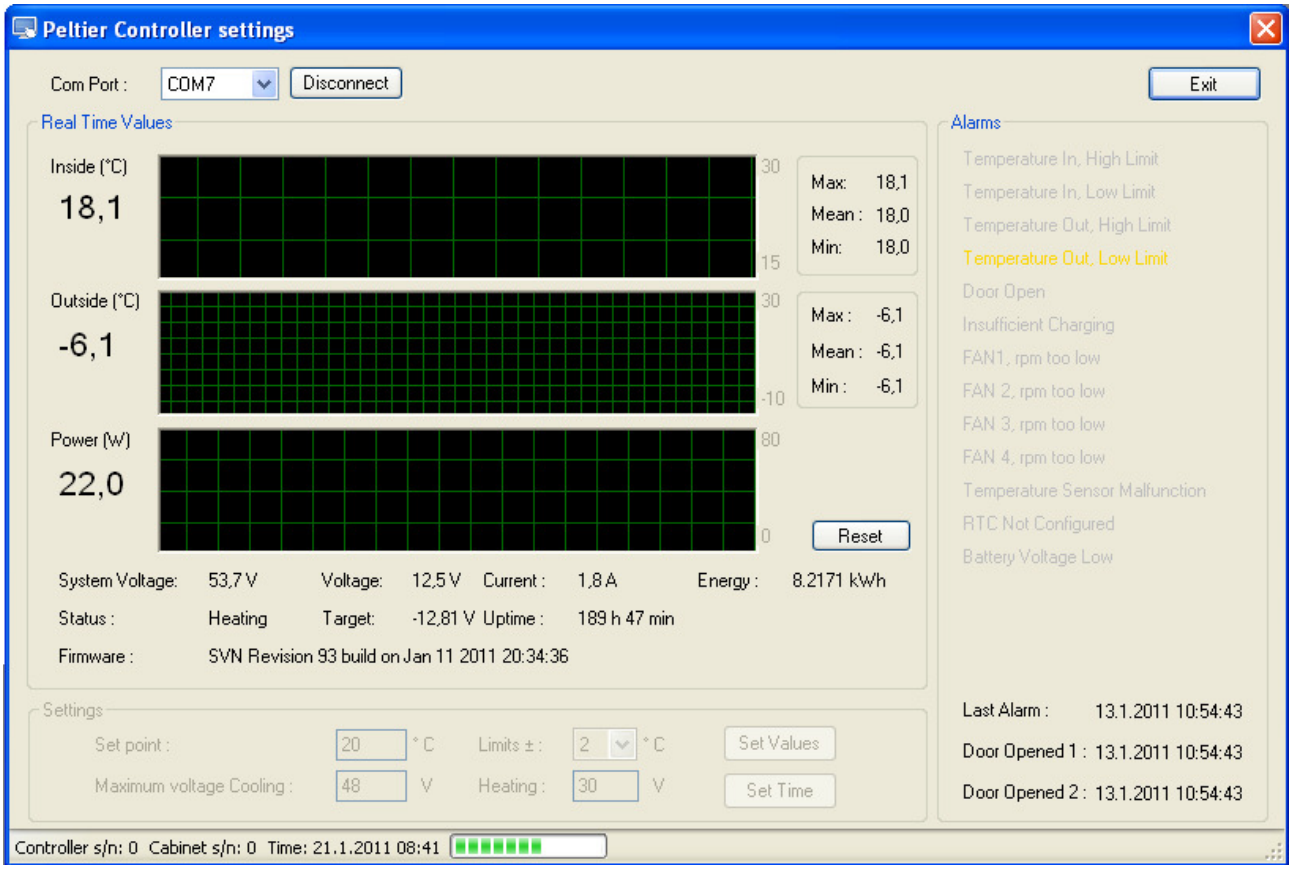


Fig. 9. Real time values of temperatures, electrical values and other user information.

The upper part of the window displays the inside and outside temperatures plus some additional information. This is followed by the voltages, current and power to the Peltier. Used energy for cooling or heating is shown in kWh.

Setting values are also shown in the window. These can be altered by pressing F12 on the laptop. When the controller is maintaining the temperature between the set limits it aims to maximum value when cooling and minimum value when heating. The reason for the electrical setting is that the user can adjust the maximum power by giving the maximum voltages to the Peltier elements (which are individual for cooling and heating).

By clicking Ctrl L the program shows the data transfer between laptop and CBU®.

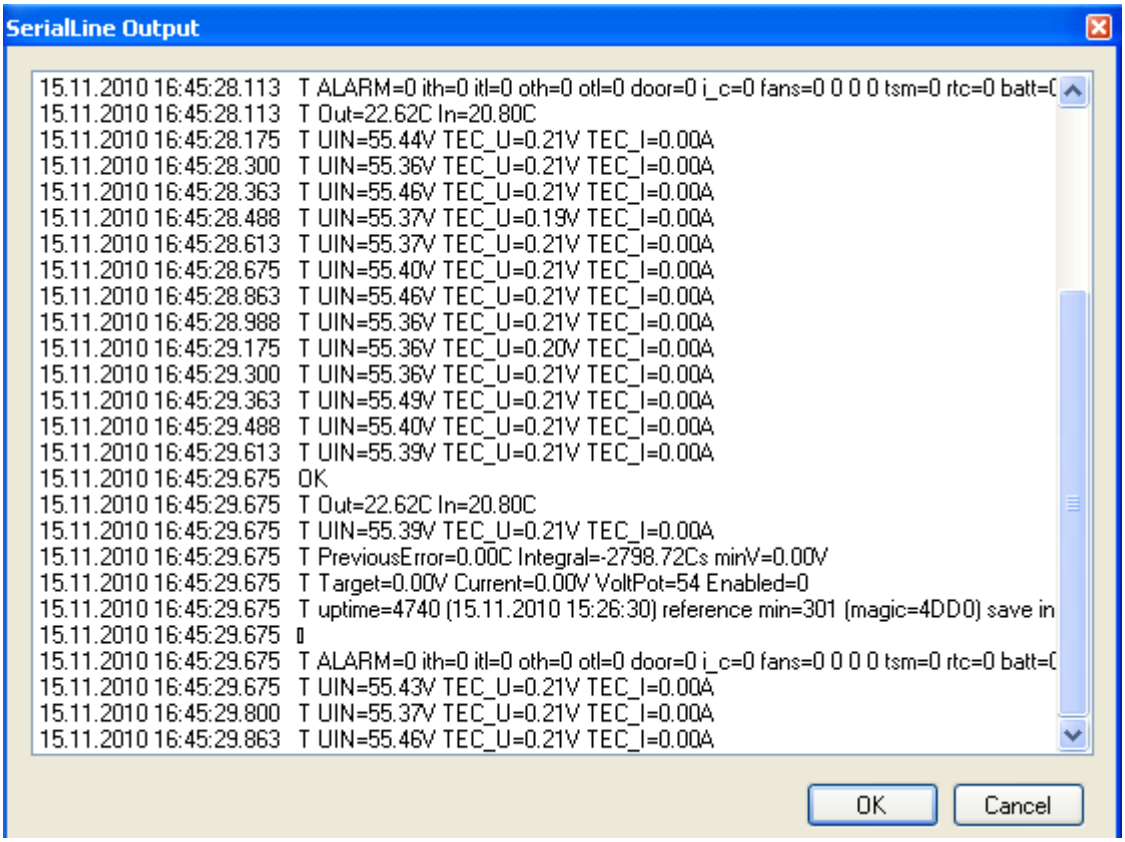


Fig. 10. Data transfer between laptop and CBU®.

Settings can be altered by pressing button F12 on the laptop. The following display will then be seen:

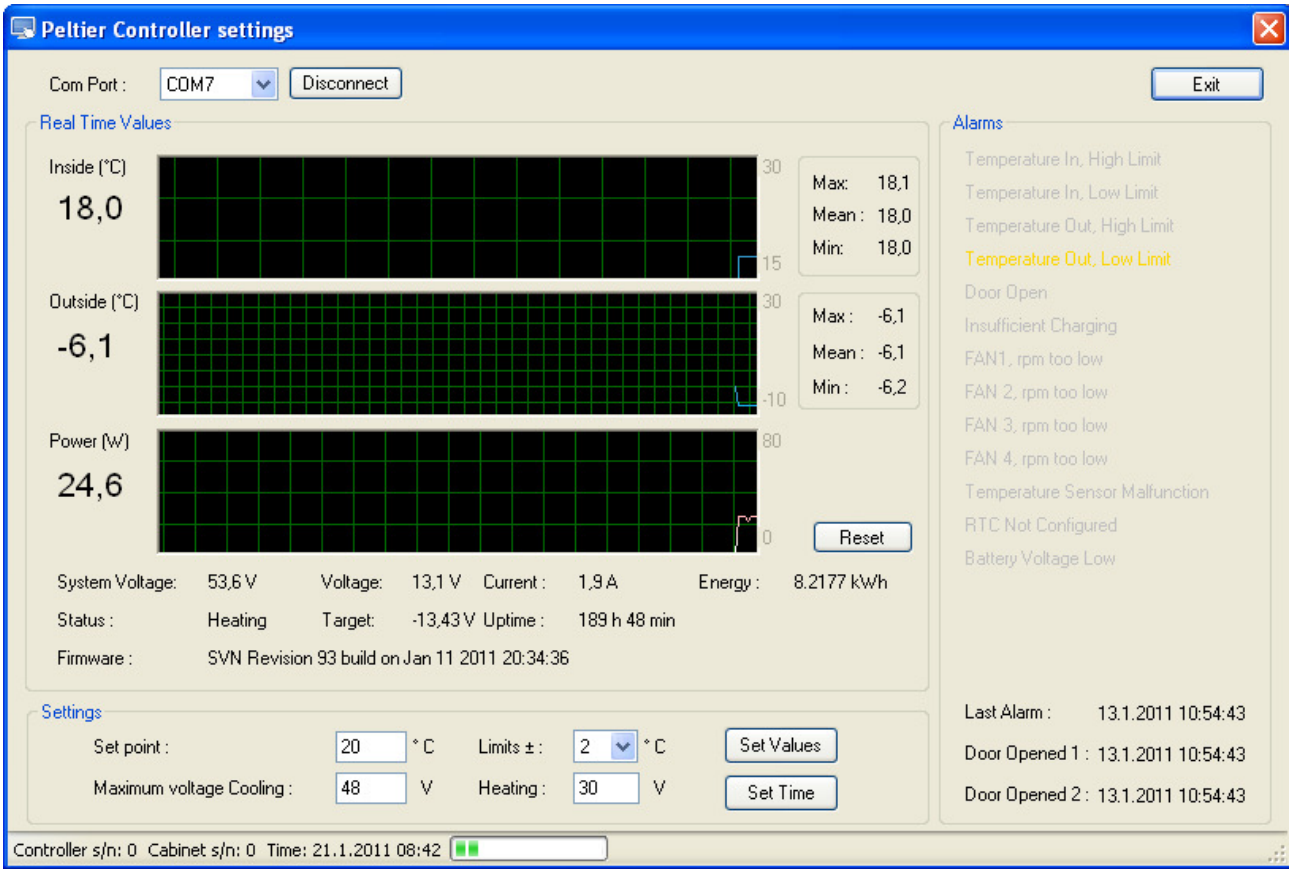


Fig. 11. Pressing F12 on the laptop changes the shade of the set point values from light gray to black. Now the values can be altered. When this is done press “SET” and the values are sent to the controller. These new set points are stored in the controller in a memory, which is maintained even when the electricity is disconnected.

Factory setting for set points are 20ºC ±2 ºC. These set point values can be altered by the user, but in doing so the life time of batteries may be shorter. Setting the limit less than ± 2ºC, will give a more exact temperature but as a draw back, will use more power. Conversely, by extending the power is saved but the life time of batteries is somewhat shorter. The maximum tolerance that can be set by the user is ±10ºC. If the program notice that wider temperature setting area than from 5 to 25ºC would be used, it does not accept the settings at all.

As a Factory settings, following Alarms are activated: Temperature In (High & Low), Door Open, Insufficient charging, FAN 1 rpm too low, FAN 2 rpm too low, FAN 3 rpm too low, Temperature Sensor Malfunction, RTC not configured, Battery Voltage Low.

It is possible to lower the maximum current used for cooling or heating. But as a consequence, the controller has fewer options in controlling the temperature. This will cause more alarms when the controller cannot keep the temperature in range. Factory settings are highly recommended.

4.3 Program Installation.

The “Follow-Up” program can be downloaded from the web page **ftp://212.94.65.222/support**. To do this, will require the serial number of the CBU® and its individual license number which can be found on the type sticker attached to the inside of the door. Download 'FollowUploader.not'. Then change the extension from not to exe. By starting the loaded program (FollowUploader.exe), it will install the executable “Follow-Up”. The temporary extension is used to make program transfer possible even when the firewalls or spam filters are used.

4.4 Alarms.

When the front LED light (or the alarm LED on the controller) blinks there is a new alarm in the unit. The following are possible reasons:

The door is opened.

The inside temperature is out of settings.

The system voltage is out of limits.

5 Maintenance

Routine maintenance of a CBU® is recommended for ensuring satisfactory performance. Good records will identify when corrective action may be necessary to ensure the integrity of emergency supply. In practice, the content and frequency of scheduled maintenance for the CBU®, is specified by the user. It should take into consideration site criticality, location and available of service personnel, together with the prevailing operating conditions.

A maintenance schedule typically includes:

• Initial readings

Upon completion of the commissioning charge and immediately after reverting to normal operation record the values such as running time, inside/outside temperatures, mean values, number of alarms etc. See record sheet.

• Annual readings or quarterly readings

Record all information shown in Figure 13. Visually inspect the CBU® and ensure it is kept clean and free from corrosion. If necessary, clean with a damp cotton cloth and mild detergent, do not use solvents or scouring powders.

Keep the air intakes clean and visually check all fans. If abnormal, a rasping or chirping noise may be heard which may be the result of a faulty fan.

In addition, check connections for correct torque, tightness of battery connections etc.

• General

Record the details of any abnormal matters and all corrective action that is undertaken. It is recommended that records are kept in a manner such that comparison with previous reports can be readily made.

If any technical problems occur contact the local EnerSys® sales office quoting the details on the type sticker inside the door. Your supplier is particularly interested in model number and serial number.

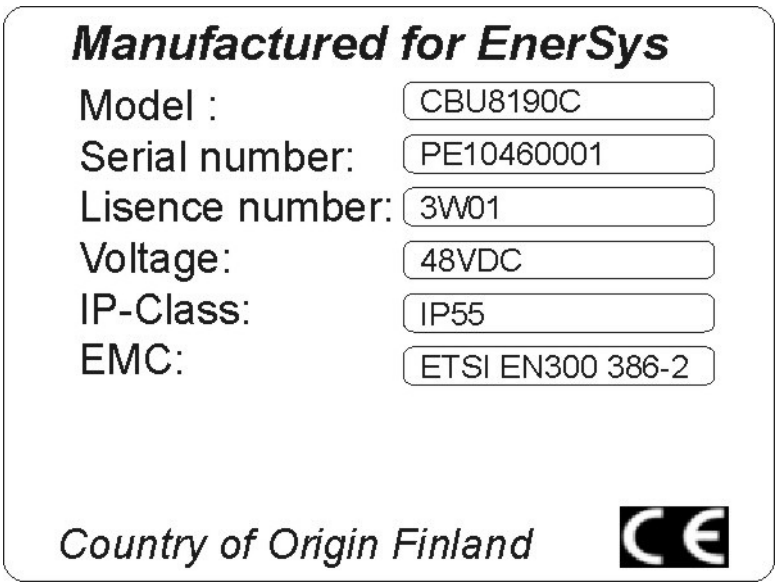


Fig. 12. Sticker inside the front door. With the model number and serial number, the manufacturer can identify the CBU®.

Every CBU has an individual license number, which is needed for downloading programs.

5.1 Fans.

It is important to check the fans. The fans used are highly reliable but as they have moving part they need to be checked. If any of the three fans is not working or is making more noise than normal all three fans must be replaced. Please note also, that the fans are different. The fans outside are more powerful and the inside fan is thinner (25 mm). Care should be taken not to mix them up.

5.2 Replacing fans.

When any of the three fans stops or starts to make more noise, all three fans should be replaced. Use only original spare part fans with readymade cables and connectors. This is important because there exists a wide variety of different fans although the dimensions may be same. The

original fans are long life fans and airflow is carefully selected to give best performance. The power consumption is moderate and calculated to match the power supply.

Needed: One set of replacement fans number CS8190C00001.

Follow the following procedure:

1. Cut the cable ties carefully so that the cables will not be damaged.

2. Unplug the first fan connector.

3. Unscrew the 4 screws in the fan you have just unplugged. Remove the finger guard, which is on top of the fan. Remove the fan, fit a replacement fan, replace the finger guard and reconnect the cable.

4. Follow the same procedure for the next two fans.

5. Fasten the cable ties.

5.3 Connector Details

5.4 Connection diagrams

See Figures 1, 2 and 5. Connectors (battery).

5.5 Compact Battery Unit Record Sheet

Site: .... Startup date ....

Startup technician ....
Company ....

	Temperature inside				Temperature outside				Electrical	
Date	Present	Minimum	Maximum	Mean	Present	Minimum	Maximum	Mean	System voltage	Peltier Power

Page 1

Figure 13. Record sheet.

Notes

EnerSys
P.O. Box 14145
Reading, PA 19612-4145
USA
Tel. +1-610-208-1991
+1-800-538-3627
Fax +1-610-372-8613

EnerSys Europe (EMEA)
Löwenstrasse 32
8001 Zurich, Switzerland

EnerSys Asia
152 Beach Road
Gateway East Building
Level 11
189721 Singapore
Tel. +65 6508 178

EnerSys Ltd.
Oak Court
Clifton Business Park
Wynne Avenue, Swinton
Manchester M27 8FF
UK
Tel: +44 (0)161 794 4611
Fax: +44 (0)161 727 3809

Contact:

www.enersys-emea.com

Publication No. EN-IOM-CBU-8190C August 2011 - Subject to revisions without prior notice. E.&O.E.

Version: 1.1
Revised: 30/08/2011

.....