



ИБП Makelsan Challenger 160-200 кВА - руководство по эксплуатации. Юниджет

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USER MANUAL

CHALLENGER SERIES

160-200KVA



USER MANUAL CHALLENGER SERIES

160-200KVA

AG-SD-33

Document P. No:2 Rev:2

About The Manual

This manual is prepared for the users of Challenger 160-200kVA.

Companion Manuals

For further information about this device and its options, please visit www.makelsan.com.tr

Updates

Please visit www.makelsan.com.tr for updates. Always use the latest manuals.

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1 Safety and Warnings

1.1 Warnings

This manual must definitely be read and understood before installing the UPS. The installation and first start-up can be performed only by an authorized MAKELSAN staff.

Installation and start-up by unauthorized persons may cause serious injury and/or result in death.

The UPS is designed to be used in continuous vertical position in fixed-positioned applications.

NOTICE:



THE UPS MUST BE USED WITH GROUND CONNECTION.

Connect the ground cable before connecting the mains.

The ground leakage current may rise up to 0.4A.



THE UPS MUST BE DISCONNECTED FROM THE MAINS AND BATTERIES BEFORE SERVICING. ALSO WAIT FOR AT LEAST 5 MINUTES FOR THE DC BUS CAPACITORS TO DISCHARGE AFTER POWER OFF.

Service-Maintenance

All service and maintenance operations are performed internally. All parts of UPS can be serviced and replaced only by a trained personnel.

Performing regular protective maintenance at least once a year is recommended beginning from the first installation. (This service will be provided for a fee by authorized MAKELSAN staff.)



BATTERY VOLTAGE MAY RISE UP TO 700 VDC!

Battery voltages are in deadly levels (700Vdc). Batteries must not be touched except the trained staff.

Batteries certainly must not be thrown into fire. Regarding the topic of batteries which are dead and defected: The waste batteries must definitely not be thrown to nature. They must be delivered to MAKELSAN authorized technicians or to the foundations which are authorized for collecting waste batteries by the Ministry of Environment.

Fire extinguishing equipment must be kept nearby the UPS.

1.2 Clearance and Access

Clearance

There exist air inlet and outlet grilles on the left-right sides and top of 160-200kVA UPS devices. All air is taken through front and sides and evacuated through fan grids on the top side. There must be 1 m clearance at least at front and sides of the UPS. There should not be permanent or temporary use within the limits specified. Otherwise, the UPS's performance will decrease.

Access

Operator can reach the inside of UPS through front panel on our products in the range of 160-200 KVA. Therefore, enough area must be left for operator.

1.3 Storage

UPS should be kept in a room or area where is protected from excessive moisture and heat before commissioning.

NOTICE: Unused batteries must be charged at regular intervals. This time interval is determined by the battery supplier. Charging batteries can be performed periodically by connecting to a proper mains for a while.

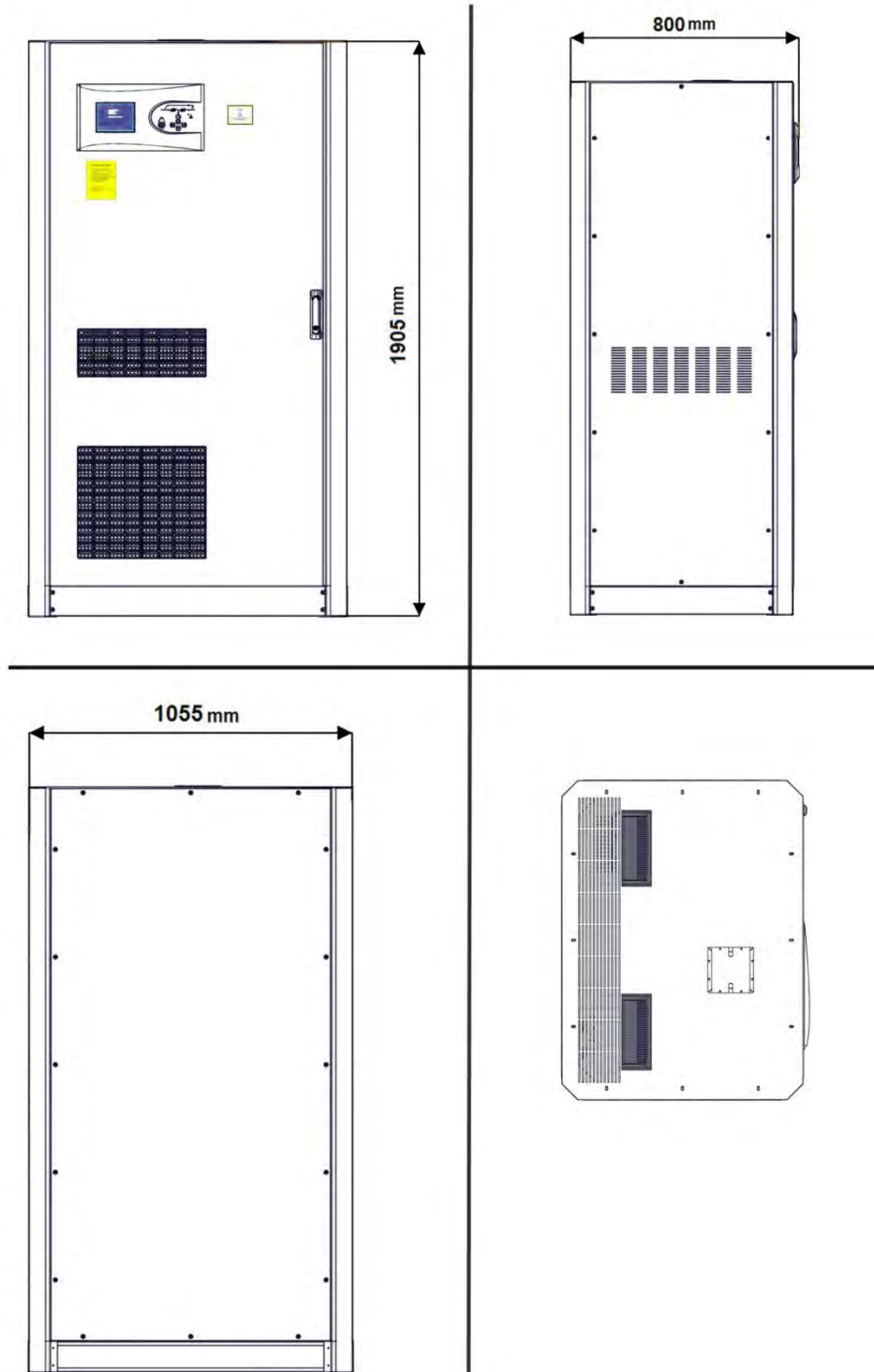
1.4 Shipment

Carrying vehicles or handling accessories must have enough features and characteristics to carry UPS's weight.

Move the UPS as rarely as possible.

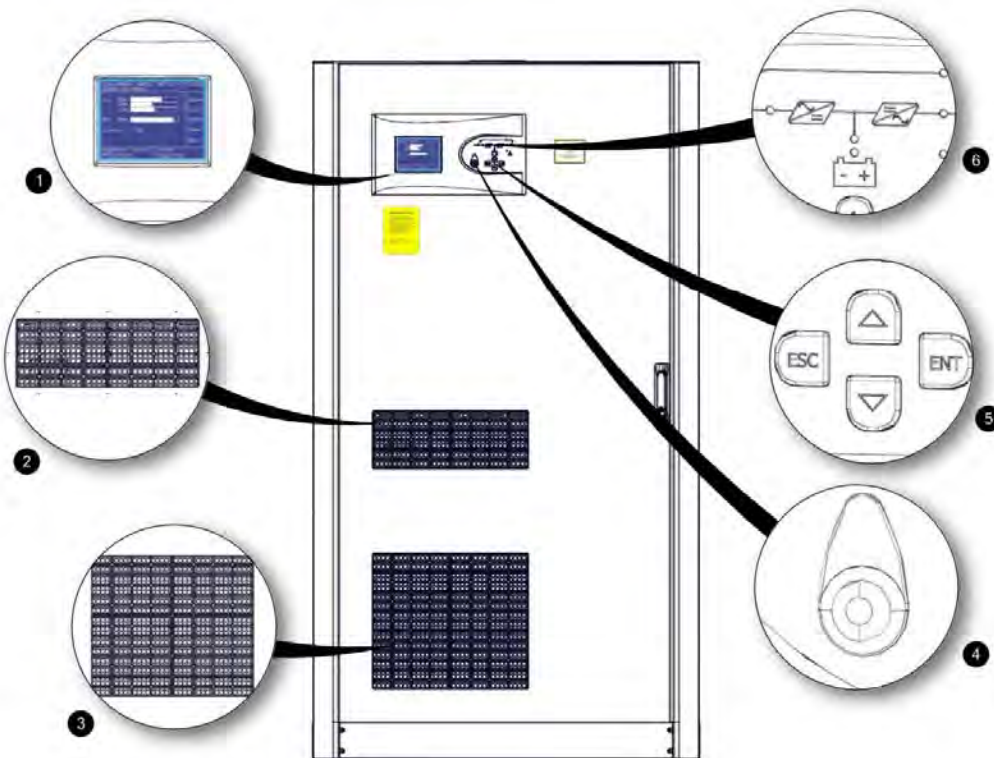
2 Product Description

General View



CH160200EN02R0

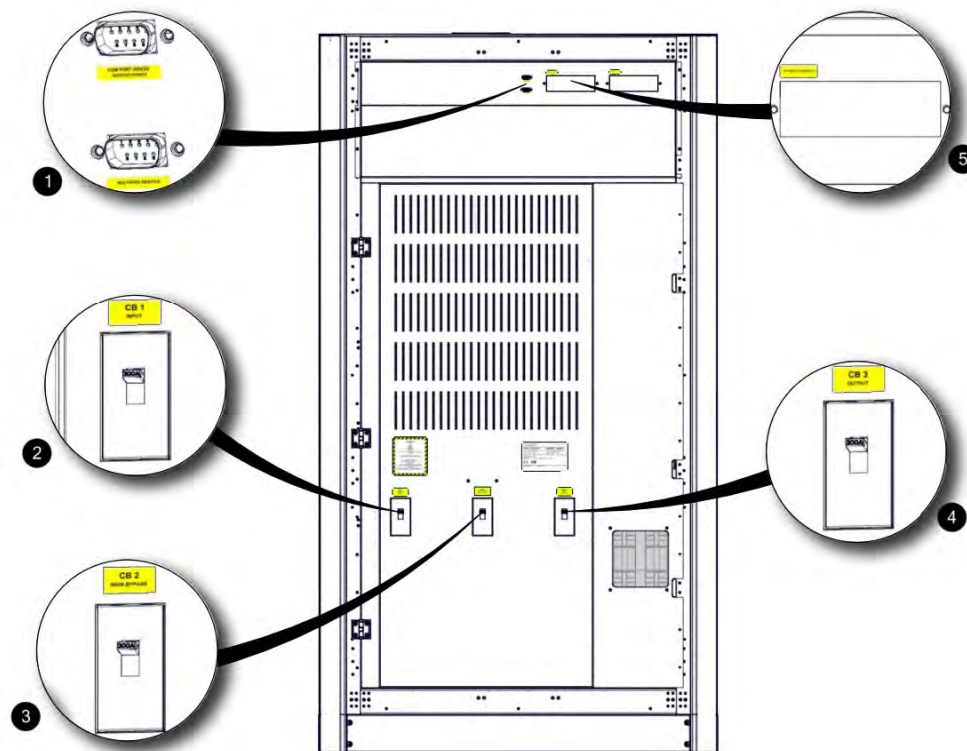
Front View



CH160200EN03R0

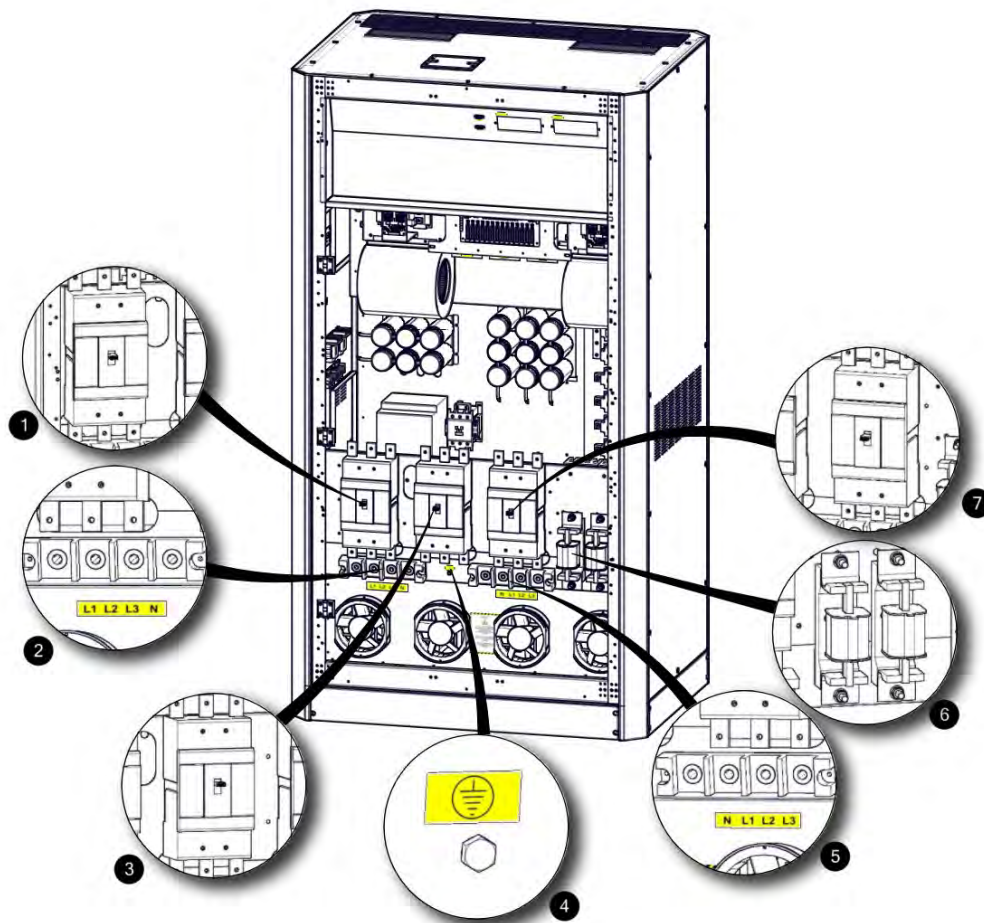
1	240x320 6"GraphicsLCD
2	Fresh Air Vacuum Grid
3	Fresh Air Vacuum Grid
4	EPO (Emergency Power Off) Button
5	Menu Navigation Keys
6	Mimic Diagram

Front Cover View

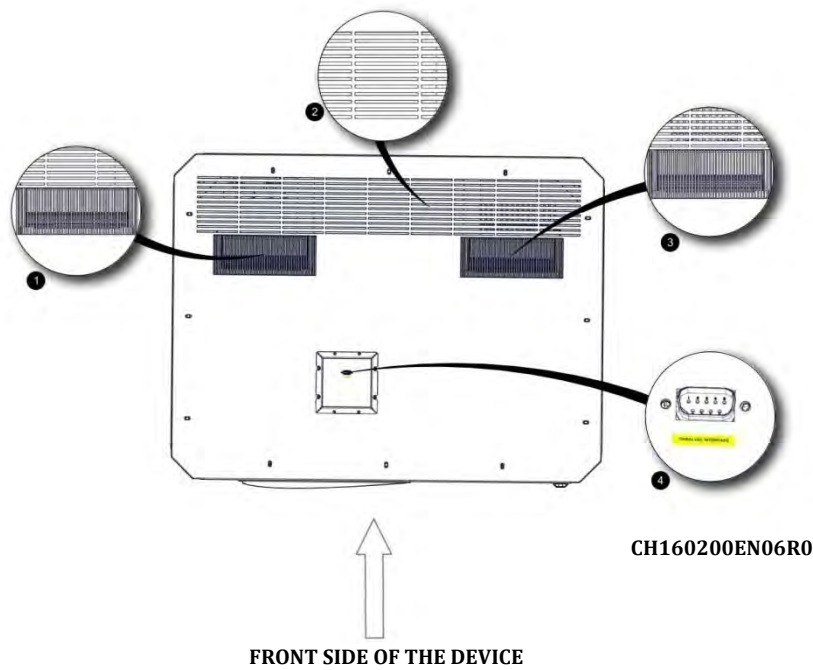


CH160200EN04R0

1	RS232 Serial Communication Connectors for Inverter and Rectifier
2	Input Circuit Breaker
3	External Bypass Circuit Breaker
4	Output Circuit Breaker
5	Optional Card Slots

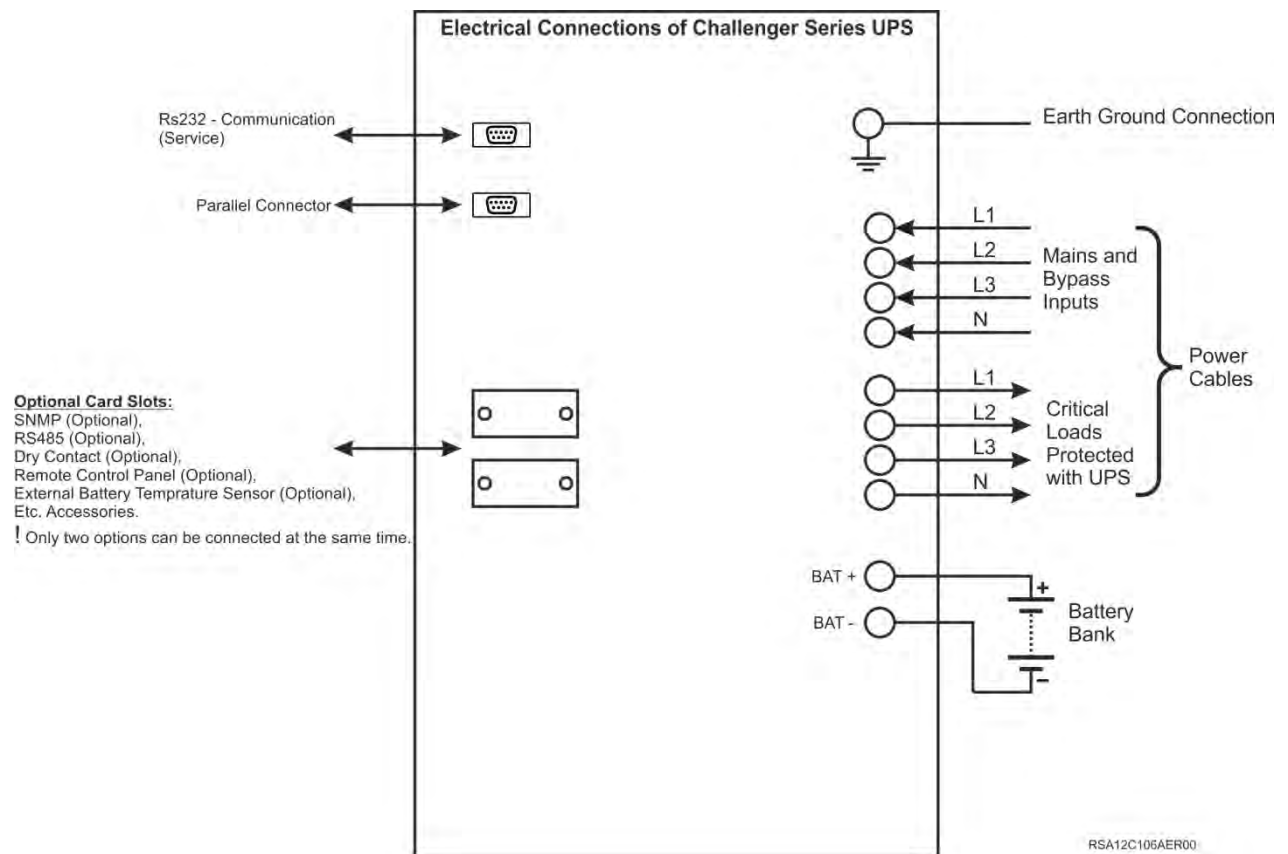
Front inside View**CH160200EN05R0**

1	Mains Circuit Breaker
2	Mains Connection Terminals
3	External Bypass Circuit Breaker
4	Earth Ground Connection
5	Output Connection Terminals
6	Battery Rapid Fuses and Battery Connection Terminals
7	Output Circuit Breaker

Top View

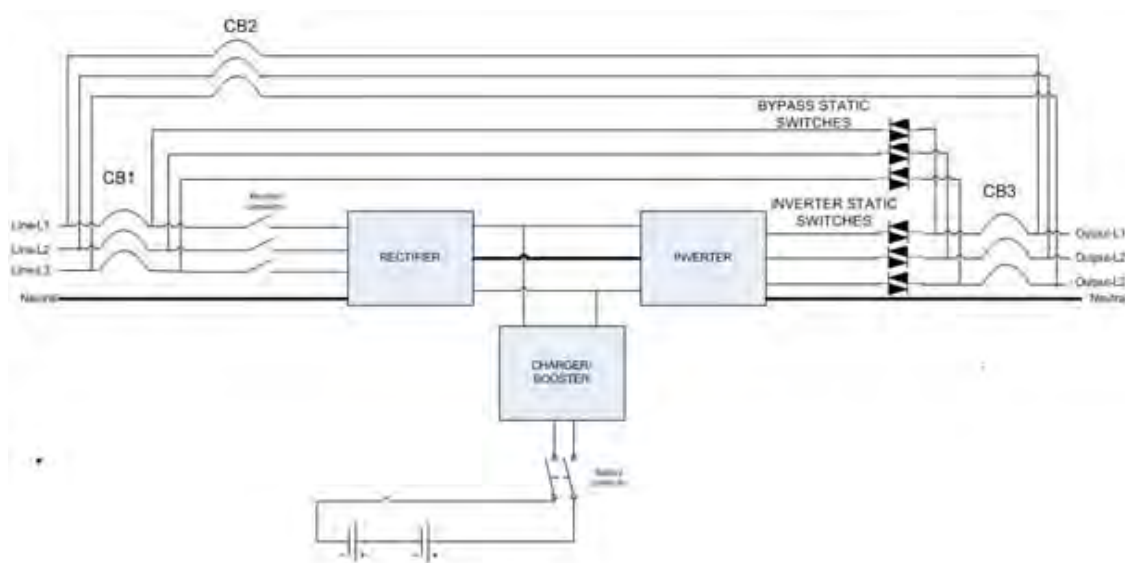
1	Power Shocks Hot Air Evacuation Channel
2	Inverter Hot Air Evacuation Channel
3	PFC Hot Air Evacuation Channel
4	Parallel Connection Terminal

Electrical Connections



2.1 General Information

General operation topology of Challenger® Series devices can be recognized as follows:



The UPS is connected to the mains voltage through the CB1 breaker. After this energy has filled DC bus condensers, the rectifier operates. The rectifier converts the AC mains voltage to DC voltage. When there exists no mains, sufficient level DC bus voltage is created by DC/DC booster, using battery voltage. DC voltage is converted to mains synchronized AC voltage by the inverter. This is a high quality voltage. Generated AC power are applied to the loads passing through the static semi-conductor transfer switches following CB3 switch.

2.1.1 Static Bypass Switch

Some blocks are named as static switches as can be seen above. These blocks consist of inverse parallel connected thyristors. These switches, which are under the control of the main board control unit, provides controlling of feeding the loads through either mains or inverters. The loads are fed through inverter during the normal operating mode. Therefore, inverter static switches are active if there is no problem with the system.

System provides the loads to be fed smooth and seamless by mains or inverter. In order to manage this process at minimum risk, UPS synchronizes the inverter output and mains bypass as the same phase and frequency. Therefore, inverter frequency is the same as mains frequency as long as it is acceptable within frequency limit.

User can switch between mains and inverter, using the front panel. Loads, operating from the mains with user instruction, will automatically undertake the load in the event that the mains cuts off or is out of tolerance.

User can, if desired, enable the mains to supply the load continuously by activating maintenance bypass switch without performing no settings via front panel. Afterwards, output and input circuit breakers can be made open circuit.

When maintenance or repair are needed, before input and output circuit breakers are turned on, the maintenance circuit breaker is taken to ON position. Then, output and input breakers of the UPS are taken to OFF position respectively.

NOTE: In the meantime, the loads are unprotected against the power-off due to the mains, damage, twist etc. problems.

2.1.2 Battery Temperature Regulation

Temperature sensor is optionally provided in external battery cabinets. Temperature of the batteries is measured by this temperature sensor. The UPS adjusts battery charge parameters according to the information of the detected temperature. These parameters can easily be adjusted via LCD in the system or Telnet interface by authorized staff. In this case, we advise you to order “**External Battery Temperature Sensor Kit**” for temperature detection of the UPS.

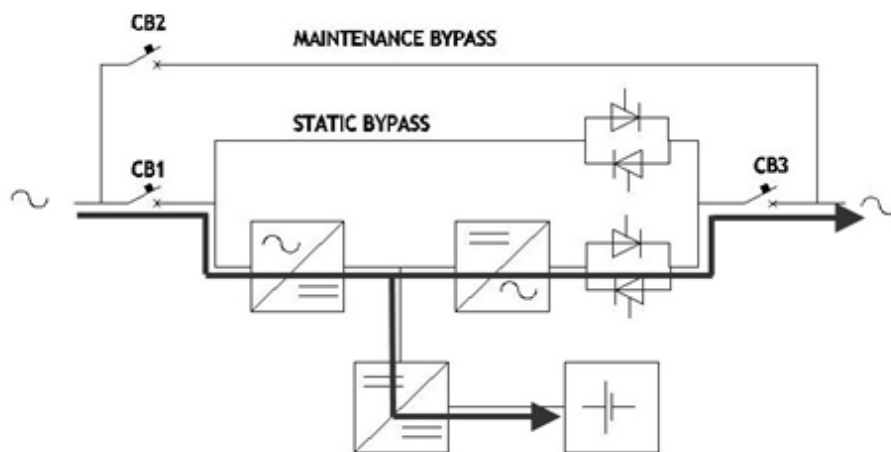
2.2 UPS's Operation Modes

Challenger series UPS's on-line and double loop structure. Our products operate in the following modes:

- Normal Mode
- Battery Mode
- Bypass Mode
- Auto Restart Mode
- Maintenance Mode

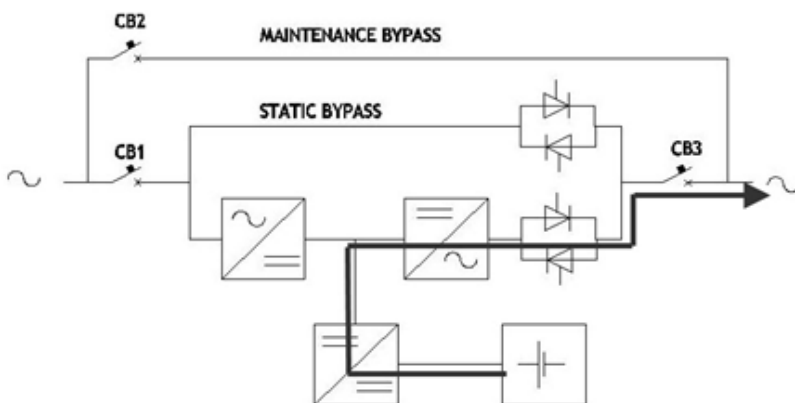
2.2.1 Normal (Online) Mode

In this mode, UPS supplies the load through the inverter. Rectifier unit gets the energy from the AC mains. Inverter and battery charger units can be fed by the generated DC supply.



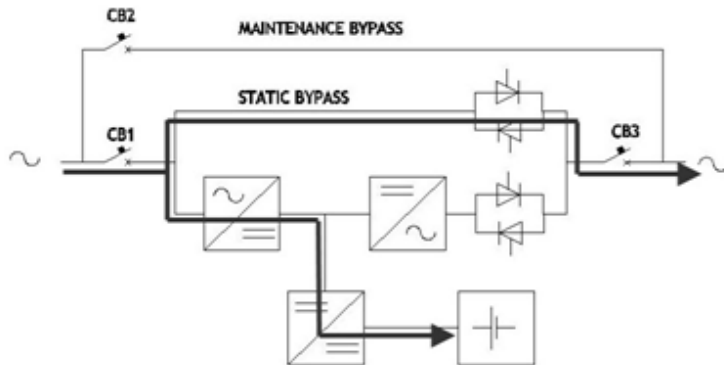
2.2.2 Battery (Stored) Mode

Due to any failure of the mains, while the UPS feeds the critical loads through inverter, this energy can be supplied from the batteries. For sufficient DC bus voltage, battery voltage is boosted.



2.2.3 Bypass Mode

On account of UPS overload or any problem on inverter, no qualified AC output is produced, the loads are fed through bypass source. UPS switches from inverter to AC source via static transfer switches without any interruption. The inverter source and mains must be synchronized in order to manage this switching process without any problem.

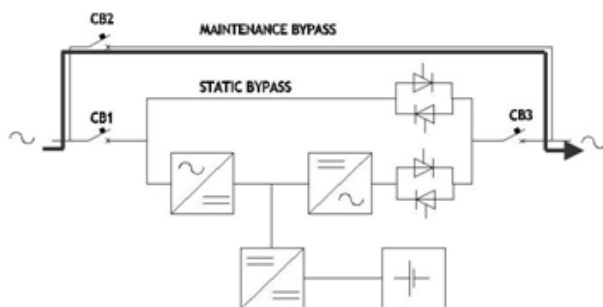


2.2.4 Automatic Restart Mode

In case of any failure of the mains, the UPS will continue feeding the critical loads until the batteries reach the end of discharge voltage level. The UPS will go on working until the batteries are drained, and then will shut down. After the mains conditions get back to normal, the UPS automatically starts to operate in a period to be determined. In this case, the UPS continues to operate in normal mode as long as the mains values are in desired criteria. In the Challenger series devices, this feature is not activated in factory settings.

2.2.5 Maintenance Mode

The UPS is equipped with a specific protection switch in order to keep the loads powered during maintenance. This switch is designed so as to handle UPS loads completely.



2.3 Battery Management

Lead – Acid Batteries, in various configurations, are internally used in the devices.

2.3.1 Normal Operation Mode

Constant Charge Current

Current is limited to 0.1C until reaching the float charge voltage. (It can be adjusted between 0.05C and 0.25C) The applied current cannot exceed the maximum charge power of the UPS.

Float Charge

Depending on the battery manufacturer, 1/3 of the energy of the battery is charged at this level. Owing to this level, batteries are kept ready for use at the highest capacity. For lead-acid batteries, this voltage varies between the values of 2.2-2.35 V/cell. This voltage may differ slightly due to temperature adaptation. Option of setting this coefficient is provided with our UPS. If the temperature sensor is used, it is recommended to use.

Deep Discharge Protection

While the system is operating in the battery mode, if battery voltage has dropped below the deep discharge voltage level, the UPS shuts down and disconnects the batteries from the system via a contactor. This value varies between 1.6-1.75 V/cell for Lead-Acid batteries, and between 0.9-1.1 V / cell for Ni-Cd batteries.

Low Battery Warning Level

While the system operates in spare, in other words, battery mode, if the battery capacity drops below its 40% value with actual loads, it will give an audible and visible alarm. This value can be adjusted by user between 20%-70%.

2.3.2 Advanced Level Functions (Automatic Battery Test)

The *Auto Battery Test* automatically discharges 30% of the battery existing capacity in a certain period defined (default is 90 days). The period between two tests can be adjusted by user between 30-360 days. At the end of the test, one of these three status, “**good, weak or replace**” is determined.

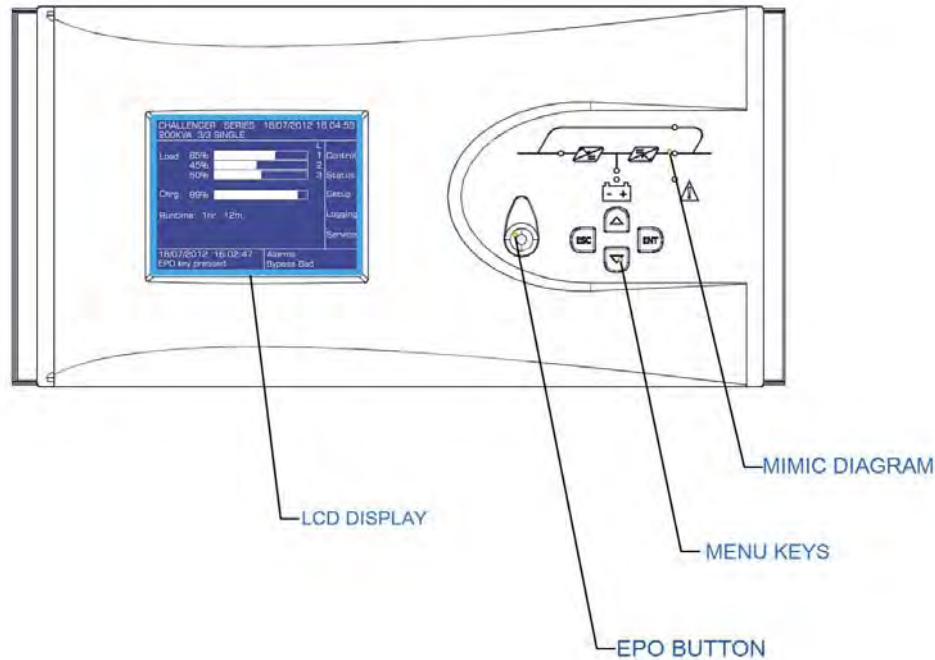
NOTICE: At the end of this test, if batteries are reported as “replace”, then the batteries are completely drained after the test. In this case, loads can remain unpowered in case of mains power off.

This test can be started by command from front panel, via Telnet interface, via RS232 smart communication or via MakNET (SNMP, see the options).

As a result of all these tests, it is checked whether the batteries that are presently used can supply the minimum needs of loads in case of the first power-off or not. It is recommended that test results be checked at regular intervals.

2.4 User Panel

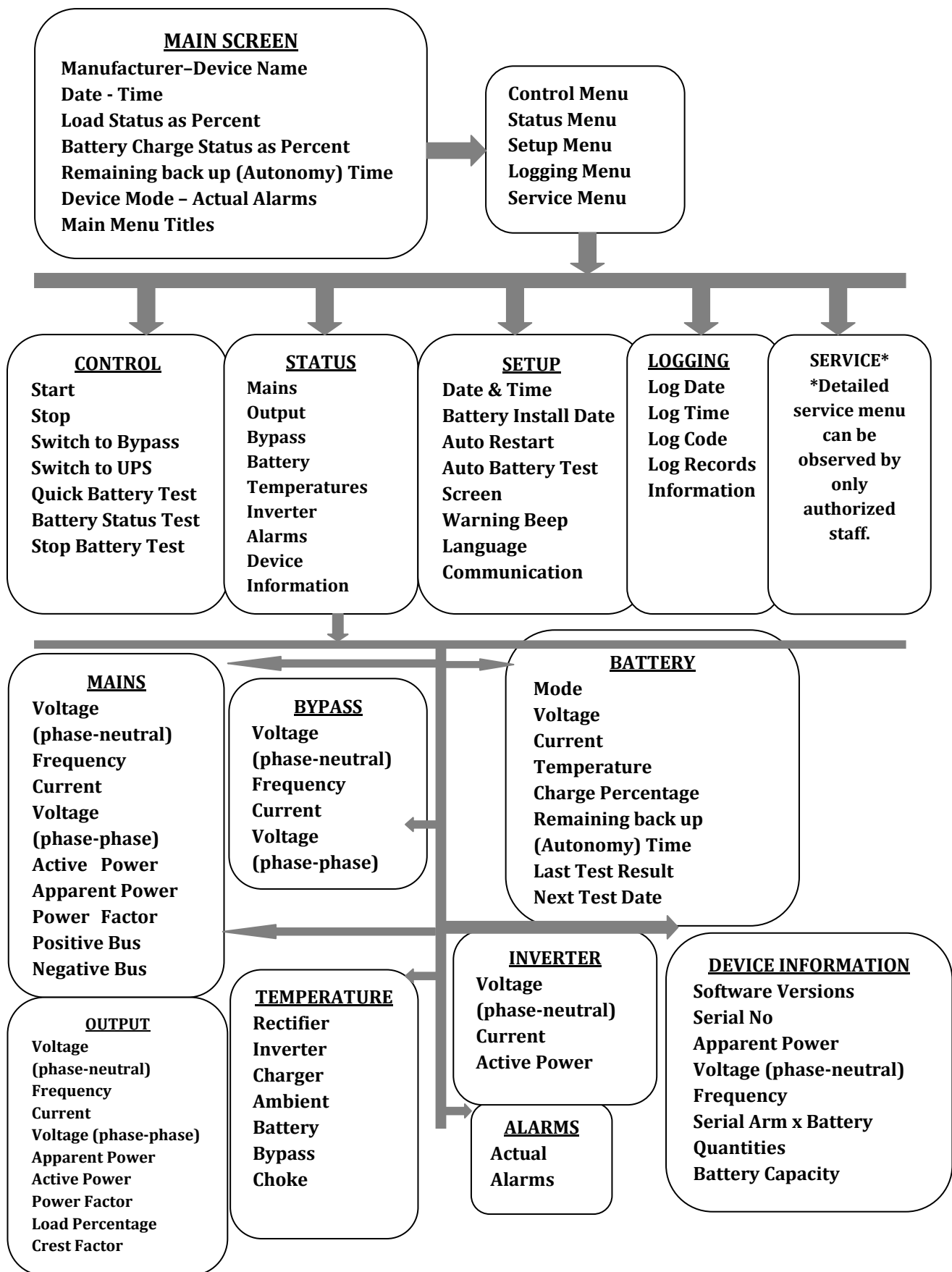
User panel consists of mimic diagram, LCD screen and menu keys. The device can be controlled via this panel.



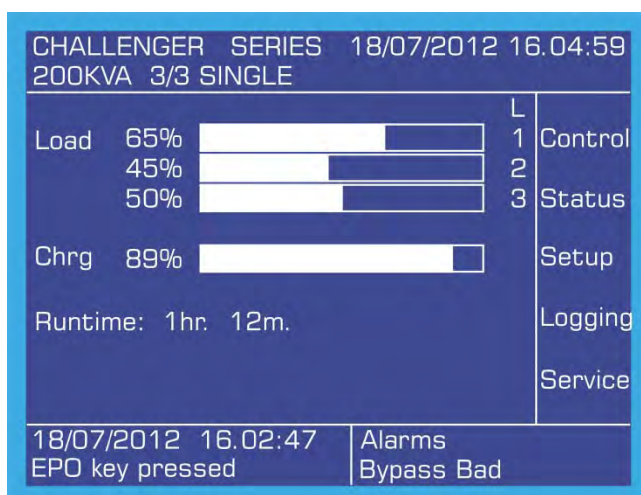
CH160200EN07R0

1	Rectifier indicator LED <i>It illuminates when rectifier works. It flashes when DC bus is being charged.</i>
2	AC/DC module (Rectifier)
3	Boost mode indicator LED <i>It illuminates in battery mode and flashes when UPS is started up through batteries.</i>
4	Battery charge indicator LED <i>It illuminates while the batteries are charged.</i>
5	Battery module
6	DC/AC module (Inverter)
7	Bypass static switch indicator LED <i>It illuminates while the loads are fed through bypass line.</i>
8	Inverter static switch indicator LED <i>It illuminates when the load is fed by the inverter.</i>
9	Alarm/Warning indicator LED
10-13	Menu keys
14	EPO Button

Menu Flow Chart



2.4.1 Opening Screen



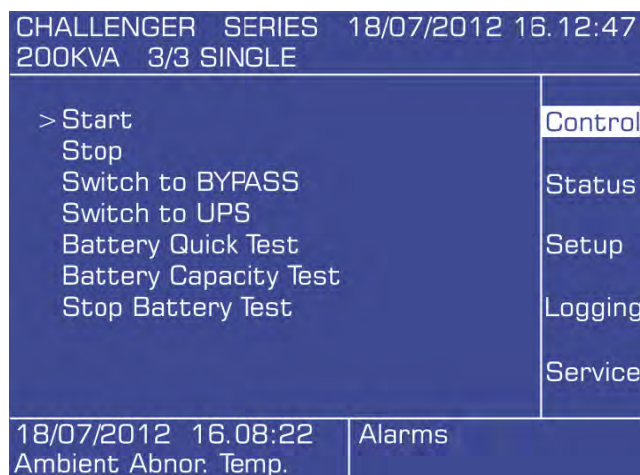
When the front panel monitor is turned on, firstly opening screen is observed. Model name, date, time, charge status, load status and remaining back-up time are displayed. The latest log record is shown in the left bottom part and actual alarms list changing at intervals of 2.5 seconds takes part in the right bottom part. If no button is pressed for 5 minutes, system returns to the opening screen.

2.4.2 Main Menu

Switch from opening screen to the main menu through **ENT** button.



2.4.3 Navigating Through the Menus



Press **UP/DOWN** keys to move the cursor arrow in the screen. Open a sub-menu with **ENT** button, go back to the previous menu with **ESC** button. Control sub-menu is shown on left.

Some menus consist of more than one page. Switch among the pages with **UP** or **DOWN** buttons.



Some menus have changeable options like **ON/OFF**, durations or quantities. To change setup in such menus, choose variable with **ENT** button, set new value with **UP/DOWN** buttons and save it with **ENT** button. Cancel with **ESC** button.



2.4.4 Password Protected Menus

Some menus such as the control menu are password protected. To enter password choose each digit with **UP/DOWN** buttons and confirm with **ENT** button.

User level password is: 0000

2.4.5 Control Menu

The followings can be done in the control menu:

Start	Start the UPS.
Stop	Stop the UPS.
Switch to BYPASS	Switch to static BYPASS mode.
Switch to UPS	Switch to online mode.
Bat. Quick Test	Start the quick battery test.
Bat. Capacity Test	Start the deep battery test.
Stop Battery Test	Stop the battery test.

Battery status test, drains the 30% of battery energy and reports batteries which has more capacity than 30% as “Good”, the ones with the capacity of 15%-30% as “Weak” and the ones with the capacity less than 15 % as “Replace” according to the test results.

Deep battery test uses all the battery energy and determines the existing battery capacity as percentage.

Note: Batteries must have been fully charged and kept in floating situation for 5 hour before performing the battery tests.

Following *Status>Battery>Duration* menu, how many minutes left to start the test can be observed.

If “Stop Battery Test” is chosen from the menu, the device cancels the battery test and goes back to the previous operating state.

CHALLENGER SERIES 18/07/2012 16.12:47		
200KVA 3/3 SINGLE		
Battery	U 680 V	Control
Mode:Resting	I 3 A	Status
	T 25°C	
Chrg 90%		Setup
Runtime: 1hr. 20m.		
-----Last Test Result-----		
No Test Performed		
Capacity: 100% Condition: Good		
18/07/2012 16.08:22		
Ambient Abnor. Temp		
Alarms		

2.4.6 Status Menu

The values of Mains, Output, Bypass, Battery, Temperature, Inverter, DC Bus Values, Alarms and Device Information can be displayed on this menu.

CHALLENGER SERIES 18/07/2012 16.12:47		
200KVA 3/3 SINGLE		
>Mains	Control	
Output	Status	
Bypass		
Battery	Setup	
Temperatures		
Inverter	Logging	
Alarms		
Device Information	Service	
18/07/2012 16.08:22		
Normal Mode		
No Alarm		

Mains

- UP, I, Hz Voltage(phase-neutral), current and frequency of each phase.
- UL,S, P Voltage (phase phase),reactive and active power of each phase.
- PF,U, D Power factor, positive DCbus and negative DCBus of each phase.

Output

- UP,I, Hz Voltage(phase-neutral), current and frequency of each phase.
- UL,S, P Voltage(phase phase),reactive and active power of each phase.
- PF,L, CF Load percentage for each phase and crest factor.

Bypass

- UP,I, Hz Voltage (phase-neutral), current and frequency of each phase.
- UL Voltage of each phase (phase-phase).

Battery

Mode Battery Mode.

U,I, T Battery Voltage, Charge Current and Temperature.

Charge % Charge Percentage.

Battery Time The estimated battery run time with current load.

Last Test Result Test type, test number, test date and time. Battery capacity and condition.

Next Test Time Next test date

Time Count down for battery test in floating situation.

Temperature

°C,°C,°C,°C,°C,°C,°C Rectifier, Inverter, Charger, Ambient, Battery, Bypass and Thyristor temperatures.

Inverter

U,I, P Voltage(phase-neutral), current and frequency of each phase.

Alarms Actual UPS alarms.

Device Information

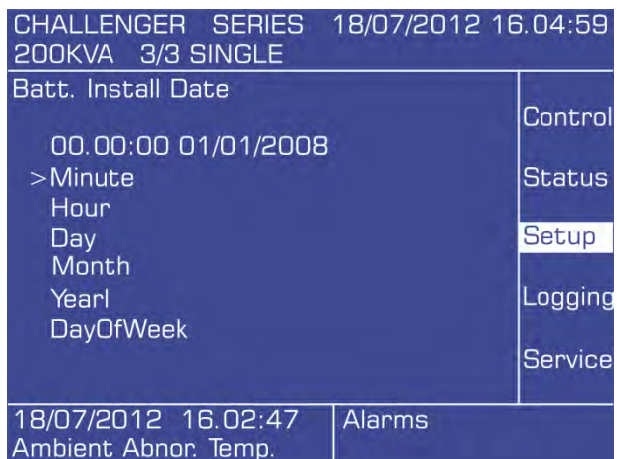
CHALLENGER SERIES 18/07/2012 16.12:47 200KVA 3/3 SINGLE	
Device Information iN33_PN67_C12_G01 HF331201911A500101A 120KVA (LN) 230V / 50Hz 1x1 9AH	Control
	Status
	Setup
	Logging
	Service
18/07/2012 16.08:22 Ambient Abnor. Temp.	Alarms

Software Version of inverter, rectifier, CPLD and front panel; UPS's serial number, apparent power (kVA), nominal output voltage (phase-neutral), nominal output frequency (Hz); parallel battery handle number x serial battery handle number and battery capacity set in UPS can be seen via version menu.

2.4.7 Setup Menu

The following adjustments can be performed via setup menu:

Date & Time

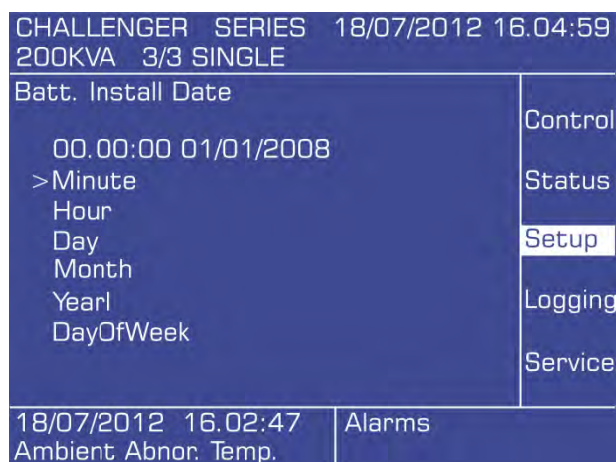


To set date and time, use up and down keys to choose the variable you want to set and press **ENT**.



Set the value via arrow buttons and press **ENT** button again.

Battery Installation Date



When new batteries are installed, set the battery install date via this menu.

Automatic Restart

CHALLENGER SERIES 18/07/2012 16.04:59 120KVA 3/3 SINGLE	
Auto-Restart	Control
>Off	Status
5 min.	Setup
	Logging
	Service
18/07/2012 16.02:47 Batteries Changed	Alarms Bypass Bad

In battery mode, the device operates until batteries discharge and then shuts down. *Auto-restart* can be used to restart the UPS automatically when the mains gets back into limit values. Open/close auto restart via the option of ON/OFF and determine how much time after the device will be started after the mains is normal.


Automatic Battery Test

CHALLENGER SERIES 18/07/2012 16.04:59 200KVA 3/3 SINGLE	
Battery Self Test	Control
>On	Status
90 days	Setup
	Logging
	Service
18/07/2012 16.02:47 Batteries Changed	Alarms Bypass Bad

Use this menu to open/close automatic battery test and to set the period (repeat period for the regular test) independently from user.

NOTE: Automatic Battery Test performs test in the same way as Quick Battery Test.

Screen

CHALLENGER SERIES 18/07/2012 16.04:59 200KVA 3/3 SINGLE	
Contrast	Control
78% 	Status
	Setup
	Logging
	Service
18/07/2012 16.02:47 Batteries Changed	Alarms Over Temp.

Change the screen contrast setting to make it more visible on different environmental conditions.

Beeper

Turn the beeper sound on/off.

CHALLENGER SERIES 18/07/2012 16.04:59 200KVA 3/3 SINGLE	
Beeper	Control
>On	Status
	Setup
	Logging
	Service
18/07/2012 16.02:47 Batteries Changed	Alarms Bypass Bad

Language

Set the menu language.

CHALLENGER SERIES 18/07/2012 16.04:59 200KVA 3/3 SINGLE	
Language	Control
>English	Status
	Setup
	Logging
	Service
18/07/2012 16.02:47 Batteries Changed	Alarms

Communication

Set the protocol for the RS232 connection. The options are SEC and Telnet.

CHALLENGER SERIES 18/07/2012 16.04:59 200KVA 3/3 SINGLE	
Communication	Control
>SEC	Status
	Setup
	Logging
	Service
18/07/2012 16.02:47 Batteries Changed	Alarms No Battery

Eco Mode

CHALLENGER SERIES 18/07/2012 16.04:59 200KVA 3/3 SINGLE	
Economy Mode	Control
>MO TU WE TH FI SA SU	Status
00:00-00:00	Setup
	Logging
	Service
18/07/2012 16.02:47 Batteries Changed	Alarms No Battery

With Economic (Eco) Mode, The UPS switches to static bypass Mode in determined days and hours. Use this menu to determine days and hours.

Service Menu

CHALLENGER SERIES 18/07/2012 16.12:47 200KVA 3/3 SINGLE	
Password	Control
0***	Status
	Setup
	Logging
	Service
18/07/2012 16.08:22 Normal Mode	Alarms

Service menu service level is password protected. It can only be accessed by authorized service staff.

2.4.8 Logging Menu

CHALLENGER SERIES 18/07/2012 16.22:47 200KVA 3/3 SINGLE	
18/07/2012 16.15:18 E001 <----- Batteries Changed	Control
18/07/2012 16.08:22 E002 Ambient Abnor. Temp.	Status
18/07/2012 16.08:22 E003 EPO key pressed	Setup
	Logging
	Service
18/07/2012 16.15:18 Batteries Changed	Alarms Over Temp.

The last 500 logs can be observed in the logging menu.

While observing any of the logs, if **ENT** button is pressed, all details regarding the moment of the event (status, settings etc.) can be seen.

Older/actual logs can be observed, using arrow buttons.

3 Installation

3.1 Single Module Installation

In this section, warnings which you must follow and the checks which you must perform before starting-up the device are stated. Additionally, you can find information concerning the points you must pay attention to during carrying style for cabinets, positioning and connections.

3.1.1 Warnings



The UPS must be installed by the staff approved by Makelsan.

Do not energize a UPS not properly installed.



Battery hazard!

In some models, during operation of battery and the UPS together, there may exist battery terminal voltages reaching up to 700 VDC.

Precautions must be taken in order to protect eyes against electrical arcs that can result from contacts.

ESD-protected rubber gloves should be used.

Batteries discharging or leaking electro liquid must not be used, if any, it must be replaced. Uninstalled batteries must be kept, carried and transferred to destruction points safely.

In case of skin contact with elector liquid, immediately rinse the exposed skin part with water. Operator must remove any dangerous accessories such as ring, watch etc. before working on the device.

The product needs three phase and four cable (+ground) supply system for input. Type of this supply system conforms to IEC60364-3 standards. The devices have transformers which have ability to optionally convert from three cable to four cable system. Provided that IT AC power distribution will be installed, 4 pole-circuit breaker must be used. More detailed explanations concerning the topic can be found in the standard named as IEC60364-3.

3.1.2 Pre-Installation Check Up

Before installing the UPS product, the following checks should be carried on. These are the first and important steps in the operation of the product correctly.

- Definitely check whether or not any damage was done to internal and external structures of the UPS, accessories and batteries during transportation or shipment. Report any damages before receiving.
- Make sure that the product is the right model. Check whether the label behind the device matches with the product ordered or not.

3.1.3 Positioning

The UPS and the batteries are designed for indoor use, and must be placed on a clean area with cool air flow.

3.1.3.1 Positioning the UPS

For the Challenger160-200kVA Series, fresh and cool air enters the device from the front and side of the device and goes out through the fans on the top side of the device. Air entrance and exit points should never be closed. It must be positioned on a place where is protected from water or similar liquid contact risks.

If the area is very dusty, filters optional provided must be used. Usage of these filters must be done according to the relevant instructions.

The UPS is structurally a losing-energy system. Lost energy occurs as temperature. How forced air cooling system is needed is provided in the following table. Using the table, what capacity of air conditioned should be used to cool the place where the UPS is can be determined.

Device	BTU/h amount for cooling	Estimated BTU/h value For 100 % Bridge Load (Non-Linear Load) Operation
160KVA	35000	42000
200 KVA	43800	52500

3.1.3.3 Placing External Batteries

Batteries should be mounted in an environment where the temperature is consistent and even over the whole battery. Temperature is a major factor directly affecting the battery life and capacity. In general, battery manufacturers recommend that batteries be used in 20-25 °C. Furthermore, battery manufacturer companies indicate the performance of batteries according to the said temperature range. If the temperature exceeds the said range, the life of the battery will decrease. On the contrary, again if the temperature drops the said range, the capacity of the battery will seriously decline. Therefore, expected time will not be obtained during back up. As a

result, keep batteries away from heat sources and serious air flows. Pay attention to the said factors and be careful about and observe the following points in terms of external connections of the batteries:

- Keep batteries away from main heat sources.
- Keep batteries away from serious air flows.
- Keep batteries away from the humid places. Hereby batteries can be prevented from terminal oxidations and possible leakage currents.
- Please use aR or gR semi-conductor type fuse at the battery rooms and cabinets.
- If it is possible, please use breaker switch without fuse for the battery cabinet.
- Keep battery cabinets and shelves high above the ground. UPS should be protected against possible floods or liquid contacts.
- Battery rooms should be properly ventilated.
- Shelves will be accessible in touch if batteries are in battery room. Therefore, please keep restricted accessing to battery rooms. Use necessary safety writings and strips.

Especially, for the external cabinet batteries system of UPS, fuses must definitely be used. These fuses must be mounted as close as possible to the batteries. This closeness will increase the electrical operation safety with the battery.

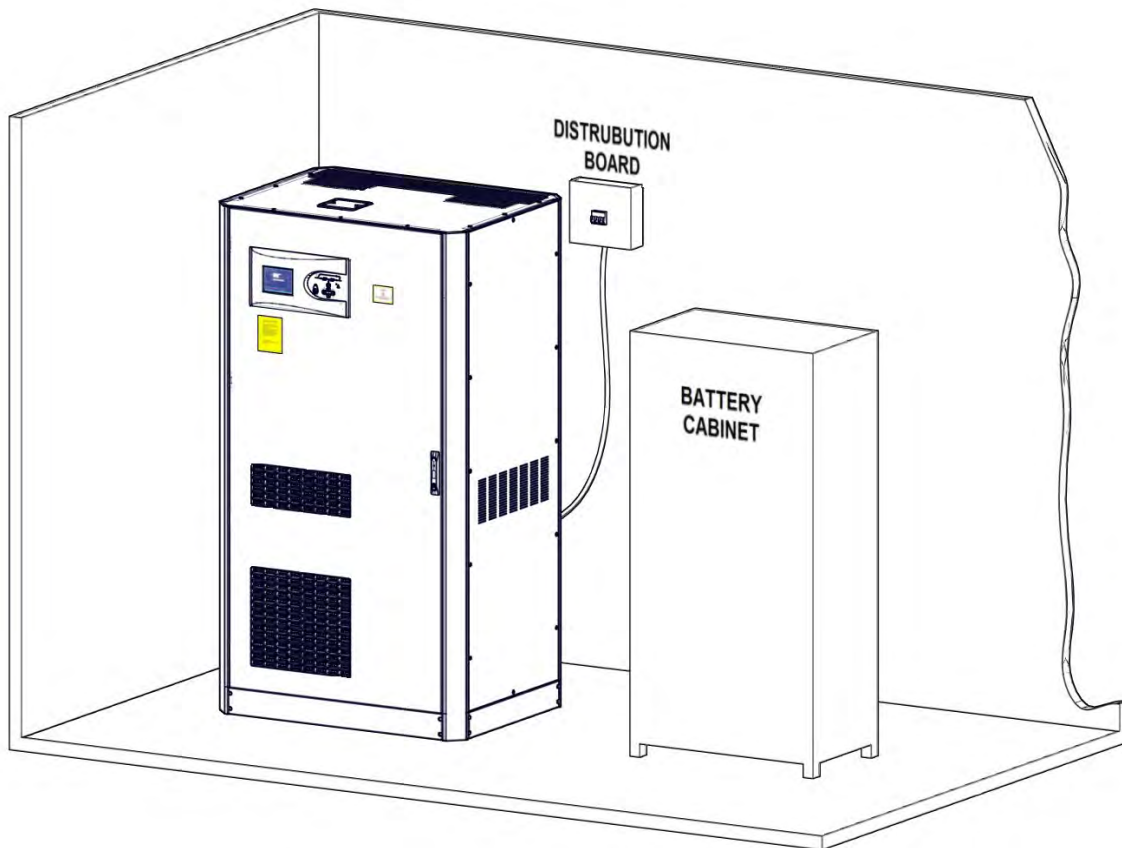
Device Rating (KVA)	160	200
Number of Batteries	50	50
I_{charge_max}@V_{bat._max}(A)	37,1	46,4
I_{bat. max}@V_{bat. cut off}(A)	271	339
Recommended external cabinet fuse (A)	280	355

External battery cabinet and battery room applications are given below as an example. The application form may vary according to the customer.



CH160200EN08R0

Example Battery Chamber Application



CH160200EN09R0

External Battery Cabinet Application

3.1.4 Transportation Type of Cabinets

Pay attention that carrying vehicles or handling accessories must have enough features and characteristics to carry the weight of the UPS.

UPS and optional battery cabinets are designed to be carried by a forklift or similar vehicles. Be more careful of sudden movements, especially when batteries are inside of cabinet. Move the UPS as rarely as possible.

3.1.5 Mains, Load and Battery Connections

Distribution board is recommended for the UPS outputs. Load protection fuses and breakers must be used in such distribution board. Additionally, fuses with various speeds may be needed according to load. A-B type fuses or magnetic breakers are recommended to be used if the load is suitable.

3.1.5.1 External Protections

To protect the AC inputs, thermal magnetic breakers or V-automat breakers must be independently installed on the distribution board. Herein, the cable intersections and fuse values must be determined and connected by an expert authorized person.

Over current protecting must be installed on mains input board. This protection must be selected in conformity with the bearing capacity of over current and over load of the UPS.

The fuses in the board must be chosen as 135% higher rated than the current values given in the table below, and the fuses must be C-type (slow).

Ground leakages flow to the ground through the EMI filters on the input and the output of the UPS. Accordingly, Makelsan recommends residual current relays that can be adjusted up to 700mA.

The residual current relays to be placed in the UPS input must also be:

- ✓ Resistant to both positive and negative DC pulses,
- ✓ Not sensitive to transient currents.
- ✓ Must be sensitive to currents which is average between 0. 3-1 ampere.

3.1.5.2 Cable and Fuse Configuration

Cable designs must be compatible to current and voltage values stated herein, additionally local instructions must be obeyed about these topics.

UPS Rating (KVA)	Rated Currents (A)					
	Mains Currents at Maximum Battery Charge (3 phase + neutral)			Mains Currents at Maximum Battery Charge (3 phase + neutral)		
	380V	400V	415V	380V	400V	415V
160	273,6	259,9	250,5	246,2	233,9	225,5
200	342,0	324,9	313,1	307,8	292,4	281,8

Non-linear loads (loads such as computer) may affect cable section design. Their neutral currents might be more than phase currents, even may rise up to 1.5 times the phase current.

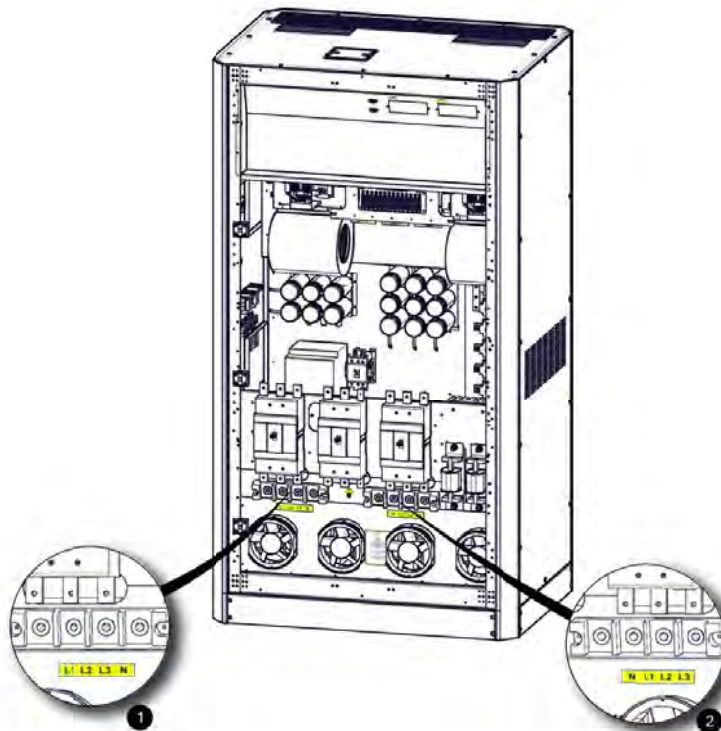
Each cabinet must be, directly and as short as possible, to ground line by means of protection ground cable. Typical ground cable cross sections are 150mm² for 160 kVA and 185 mm² for 200kVA.

3.1.5.3 Cable Connections

UPS input, output and battery connection inlets are made from the front side of the UPS.



ATTENTION! 3 pole-circuit breakers (switch) are used for the input and output of the UPS, Neutral line is not interrupted.

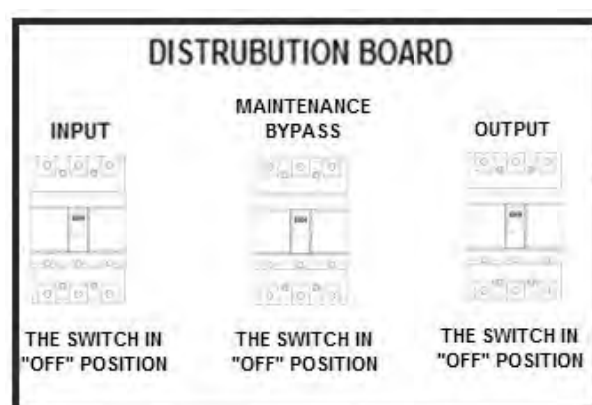


CH160200EN10R0

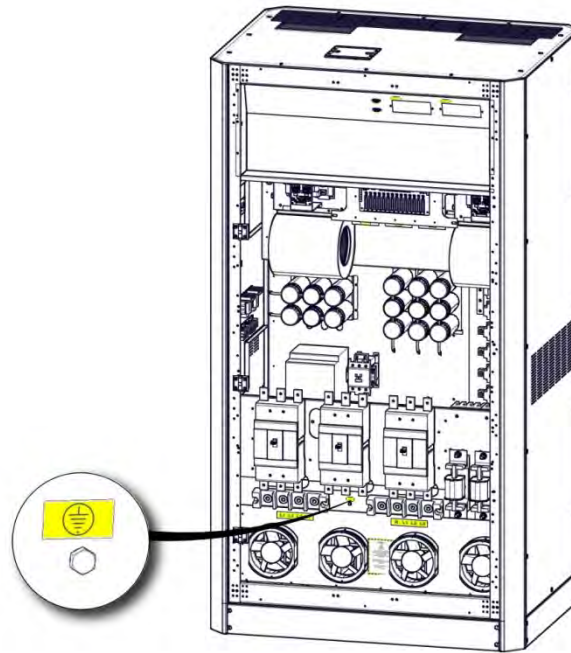
1	Input Terminals
2	Output Terminals

Please, follow the steps below for electrical connections: 1. Turn all the breakers in the distribution boards and make sure that loads and the mains are isolated from cables

CH160200EN11R0

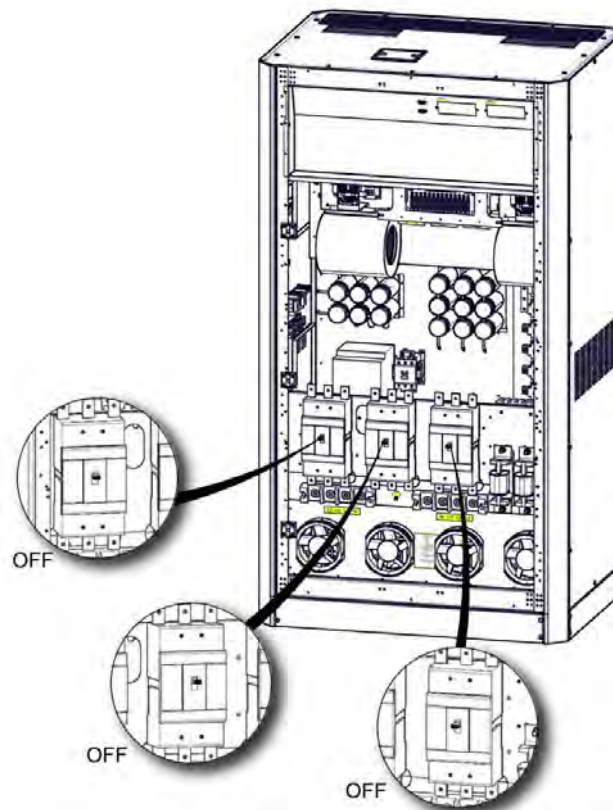


2. Connect the ground cable.



CH80120EN12R0

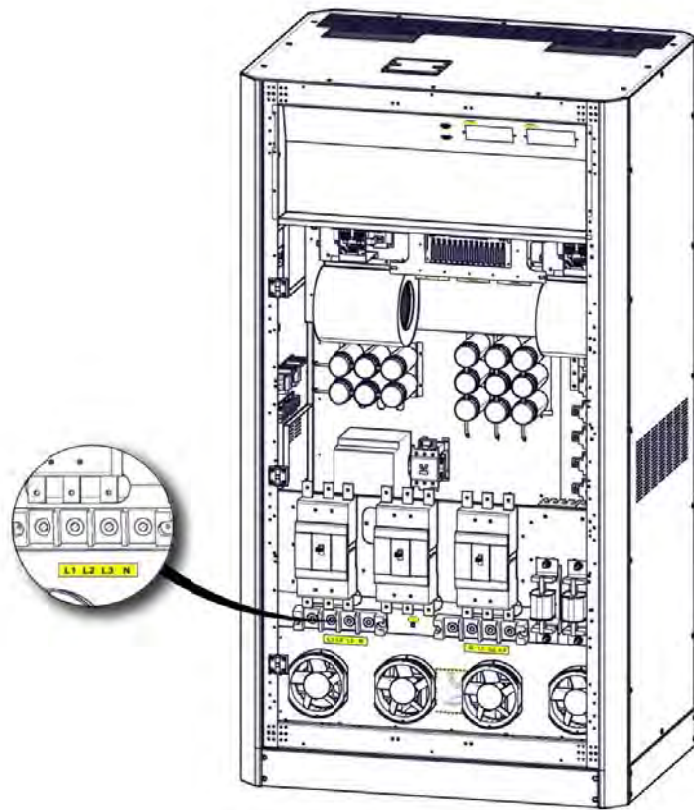
3. Make sure that all the circuit breakers are OFF. The use of these circuit breakers are explained in the next sections.



CH160200EN13R0

4. Connect the input cables:

- R phase to input L1,
- S phase to input L2,
- T phase to input L3,
- N(Neutral) to input N.



CH160200EN14R0

5. Check the phase sequence.

6. Repeat steps 4-5 for output connections.

Use the cable clips to stabilize the cables when the connections have been made.

NOTICE: Make sure that the loads in the output of the UPS prepared are isolated during the connection if they are not ready to be connected yet.

NOTICE: Before the UPS is started, make sure that cable connections have been made in accordance with the warnings in boards. Additionally, check if there is isolated transformer at the input of UPS and consider the local directions.

NOTICE: Make sure that grounding has been made properly. Wrong works or grounding made may damage the UPS and other systems in the installation.

3.1.5.4 Connecting Batteries

You can find details about external batteries installation procedure and connections in this section.



Battery Hazard!

- Battery terminal voltage can reach up to 700 Vdc.
- Protect your eyes and skin against arcs that can occur.
- Check whether there exists any leakage or not before connecting the batteries.
- Battery content is harmful. In case of any contact, wash the area with plenty of water and if irritation insists, seek for medical advice.

Take off metal accessories such as ring, watch before operating with batteries.

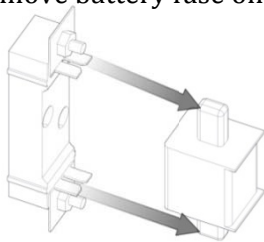
3.1.5.4.1 External Battery Installation Procedure and Connection

You can find details about how to configure the external batteries under “External Batteries Configuration” title above. The information about connection of external batteries and UPS is given in this section.



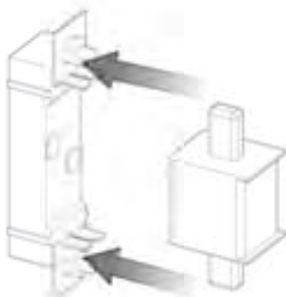
Avoid short circuiting batteries.
Exploding batteries can damage you and your environment!
Battery terminal may rise up to 700 Vdc!

1. If any, switch the breakers on the battery cabinet to the position of “OFF”.
2. Remove the battery fuse on the battery cabinet.
3. Remove battery fuse on the UPS.



CH160200EN15R0

4. Make sure that serial and parallel connections of external battery packs are correct.
5. Connect -BAT cable to the negative battery terminal and +BAT cable to the positive battery terminal inside the UPS.
6. Make sure that the polarities are connected correctly by checking battery connections for the last time.
7. Replace battery fuse on UPS.

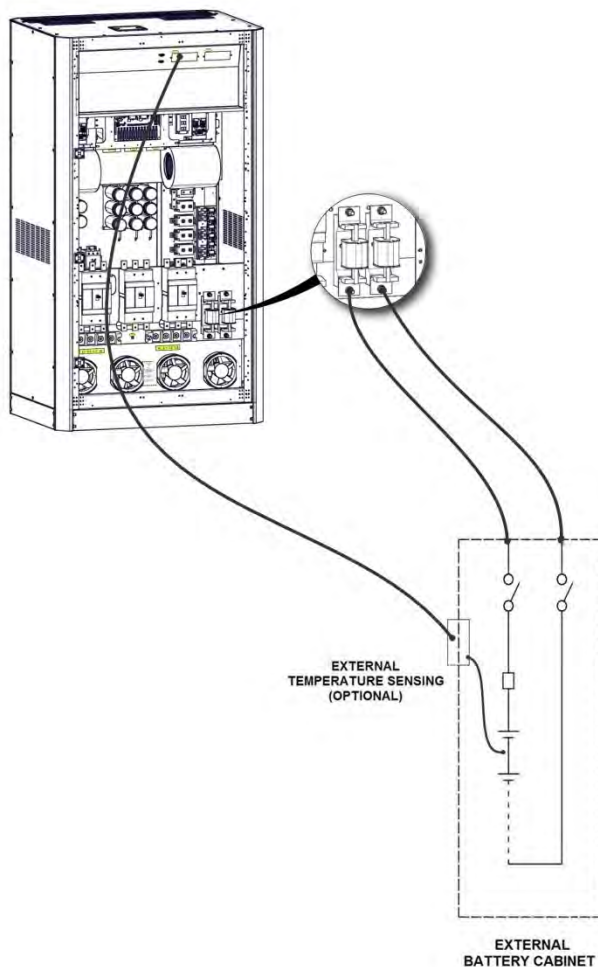


CH160200EN16R0

8. Replace battery fuse on battery cabinet.
9. If there is, switch breakers on the battery cabinet to the position of "ON".
10. Check if there is appropriate battery voltage to the battery input terminals of the UPS by means of a proper measuring device.

External battery cable selection is determined by application. Fuses which are recommended for the UPS and battery cabinet are given. To connect to these type fuses, the highest diameter cables are suggested. Please, refer to the standard called EN 50525-2-31(VDE 0100-430) in this subject. The selection should be such that the cable will allow at most 0.5 Vdc decreasing.

It is recommended that you buy "**External Battery Temperature Measurement Kit**" which is sold optionally to provide optimization of the batteries according to battery temperatures in the external battery cabinet application. Otherwise, your batteries will not be optimized according to the temperature.



CH160200EN17R0

3.1.5.5 Control and Communication Cable Connections

Makelsan UPS products have standard or optional connections of advanced external battery cabinet, environmental monitoring, control panels and various intelligent monitoring.

Connections at the front side of the UPS:

- One RS232 serial communication socket (for rectifier),
- One RS232 serial communication socket (for inverter),
- Two optional card slots,

Connections on the top of the UPS.

- One parallel connection socket.

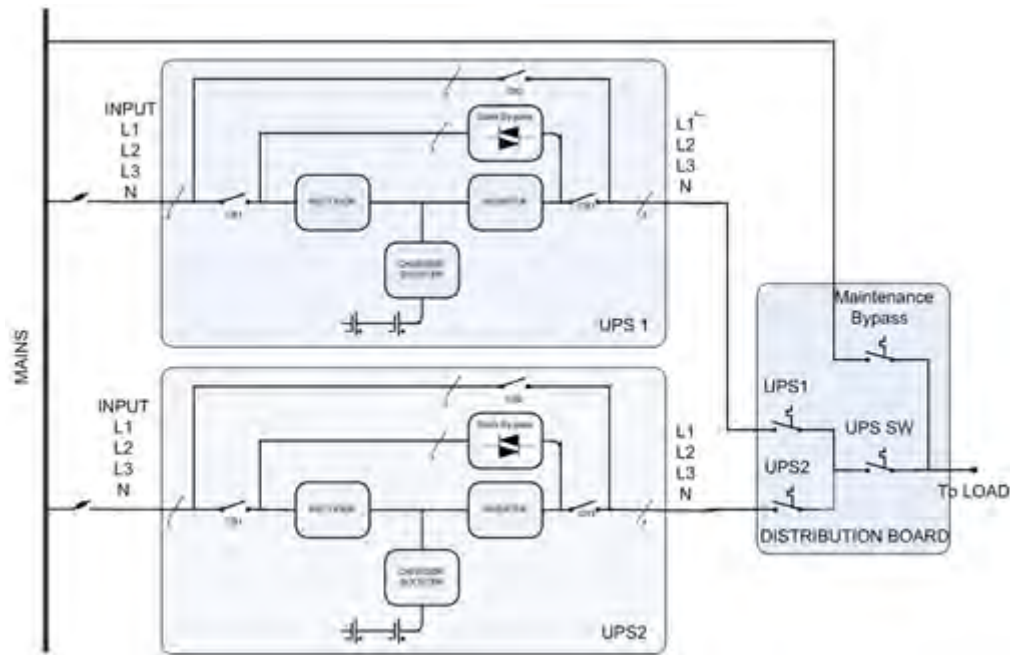
3.2 Parallel Setup

The product which you have bought can be operated in parallel. Please contact your authorized dealer for parallel operation.



Parallel application should be made by authorized personnel assigned by MAKELSAN!

In case of need of redundancy or more power, Challenger® series devices can be operated as parallel up to the amount of 8. A principle scheme which shows a system in which two UPS are connected in parallel is given below:

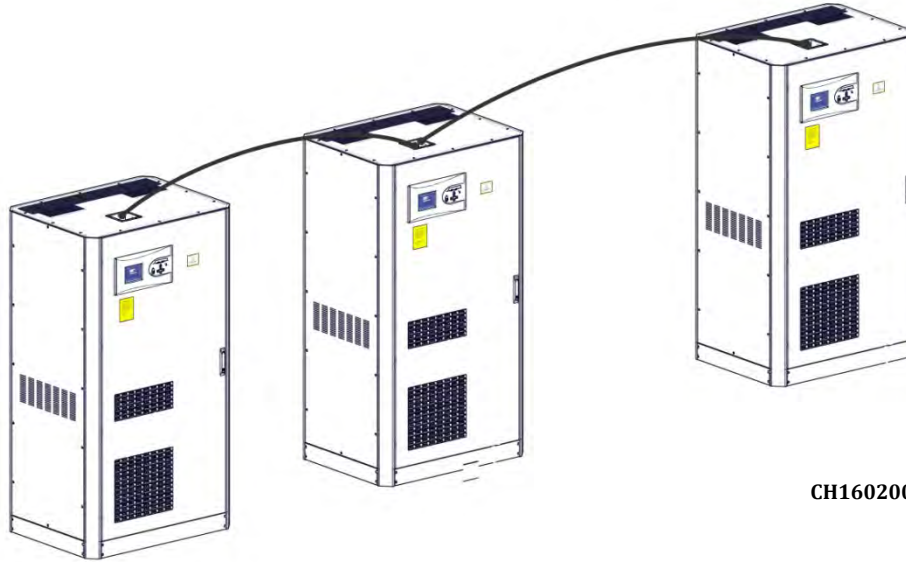


Input and output of more than one device are connected to each other; but definitely each battery group is different from another, batteries cannot be used in common. The following points should be considered while placement of devices in parallel system and their electrical connections are made:

- The devices which are connected in parallel must be from the same series and must have the same rated power.
- Devices must be running on the firmware with the same version and revision codes, devices operating with old firmware must be updated.
- Devices must be located as close possible as to each other (maximum 6 * 110 cm paralleling cables.)
- Each device must have its own neutral cable.
- Each device must have its own ground cable.
- Devices must be connected through the distribution board and phases must be properly connected. ($U_1-U_2-...-U_N$), ($V_1-V_2-...-V_N$), ($W_1-W_2-...-W_N$).
- Same battery group must not be connected to devices more than one
- For equal current sharing, all cables with which the devices are connected to the board must be equal in length and cross section.

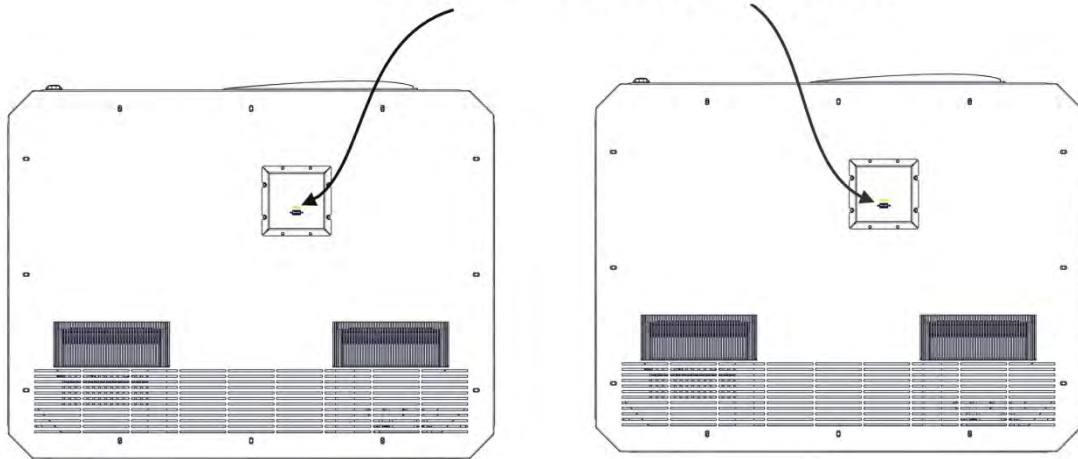
Parallel Settings

Connect the parallel cable as shown in figure below. Only use the cables provided by Makelsan.



CH160200EN19R0

PARALEL CONNECTION SOCKET



CH160200EN18R0

* Software settings on the user panel should be made by authorized personnel.

4 Operation

4.1 Operation Procedure

You can find information about circuit breaker, first start-up, types of UPS operation tests, turning UPS off, EPO and RS232 serial communication system in this section.

4.1.1 Circuit Breakers

The UPS has three circuit breakers accessible from the front side. These are used for the AC input, maintenance bypass and output connections respectively.

Three-phase AC voltage is applied through **CB1** to input of UPS.

AC input voltage will be applied directly to loads through **CB2**. In this way, maintenance purposed switching is done properly. Owing to the auxiliary contact detail in CB3, if it is activated while the UPS is operating, the mains activates bypass static switches. The system switches to maintenance mode without any interruption.

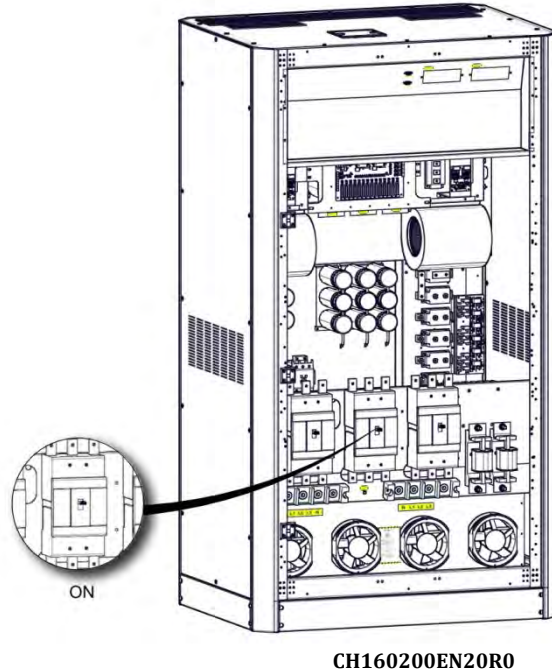
CB3 is used to connect or separate AC voltage that come from static switches to the loads on UPS.

Active Breakers	Operation Mode	Explanation
CB1, CB3	Online Mode	<i>UPS operates in on-line mode.</i>
CB1, CB3	Static Bypass Mode	<i>UPS is overload, loads will be transferred to static bypass line temporarily.</i>
CB2	Test Mode	<i>UPS is on but loads are supplied through mechanic bypass.</i>
CB2	Maintenance Mode	<i>UPS is shut down for maintenance, maintenance is supplied through Bypass.</i>

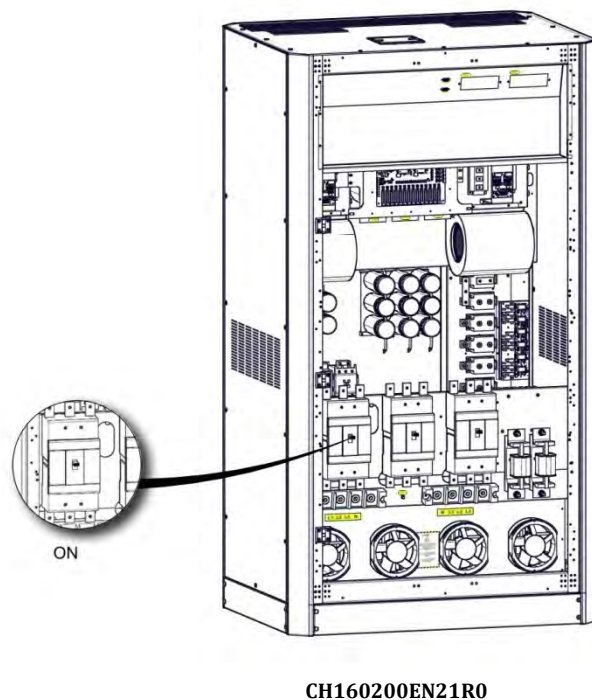
4.1.2 First Start-Up

NOTICE: Wait at least 5 seconds between each step.

1. Switch the maintenance breaker (CB2) to “ON” position.

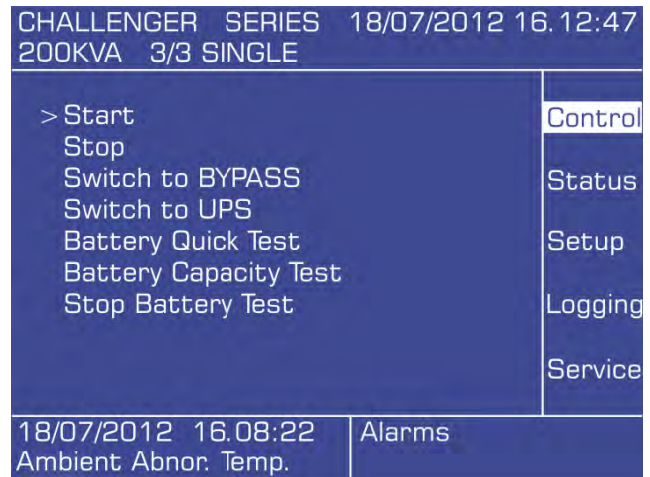


2. Switch the line breaker (CB1) to “ON” position.

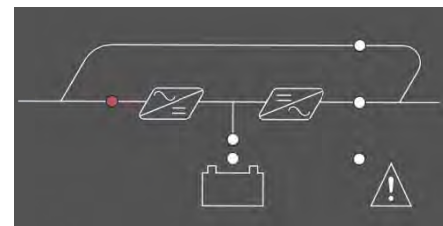


3. Start the UPS using the front panel.

Control>Password>Start

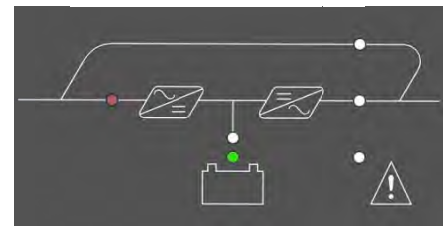


4. Wait for the rectifier to start. Rectifier led indicator in mimic diagram will flash for a while and then illuminates continuously.



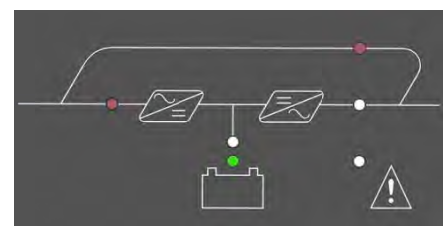
CH160200EN22R0

5. Wait for battery charger to start. Battery charging led indicator in mimic diagram will continuously illuminate



CH160200EN23R0

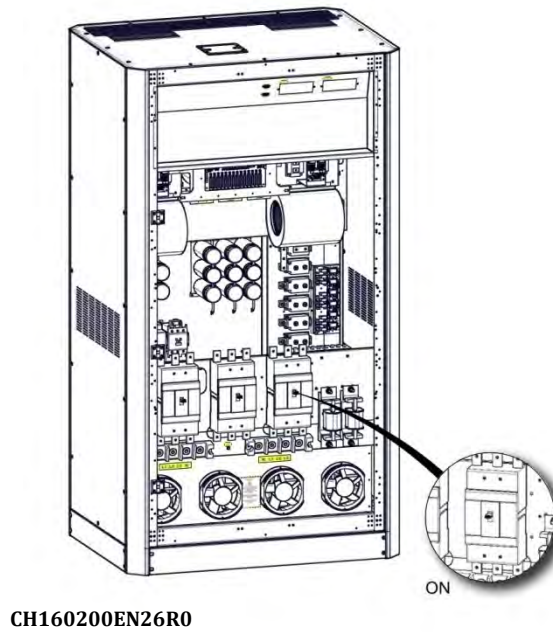
6. Wait for the UPS to switch to static bypass mode. Static bypass led indicator in mimic diagram will illuminate.



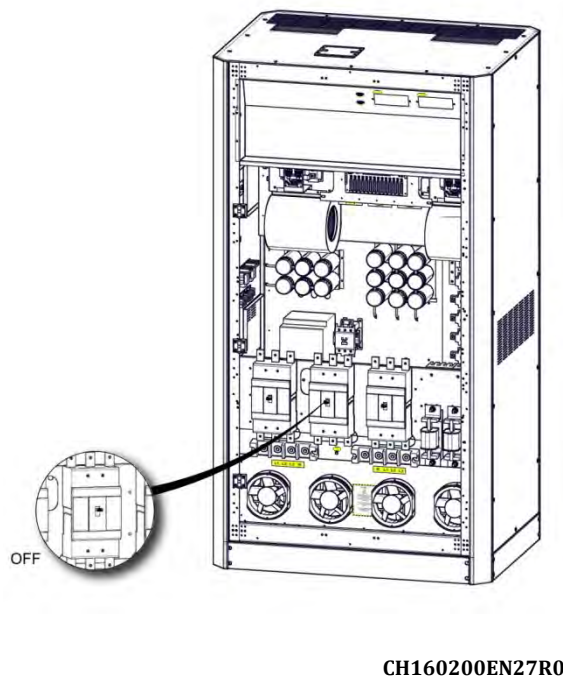
CH160200EN24R0

7. Verify through front panel led indicators and the menu of *Status>Battery* that the batteries have been activated.

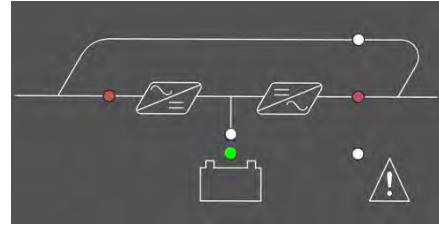
8. Switch the output breaker (CB3) to "ON" position.



9. Switch the maintenance breaker (CB2) to "OFF" position.



10. Check that the device has switched to normal operating mode through front panel led indicators and LCD screen.



11. You can turn on the loads connected to the device.

CH160200EN25R0

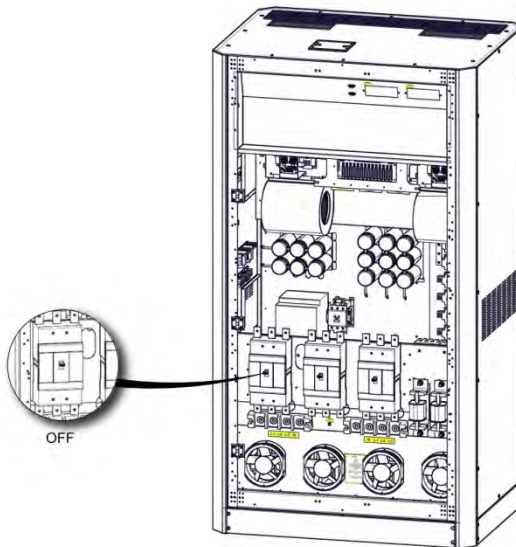
After all these steps, check that load is fed through inverter static switches via mimic diagram. In a contrary situation, check UPS total and phase loads. The UPS gives audio alerts in an overload condition, without feeding critical AC loads.

4.1.3 Testing the Operation Modes of the UPS

After first start-up, switch among operation modes with the aim of control.

4.1.3.1 Switching from Normal Mode to Battery Mode

Turn CB1 off. This action cuts off the mains voltage and the UPS starts operating on battery mode. After checking the operation, turn CB1 on again.

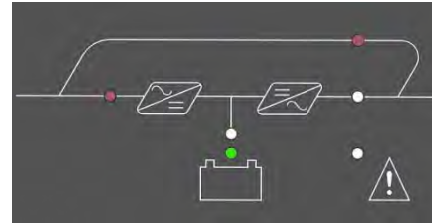
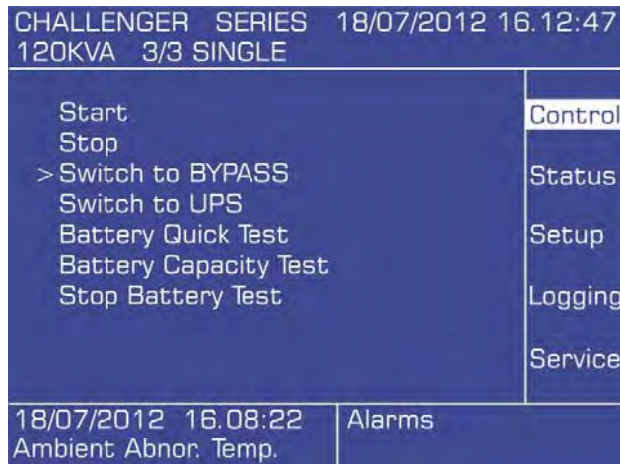


CH160200EN28R0

4.1.3.2 Switching from Normal Mode to Static Bypass Mode

Switch the UPS to bypass mode via user panel. Check if static bypass led has flashed in mimic diagram.

Main Menu>Control> Switch to BYPASS



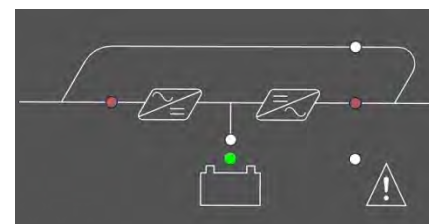
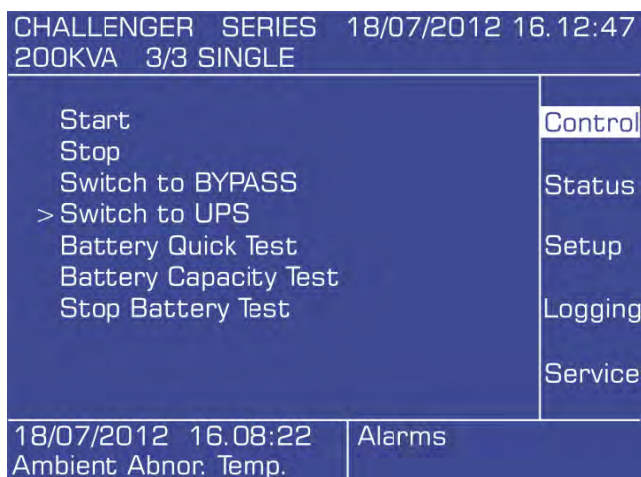
CH160200EN29R0

Note: The UPS will not switch to bypass mode if the mains is out of limits or phases are wrongly connected.

4.1.3.3 Switching from Static Bypass Mode to Normal Mode

Switch the device to UPS mode via user panel. Verify the case through mimic diagram.

Main Menu> Control > Switch to UPS



CH160200EN30R0

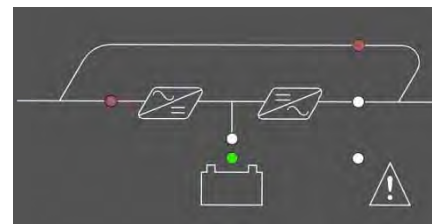
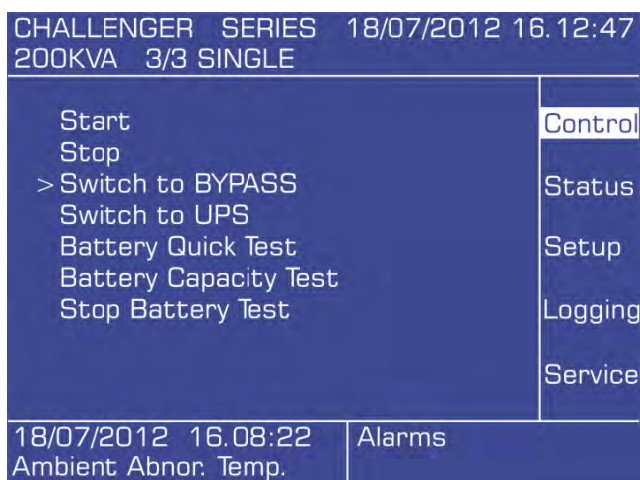
Note: The inverter will not undertake the load if its voltage is out of limits or there is overload or over temperature situation.

4.1.3.4 Switching from Normal Mode to Maintenance Bypass Mode

NOTICE: Make sure that the inverter output is synchronized with the maintenance bypass line before switching to maintenance bypass mode. Otherwise, there is a possibility of cutting off the load power for a short while.

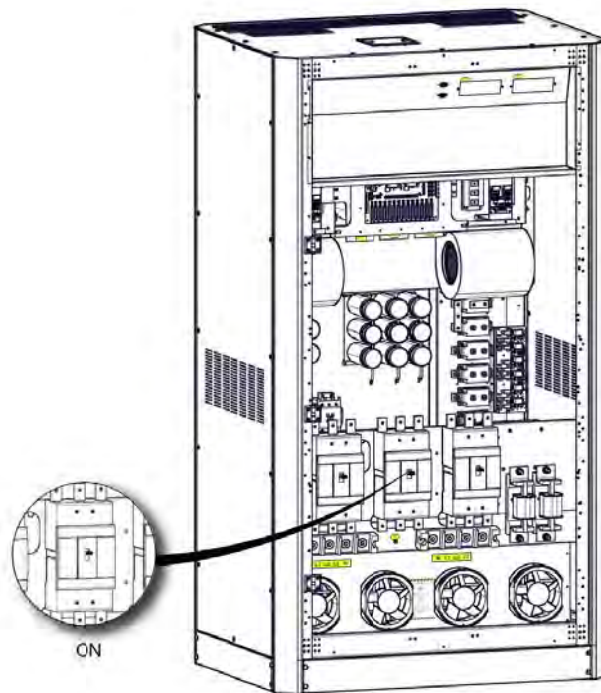
Switch the device to static bypass mode using the front panel. Check if static bypass led has flashed in mimic diagram.

Main Menu> Control > Switch to BYPASS



CH160200EN31R0

1. Turn CB2 on (ON).



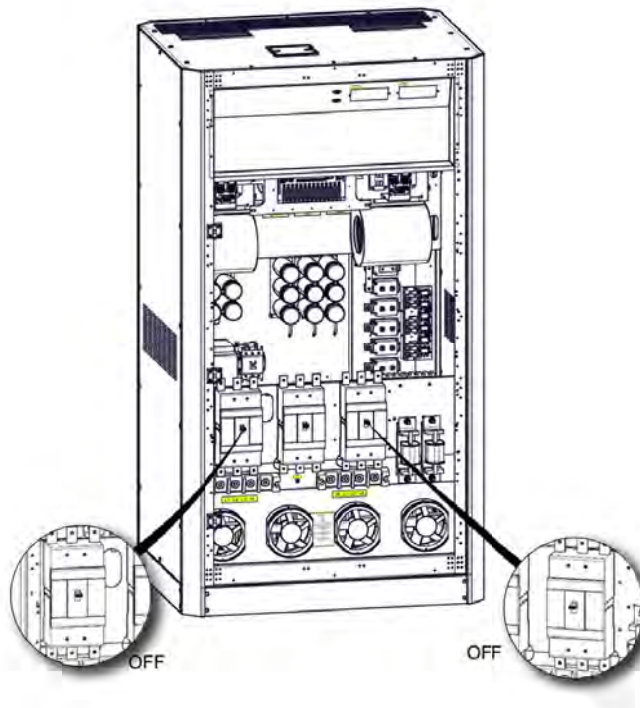
CH160200EN32R0

2. Stop the UPS using the front panel.

Main Menu>Control >Stop

CHALLENGER SERIES 18/07/2012 16.12:47 200KVA 3/3 SINGLE	
Start	Control
> Stop	Status
Switch to BYPASS	Setup
Battery Quick Test	Logging
Battery Capacity Test	Service
Stop Battery Test	
18/07/2012 16.08:22	Alarms
Ambient Abnor. Temp.	

3. Turn CB1 and CB3 off(OFF).



CH160200EN33R0



NOTICE: For safety, wait 5 minutes at least before opening up the device after you have switched the device to the maintenance bypass mode.

4.1.4 Performing a Complete Shutdown

1. Turn off the loads connected to the device.
2. Stop the device using the front panel

with the sequence of
Control > Password > Stop.

CHALLENGER SERIES 18/07/2012 16.12:47 200KVA 3/3 SINGLE	
Start	Control
> Stop	
Switch to BYPASS	Status
Switch to UPS	
Battery Quick Test	Setup
Battery Capacity Test	
Stop Battery Test	Logging
	Service
18/07/2012 16.08:22	Alarms
Ambient Abnor. Temp.	



NOTICE: Make sure that there are no critical loads on the ups output before performing a complete shutdown.

4.1.5 EPO (Emergency Power OFF)

By pressing the EPO button, the UPS turns the rectifier, booster and inverter off respectively. If the output circuit breaker turn off option is also set, the UPS completely disconnects from the system.



CH160200EN34R0

4.1.6 RS232 Serial Communication Installation and Examination

Challenger series has an RS-232 interface which supports SEC protocols as standard and whose default connection speed is 2400bps. This interface is fully isolated and safe. The status of UPS can be monitored remotely via a PC or SNMP by using this protocol. This connection works with any kind of option.

5 Explanations of Logging

The UPS will beep when any problem is detected. You can see the first information about the situation on the mimic status membrane. This may not be enough most of the time. In this case, you can see the following warnings by making use of log screen.

	Event	Explanations of Events
1	RS232 Start Command	UPS was started by RS232 communication software.
2	RS232 Stop Command	UPS was stopped by RS232 communication software.
3	Auto Restart	After the batteries discharge totally, UPS restarted itself automatically after the mean time which was adjusted that follows the mains getting back to normal values.
4	UPS Startup	The main board of the UPS is energized.
5	Bus not Charged	UPS could not charge its bus to the desired value.
6	Quick Battery Test	Quick battery test has begun.
7	Deep Battery Test	Battery capacity test has begun.
8	Battery Self -Test	Periodical battery test has begun.
9	End of Discharge	Batteries' voltage has gone below cut off voltage value while UPS was operating on the battery mode.
10	Overload Timeout	UPS has operated at overload more than time limit adjusted. The Loads will be transferred to bypass line.
11	End of Battery Test	Battery test has completed. Details concerning test results can be monitored via the battery status menu.
12	Battery Test Aborted	Test was aborted manually or by UPS since the criteria were not provided during battery test.
13	Manuel Switch To BYPASS	Static switches directions were changed manually to the bypass line via UPS command menu.
14	No Battery	UPS detected that no battery exists during operation.
15	Maintenance Bypass Switch On	Maintenance bypass switch has been activated.

16	Abnormal Ambient Temperature	UPS operating ambient temperature has exceeded the permitted limits.
17	Excessive Current in the Battery	UPS battery charge current has exceeded the determined limits. Charging will stop until it gets normal.
18	Mains Voltage Bad	Mains voltage has exceeded the determined limits. The UPS will switch to battery mode.
19	Inverter Over Temperature	Inverter's temperature is out of limits, in the event of 5 degrees increment more, the load will be transferred to bypass line.
20	PFC Over Temperature	Rectifier's temperature is out of limits, in the event of 5 degrees increment more, the load will be transferred to bypass line.
21	Charger Over Temperature	Charger/boost module temperature is out of determined limits, if it is in charging mode, charging will be stopped, if it is in boost mode, the UPS will be stopped.
22	STS Over Temperature	Static transfer switches' temperatures are out of limits. The UPS will be stopped.
23	Output FL1 Over Current	Short circuit protection is activated for output L1 phase.
24	Output FL2 Over Current	Short circuit protection is activated for output L2 phase.
25	Output FL3 Over Current	Short circuit protection is activated for output L3 phase.
26	Bypass Voltage Bad	Bypass voltage value is out of limit while UPS was operating on the bypass mode. UPS will switch to normal mode if temperature and load status are normal, but if not, UPS will stop.
27	Bypass Frequency Bad	Bypass frequency value is out of limit while UPS was operating on the bypass mode. UPS will switch to normal mode if temperature and load status are normal, but if not, UPS will stop.
28	Coil Over Temperature	Over temperature is observed in UPS inverter or rectifier coils.
29	Inverter Voltage Bad	Inverter voltage limit values are exceeded. The load will be transferred to bypass line, when inverter voltage gets back to normal values, UPS will switch to normal mode again.
30	Overload	Output load value is over %105, overloading counter will start to count, If UPS is on normal mode, charging will be stopped until load value gets back to normal.
31	Maintenance Bypass Switch Off	Maintenance bypass switch is deactivated.
32	Normal Ambient Temp.	UPS ambient temperature has got back to allowed limit values.
33	Normal Mains Voltage	Mains voltage is in the limited values, UPS will switch to normal mode.

34	Normal Inverter Temperature	Inverter temperature is in the limited values. If load and other temperature values are normal, UPS will switch to normal mode.
35	Normal PFC Temperature	Rectifier temperature is in the limited values. If load and other temperature values are normal, UPS will switch to normal mode.
36	Normal Charger Temperature	Charger/booster module temperature is in the allowed limits, charging will be activated again.
37	Normal STS Temperature	Temperature of static transfer switches is in the allowed limit.
38	Normal Bypass Voltage	Bypass voltage is within defined limits.
39	Normal Bypass Frequency	Bypass frequency is within defined limits.
40	Normal Coil Temperature	UPS inverter or rectifier coil temperature has got back to normal values.
41	Normal Inverter Voltage	Inverter voltage is in the limited values, UPS will switch to normal mode.
42	Normal Load	Output load is under %100, If charging was shut down, it will be activated.
43	BYPASS Thyristor L1 Short Circuit	UPS has detected short circuit at bypass L1 thyristor. UPS will shut down.
44	BYPASS Thyristor L2 Short Circuit	UPS has detected short circuit at bypass L2 thyristor. UPS will shut down.
45	BYPASS Thyristor L3 Short Circuit	UPS has detected short circuit at bypass L3 thyristor. UPS will shut down.
46	UPS Thyristor L1 Short Circuit	UPS has detected short circuit at inverter L1 thyristor. UPS will shut down.
47	UPS Thyristor L2 Short Circuit	UPS has detected short circuit at inverter L2 thyristor. UPS will shut down.
48	UPS Thyristor L3 Short Circuit	UPS has detected short circuit at inverter L3 thyristor. UPS will shut down.
49	UPS Thyristor L1 Open Circuit	UPS has detected that inverter L1 thyristor cannot be activated. Load will be transferred to bypass line.
50	UPS Thyristor L2 Open Circuit	UPS has detected that inverter L2 thyristor cannot be activated. Load will be transferred to bypass line.
51	UPS Thyristor L3 Open Circuit	UPS has detected that inverter L3 thyristor cannot be activated. Load will be transferred to bypass line.

52	BYPASS Thyristor L1 Open Circuit	UPS has detected that bypass L1 thyristor cannot be activated. Load will be transferred to inverter line.
53	BYPASS Thyristor L2Open Circuit	UPS has detected that bypass L2 thyristor cannot be activated. Load will be transferred to inverter line.
54	BYPASS Thyristor L3 Open Circuit	UPS has detected that bypass L3 thyristor cannot be activated. Load will be transferred to inverter line.
55	Parallel System Phase Sequence Error	One or more of UPSs which operate in parallel mode do not match in phase sequence.
56	Battery Start	UPS was given the command to start from the battery.
57	Parallel Start Error	One or more of UPSs which operate in parallel mode could not be prepared to operate.
58	Inverter Error	UPS couldn't prepare the inverter voltage when it was started.
59	Output Off	Static transfer switches all disabled. The loads cannot be energized.
60	Normal Mode	UPS is operating in the normal mode, loads are energized through rectifier – inverter line.
61	Battery Mode	UPS is operating in the battery mode, loads are energized through battery – inverter line.
62	Bypass Mode	UPS is operating in the bypass mode, loads are energized through bypass line.
63	Maintenance Bypass Mode	UPS is operating in the maintenance bypass mode, loads are energized through maintenance bypass line.
64	Parallel Mode	2 or more UPS are operating in power sharing mode. Load is fed through UPSs' inverter lines.
65	Test Mode	UPS has switched to battery test mode, loads are energized through rectifier- battery- inverter line as source sharing.
66	ECO Mode	UPS is operating in ECO mode. The Loads are energized through bypass line.
67	Switch to Inverter Mode	Direction of static switches was manually changed to inverter via UPS commands menu.
68	Output Voltage Error	Output voltage is detected during the period of starting UPS. UPS has been stopped.
69	PFC Stop Command	Abnormal situation is detected during the moment of rectifier operating. UPS has given a command to stop itself.

70	Start Command	Start command is given via UPS command menu.
71	Stop Command	Stop command is given via UPS command menu.
72	Battery Switch Error	An error has occurred during battery bus charging. Batteries could not be activated.
73	UPS Stopped	UPS has been stopped.
74	Bypass Error	UPS has switched to bypass mode so many times in a short period, UPS will be shut down.
75	Parameters Changed	Device-related parameters were changed on the service menu.
76	Batteries Changed	Battery replacement date has been changed. Battery statistics will be reset.
77	Battery Contactor OFF	Battery mechanic switch has been deactivated through service menu. Batteries are not active.
78	Battery Contactor ON	Battery mechanic switch has been activated through service menu. Batteries are active.
79	Charging Error	Batteries cannot be charged although they are connected to UPS.
80	Parallel Command	An UPS which is operating in parallel mode has been given a command to change the status of static switches.
81	No Parallel CAN Bus Communication	Slave UPS which is operating in parallel mode can't reach to master UPS from CAN bus. If UPS is operating, it will be shut down.
82	Externally Start Command	UPS which is operating in parallel mode has been received a command to start up by another UPS.
83	Externally Stop Command	UPS which is operating in parallel mode has been received a command to stop by another UPS.
84	Externally Switch To BYPASS.	UPS which is operating in parallel mode has been received a command to transfer the load to bypass line.
85	Externally Switch To UPS	UPS which is operating in parallel mode has been received a command to transfer the load to inverter.
86	Parallel Communication FE Error	Slave UPS which is operating in parallel mode has detected a failure of input current sharing.
87	Inverter OKAY	Inverter voltage reached needed value after UPS is started up. UPS can feed the loads through inverter.
88	Abnormal Battery Temperature	Battery temperature is out of defined limits, batteries can be damaged.

89	Booster Excessive Current	Excessive Current in Battery mode. UPS will be shut down.
90	EPO key pressed	EPO button is pressed.
91	Low Battery	Battery capacity has decreased below formerly defined battery low limit while UPS was operating in battery mode.
92	No Parallel 485 Communication	No RS485 communication between the parallel UPS devices is available.
93	STS Over Current	Time of over load in bypass line is up.
94	Output Fuse OFF	UPS output switch is OFF. Loads cannot be energized.
95	BYPASS Phase Sequence Error	Reverse phase sequence was detected in mains at the UPS run time.
96	Fan Error	No communication can be established with fan control system (Only for UPS devices having fan control system).
97	Output DC Voltage Error	Inverter DC voltage limit has been exceeded. Loads will be transferred to the bypass line.
98	Normal Battery Temperature	Battery temperature is within limits.
99	Output Fuse ON	UPS output switch has been turned on. Loads can be energized.
100	Fans Active	Communication has been established with fan control system (Only for UPS devices having fan control system).
101	PFC Pbus Over Voltage	Positive bus voltage limit excess.
102	PFC Nbus Over Voltage	Negative bus voltage limit excess.
103	PFC FL1 Over Current	Short circuit protection is activated in rectifier L1 phase.
104	PFC FL2 Over Current	Short circuit protection is activated in rectifier L2 phase.
105	PFC FL3 Over Current	Short circuit protection is activated in rectifier L3 phase.
106	Single Stop	Command to stop itself has been given to UPS which is operating in parallel mode separately from parallel system.
107	Master Changed	UPS became master device in parallel system.

108	Parallel ID Coincidence	ID values of one or more device are the same as each other in parallel system.
109	Output Offset Error	One or more phases of output of slave device in parallel systems are not connected to master device.
110	Short Circuit in Bypass	While operating from bypass, short circuit current limit has been exceeded. UPS will be shut down.
111	Output RMS Error	Value of UPS output voltage is out of limits. UPS will be shut down.
112	Stop All	Stop the whole parallel unit command was given via front panel.
113	Float Charge Mode	UPS charging mode has switched to waiting at constant voltage mode from constant current mode.
114	Power Supply Error	An error signal is detected through power source circuit debugger.
115	Generator Mode	Signal is detected from generator mode input of dry contact board. UPS will switch to generator mode.

Alarms and Their Explanations

	Alarm	Explanation of Alarm
1	Over Temperature	Temperature limit has been accessed in UPS units. Check the menu of Status>Temperature.
2	Over Load	UPS is overloaded, decrease the load.
3	Bypass Bad	Bypass line voltage or frequency is out of limits, no bypass can be made.
4	UPS has shut down.	The device has shut down.
5	Charging Error	Charging circuit detected a problem. Batteries cannot be charged. In case of mains cut off, critical loads cannot be energized.
6	Fan Error	Fan control card cannot be accessed, control will not be made according to temperature.
7	Fuse Error	Output fuse is off.
8	Waiting for shutting down	At the end of the given time, UPS was given the command to stop.
9	No Battery	No battery connected to UPS has been detected.
10	Maintenance Bypass Fuse Active	Maintenance bypass fuse is on.
11	Static Bypass Mode	UPS is feeding critical loads through static bypass line.
12	Testing	UPS has switched to battery testing mode.
13	Replace batteries	At the end of battery test, it has been seen that capacities of batteries are insufficient. In case of mains cut off, critical loads cannot be energized.
14	Inverter Error	No inverter voltage can be formed. UPS will not be able to switch to on-line mode.
15	Battery Mode	UPS has switched to operating from battery mode.
16	Parallel ID Coincidence	There are more than one UPS having the same ID number in parallel connected system. Check ID numbers. System cannot be operated in this case.
17	No Parallel Communication	UPS cannot communicating with the master device in parallel system. Check parallel system connections.
18	Low Battery	In operating from battery mode, battery capacity has dropped below the determined percentage limit.
19	ECO Mode	UPS is operating in ECO mode.

20	Thyristor Error	One or a few thyristors are broken. Look former log records for details.
21	Bypass Phase Sequence Error	Bypass line phase sequence, with inverter phase sequence.
22	Missing Parallel Device	The number of devices detected in parallel system is not same as the number of devices having been set.
23	Current Sharing Error	One or a few phases of UPS are being loaded in a different way from the other devices in parallel system.
24	Power Supply Error	One of power supplies operating as parallel has been deactivated.
25	Generator Mode	UPS has switched to generator mode. Command to switch to generator mode has been come from dry contact board.

6 Table of Technical Specifications

Technical Specifications		
Power	160 kVA	200 kVA
Active Power	128 kW	160 kW
INPUT		
Input Voltage Range	220 ± 15% (L-N) or 380 ± 15% (L-L) 3P + N + PE	
Input Power Factor	At Full Load > 0,99	
Input Frequency Range	50Hz ± 10% / 60Hz ± 10%(Selectable)	
Rectifier	IGBT Rectifier	
Total Harmonic Distortion (THDi)	<5%	
OUTPUT		
Output Voltage	220/380 VAC (230/400 VAC Selectable) 3P + N ± 1% Static, ± 1% Dynamic	
Recovery	At 0% - 100% - 0% load maximum output tolerance 5%, 1% back to band<40ms.	
Efficiency	Up to 93%.	
Output Frequency Range	In 50Hz ±2% range synchronous with the network, in out of mains range 50Hz ± 0,2%, in battery mode 50Hz ± 0,2%	
Output Harmonic Distortion(THDv)	Linear<3%	
	Non-Linear <4%	
Crest Factor (CF)	3:1	
Overload Capacity	At 125 % load 10 minutes, at 150 % load 1 minute.	
Protections	The input voltage is out of tolerance, input frequency is out of tolerance, input phase failure, output voltage is out of tolerance, output frequency is out of tolerance, output phase failure, DC component that can occur at the output voltage, Overload that will occur at the output (out of the periods specified), Overheating that will cause failure related to over temperature, high voltage which will occur at DC bus voltage, low voltage which will occur at DC bus voltage, short circuit at the output.	

BATTERY		
Battery Number (12V DC VRLA)	50	
Charge Value (C)	Nominal 0.1 C, selectable.	
Battery Power	25% of the constant output power	
COMMUNICATION		
Communication Port	RS232 Standard, RS485 and SNMP Adapter option	
Dry Contact	Optional	
Protocol	SEC, TELNET	
CERTIFICATES		
Quality	ISO 9001	
Standard	CE, TSE	
Safety	TS EN 62040-1-1, IEC60950	
EMC/LVD	TS EN 62040-2; A Class	
GENERAL		
Running Temperature	0 °C ~40 °C range (for batteries 0 ~ 25 °C)	
Storage Temperature	-15 °C ~ 45 °C range (for batteries -10 ~ 60°C)	
Protection Class	IP20	
Chassis	Anti-Static Paint Protection	
Humidity	0-95 %	
Operating Altitude	<1000m, Correction Factor 1. <2000m, Correction Factor >0,92, <3000m; Correction Factor >0,84	
Acoustic Noise (1m)	<70dBA	
Logging	500 detailed event log. (Status Menu is recorded)	
Parallel Operation	Parallel power increase up to 8 pieces	
EPO (Emergency Power Off)	Standard	
Isolation Transformer	Optional	
Net Weight (Without Battery)	550	575
Dimensions (W x D x H)mm	1055 x 800 x 1905 mm	

7 Guarantee

7.1 Terms of Guarantee

- Our products are under a two-year guarantee starting from the date of delivery against malfunctions resulting from production, material and workmanship faults. Malfunctions due to such type of faults will be removed without claiming any price of workmanship or spare parts to be replaced.
- Whether aforementioned malfunctions originate from usage faults or not are determined with a report to be issued by service stations, if there exists no service stations, by one of seller, dealer, agency, representative, importer or manufacturer or producer of those products respectively.
- Repair time of defective products is twenty business days at most. This period starts from the date when products are delivered to one of seller, dealer, agency, representative, importer or one of manufacturer or producer. Provided that products break down within the period of guarantee, the time passing during the repair process is added to the guarantee time. Provided that faults of products cannot be removed within ten business days, manufacturer-producer or importer is obliged to assign another product having similar features for the use of consumers until the faulty product has been repaired.
- Even though consumers exercise their repair rights, they can claim free replacement of products, refund or price discount at the rate of fault in the events;
 - That, besides, the product, as of the date when the product is delivered to the consumer, breaks down four times a year or six times within the guarantee period to be determined by the manufacturer-producer and/or importer at least, on the condition of being in guarantee period, such malfunctions perpetuate passing over;
 - That maximum time required for the repair of products is exceeded;
 - That repair of the malfunction is determined as impossible through a report to be issued by service station, if there exists no service station, one of seller, dealer, agency, representative, importer or manufacturer or producer of the company respectively.
- The consumer is, on demand, obliged to submit guarantee certificate in terms of repairs or replacements within the scope of guarantee.

- It is essential that you definitely perform damage control over external packaging before receiving the products to be sent through freight. In the event of any damage, delivery person must be made to prepare a “damage determination record”.
 - (For example; during the delivery process, the product has been checked and seen that is damaged.)
- After the damage determination record has been issued, we request you to inform the MAKELSAN head office of the case. Products to be received from freight by signature means that products have been received completely and without no damage.
- Repairs of plug-and-play products in the places where no service point is around are performed in the factory of MAKELSAN or the nearest service point according to the direction to be made by the MAKELSAN head office. Defective product is delivered by hand to the nearest service point or to the contracted freight company in its original packaging to be sent to the factory of MAKELSAN according to the direction to be made by the MAKELSAN head office. For malfunctions in the scope of guarantee, shipment fees are under the responsibility of MAKELSAN on the condition that products are delivered to the contracted freight company.
- The device must be sent as packed in its original packaging as long as it is not desired by the service. Original packaging of devices should be preserved in order to use them for shipment of devices in terms of repairs to occur. Otherwise, no responsibility is assumed with regards to any troubles to be experienced.
- All defective products to be delivered by hand or through freight are to meet the necessary shipment requirements. (Anti-static protective, bubble wrap or box etc.) It is essential that legible barcode serial number belonging to the product be on the product. Otherwise, it is not covered in the scope of the guarantee.
- It is essential that products to be sent through freight definitely be together with delivery note, and that serial/model/malfunction details be written on delivery note to be sent (for example, breakdown report form), and that packaging content match with the products specified in the delivery note. Otherwise, freight is not accepted.
- The use of the Guarantee Certificate, submitted together with products with MAKELSAN trademark, is permitted by the T.R. Ministry of Industry and Commerce and General Directorate of Protection of Competition with no..... in accordance with the law, with no. 4077, and the notification, with no. TRKGM-95/116-117, issued basing the aforementioned law. MAKELSAN acknowledges and undertakes to obey the liabilities determined by the laws and legislations.

7.2 Cases Not Covered by the Guarantee

- Breakdowns resulting from the use of products contrary to the issues or the environment conditions (temperature, humidity etc.) specified in the user manual are not covered in the scope of guarantee.
- Damages and breakdowns resulting from the use of software, hardware, interface, accessories or consumables apart from those used together with products or recommended ones; changing place, wrong and insufficient maintenance, calibration or use; its operation contrary to environment specifications published for products; insufficiency of air installation; use of products in ambient having excessive humid or temperature; its operation in environment harmful for electrical circuits and abrasive; and accidents, impacts, electric, shipment, natural disasters, not limited to the ones listed above, are not covered in the scope of product guarantee.
- In the general examination performed during the breakdown acceptance process, certain troubles causing products not to be covered in the scope of guarantee might not be understood. Provided that such faults come up in the detailed examination to be performed via technical service equipment, products are returned to customers.
- Products not covered in the scope of guarantee can, on demand of customer, be treated in a fee-paying way within the bounds of possibilities of the authorized service. Products out of the scope of guarantee, repairs of which are not possible are returned to customers.
- Damages and breakdowns resulting from treatments, internally or externally tampering, efforts to repair and spare part replacement of products, without approval of MAKELSAN, and those resulting from treatment of unauthorized service/dealer/person/establishment, are not covered in the scope of guarantee. Breakdown, cracks, scratches and wear, corrosion and dust to occur in time and by use in the outer surfaces of products (cabinet, cover, and front panel) are not covered in the scope of guarantee.
- In the event that original serial numbers, guarantee labels and stamps on products are removed or distorted, products are not covered in the scope of guarantee. No guarantee is issued against the use of products for any other purpose, apart from those specified in introduction or manual of products.
- Shelf lives of VRLA batteries are 6 months under the ambient temperature of 15 °C and 3 months under the ambient temperature of 25 °C.
- It is compulsory that systems to be purchased be commissioned within 3 months.

CERTIFICATE OF GUARANTEE

MANUFACTURER COMPANY

Certificate Approval Date : -- / -- / ----
Certificate No :

TITLE : MAKELSAN MAKİNE KİMYA
ADDRESS : ELEKTRİK SAN. TİC. A.Ş.
TELEPHONE : 0216 – 428 65 80
FAX : 0216 – 327 51 64

SIGNATURE AND STAMP OF
COMPANY AUTHORITY

OF THE PRODUCT

TYPE : _____
TRADEMARK : _____
MODEL : _____
SERIAL NO / BANDEROLE : _____
DELIVERY DATE AND PLACE : _____
MAXIMUM REPAIR PERIOD : 20 business days
GUARANTEE PERIOD : _____

VENDOR

TITLE : _____
ADDRESS : _____
TELEPHONE : _____
FAX : _____
INVOICE DATE / NO : _____
DATE / SIGNATURE AND STAMP : _____

CUSTOMER

TITLE / NAME : _____
ADDRESS : _____
SIGNATURE : _____

UPS AUTHORIZED SERVICES

İstanbul Deri Organize Sanayi
Bölgesi
2. Yol I-5 Parsel
34956 Tuzla/İstanbul
Tel: 0216 428 65 80
Fax: 0216 327 51 64
makelsan@makelsan.com.tr
www.makelsan.com.tr



CERTIFICATE OF GUARANTEE

- 1 – Guarantee period starts from the delivery date of the product and lasts.....years.
- 2 – The whole product, including all its parts are under the guarantee of our company.
- 3 – Provided that the product breaks down within the period of guarantee, the time passing during the repair process is added to the guarantee time. Repair time of the product is business days at most. This period starts from the date when the malfunction related to the product is informed to the service station, if there exists no service station, to one of seller, dealer, agency, representative, importer or one of manufacturer. Provided that the fault of industrial product cannot be removed within 10 business days, manufacturer or importer is obliged to assign another industrial product having similar features for the use of the consumer until the faulty product has been repaired.
- 4 – Provided that the product breaks down due to materials and workmanship or assembly faults within the period of guarantee, the product is repaired without claiming any charge for workmanship, any price for spare part replacement or any fee under any name.
- 5 – The product will be replaced without any charge in the events;
 - That passing over the product perpetuates due to the fact that the product repeats the same malfunction more than twice or different malfunctions occur more than four times in a year starting from the delivery date, on the condition of being in guarantee period;
 - That maximum time required for the repairment of the product is exceeded;
 - That, if there exists no service station, the repair of the malfunction is determined as impossible through a report to be issued one of seller, dealer, agency, representative, importer or manufacturer of the product respectively.
- 6 - Malfunctions resulting from the use of the product contrary to the issues specified in the user manual of the product are not covered in the scope of guarantee.
- 7 –For any trouble that may come up in terms of the Certificate of Guarantee, the Ministry of Industry and Commerce, General Directorate of Protection of Consumer and Competition can be applied.

NOTICE

- 8 – Under no circumstances shall the customer treat the product with the aim of repair, apart from MAKELSAN authorized service personnel.
- 9 – Damages and results originating from the violation of the 8th Article shall be invoiced to the customer.

The use of herein the certificate is permitted by the T.R. Ministry of Industry and Commerce and General Directorate of Protection of Consumers and Competition in accordance with the Law on the Protection of Consumers, with no. 4077, and the Notification Concerning the Application Principles of Guarantee Certificate, issued basing the aforementioned law.

8 Contact Information



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