Vanguard Three Phase
10-40kVA UPS
Installation and Operation Manual
## CONTENTS

Preface .......................................................................................................................................... 1

Safety ............................................................................................................................................ 2

1. **Function Description** ........................................................................................................... 5
   1.1 UPS Block Diagram.................................................................................................... 5
   1.2 UPS Front View.......................................................................................................... 6

2. **Installation and Wiring** ...................................................................................................... 20
   2.1 Storage and Installation Environment ...................................................................... 20
   2.2 Unpacking, Removing and Securing UPS.................................................................. 21
   2.3 General Requirements for Ventilation and Maintenance ......................................... 30
   2.4 Power Cables Connections ....................................................................................... 31
   2.5 Auxiliary Power Supply Control Switch and Precharge Button .............................. 39
   2.6 Communication Cables Connections ........................................................................ 40
   2.7 UPS Parallel Connections (Option) .......................................................................... 44

3. **Operation And Descriptions** .............................................................................................. 48
   3.1 Operating Mode ........................................................................................................ 48
   3.2 Online Operations ..................................................................................................... 49
   3.3 Manual Bypass Operation ......................................................................................... 49
   3.4 Operating Processes .................................................................................................. 50

4. **Control Panel Operation and Function Description** ....................................................... 54
   4.1 Screen Introduction ................................................................................................... 54
   4.2 Menu ......................................................................................................................... 55
   4.3 Mimic Display .......................................................................................................... 60

5. **Options** ................................................................................................................................. 61
   5.1 Dry Contact Card ...................................................................................................... 61
   5.2 RS-485 MODBUS Card ........................................................................................... 61
   5.3 SNMP Card ............................................................................................................... 61
   5.4 Temperature Sensor .................................................................................................. 62
   5.5 Parallel Communication Card ................................................................................... 62

6. **Troubleshooting** .................................................................................................................. 63
   6-1. Export machine information from LCD panel.......................................................... 63
   6-2. Exporting The event log from LCD panel................................................................. 64

7. **Technical Specifications** .................................................................................................... 65

Appendix .................................................................................................................................... 67
Preface

We thank you for the trust in selecting our UPS.

The purpose of this manual is to introduce the user to the operating principles of the UPS and to provide instructions in its safe operation. The manual also provides troubleshooting assistance should an abnormal message or behavior occur.

Should an abnormal message not covered in this manual appear, contact your local authorized service agent for troubleshooting and repair.

All of the installation, operation, and maintenance of this device must be performed by authorized and qualified technicians who are familiar with this UPS.
Safety

SAVE THESE INSTRUCTIONS - This manual contains important instructions that should be followed during installation and maintenance of the UPS.

- **Important Rules**
  1. Please follow the UPS operating instructions to ensure safe and proper operation.
  2. When the UPS is being moved or operated, please ensure that the machine is standing vertically. Do not shake or tip over the machine. Avoid heavy impact.
  3. Poor grounding will lead to unexpected current leakage. Please ensure that the AC power input is properly grounded (PE Ground) before making any connections.
  4. Please make sure that the UPS is placed in an insulated environment before use and that there is no risk of electrocution hazard to any personnel.
  5. Do not connect the neutral wire with the ground and make sure that the input voltage phasing and conductor sizing is correct.
  6. Once the UPS has been switched on, if the UPS needs to be moved then it must be fully switched off and fully discharged. If the UPS is not discharged, the UPS will switch to battery power after grid power is disconnected and pose an electrocution hazard.
  7. Do not place any objects, liquid containers, or coverings on the UPS. Any liquid spilled onto the UPS could potentially lead to internal damage or high risk of electrocution.
  8. Make sure that the battery specifications match the UPS requirements before connecting any external batteries.
  9. For 30k/40k models: The over current protection for the external battery circuit is to be provided by others.
  10. For 30k/40k models: The maximum available fault current from the battery supply is 15 KA minimum. The dc voltage rating of the battery supply over current protection device must be installed near the battery supply must have a minimum rating of 250 VDC.
  11. Follow the safety guidelines below before engaging in any testing that involves the battery.
    a. Remove all metallic items such as rings, watches and jewelry before working on the batteries.
    b. Always wear eye protection and use insulated tools.
    c. Do not open or damage the batteries. The toxic liquid inside will harm the skin and eyes.
    d. Keep batteries away from fire to prevent explosion.
  12. A readily accessible disconnect device shall be incorporated external to the equipment.
  13. For 10-20k models:
    - This UPS may be provided with maximum one extension battery packs
    - External DC Circuit disconnect Device shall be provided by other.
    - Before installing or servicing the equipment, identify and disconnect the UPS from the AC mains and load. The UPS contains internal batteries and may present a shock hazard even when disconnected from the AC input branch circuit (mains).
    - Any wiring, maintenance service and battery replacement, must be performed or supervised by personnel knowledgeable about batteries and the required precautions.
    - When replacing batteries, replace with the same type and number of batteries or battery packs.
    - CAUTION: Do not dispose of batteries by burning them. The batteries may explode.
- CAUTION: Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes, and may be toxic.
- CAUTION: A battery can present a risk of electrical shock and high short-circuit current through conductive materials could cause severe burns. The following precautions should be observed when working on batteries: Before installing or replacing the batteries, remove jewelry such as wristwatches and rings, or other metal objects.
- When working on batteries should wear rubber gloves and boots. Also, must use tools with insulated handles, and do not lay tools or metal parts on top of batteries. Remove battery grounds during installation and maintenance to reduce likelihood of shock. Remove the connection from ground if any part of the battery is determined to be grounded.

**Symbols**

Always follow the instructions and warnings on the UPS.

![WARNING ! Refer to the operating instructions.](image)

WARNING ! Refer to the operating instructions.

![WARNING ! High voltage inside.](image)

WARNING ! High voltage inside.

![Ground](image)

Ground
NOTE

NOTE: THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS A DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES. THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS. OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

● WARNING

WARNING: This is a category C2 UPS product. In a residential environment, this product may cause radio interference, in which case the user may be required to take additional measures.
1. **Function Description**

1.1 **UPS Block Diagram**

The system block diagram is shown below.

![UPS Block Diagram](image)

1. Input Breaker/Switch
2. Manual Bypass Breaker
3. Rectifier
4. Inverter
5. Static Switch
6. Charger/Booster
7. Output Breaker
8. Bypass Breaker
1.2 UPS Front View

- 10kVA Front View

1. Control Panel with Color LCD Touch Screen
2. Ventilation Grille
3. Wheels for Positioning
15-20kVA Front View

1 Control Panel with Color LCD Touch Screen
2 Ventilation Grille
3 Wheels for Positioning
30-40kVA Front View

1 Control Panel with Color LCD Touch Screen
2 Ventilation Grille
3 Wheels for Positioning
10kVA Right Side View

850 mm
15-20kVA Right Side View

850 mm
■ 30-40kVA Right Side View

850 mm
1. Communication Slot 1
2. Communication Slot2
3. Dry Contacts
4. External Battery Temperature Connector
5. RS-232 Port for Setting Software
6. Parallel Communication Ports (Option)

7. Communication Selector for Service Only
8. USB Port for Service Only
9. Terminal Resistor Setting Switch for Parallel Communication
10. Status LED Indicators
11. EPO
12. Backfeed Protection
13. MBP Detector

Please find the detail descriptions of above items on section 2-6.

14. Manual Bypass Breaker
15. Bypass Fuses
16. Bypass Input Breaker
17. Mains Input Breaker
18. AC Power

20. Output Breaker
21. X40: Bypass Input Connections Terminal(2N, 2L3, 2L2, 2L1)
22. X10: Mains Input Connections Terminal(1N, 1L3, 1L2, 1L1)
23. X50: Output Connection Terminals (3N, 3L3, 3L2, 3L1)
24. X20: External Battery Connection Terminals(B- , B_N, B+)
25. Ground Connection
1. Communication Slot 1
2. Communication Slot 2
3. Dry Contacts
4. External Battery Temperature Connector
5. RS-232 Port for Setting Software
6. Parallel Communication Ports (Option)

7. Communication Selector for Service Only
8. USB Port for Service Only
9. Terminal Resistor Setting Switch for Parallel Communication
10. Status LED Indicators
11. EPO
12. Backfeed Protection
13. MBP Detector

Please find the detail descriptions of above items on section 2-6.

14. Bypass Input Breaker
15. Output Breaker
16. Manual Bypass Breaker
17. Mains Input Breaker
18. Bypass Fuses
19. AC Working Power
20. Batt. Start
22. X10: Mains Input Connections Terminal (1N, 1L3, 1L2, 1L1)
23. X40: Bypass Input Connections Terminal (2N, 2L3, 2L2, 2L1)
24. X50: Output Connection Terminals (3N, 3L3, 3L2, 3L1)
25. X20: External Battery Connection Terminals (B-, B_N, B+)
26. Ground Connection
1. Communication Slot 1
2. Communication Slot 2
3. Dry Contacts
4. External Battery Temperature Connector
5. RS-232 Port for Setting Software
6. Parallel Communication Ports (Option)
7. Communication Selector for Service Only
8. USB Port for Service Only
9. Terminal Resistor Setting Switch for Parallel Communication
10. Status LED Indicators
11. EPO
12. Backfeed Protection
13. MBP Detector

Please find the detail descriptions of above items on section 2-6.

14. Bypass Input Breaker
15. Output Breaker
16. Manual Bypass Breaker
17. Mains Input Switch
18. AC Power
20. X20: External Battery Connection Terminals (B-, B_N, B+)
21. X10: Mains Input Connections Terminal (1N, 1L3, 1L2, 1L1)
22. X40: Bypass Input Connections Terminal (2N, 2L3, 2L2, 2L1)
23. X50: Output Connection Terminals (3N, 3L3, 3L2, 3L1)
24. Ground Connection
1. Battery Tray
1. Battery Tray
1. SD Card Slot
2. Jumpers (J1~J3) for each output contact

The detailed descriptions of the above items are located in section 2-6.
15-20kVA Internal Top View

1. SD Card Slot
2. Jumpers (J1~J3) for each output contact

The detailed descriptions of the above items are located in section 2-6.
1. SD Card Slot

2. Jumpers (J1~J3) for each output contact

Please find the detail descriptions of above items on section 2-6.
2. Installation and Wiring

2.1 Storage and Installation Environment

- **Storage Environment**
  - Temperature: 20°C ~ 70°C
  - Relative Humidity ≤ 95%

- **Installation Environment**
  A proper installation environment not only ensures the effective operation of the UPS but it also reduces the chance of failure and extends service life. Take the following recommendations into account when selecting a suitable environment. This will also minimize any potential accidents.

  - This product must be used in a CONTROLLED ENVIRONMENT.
  - Temperature: 0°C ~ 40°C (20°C ~ 25°C is recommended for extending battery life).
  - Relative Humidity ≤ 95% (without condensation)
  - Altitude: 1000m at normal power. Over 1000m above sea level, the maximum output current must be derated by 1% every additional 100m.
  - This product must not be used in an environment with sparks, smoke or gas to prevent arcing, injury and fire hazards.
  - Avoid using dusty materials, volatile gases, or corrosive substances with a high salt-content in the environment where the UPS is installed.
  - The installation location of the UPS must be well-ventilated. During charging, the chemical reaction of the battery generates small amounts of gases. A crack in any of the batteries may pose an environmental hazard.
  - Do not place in a location near a heat source as this will shorten the battery life.
  - Do not place outdoors and avoid direct exposure to sunlight.
  - Always ensure that the environment where the UPS is located is free from animals that may damage the wiring, such as rats and domestic pets.
  - Always ensure that the floor is designed enough to support the UPS and battery. The must meet the minimum requirements for floor weighting to prevent failure and injury.
  - We recommend placing a fire extinguisher near the UPS in case of an emergency.
2.2 Unpacking, Removing and Securing UPS

This section describes the unpacking and removing processes with the wheels installed.

- Remove the packing materials and cut straps. Remove and slide up the cardboard box.

- Unscrew the fasteners on the ramp kits located on the front, right and left side of 10kVA, as well as the front side of 15-40kVA.
- Install 2 fasteners on the rail kits on the pallet edge by fastening 4 screws in the pallet.

- Remove the UPS from the pallet by using the rails to slide the UPS forward onto a flat surface. See the next figure when using a Fork Lift to remove the UPS from the pallet.
- Raise the wheel-brakes to remove the UPS.

10kVA

15-20kVA
Block the wheel-brakes to secure the UPS.
Follow this step to secure the UPS.
30-40kVA
2.3 General Requirements for Ventilation and Maintenance

During the installation ensure that the following conditions are followed.

- Keep at least 1000mm of clearance to the front of the UPS for air flow and future maintenance purposes.
- Keep at least 300mm of clearance from the rear of the UPS for air-flow space.
- Keep at least 300mm of clearance to the top of UPS for maintenance operations.
2.4 Power Cables Connections

- Power Connection Positions

The drawing below shows the positions of the power terminals.

10kVA Power Terminal Positions

15-20kVA Power Terminal Positions
### Maximum Current Table

<table>
<thead>
<tr>
<th>Input/Output Voltage</th>
<th>Output Power</th>
<th>Maximum Input Current(^{(1)})</th>
<th>Max. Output/Bypass Input Current(^{(2)})</th>
<th>Max. Battery Discharge Current(^{(3)})</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>200V</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10kVA/10kW</td>
<td>33.8A</td>
<td>28.9A</td>
<td>70.4A</td>
<td></td>
</tr>
<tr>
<td>15kVA/15kW</td>
<td>50.2A</td>
<td>43.3A</td>
<td>105.0A</td>
<td></td>
</tr>
<tr>
<td>20kVA/20kW</td>
<td>67.2A</td>
<td>57.7A</td>
<td>140.0A</td>
<td></td>
</tr>
<tr>
<td>30kVA/30kW</td>
<td>100.8A</td>
<td>88.7A</td>
<td>191.8A</td>
<td></td>
</tr>
<tr>
<td>40kVA/40kW</td>
<td>134A</td>
<td>118.3A</td>
<td>255.8A</td>
<td></td>
</tr>
<tr>
<td><strong>208 V</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10kVA/10kW</td>
<td>32.5A</td>
<td>27.8A</td>
<td>70.4A</td>
<td></td>
</tr>
<tr>
<td>15kVA/15kW</td>
<td>48.3A</td>
<td>41.6A</td>
<td>105.0A</td>
<td></td>
</tr>
<tr>
<td>20kVA/20kW</td>
<td>64.6A</td>
<td>55.5A</td>
<td>140.0A</td>
<td></td>
</tr>
<tr>
<td>30kVA/30kW</td>
<td>96.6A</td>
<td>85A</td>
<td>191.8A</td>
<td></td>
</tr>
<tr>
<td>40kVA/40kW</td>
<td>128.6A</td>
<td>113.4A</td>
<td>255.8A</td>
<td></td>
</tr>
<tr>
<td><strong>220 V</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10kVA/10kW</td>
<td>30.7A</td>
<td>26.2A</td>
<td>70.4A</td>
<td></td>
</tr>
<tr>
<td>15kVA/15kW</td>
<td>45.6A</td>
<td>39.4A</td>
<td>105.0A</td>
<td></td>
</tr>
<tr>
<td>20kVA/20kW</td>
<td>61.1A</td>
<td>52.5A</td>
<td>140.0A</td>
<td></td>
</tr>
<tr>
<td>30kVA/30kW</td>
<td>91.3A</td>
<td>80.3A</td>
<td>191.8A</td>
<td></td>
</tr>
<tr>
<td>40kVA/40kW</td>
<td>121.5A</td>
<td>107.1A</td>
<td>255.8A</td>
<td></td>
</tr>
</tbody>
</table>

\(^{(1)}\) The UPS is operating at rated voltage, rated power and batteries are charging but regardless of the overload.

\(^{(2)}\) The UPS is operating at rated voltage and rated power but regardless of the overload.

\(^{(3)}\) 12V battery blocks \(\times\) 16pcs. The UPS is operating at rated voltage and rated power but regardless of the overload.
### Minimum Recommended Size of Cables

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Mains Input(1)</th>
<th>Output/Bypass Input(1)</th>
<th>External Battery(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R/S/T/N/PE</td>
<td>R/S/T/N/PE(2)</td>
<td>B+/N/B-/PE</td>
</tr>
<tr>
<td>10kVA</td>
<td>10 AWG / 6mm²</td>
<td>10 AWG / 6mm²</td>
<td>6 AWG / 16 mm²</td>
</tr>
<tr>
<td></td>
<td>TQ:22.1 Lb-in</td>
<td>TQ:22.1 Lb-in</td>
<td>TQ:53.1 Lb-in</td>
</tr>
<tr>
<td>15kVA</td>
<td>8 AWG / 10 mm²</td>
<td>8 AWG / 10 mm²</td>
<td>2 AWG / 35 mm²</td>
</tr>
<tr>
<td></td>
<td>TQ:22.1 Lb-in</td>
<td>TQ:22.1 Lb-in</td>
<td>TQ:53.1 Lb-in</td>
</tr>
<tr>
<td>20kVA</td>
<td>6 AWG / 16 mm²</td>
<td>6 AWG / 16 mm²</td>
<td>1 AWG / 50 mm²</td>
</tr>
<tr>
<td></td>
<td>TQ:22.1 Lb-in</td>
<td>TQ:22.1 Lb-in</td>
<td>TQ:53.1 Lb-in</td>
</tr>
<tr>
<td>30kVA</td>
<td>1/0 AWG / 67 mm²</td>
<td>1/0 AWG / 67 mm²</td>
<td>4/0 AWG / 107 mm²</td>
</tr>
<tr>
<td></td>
<td>TQ:53.1 Lb-in</td>
<td>TQ:53.1 Lb-in</td>
<td>TQ:88.3 Lb-in</td>
</tr>
<tr>
<td>40kVA</td>
<td>2/0 AWG / 67 mm²</td>
<td>2/0 AWG / 67 mm²</td>
<td>250 AWG / 127 mm²</td>
</tr>
<tr>
<td></td>
<td>TQ:53.1 Lb-in</td>
<td>TQ:53.1 Lb-in</td>
<td>TQ:88.3 Lb-in</td>
</tr>
</tbody>
</table>

(1) The recommended maximum length of cabling is less than 10 meters.
(2) Always oversize neutral line N by 1.7 times of the phase line for non-linear loads.

### Minimum Recommended Circuit Breaker Size Table

<table>
<thead>
<tr>
<th>Input/Output Voltage</th>
<th>Output Power</th>
<th>Mains Input(1)</th>
<th>Output/Bypass Input(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>200V</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10kVA/10kW</td>
<td>40A</td>
<td>32A</td>
<td></td>
</tr>
<tr>
<td>15kVA/15kW</td>
<td>50A</td>
<td>50A</td>
<td></td>
</tr>
<tr>
<td>20kVA/20kW</td>
<td>80A</td>
<td>63A</td>
<td></td>
</tr>
<tr>
<td>30kVA/30kW</td>
<td>115A</td>
<td>100A</td>
<td></td>
</tr>
<tr>
<td>40kVA/40kW</td>
<td>150A</td>
<td>125A</td>
<td></td>
</tr>
<tr>
<td><strong>208V</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10kVA/10kW</td>
<td>40A</td>
<td>32A</td>
<td></td>
</tr>
<tr>
<td>15kVA/15kW</td>
<td>50A</td>
<td>50A</td>
<td></td>
</tr>
<tr>
<td>20kVA/20kW</td>
<td>80A</td>
<td>63A</td>
<td></td>
</tr>
<tr>
<td>30kVA/30kW</td>
<td>115A</td>
<td>100A</td>
<td></td>
</tr>
<tr>
<td>40kVA/40kW</td>
<td>150A</td>
<td>125A</td>
<td></td>
</tr>
<tr>
<td><strong>220V</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10kVA/10kW</td>
<td>40A</td>
<td>32A</td>
<td></td>
</tr>
<tr>
<td>15kVA/15kW</td>
<td>50A</td>
<td>50A</td>
<td></td>
</tr>
<tr>
<td>20kVA/20kW</td>
<td>63 A</td>
<td>63A</td>
<td></td>
</tr>
<tr>
<td>30kVA/30kW</td>
<td>115A</td>
<td>100A</td>
<td></td>
</tr>
<tr>
<td>40kVA/40kW</td>
<td>150A</td>
<td>125A</td>
<td></td>
</tr>
</tbody>
</table>

(1) Tripping curve C breaker is recommended.
(2) The sizing takes into account 150% overload capacity.
(3) Always use a curve D breaker for motor loads with high starting currents.
- Electrical System Connections
  - UPS with single input

![Diagram of UPS with single input]

- UPS with single input and isolation transformer

![Diagram of UPS with single input and isolation transformer]
● UPS with dual inputs

● UPS with dual inputs and isolation transformer
Note: You must install an isolation transformer on one of the inputs if the two power sources are different.

- UPS in parallel, using separate battery
- UPS in parallel, using a common battery
- UPS in parallel with an output transformer

Do not use individual output transformers for each UPS. A common output transformer must be used.
2.5 Auxiliary Power Supply Control Switch and Precharge Button

- **AC Power**
  
  This is auxiliary power switch for the main control power.
  
  This Power switch is used first in sequence before turning on UPS. Don't switch this OFF at any time while the UPS is operating.

- **Batt. Start (Battery Cold Start)**
  
  The UPS will start-up using batteries when main input power is not available.
  
  Always ensure the Battery Power switch is on before push this precharge button.
  
  The detailed descriptions of above items is in section 3.4.2.
2.6 Communication Cables Connections

Dry Contacts

The UPS provides 3 output dry contacts and 1 input contact.

Specification of Output dry contact: 250 VAC/2 A; 30 VDC/2 A

There are 3 jumpers (J1~J3) to set NC/NO for each output contact.
To short the input contact to send a command to the UPS.

The user can change the definition for each contact, please contact the local authorized service agent to change the setting.

Jumper (J1~J3) are displayed in Internal Top View (Please check section 1-2.UPS Outlook View).
Communication Slot1
This slot can accept a Relay card or RS-485 MODBUS card.

Communication Slot2
This slot will accept a Relay card or SNMP card. Always ensure that the SW2 switch is in the correct position when this slot is used.

Batt. Temp.--External battery temperature connector
Connect to external battery temperature sensor. Please refer to section 5-4.

RS-232
Pin Assignment:

<table>
<thead>
<tr>
<th>Default Definition</th>
<th>OUT-1</th>
<th>OUT-2</th>
<th>OUT-3</th>
<th>IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>General alarm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load on inverter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load on Bypass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Baud Rate 57600bps
Data Length 8 bits
Stop Bit 1 bit
Parity None

This port is available for changing the settings of the UPS by setting software.

Paral-1&Paral-2—Parallel communication port
Parallel communication cables are required to connect 2 or more UPSs' to each other in order to operate in parallel. Refer to section 2-7 for detail connections.

H↔U—communication selector
This switch is to select HMI or USB port. This switch must be in the “H” position in order for HMI port is function.
- **USB**
  This port is for service only.

- **Switch**—the switch for a terminal resistor for parallel communication
  To ensure good parallel communication quality, please set the switch of the two farthest UPS to the “ON” position. Please refer to section 2-7 for detail.

- **LED Status Indicators**
  - **Normal**: The UPS is normal.
  - **Alarm**: The UPS has an abnormal condition(s).

- **EPO-- Emergency Power Off**
  This EPO contact allows you to turn off the UPS in case of emergency. Short this contact to turn off the UPS immediately.

- **Backfeed Trip**
  The UPS provides a backfeed protection contact to trip the external electromechanical device for isolation from the power circuit. The backfeed protection is to ensuring personnel safety against any risk of accidental energy returning to the input circuit. It imposes the automatic opening of an switching device in case of a malfunction of the static switch.

- **MBP Det.**
  If an external manual bypass switch has been installed with UPS system, this detector must be connected to the auxiliary contact of the external manual bypass switch.
■ **SW2**

When the Relay Card is installed in Slot 2, move the switch to “Slot” position. When SNMP card is installed in Slot 2, move the switch to “SNMP” position.

■ **SW3--the switch for terminal resistor of parallel communication**

To ensure a proper parallel communication connection, the selector switch on each of the additional UPSs', starting from the furthest UPS, must be moved to the “ON” position. Please refer to section 2-7 for detail.
2.7 **UPS Parallel Connections (Option)**

The UPS may be operated in parallel to increase its capacity and also adds redundancy and increases the system's reliability.

- Up to 6 UPS units may be connected and operated in parallel.
- Each UPS requires the addition of the parallel card (Option).
- The size and length of the AC input and output cables must be identical for all UPS units.
- The phase rotation must be the same for each UPS unit.
- It is recommended to use an external bypass cabinet to facilitate maintenance and system testing for parallel operation system.
- Parallel configuration must be performed by authorized and qualified technicians who are familiar with this the UPS.
- Parallel cables must be installed in order for each UPS to communicate with each other.
- Only use the parallel communication cables which are supplied with UPS to ensure that the UPS will operate properly in a parallel configuration.
- The parallel communication cables must be connected in a ring configuration. The maximum total length of the parallel communication cables must be less than 38 meters. To ensure good communication quality you must set the Switch & SW3 of the two furthest UPS to the “ON” position as shown in below. (Please reference to section 2.6 for SW3)
- Parallel communication cables connected are shown below.
Recommended 1+1 parallel system configuration
- Recommended N+1 parallel system configuration
3. Operation And Descriptions

3.1 Operating Mode

The UPS provides the following operating modes:

- **Normal Mode (Online Mode)**
  In Normal mode, grid power is passed through Rectifier then used to charge the battery and provide power through the Inverter simultaneously. Different output voltages settings can be set in VFI mode. The three options are 200/115V, 208/120V and 220/127V. These can be fine-tuned by ±8V.

- **Economy Mode (ECO)**
  Economy Mode effectively improves overall efficiency. In ECO Mode grid power is routed through the Static Switch to the load. At the same time, grid power continues to charge the battery in DC/DC mode through Rectifier following the same setup as VFI Mode. Inverter is also kept ready to switch power supply modes at any time. If VFI mode is set then power can be quickly routed from Bypass to Inverter.

  **Attention:** In ECO Mode, the power supply frequency and voltage will be less stable. Always verify the load requirements and use ECO Mode with care.

- **Converter Mode**
  Converter Mode allows the user to provide a power supply with constant voltage and constant frequency based on their power requirements. The frequency can be set to 50Hz or 60Hz. The voltage options are 200/115V, 208/120V and 220/127V. These can be fine-tuned by ±8V. When the Converter mode is used and in the event of grid power failure, the power will be provided from the battery in Back-up mode. In the event of the battery running low, UPS overload, Inverter failure or module overheating, the entire system will shut down.
3.2 Online Operations

The online UPS provides stable power that is not affected by an unstable main power supply (e.g., grid power). Through the online UPS, the power provided is a clean, noise-free power source.

The online architecture offers three types of power supply methods depending on the power environment.

- **Normal Mode**
  
  When grid power is normal, once Rectifier has been turned on at the main power supply then the battery is charged in DC/DC mode while the required power is supplied via Inverter at the same time.

- **Bypass Mode**
  
  In the event of UPS overload, Inverter failure or module overheating, the power supply circuit switches from Inverter to the bypass output.

- **Battery Mode**
  
  When the UPS detects a failure in the main power supply then power is provided from the battery instead. The touch screen at the front of the module will also display current battery level to remind the user.

3.3 Manual Bypass Operation

When the manual bypass breaker is activated, the load is powered directly from the bypass input. This operation is useful when maintenance needs to be carried out on UPS allowing the technician to perform the complete service without having to disconnect the power to the load.

**Attention:**

- **UPS maintenance can only be performed by authorized and qualified technicians who are familiar with this UPS.**
- **If the UPS is in battery mode, closing or changing the position of the manual bypass breaker will cut off power to the load.**
3.4 Operating Processes

10kVA

15-20kVA

30-40kVA
3.4.1 Normal Mode Start-up

(1) On the rear of UPS, switch ON the *AC Power* switch.

(2) Close UPS Mains Input Breaker/Switch and Bypass Input Breaker if equipped.

(3) Select $\rightarrow$ Command $\rightarrow$ Operation $\rightarrow$ Normal Mode on LCD display.

(4) Return to the Mimic Display. Wait for few minutes, the rectifier will have started.

(5) Close the battery switch/fuses to connect the batteries after rectifier has been turned on.
(6) The inverter will have started and supply output voltage.

(7) Close the UPS Output Breaker to supply the power to the load.

3.4.2 Cold Start
(1) User can start-up the UPS using the battery when main input power is not available.
(2) If the UPS is with an external battery configuration, it is imperative that the batteries are connected.
(3) On the rear of UPS, push button and hold down the button that indicates “Batt. Start” for a minimum of 10 seconds.
(4) Select → Command → Operation → ColdStart Precharge Ready on LCD display.
(5) Select Normal Mode to start UPS.
(6) Once UPS working in Normal Mode.

3.4.3 Shutdown
(1) Select → Command → Operation → Shutdown on LCD display.

Attention:
- IMMEDIATE LOAD OFF!
- For turn off the working power, switch OFF both AC Power and Batt. Power switches in the rear of UPS.
3.4.4 Switch to bypass

(1) Select \( \text{Command} \rightarrow \text{Operation} \rightarrow \text{Load on Bypass} \) on LCD display.

(2) The Inverter will be shutdown and the bypass will supply the power to the load. If the battery is disconnected, Rectifier and Charger will be shutdown as well.

3.4.5 Switch from normal mode to maintenance bypass

(1) Select \( \text{Command} \rightarrow \text{Operation} \rightarrow \text{Load on Bypass} \) on LCD display.

(2) The Inverter will be shutdown and bypass will supply the power to the load.

(3) Open/disconnected the external battery Switch/fuses if equipped.

(4) Close the maintenance bypass switch.

(5) Select \( \text{Command} \rightarrow \text{Operation} \rightarrow \text{Shutdown} \) on LCD display.

(6) Open Output and Mains/Bypass Input breaker.

(7) On the rear of UPS, switch OFF \textit{AC Power} and \textit{Batt. Power} switches.

3.4.6 Maintenance bypass \( \rightarrow \) normal mode

(1) On the rear of UPS, switch ON \textit{AC Power} switch to start the working Power.

(2) Close the Output and Mains/Bypass Input breaker.

(3) Select \( \text{Command} \rightarrow \text{Operation} \rightarrow \text{Load on Bypass} \) on LCD display.

(4) Open maintenance bypass breaker.

(5) Select \( \text{Command} \rightarrow \text{Operation} \rightarrow \text{Normal Mode} \) on LCD display.

(6) Return to \textit{Mimic Display}. Wait for a few minutes, the rectifier will start and the icon will show you when can close the Battery line switch/fuses to connect the batteries.
4. Control Panel Operation and Function Description

Each UPS is equipped with an LCD touch panel to provide the user with a simple and intuitive user interface that is easy to learn. The touch panel offers a combination of graphics and numbers that make it easy to determine the input/output voltage, frequency, load and battery level at a glance. The current status of the UPS is displayed at the main screen. More detailed information such as real time input/output voltage, frequency, current and battery information from the touch panel.

Refer to the selection below for detailed information and functions viewed using the LCD touch panel.

4.1 Screen Introduction

- **A** Displays the current time, status and information of the UPS.
- **B** Indicates Single or Parallel systems, and selects the identified UPS unit to check the parameters.
  - ●: Single Unit
  - ◆: Parallel System
- **C** Click here to view the alarm message.
  - ▶: The green pattern indicates that UPS is normal.
  - △: The red pattern indicates that UPS an abnormal condition has occurred.
- **D** Click to view the status.
- **E** Enter for Sub-Menu, please refer to section 4-2 for more details.
- **F** Enter for Menu, please refer to section 4-2 for more details.
4.2 Menu

Click \( \mathbb{F} \) to enter to the Menu screen as shown in the above picture. Slide the screen to select the menu page and click the menu icon to enter to the desired function.

Click \( \mathbb{F} \) to hide/show the sub-menu.

The button below will appear on some of the function pages.

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="button" /></td>
<td>Click it to save the new setting</td>
</tr>
<tr>
<td><img src="image" alt="button" /></td>
<td>Click it to reload the data</td>
</tr>
<tr>
<td><img src="image" alt="button" /></td>
<td>Click it to go to Mimic Display</td>
</tr>
</tbody>
</table>
All menu functions are in the table below.

<table>
<thead>
<tr>
<th>Menu</th>
<th>Sub-Menu</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mimic Display</td>
<td></td>
<td>Displays the UPS status, alarm, operating mode and measurements. Please refer to section 4-3 for more detail.</td>
</tr>
</tbody>
</table>
| Command \(^{(1)}\) | Operation | • Normal Mode  
• ECO Mode  
• Converter Mode  
• Shutdown  
• Load on Bypass  
• Cold Start Precharge Ready |
|             | Buzzer & Alarm | • Enable/Disable buzzer  
• Clear Latch Alarm and Buzzer |
|             | Other | • Force Charger on  
• Recovery Backfeed Protection Signal  
• Clear UPS Maintenance Alarm |
|             | Battery Test | • Battery Test.  
• Turn off The Battery Test. |
| Monitor     | Identification | Displays UPS information |
|             | Real Time Information | Displays real time measurements of input, output, bypass and battery. |
|             | Maintenance Code | Displays the maintenance code for technician to check the status of the UPS. |
|             | Version | Displays the control MCU software and firmware version. |
| Configuration | Alarm | Set alarm latch function.  
• General Alarm  
• Mains Alarm  
• Bypass Alarm  
• Over Temperature  
• Vbatt. Low  
• Inverter Overload  
• Bypass Overload  
• EPO Activated |
<p>|             | Main | Select the measurements on the Mimic Display. |
|             | Bypass | Select the measurements on the Mimic Display. |
|             | Output | Select the measurements on the Mimic Display. |</p>
<table>
<thead>
<tr>
<th>Menu</th>
<th>Sub-Menu</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>Schedule</td>
<td>Displays the schedule.</td>
</tr>
<tr>
<td></td>
<td>Schedule Setting&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>To define the schedule for ECO mode.</td>
</tr>
<tr>
<td></td>
<td>Battery Test Schedule&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>To define the schedule for battery test.</td>
</tr>
<tr>
<td>Setting</td>
<td>Language</td>
<td>Select the display language</td>
</tr>
<tr>
<td></td>
<td>Update Prog.</td>
<td>Upgrade the software of LCD touch display.</td>
</tr>
<tr>
<td></td>
<td>General</td>
<td>Set the turn off time of LCD backlight.</td>
</tr>
<tr>
<td></td>
<td>Date and Time</td>
<td>Set date and time.</td>
</tr>
<tr>
<td></td>
<td>Peripherals&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>Set communication card.</td>
</tr>
<tr>
<td></td>
<td>Parameters&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>UPS the parameters which can be modified.</td>
</tr>
<tr>
<td>Event Log</td>
<td></td>
<td>Display the event log list of UPS.</td>
</tr>
<tr>
<td>Permission Setting</td>
<td>Login/Logout</td>
<td>Login with the password&lt;sup&gt;(2)&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Password Modification&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>Change user password.</td>
</tr>
</tbody>
</table>

<sup>(1)</sup> This function menu only appears after login; please refer to “Permission Setting”.
<sup>(2)</sup> Default password is “3366”.
Enter in the Parameters Page
From the menu, enter in the Setting Icon then tap the blue row to see additional Parameters

Use the login password (Default is: 3366) then press enter

You will not be able to modify the UPS parameters. Make sure that the converters are off in order to save them.
The UPS parameters that can be modified by the user using the control panel are listed in the table below.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Content</th>
<th>Range</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>Independent/Common</td>
<td>Ind. / Common</td>
<td>Common</td>
</tr>
<tr>
<td></td>
<td>Total cell number</td>
<td>96 ~ 120</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Capacity</td>
<td>1~1000</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Voltage Temperature compensation</td>
<td>Yes / No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Detect the Battery connecting</td>
<td>Yes / No</td>
<td>Yes</td>
</tr>
<tr>
<td>Battery</td>
<td>Charger current</td>
<td>0.0~1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Battery</td>
<td>CV Charger voltage [V/cell]</td>
<td>2.000~2.550</td>
<td>2.300</td>
</tr>
<tr>
<td>Battery</td>
<td>FV Charger voltage [V/cell]</td>
<td>2.000~2.550</td>
<td>2.250</td>
</tr>
<tr>
<td>Battery</td>
<td>Vbatt. Low [V/cell]</td>
<td>1.850 ~ 1.883</td>
<td>1.850</td>
</tr>
<tr>
<td>Battery</td>
<td>Vbatt. Min [V/cell]</td>
<td>1.600 ~ 1.900</td>
<td>1.670</td>
</tr>
<tr>
<td>Battery</td>
<td>Battery test 2 minutes</td>
<td>Yes / No</td>
<td>Yes</td>
</tr>
<tr>
<td>Output</td>
<td>Output voltage</td>
<td>115 , 120 , 127</td>
<td>120</td>
</tr>
<tr>
<td>Output</td>
<td>Output frequency</td>
<td>50 , 60</td>
<td>50</td>
</tr>
<tr>
<td>Output</td>
<td>Fine adjustment voltage</td>
<td>-8 ~ 8</td>
<td>0</td>
</tr>
<tr>
<td>Output</td>
<td>Input transformer</td>
<td>No / Mains &amp; Bypass</td>
<td>No</td>
</tr>
<tr>
<td>Transformer</td>
<td>Input transformer ratio(1)</td>
<td>0.00~10.00</td>
<td>0</td>
</tr>
<tr>
<td>Transformer</td>
<td>Output transformer</td>
<td>No / Yes</td>
<td>No</td>
</tr>
<tr>
<td>Transformer</td>
<td>Output transformer ratio(1)</td>
<td>0.00~10.00</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>Unit number</td>
<td>1 ~ 6</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>Number of units in parallel system</td>
<td>1 ~ 6</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>Set EPO logic</td>
<td>NO/NC</td>
<td>NO</td>
</tr>
</tbody>
</table>

(1) Transformer ratios can be calculated as following,
\[
\text{Input transformer ratio} = \frac{V_{p_{\text{in}}}}{V_{s_{\text{in}}}}; \quad \text{Output transformer ratio} = \frac{V_{s_{\text{out}}}}{V_{p_{\text{out}}}}
\]
4.3 Mimic Display

【A】is Rectifier, 【B】is Static Switch and 【C】is Inverter.
- The faded pattern indicates this part isn’t activated.
- The blue pattern indicates this part is activated.
- The red pattern indicates this part is currently in an abnormal condition.

【D】Displays the bypass input measurements.
【E】Displays the mains input measurements.
【F】Displays the output measurements.

The abnormal measurements will have red background.
Click 【D】 【E】 【F】 to change the measured parameter and press for 3 seconds to enter to Real Time Information.

【G】Display the status of battery.
Press it for 3 second to enter to Real Time Information.
- The battery isn’t connected.
- The green pattern indicates the battery is charging.
- The yellow pattern indicates the battery is discharging.

【H】Alarm silence button. Click it to silence the alarm and press for 3 seconds to enable/disable the buzzer.
- Buzzer is enabled and
- Buzzer is disabled.

【I】Displays UPS internal temperature.
Press for 3 seconds to enter to Real Time Information.

【J】Overload counter
5. Options

5.1 Dry Contact Card

This card provides six output dry contacts and six input contact. These contacts are programmable and user can change the definition for each contact. Please refer to Dry Contact Card manual for more detail.

5.2 RS-485 MODBUS Card


5.3 SNMP Card

This is the Ethernet network card with TCP/IP, HTTP and SNMP protocols.
5.4 Temperature Sensor

Measure the battery temperature.

5.5 Parallel Communication Card

The parallel communication cards are required when 2 or more UPS are in parallel. Also included is a 1.5 meter parallel communication cable. A longer parallel communication cable is available when multiple UPS are in parallel.
6. **Troubleshooting**

In the event of failure, the display area on the control panel will highlight the problem area in red. The “Alarm” symbol 🔴 will also blink to warn that there is a problem with the UPS. Click 🔴 to have an alarm list as below picture.

![Alarm List](image)

We recommend using the following method when troubleshooting to export the event log and machine information from LCD panel to the SD card.

**6-1. Export machine information from LCD panel**

1. Make sure the SD card has been inserted on the LCD panel.
2. On the LCD, select 🔄 → Management → Export → Export Unit Info and Settings.
3. On the LCD, it will indicate " Export Unit Info and Setting. ? ". Then select " Enter ".
4. The information and setting data will be saved on SD card named

    `xxxx_KL_xx_IDx_xxxxxx_Inf.mch`, please send it to your technical support.
6-2. Exporting The event log from LCD panel

1. Make sure the SD card has been inserted on the LCD panel.

2. On the LCD, select → Event Log.

3. Before exporting, you need to refresh the log on LCD. Touch here for refreshing.

4. After all log have been displayed on the LCD, touch and hold again for 2 seconds.

5. LCD will show " Export ? ". Then select " Enter ".

6. The event log will be saved on SD card named

   *xxxx_KL_xx_IDx_xxxxxx_Log.txt, please send it to your technical support.*
## Technical Specifications

<table>
<thead>
<tr>
<th>Capacity</th>
<th>10kVA</th>
<th>15kVA</th>
<th>20 kVA</th>
<th>30kVA</th>
<th>40kVA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>208V_LN 3 Phase + N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage Tolerance</td>
<td>±20% @ 100% load, -40% ~ -20% @ 50% load</td>
<td>Output capacity decrease linearly according to the input voltage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>40 ~ 70Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Factor</td>
<td>≥ 0.99</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THDi</td>
<td>≤ 3% @ 100% load</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>200/208/220V 3 Phase + N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage Tolerance</td>
<td>±1% (Static Load)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency Tolerance</td>
<td>±1% (free running)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Factor</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crest Factor</td>
<td>3:1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage Harmonic Distortion</td>
<td>≤ 1.5% with linear load</td>
<td>≤ 5% with distorting load</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Overload | 110% for 60 minutes, 125% for 10 minutes, 150% for 1 minute
(<105% overload continuously without alarm, ≥ 105% < 110% continuously with alarm) |       |        |       |       |
| **Bypass** |       |       |        |       |       |
| Voltage | 200/208/220V 3 Phase + N |       |        |       |       |
| Voltage Tolerance | Preventive range ±10% (Adjustable ±5% ~ ±15%)
Critical range ±25% (Adjustable ±16% ~ ±30%) |       |        |       |       |
| Frequency | 50/60Hz |       |        |       |       |
| Frequency Tolerance | ±1Hz / ±3Hz (Selectable) |       |        |       |       |
| **Battery** |       |       |        |       |       |
| Number of batteries | 12V,16/18/20pcs configurable |       |        |       |       |
| Max. Charging Current(1) |       |       |        |       |       |
| 100% Load | 3.5A | 5A | 7A | 10A | 13A |
| <60% Load | 10A | 15A | 21A | 31A | 42A |
| Common Battery for Parallel Configuration | Yes |       |        |       |       |
| Internal Battery | Available for housing 12V 7/9Ah 20pcs x 2 strings | Available for housing 12V 7/9Ah 20pcs x 3 strings |       |       | N.A |
| **Maximum Efficiency** |       |       |        |       |       |
| VFI Mode | 93.5% | 94% | 94.5% | 94.6% | 94.6% |
| ECO Mode | 98% |       |        |       |       |
| Backup | 92.5% | 94% | 94.5% | 93.5% | 94.3% |

(1) Provides more charging current with less load condition.
<table>
<thead>
<tr>
<th>Capacity</th>
<th>10kVA</th>
<th>15kVA</th>
<th>20 kVA</th>
<th>30kVA</th>
<th>40kVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMI &amp; Communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display and MMI</td>
<td>4.3” Colorful LCD Touch Screen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built-in Communication Port</td>
<td>RS-232, EPO, Dry Contacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optional Communication</td>
<td>2 Communication Slots for SNMP Card, RS-485 MODBUS Card, Dry Contact Card</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Characteristic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions (W x D x H) mm</td>
<td>260 x 850 x 890</td>
<td>410 x 850 x 983</td>
<td>410 x 850 x 1256</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (w/o battery)</td>
<td>83 kg</td>
<td>105 kg</td>
<td>115 kg</td>
<td>155 kg</td>
<td>160 kg</td>
</tr>
<tr>
<td>Protection Grade</td>
<td>IP20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>RAL 9005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-20~70°C (UPS w/o battery)</td>
<td>-15~40°C (UPS with battery)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Humidity</td>
<td>≤ 95%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>0~40°C</td>
<td>20~25°C (Recommended for optimum battery performance; Battery life is halved for every 10°C increase above 25°C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation Humidity</td>
<td>0 ~ 95% (w/o condensation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Altitude</td>
<td>&lt;1000 m without derating (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test to standards :</td>
<td>FCC part 15 Class A, EN/IEC 62040-2 C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mark</td>
<td>UL/cUL, FCC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise (at 1 meter)</td>
<td>&lt;55dBA</td>
<td></td>
<td></td>
<td></td>
<td>&lt;60dBA</td>
</tr>
</tbody>
</table>

(1)Over 1000m above sea level, the maximum output capacity must be derated by 1% every additional 100m.
# Appendix

## No. and type of battery

<table>
<thead>
<tr>
<th>Battery Manufacturer</th>
<th>Rating</th>
<th>Battery Case Flame Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAIWAN YUASA BATTERY CO., LTD. (MH28947)</td>
<td>NPW45-12 12Vdc, 7.5Ah</td>
<td>HB</td>
</tr>
<tr>
<td></td>
<td>NPW45-12FR 12Vdc, 7.5Ah</td>
<td>V-0</td>
</tr>
<tr>
<td></td>
<td>NPW36-12 12Vdc, 7.0Ah</td>
<td>HB</td>
</tr>
<tr>
<td></td>
<td>NPW36-12FR 12Vdc, 7.0Ah</td>
<td>V-0</td>
</tr>
<tr>
<td></td>
<td>NP7.2-12 12Vdc, 7.0Ah</td>
<td>HB</td>
</tr>
<tr>
<td></td>
<td>NP7.2-12FR 12Vdc, 7.0Ah</td>
<td>V-0</td>
</tr>
<tr>
<td>SHENZHEN LEOCH BATTERIES TECHNOLOGY CO LTD (MH26866)</td>
<td>DJW12-5.0 12Vdc, 5.0Ah</td>
<td>HB</td>
</tr>
<tr>
<td></td>
<td>DJW12-7.0 12Vdc, 7.0Ah</td>
<td>HB</td>
</tr>
<tr>
<td></td>
<td>DJW12-9.0 12Vdc, 9.0Ah</td>
<td>HB</td>
</tr>
<tr>
<td>FIAMM ENERTECH CO LTD (MH27960)</td>
<td>12FGHL28 12Vdc, 7.2Ah</td>
<td>V-0</td>
</tr>
<tr>
<td></td>
<td>12FGHL34 12Vdc, 8.5Ah</td>
<td>V-0</td>
</tr>
<tr>
<td>B&amp;B BATTERY (USA) INC. (MH19884)</td>
<td>HR9-12/FR 12Vdc, 8.0Ah</td>
<td>V-0</td>
</tr>
<tr>
<td>HITACHI CHEMICAL ENERGY TECHNOLOGY CO LTD (MH14533)</td>
<td>GP 1245 12Vdc, 4.5Ah</td>
<td>HB</td>
</tr>
<tr>
<td></td>
<td>GP 1245 FR 12Vdc, 4.5Ah</td>
<td>V-0</td>
</tr>
<tr>
<td></td>
<td>GP 1272 12Vdc, 7.2Ah</td>
<td>HB</td>
</tr>
<tr>
<td></td>
<td>GP 1272 F2 (12V 28W) 12Vdc, 28W/cell</td>
<td>HB</td>
</tr>
<tr>
<td></td>
<td>GP 1272 (12V 28W) 12Vdc, 28W/cell</td>
<td>HB</td>
</tr>
<tr>
<td></td>
<td>GP 1272 FR (12V 28W) 12Vdc, 28W/cell</td>
<td>V-0</td>
</tr>
<tr>
<td></td>
<td>GP 1272 FR 12Vdc, 7.2Ah</td>
<td>V-0</td>
</tr>
<tr>
<td></td>
<td>GP 1272 F2FR (12V 28W) 12Vdc, 28W/cell</td>
<td>V-0</td>
</tr>
<tr>
<td></td>
<td>HR 1234W 12Vdc, 8.5Ah</td>
<td>HB</td>
</tr>
<tr>
<td></td>
<td>HR 1234W FR 12Vdc, 8.5Ah</td>
<td>V-0</td>
</tr>
<tr>
<td></td>
<td>HRL 1234W 12Vdc, 8.5Ah</td>
<td>HB</td>
</tr>
<tr>
<td>Battery Manufacturer</td>
<td>Rating</td>
<td>Battery Case Flame Rating</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>-------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>HITACHI CHEMICAL ENERGY TECHNOLOGY CO LTD (MH14533)</td>
<td>HRL 1234W FR</td>
<td>12Vdc, 8.5Ah</td>
</tr>
<tr>
<td></td>
<td>HRL 1223W</td>
<td>12Vdc, 5.75Ah HB</td>
</tr>
<tr>
<td></td>
<td>HRL 1223W FR</td>
<td>12Vdc, 5.75Ah V- 0</td>
</tr>
<tr>
<td></td>
<td>HRL 1225W</td>
<td>12Vdc, 25W HB</td>
</tr>
<tr>
<td></td>
<td>HRL 1225W F2</td>
<td>12Vdc, 25W HB</td>
</tr>
<tr>
<td></td>
<td>HRL 1225W FR</td>
<td>12Vdc, 25W V- 0</td>
</tr>
<tr>
<td></td>
<td>HRL 1225W F2FR</td>
<td>12Vdc, 25W V- 0</td>
</tr>
<tr>
<td>HITACHI CHEMICAL ENERGY TECHNOLOGY CO LTD (MH14533)</td>
<td>XTV 1285 F2FR</td>
<td>12 V dc, 8.5 Ah V-0</td>
</tr>
<tr>
<td></td>
<td>XTV 1285</td>
<td>12 V dc, 8.5 Ah HB</td>
</tr>
<tr>
<td></td>
<td>HRL 1234WF2</td>
<td>12 V dc, 8.5 Ah HB</td>
</tr>
<tr>
<td></td>
<td>HR 1232W F2</td>
<td>12 V dc, 32 W/cell HB</td>
</tr>
<tr>
<td>KUNG LONG BATTERIES (MH16982)</td>
<td>WPS7-12</td>
<td>12 V dc, 7.0 Ah HB</td>
</tr>
<tr>
<td></td>
<td>WPS8-12</td>
<td>12 V dc, 8.0 Ah HB</td>
</tr>
<tr>
<td></td>
<td>WP1236(XXXX)</td>
<td>12 V dc, 9.0 Ah HB</td>
</tr>
<tr>
<td>FUJIAN MINHUA POWER SOURCE (MH47104)</td>
<td>MS9-12</td>
<td>12 V dc, 9.0 Ah V-0</td>
</tr>
<tr>
<td></td>
<td>MS7-12</td>
<td>12 V dc, 7.0 Ah V-0</td>
</tr>
</tbody>
</table>