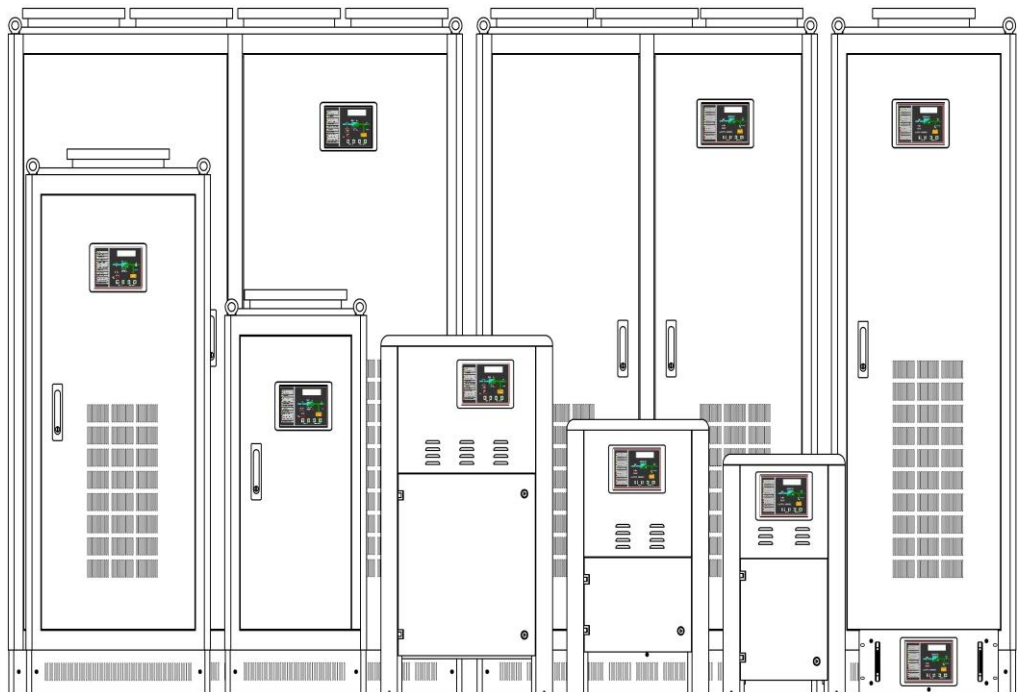


1Phase DC RECTIFIER / BATTERY CHARGER USER MANUAL



In terms of helping the service and maintenance, please fill out and save following information specified in the table below.

Warranty period is 2 years for both charger and battery as per standard warranty conditions.

MODEL / TYPE	
SERIAL NUMBER	
APPLICATION	
SHIPMENT DATE	
COMMISSIONING DATE	
ADMISSION DATE	

FOREWORD

This user guide includes transportation, installation, commissioning, operation, maintenance, etc. procedures for chargers.

DC Rectifier / Battery Chargers is mentioned as "Charger" in the user manual

This user manual may not be copied or reproduced without permission of 

Keep the user manual in a safe place on or near the rectifier.

When faced with any problems with the rectifier, if the problem can not be solved with the instruction manual / procedures and information in this manual, please contact with our technical service.



Although this guide is prepared in order to use the rectifier correctly and safely prepared, though, arising from the use of the information contained in this book  assumes no responsibility or liability for any loss or damage  has the right to make changes in the products described in this manual at any time due to technological development and improvement without notice.

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1. General

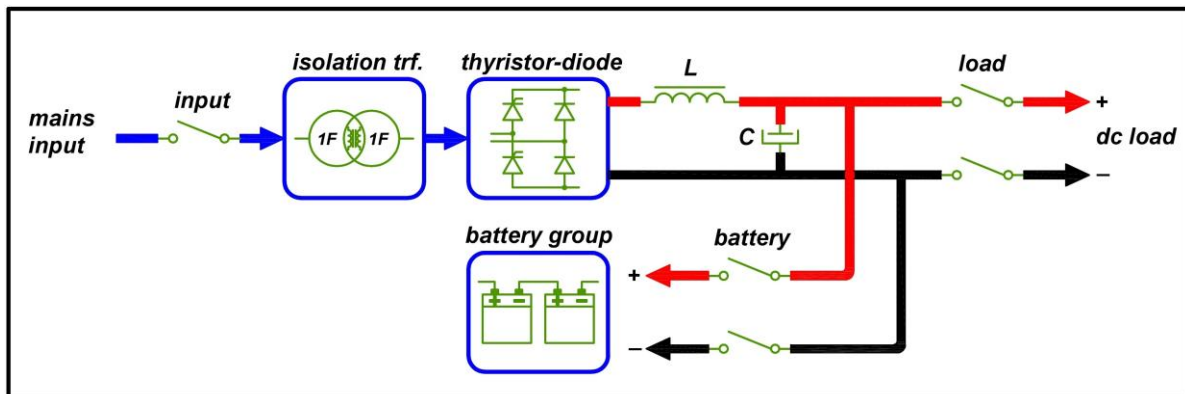
PMI Charger is SCR controlled AC/DC rectifier with automatic constant voltage and constant current ability. Thanks to isolation transformer and DC current module, the load is fully isolated from the system and so the load is protected against charger failure.

12 pulse and 6 pulse options are available according to the different application requirements. The most important advantages of the 12-pulse charger are lower input current harmonic ($THDi < 10\%$) and higher input power factor ($\cos\phi > 0.9$). Total output current, battery charge current, Boost and Float Charge voltages are adjustable on the control panel easily. Also, smart Boost charger and battery test function can be activated easily on the LCD front panel or with remote communications. Remote communication options are RS485 / Modbus, Profibus or TCP-IP.

The AC ripple on the DC output is lower than 1% thanks to output LC filter and so the battery life will be maximum. Input and output can be switched separately with the circuit breaker and the condition of these circuit breakers can be monitored on the mimic diagram via their auxiliary contacts. Also, there are LEDs on the front panel for 8 units critical alarms and charge modes.

1.1 Uninterrupted Protection with Full Isolation

PMI Charger is completely isolated from the input thanks to usage of input isolation transformer and DC current control by DC current module. Thus, the surge voltage at the input and even in systems with high-frequency noise, the charger and load are under safety. The standard LC filters at output allows to charger the battery safely.



1 Phase – Phase Angle Controlled Rectifier

1.2 Protections

Thanks to the input isolation transformer, the load is fully isolated from the mains and protected. Input, load and battery outputs are protected by circuit breakers. In case of excessive heat, the related alarms will be activated and output will be cut off after a while. Electronic protections are available for short circuit, over / undervoltage. All components can be accessed easily to do maintenance thanks to simple structure.

1.3 Parallel / Serial Connection

The charger is designed according to the easy accessibility principle to provide service and maintenance easily and also it is simple to connect in series or parallel according to need. In case of parallel connection with the correct capacity selection, one of the charger

will be redundant and will be able to continue uninterrupted to supply the load in the event of any failure.

1.4 Voltage Ripple < %1

DC output is filtered by L/C, so DC ripple at full load always lower than 1% to increase battery life.

1.5 Wide Usage

PM Rectifier Systems are reliable and ideal for transformer energy distribution centers, gas oil energy distribution centers, natural gas energy distribution centers, mining industry security and lighting, building automation systems and for special telecommunication applications.

1.6 Boost Charge Protection Function (Boost Inhibit)

This function is designed for “Parallel Redundant Industrial Charger with Two Battery Groups” systems. In parallel operation, if two rectifiers start boost-charging at the same time there is danger the load would be damaged by overvoltage. So, the principle idea of Inhibit facility is to block any one of the two chargers feeding the load in Boost mode when the other rectifier is charging the batteries in Boost mode. Only one rectifiers can be in boost mode, both rectifiers can not be on boost mode at the same time. When one rectifier applies boost voltage, it will be disconnected from the load (only its battery will be charged on boost) and other rectifier will supply the total load current on float charge mode. So the system prevents applying overvoltage to the load. This function is primarily handled by a powerful communication between two rectifiers and the use of contactors.

1.7 On-Line Battery Test

Battery test function tests the battery capacity based on discharge current, minimum voltage and autonomy time.

The operator adjusts battery discharge current (expected load current), expected autonomy time and the voltage level that is assumed as battery discharged. Then the load is fed through the battery during this autonomy time. If the voltage of the battery do not fall to battery discharged alarm level in the adjusted autonomy time, the battery test result is PASS. If not, the Battery Test Fail Alarm will be activated on front panel.

Battery test function can be activated manually or set automatically. Automatic battery test intervals can be set from the front panel and communication interface.

EXAMPLE:

System Description for example:

Nominal Voltage: 110VDC

Charger Output: 60A

Adjustable Values:

Low Battery: 90VDC (Adjustable through front panel)

Disch I= 10A (Adjustable through front panel) Note: This value should be adjusted lower than the load current. If the load is lower than the adjusted battery discharge current, then test will be cancelled automatically.

Disch T=60minutes (Adjustable through front panel)

Considering the load as 15A, during battery test 10A will be supplied through battery and remaining 5A will be supplied through rectifier. During battery test, battery charger will check the battery voltage continuously. If battery voltage decreases to low battery

level in less than 60 minutes, then battery test will fail. But, if battery voltage does not reach to the discharged voltage level in 60 minutes, then battery group will pass the test.

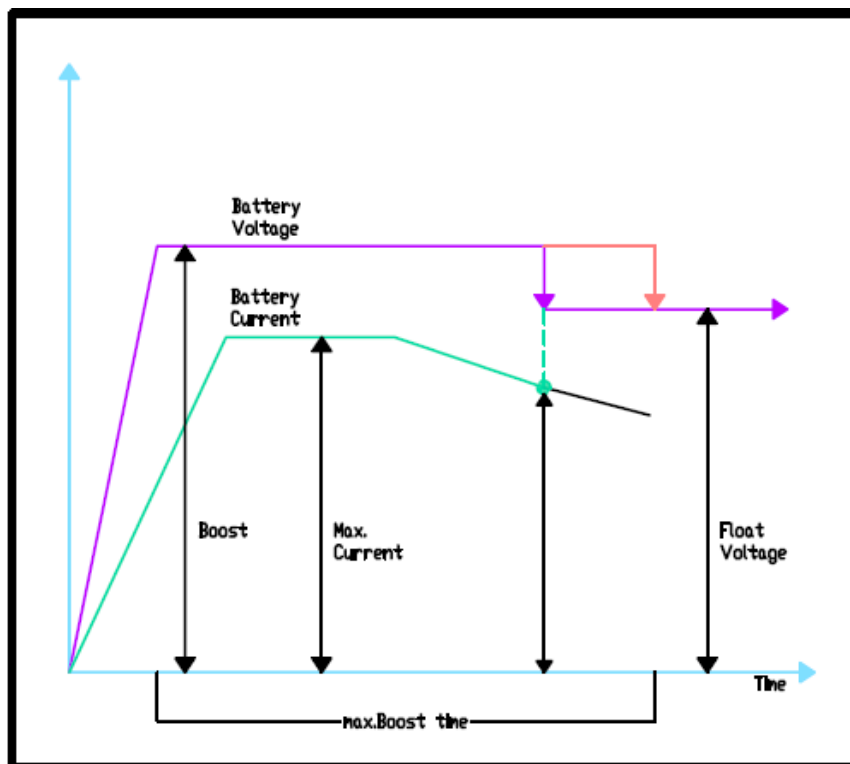
1.8 Automatic Boost Charge (Autoboost)

The Autoboost Charge is a function that provide charger make automatically a choice between float or boost charge modes according to the battery discharge status. This feature allows charging the battery quickly for the optimum duration after discharge without need to intervene manually after each discharge.

Auto Charge Function is set as appropriate according to the battery characteristics and is determined to be engaged in what value the boost charge. Automatic switching between Boost Charge and Float Charge is done by measuring current drawn by battery after the discharge. The user can set reference Battery charging current values via the front panel or software.

Two reference current value must be set for Float Charge and Boost Charge. After being discharged in any way the battery, while the battery being recharged, if the drwan charging current value is greater than set reference Boost charge current then the Autoboost function will begin to apply boost charge voltage to the battery. Applied Boost charge time is determined by the charge current drawn by the battery. Battery charge current decreases during charging battery. When the reduced battery charges current drops to the set reference value, the recitifer will automatically switch to Float Charge from Boost Charge.

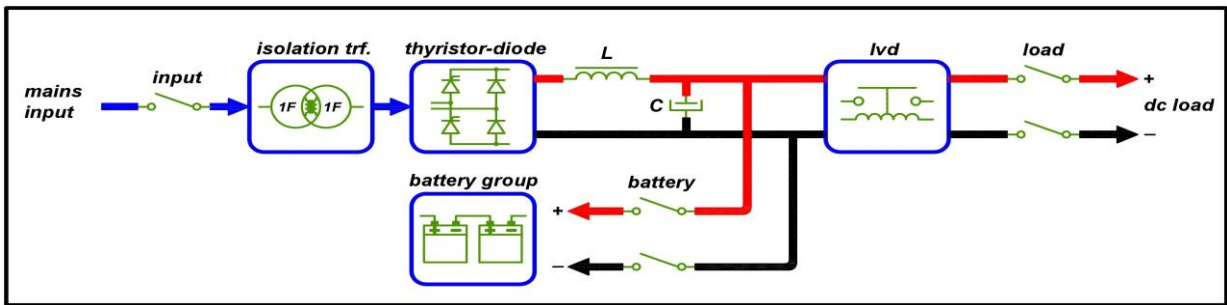
Thanks to Autoboost function, Boost charge voltage applied to the battery after the discharge is not a fixed period. The boost charge duration will be determined according to the battery need. This function will prevent to damage the battery and shortening of battery life due to exposed long-term high voltage during boost charger.



1.9 LVD

Long mains failure (no AC on the input) period may cause deep charge on the battery if the mains failure period is longer than the expected back up time of the battery. Although battery run out and depleted, without AC voltage in the input of the charger, battery will keep discharging to the lower voltage levels. This deep discharge may damage some kind of battery types (especially AGM type). Additionally, the charging time of a deep discharged battery will take longer time than normally. To protect the battery from deep discharge, a contactor can be used to disconnect the battery and the load from each other when battery voltage reaches to the minimum discharge value in case of a mains failure. This protection is called as LVD (Low Voltage Disconnect).

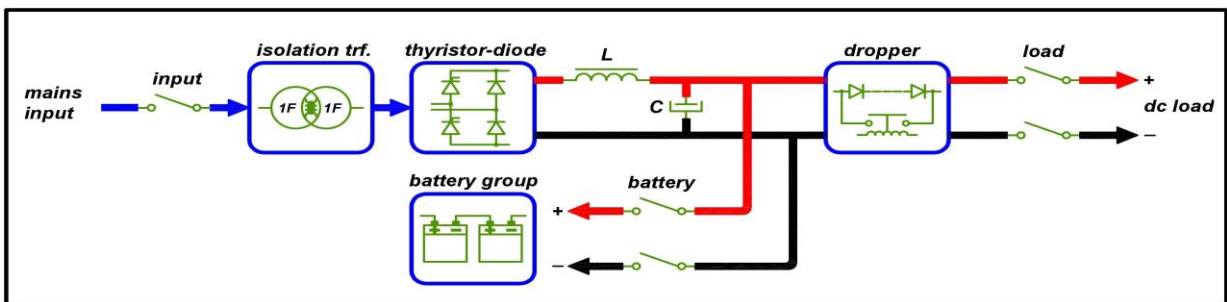
Rectifier Control PCB operates the LVD contactor by monitoring the battery voltage. The minimum discharge voltage (Low Battery value) can be adjusted from the LCD front panel or through communication software. During battery discharge, if the battery voltage decreases down to the adjusted “Low Battery” value, LVD Ccontactor will disconnect the battery from load to protect the battery from deep discharge. When the mains come back and input AC becomes “ON”, automatically DC bus voltage will be generated, battery will be charged and load will be supplied.



LVD Block Schema

1.10 DROPPER

The function of this item is to drop/decrease the voltage on the load. If there is no dropper diode, the battery voltage (float or boost) will be directly reflected to the load. If there is no dropper in the system and float or boost voltage is higher than the maximum operating voltage of the load, then load may not operate and damaged. The dropper consists of diodes that are connected in serial and made on-line or off-line with by a contactor. The quantity of the dropper diodes and steps on the dropper circuit is based on the load operating voltage range, battery quantity and battery charge voltage (float and boost).



Dropper Block Schema

General / Optional Features

Rectifier	Standard Type	Automation Type
General		
Input Isolation Transformer	*	*
DSP Thyristor Control	*	*
6 Pulse Phase Angle Controlled Rectifier	*	*
Separate Outputs for Battery and Load	*	*
Use as DC Current Source or Battery Charger	*	*
Adjustable Output Voltage / Current	*	*
Adjustable Battery Voltage / Current		*
Adjustable Timer for Manuel Boost Charge	*	*
Automatic or Manual Battery Test Function	*	*
Automatic Boost Charge Voltage Adjustment	*	*
Over / Under Voltage, Over Current, Short Circuit, Over Temperature and Reverse Voltage Protection	*	*
Low Battery LED Indication and Free Contact	*	*
Main Input Normal / Failure LED Indication and Free Contact		*
Rectifier Failure LED Indication and Free Contact	*	*
Over Temperature LED Indication and Free Contact		*
Rectifier Overvoltage LED Indication and Free Contact		*
Load MCB ON / OFF LED Indication and Free Contact		*
Battery MCB ON / OFF LED Indication and Free Contact		*
Earth Fault LED Indication and Free Contact		*
Reset ON / OFF Switch	*	*
Bottom Cable Entry	*	*
IP21 Protection Class	*	*
Forced Fan Ventilation	*	*
Optional		
12 Pulse Phase Angle Controlled Rectifier	*	*
Remote Communication: RS485/ModBus, ProfiBus or TCP-IP	*	*
Dropper Diode Circuit for the output voltage regulation (1-4 Stages)	*	*
LVD Contactor for battery deep discharge protection	*	*
Active Load Sharing Parallel Operation		*
Redundant Parallel Operation		*
Rectifier Integrated Battery Rack	*	*
Front Access Cabin with Higher IP Protection (IP31-42-51-54-55)	*	*
Different Cabin Color	*	*
Temperature Compensation for Battery Group		*
Remote Boost Charge Cancel Digital Output		*
Analog / Digital DC Voltmeter / Ammeter, Power Analyzer	*	*
Distribution MCB		*
Natural Cooling	*	*
Blocking Diode		*
Lighting for Cabin	*	*
Heater for Cabin	*	*
Top Cable Entry	*	*

Technical Features

GENERAL	
Model	RDA (Monophase) Series
Topology	Thyristor controlled AC/DC Rectifier with input isolation transformer
Charging Principle	Constant Current/ Constant Voltage
INPUT	
Nominal Voltage	220/230 VAC
Voltage Tolerance	± %15
Nominal Frequency	50 Hz / 60 Hz ±%5
Cosφ	>0.8 (Monophase)
Transformer	Galvanically isolated Input Isolation Transformer
Protection	Thermic-Magnetic Over Current Protection, Over Voltage Protection, Soft Start, MCB
THDi	< 30% (Monophase)
OUTPUT	
Nominal Voltage	12 / 24 / 48 / 110 / 220 VDC
Voltage Adjustment	12/24VDC:12-30VDC, 48VDC:48-60VDC, 110VDC:110-160VDC, 220VDC:220-300VDC
Nominal Current	Up to 1000 A
Current Adjustment	0-100% of Nominal Output Current
Battery Charge Current Adjustment	0-100% of Nominal Output Current
Boost Charge Voltage	up to 120% of Floating Output Voltage
Output Voltage Tolerance	±%1
Output Ripple	< %1 RMS AC of Output Voltage
Dynamic Response (without battery)	±%5 of Output Voltage (50% and 25% load change)
Dynamic Response (with battery)	Dynamic Response (without battery)
Output Protection	Short Circuit Protection, Over Voltage Protection, Reverse Voltage Protection, Short Circuit, MCB or NH Fuse (based on current value)
Battery Protection	L-C filters, Over Voltage Protection, Short Circuit, MCB or NH Fuse (based on current value)
DISPLAY PANEL	
Front Panel Measured Values	LCD Display for Output Voltage / Current, Battery Voltage / Current and Line Voltage / Line Current (Monophase) / Frequency
Front Panel Indicators	Float mode, Boost mode, Current mode, Battery ending, Low battery, Battery test failure, Line failure, Fan failure, Over voltage, Under voltage, Over temperature, Rectifier failure, Line / Load / Battery MCB, Last 256 Events
Front Panel Set Menu	Boost charge voltage, Float charge voltage, Low battery voltage, Battery test, Charger output current, Battery charge current, Auto & Manual boost selection, Manual boost time, LED test and On - OFF, Rectifier ON-OFF, Time & Date settings.
COMMUNICATION & PARALLELING (OPTIONAL)	
Communication	Parameter settings via RS 485/ModBus, Profibus, TCP/IP or SMS/Mail Order:
Paralleling	Active or Passive Load Sharing Parallel Operation
ALARM CONTACTS	
Open or closed free contacts	Low Battery, Line Input OK/Fail, Rectifier Failure, Over Temperature, Rectifier Over Voltage, Load MCB ON/OFF, Battery MCB ON/OFF, Earth Fault
ENVIRONMENT	
Electrical Standards	IEC 60146-1-1 / EN 50091 -1 (Security) / EN 50091 -2 (EMC)
Cooling	Forced fans with smart fan controlling system
Isolation Voltage	2500VAC input/chassis and output/chassis
Efficiency at full load	Monophase >%80
Circuit Breakers	Input: MCB; Battery and Load Output: MCB or NH Fuse
Protection Level / Color	IP21/RAL 7035 (Standard), IP31, IP42 and IP54 with different color (optional)
Operating Temperature	-10/+40°C (50°C optional)
Relative Humidity	%5 - %90
Operating Altitude	Maximum 2000 Mt.
Noise Level	Maximum 60 dB.

2. General Safety Instructions and Warnings

Do not start / interfere the rectifier before checking all the safety and usage instructions in the manual. Please pay attention to the warnings and safety for the electrical connections described below. Installation, commissioning, service and maintenance must be performed by trained technical service personnel or authorized personnel.

2.1 General

1. Please check carefully the quantity and material integrity specified in the shipment document. In case of any deficiencies, damages etc., please contact our technical service or your supplier.
2. Do not open the product door without technical service assistant. There are not any parts in rectifier or battery that the maintenance or service can be done by end user.
3. There is high voltage on the AC / DC electrolytic capacitors in the rectifier that causes serious injury. This voltage will be discharged after a while (2-3 min.) after the circuit breakers are made "OFF".
4. There is battery group with high voltage in the circuit that causes serious injury. Even the circuit breaker is taken "OFF" position; there is still potentially hazardous voltage at the input terminal of the battery.

2.2 Transportation and Shipping

1. Please ship the rectifier in original packing against shock, damage etc. during transportation.
2. Please take necessary precaution to prevent any damage in the rectifier cabin during lifting.
3. Please move the rectifier in the upright position according to the center of gravity. It may cause damage in rectifier to move in sideward due to heavy materials in it.
4. Excessive vibration and bounce may damage the charger during transportation.
5. Do not move the charger by pulling or pushing from the package. Always use forklift, crane or transpallet to move it.
6. If the rectifier will be lifted by crane, please use appropriate distributor bar or lifting strap.
7. Do not expose the rectifier to water directly even if it is packaged during transportation.
8. Do not bend the rectifier more than +/-10° during transportation, otherwise it may fall over and cause injury.
9. Do not place other packages on the rectifier package during transportation. Otherwise, it may cause damage to the rectifier.



Please check capacity of sufficient floor and elevator / crane to avoid causing serious injury in case falling tipping etc.



Transpallet

Forklift

2.3 Storage

1. Store the rectifier in a dry place. The environment temperature should be in ideal storage temperature range (-25°C/+55°C).
2. Optimum storage temperature range for battery is -20°C/+25°C and the battery will be damaged beyond -20°C/+40°C range.
3. If the rectifier will be stored for a period more than 3 months, then the batteries (over time depending on storage temperature) must be recharged periodically.

2.4 Installation Location

1. Due to the humidity caused by temperature difference, there may be condensation on battery charger. In that case, wait for 2 hours before installation to adapt the battery charger to the environment.
2. Do not keep explosives and substances that may be affected from the heat in the same area with battery charger.
3. Objects that may be affected from the magnetic field should be kept at least 1m away from the battery charger.
4. The area that battery charger placed should be open and have free space. Do not install the battery charger to the places that receive direct sunlight, next to the radiators, humid/damp areas and close with conductive materials.
5. Do not block the ventilation fans and other openings. Foreign objects must not be inserted to the battery charger.
6. Battery charger must be protected against water or any other liquids that may enter to the battery charger cubicle.
7. Battery charger must be protected against rodents or insects that may enter to the battery charger cubicle.

2.5 Installation



**All the connections must be done by the technical personnel.
Ground line connection must be done before the other connections.**

1. Please open the rectifier package carefully and check it against shock, impact, scratches, breakage, damage etc. That may occur during transportation.
2. There is not any hardware available on the rectifier for protection against leakage current. Therefore, the technical staff or user should put the warning labels on the circuit breakers on the line during working on the rectifier. Warning labels will remind the intervene on the line to technical staff who is working on the system.



MAINTENANCE / EXCAVATION IS DONE ON THIS LINE.

Do not interfere.

Warning Label

4. For safe operation; please use suitable cross-sections for connection proper to rectifier capacity. Thin wires or loose connections will cause dangerous overheating in the cable connection and terminals.
5. Please use original accessories and insulated service tools while doing rectifier connections.

2.6 Battery

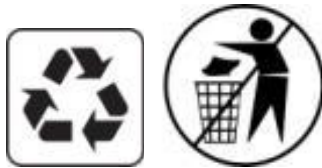


Please pay attention to the following warnings when working with batteries. Batteries pose a great risk for electrical shock. Fire or life-threatening may occur due to short circuit, spark etc. occurring during working.

1. Please take off the conductive metal objects such as ring, tag, wristwatch etc. before starting maintenance or replacement processes on the batteries.
2. Please use original accessories and insulated service tools while doing battery connections.
3. Please do not leave the service tools and/or conductive metal objects on the battery.
4. Please do not throw never the batteries in the fire to destroy them. The battery exposed to high temperature may cause serious injury.
5. Please do not pierce the battery casing and do not absolutely open inside the battery. The battery contains toxic gases and electrolytes that are extremely harmful for skin and eyes.
6. Please do not make short circuit the battery negative (-) and positive (+) terminals. Otherwise, the battery may be damaged and there may occur electrical shock or burn in your body due to short circuit.
7. Even the Mains Input MCCB/MCB/Fuse is "OFF", the hardware in the rectifier is still connected to the battery and there is still battery total voltage on this hardware. Therefore, the Battery MCCB/MCB/Fuse should be turned OFF and the

connection cables between batteries should be removed before doing any maintenance or replacement for the battery.

8. Please make sure that there is not any voltage on the battery connection terminals before making intervention to the battery. Battery circuit has not been isolated from the input voltage circuit. A voltage that may lead to life threatening, can occur between battery terminals and ground (chassis)
9. The direction of the (-) and (+) terminals in battery connections is important. Reverse connection may damage the rectifier. Please make connections to the related terminals as per labels on the rectifier and wiring diagrams.
10. Please replace the battery with a new with same voltage, capacity and cells number as per the one on the rectifier. Please pay attention to the same battery manufacturer and production time of the new battery.
11. There are current and voltage on the battery that may lead to life-threatening. Therefore, battery maintenance and replacement should be done by trained technical service personnel. Battery replacement and maintenance should not be carried out by unauthorized persons.
12. Please contact with technical service to change a higher capacity battery. It is required to know the technical details of rectifier and connection to do this. The uninformed transactions may damage the rectifier.



Batteries contain toxic substances such as lead- acid etc. If they are not disposed of properly, they are harmful for the environment and human health. Recycling / reuse or hazardous waste process must be carried out as per prescribed by local laws.

2.7 Symbols

	Electrical hazards that may cause serious injury or loss of life if the warning is not taken into account.
--	---

	Serious injury, loss of life or rectifier failure may occur if the warning is not taken into account.
--	--



Earthing



Recycling



Do not dispose of garbage: Do not dispose of this product have not been classified as urban waste. Such waste should be collected separately for special handling of the donated.

3. Electrical Connections



Before starting this process, please pay attention to the substances of the safety and warning in "2. General Safety Instructions and Warnings" section.

3.1 Cable Cross-Section

Cable size to be used in connection with standard models are given in the following table. You can get technical information in consultation with our sales or technical service for custom models.

MODEL	INPUT VOLTAGE (VAC)	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (ADC)	INPUT CABLE CROSS-SECTION (mm ²)	BATTERY/OUTPUT CABLE CROSS-SECTION (mm ²)
RDA 24-10	220 (PH-N)	12-24	10	2,5	4
RDA 24-30	220 (PH-N)	12-24	30	2,5	10
RDA 24-60	220 (PH-N)	12-24	60	4	25
RDA 24-100	220 (PH-N)	12-24	100	6	35
RDA 24-200	220 (PH-N)	12-24	200	10	70
RDA 48-10	220 (PH-N)	48	10	1,5	4
RDA 48-30	220 (PH-N)	48	30	4	10
RDA 48-60	220 (PH-N)	48	60	6	25
RDA 48-100	220 (PH-N)	48	100	10	35
RDA 48-200	220 (PH-N)	48	200	25	70
RDA 110-10	220 (PH-N)	110	10	2,5	4
RDA 110-30	220 (PH-N)	110	30	10	10
RDA 110-60	220 (PH-N)	110	60	16	25
RDA 110-100	220 (PH-N)	110	100	25	35
RDA 110-200	220 (PH-N)	110	200	50	70

3.2 Cable Connection

3.2.1 Mains Input Connection

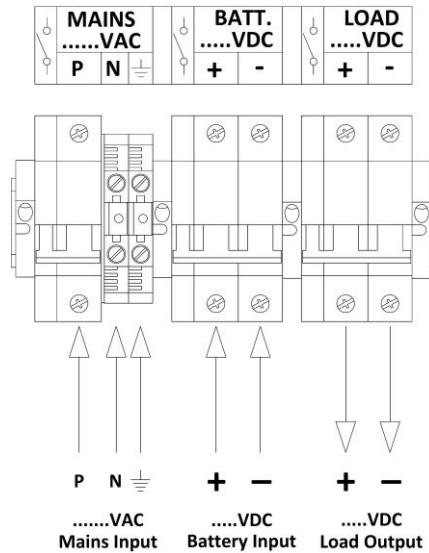


Before starting this process, please pay attention to the substances of the safety and warning in "2. General Safety Instructions and Warnings" section.

1. Please make sure that there is no voltage on the cables to be connected.
2. Please use appropriate cable cross-section according to the rectifier power and model.
3. Please check if the MCB/fuses on the rectifier are at OFF position.
4. **For 1 Phase Input Models;** Please do the phase, neutral and ground connections as specified in the label of the Rectifier mains input MCB/terminal.
5. Please check the robustness and accuracy of your connections. The loose connections will cause dangerous overheating in cables and terminals.

Please do not turn ON the Mains Input MCB. Please check the "Startup" section.

NOTE: Below seen fuses/terminals may be different type and sizes according to the rectifier model / power.

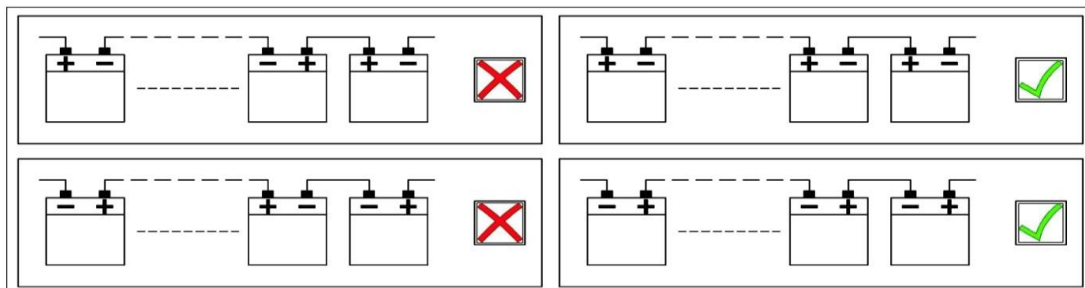


1 Phase Input Connection Type

3.2.2 Battery Connection

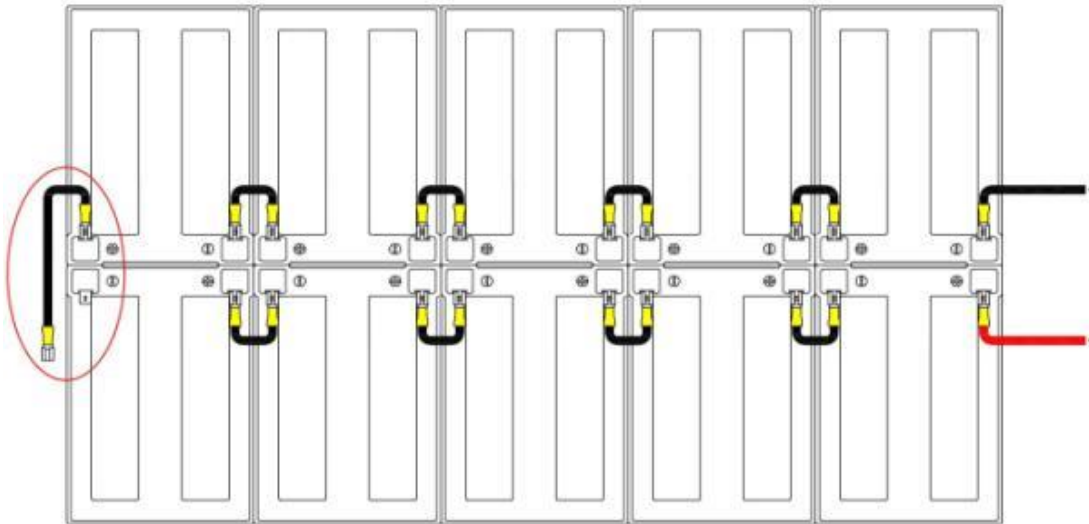
Before starting this process, please pay attention to the substances of the safety and warning in "2.6 Battery" section.

1. Please keep as short as possible the connection cables between rectifier and battery.
2. Please use colored cables to avoid confusion during this process. For example: Red cable for positive (+) end, black or blue for negative (-) end.
3. Please connect batteries in series. The correct and wrong connection examples are given below.



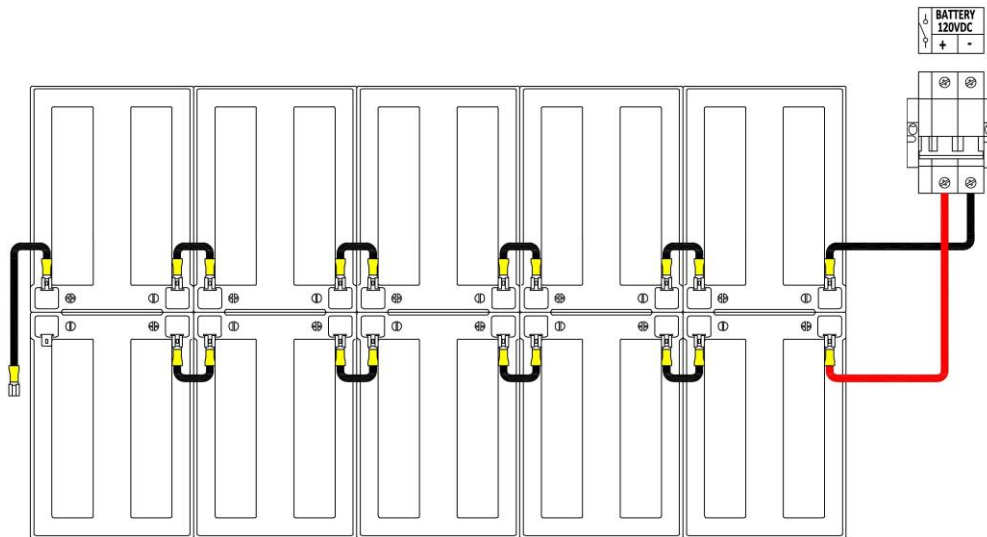
Correct Battery Connection

4. There is a total battery voltage between main (+) and (-) terminals. Please leave the shunt connection between any two batteries open as indicated in the following examples to avoid arc, burns etc. as a result of short circuit during battery connections.




10 Batteries Serial Connection

5. Please connect battery main (+) and (-) terminals to the rectifier input battery fuse /terminal as specified in example below by paying attention to the direction of (+) and (-) as indicated on the label.



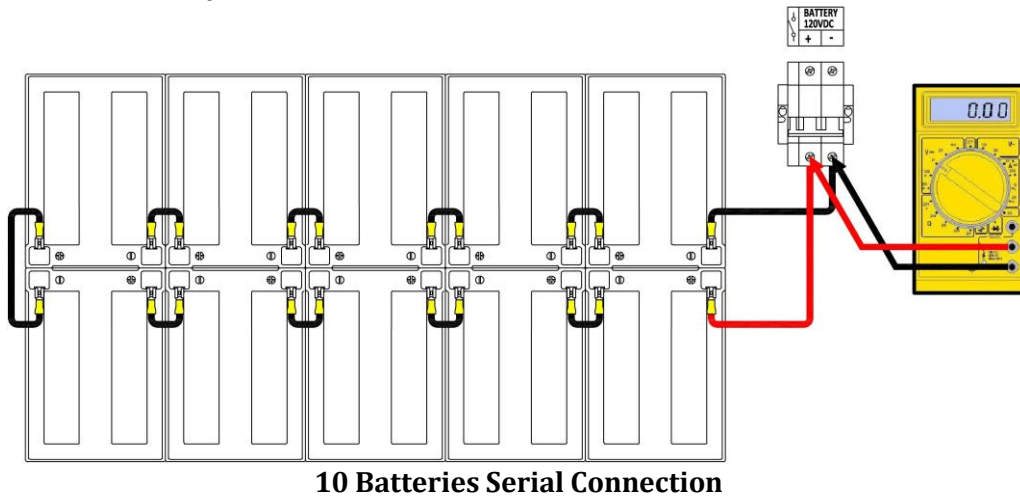
10 Batteries Serial Connection



Please pay attention to the direction of the (+) and (-) terminals while doing battery connections. Reverse connection may damage the battery and rectifier.

6. Please connect the shunt left open while Battery Fuse is OFF. Please measure the total battery voltage on the battery fuse/terminal by a measurement device (at

DC voltage level) with correct probe direction. Please check the accuracy of the connections by this method.



Please do not turn ON the Battery Fuse. Please check the “Startup” section.

3.2.3 Load Connection

1. Please use colored cable to avoid confusion during this process. For example: Red cable for (+) end, black or blue cable for (-) end.
2. Please connect load connection main (+) and (-) terminals to the rectifier load output fuse/ terminal as specified in example below, by paying attention to the direction of (+) and (-) as indicated on the label.
3. Please check the robustness and accuracy of your connections. The loose connections will cause dangerous overheating in cables and terminals.



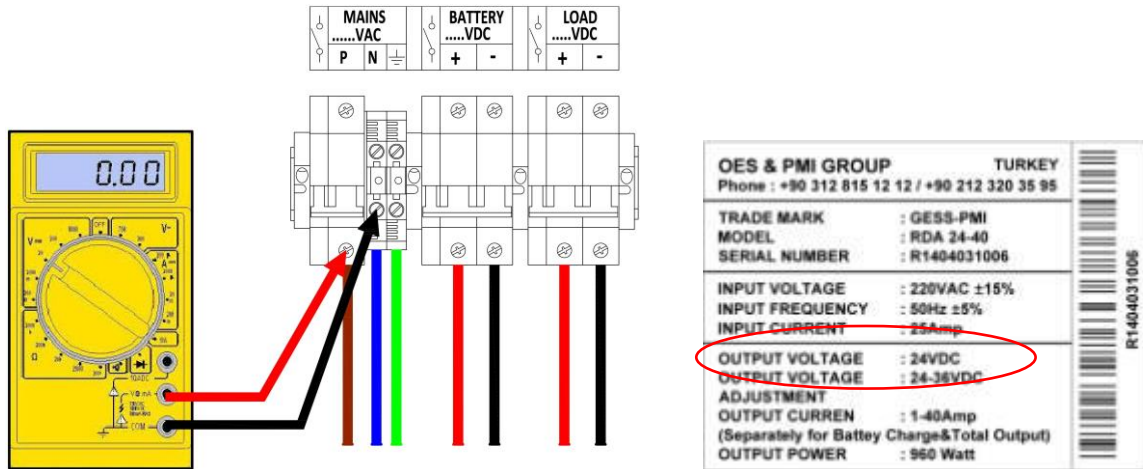
Please pay attention to the direction of the (+) and (-) terminals while doing load connections. Reverse connection may damage the load and rectifier.- Please do not turn ON the Load Fuse. Please check the “Startup” section.

4. Commissioning / Operation

4.1 Preliminary Checks

1. Please turn ON the Mains Input MCCB/MCB/Fuse to energize the rectifier.
2. Please measure the Mains voltage over the Mains Input MCCB/MCB/Fuse/ terminal by a AC voltage level measurement device (Phase-Neutral voltage for 1 phase rectifier; Phase – Phase voltage for 3 phase rectifier) and check if the voltage is same with “Input Voltage” as written on the rectifier label.
3. Please measure the Mains voltage over the Mains Input Fuse / terminal by a measurement device at Hertz level (Phase-Neutral frequency for 1 phase rectifier;

Phase – Phase frequency for 3 phase rectifier) and check if the frequency is same with “Input Frequency” as written on the rectifier label.



Mains Control

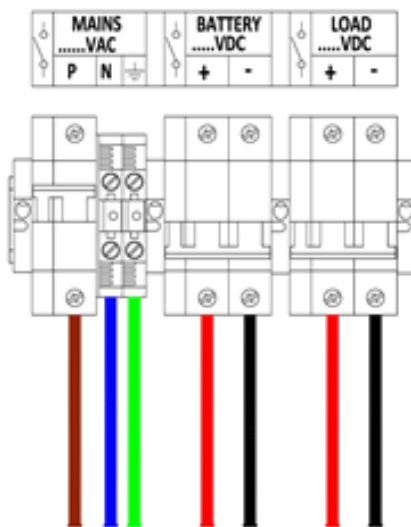
Note: Values on the label is shown as an example. Values may vary depending on the model and optional features.

4. Please measure the ground voltage over the netural and ground connection terminal with a measurement device at AC voltage level and check it. The neutral to ground voltage should be less than 3VAC. If it is greater than 3VAC, please strengthen the ground line.

Note: Please check the neutral to ground voltage of the installation place for the 3 Phase rectifier without neutral.

4.2 Startup with Mains/Input Voltage

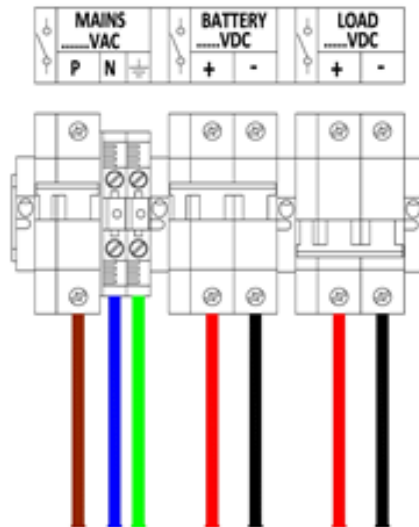
1. Please turn ON Rectifier Mains Input MCCB/MCB/Fuse.



Mains Input MCCB/MCB/Fuse is ON

After applying the Mains voltage to the rectifier, the rectifier will generate DC bus voltage with help of soft start feature and LCD front panel will be energized.

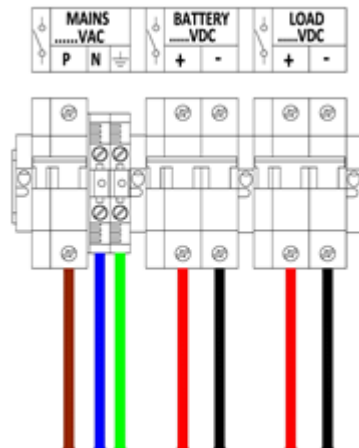
2. Please turn ON Battery MCCB/MCB/Fuse.



Mains Input MCCB/MCB/Fuse and Battery MCCB/MCB/Fuse are ON

Note: Please check battery charge voltage and current from the LCD front panel.

3. Please turn ON Load MCCB/MCB/Fuse.



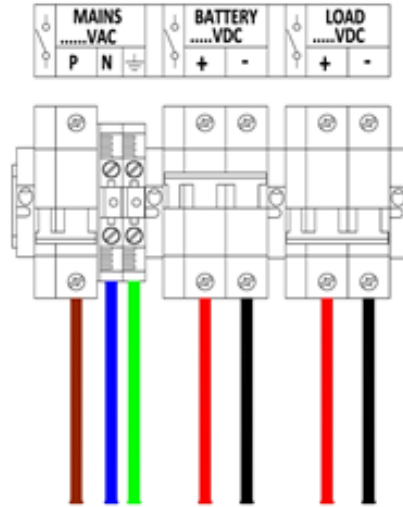
Mains Input, Battery and Load MCCBs/MCBs/Fuses are ON

Note: Please check load voltage and current from the LCD front panel.

4.3 Startup with Battery Group without Mains Voltage

When Mains voltage is not available and if you need to supply the DC load during installation, please apply the following commissioning procedure.

1. Please turn ON Battery MCCB/MCB/Fuse.



Battery MCCB/MCB/Fuse is ON

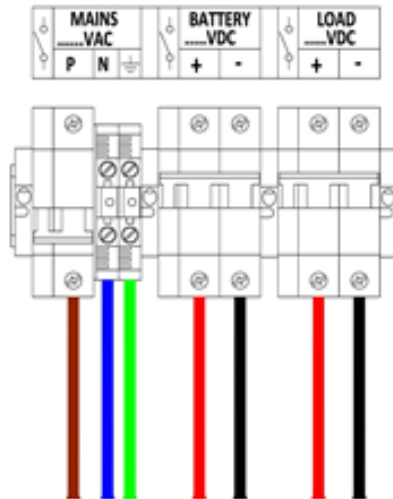


This is valid for 24-125VDC Rectifiers. For above 125VDC rectifiers, please use charge button (optional). It may cause damage to the rectifier to turn only ON Battery Fuse.

Use of Charge Button

When Battery Fuse is OFF, please hold on charge button for a while. After the LCD front panel is energized, please turn ON Battery MCCB/MCB/Fuse.

2. Please turn ON Load MCCB/MCB/Fuse.




Battery and Load MCCBs/MCBs/Fuses are ON

Note: Please check battery voltage, load voltage and current from the LCD front panel.

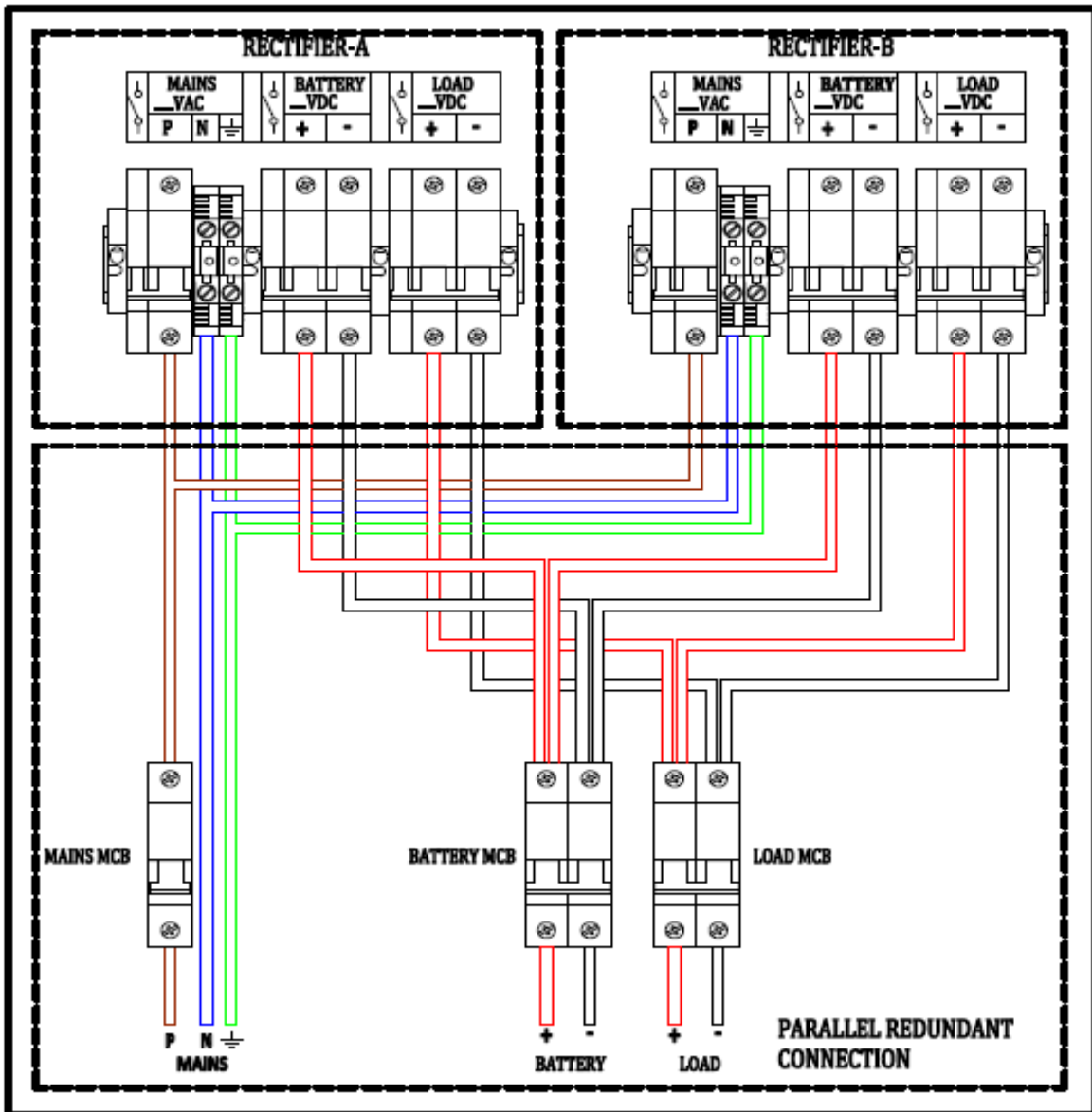
At this stage, if the Mains Voltage returns, please turn ON Mains Input MCB and you can continue to work. The load supply will continue and the battery will be charged.

4.4 Startup of Parallel Hot-Standby Systems



The parallel redundant connection requires a separate hardware (Blocking Diode). If blocking diode is not available in the rectifier, this application can not be used.

1. Please do the following connection and control the substances specified in “4.1 Preliminary Checks” section. Please turn Mains Input MCB while all of the input and output MCBs / Fuses are in “OFF” position,



Connection for 1 Phase Input

2. Turn ON Rectifier-A Mains Input MCCB/MCB/Fuse.
Turn ON Rectifier-B Mains Input MCCB/MCB/Fuse.
After applying Mains voltage to the rectifiers, the rectifier-A and rectifier-B will generate DC bus voltage with the help of soft start feature and the LCD front panel will be energized.

3. Turn ON Rectifier-A Battery MCCB/MCB/Fuse.
Turn ON Rectifier-B Battery MCCB/MCB/Fuse.
4. Turn ON Rectifier-A Load MCCB/MCB/Fuse.
Turn ON Rectifier-B Load MCCB/MCB/Fuse.
5. Turn ON Battery MCCB/MCB/Fuse.
Note: Please check battery charge voltage and current from the LCD front panel.
6. Turn ON Load MCCB/MCB/Fuse.
Note: Please check load voltage and current from the CD front panel.

If any rectifier failed, then the load and battery will be supplied through the other rectifier.

4.5 Startup of Parallel Load Sharing Systems

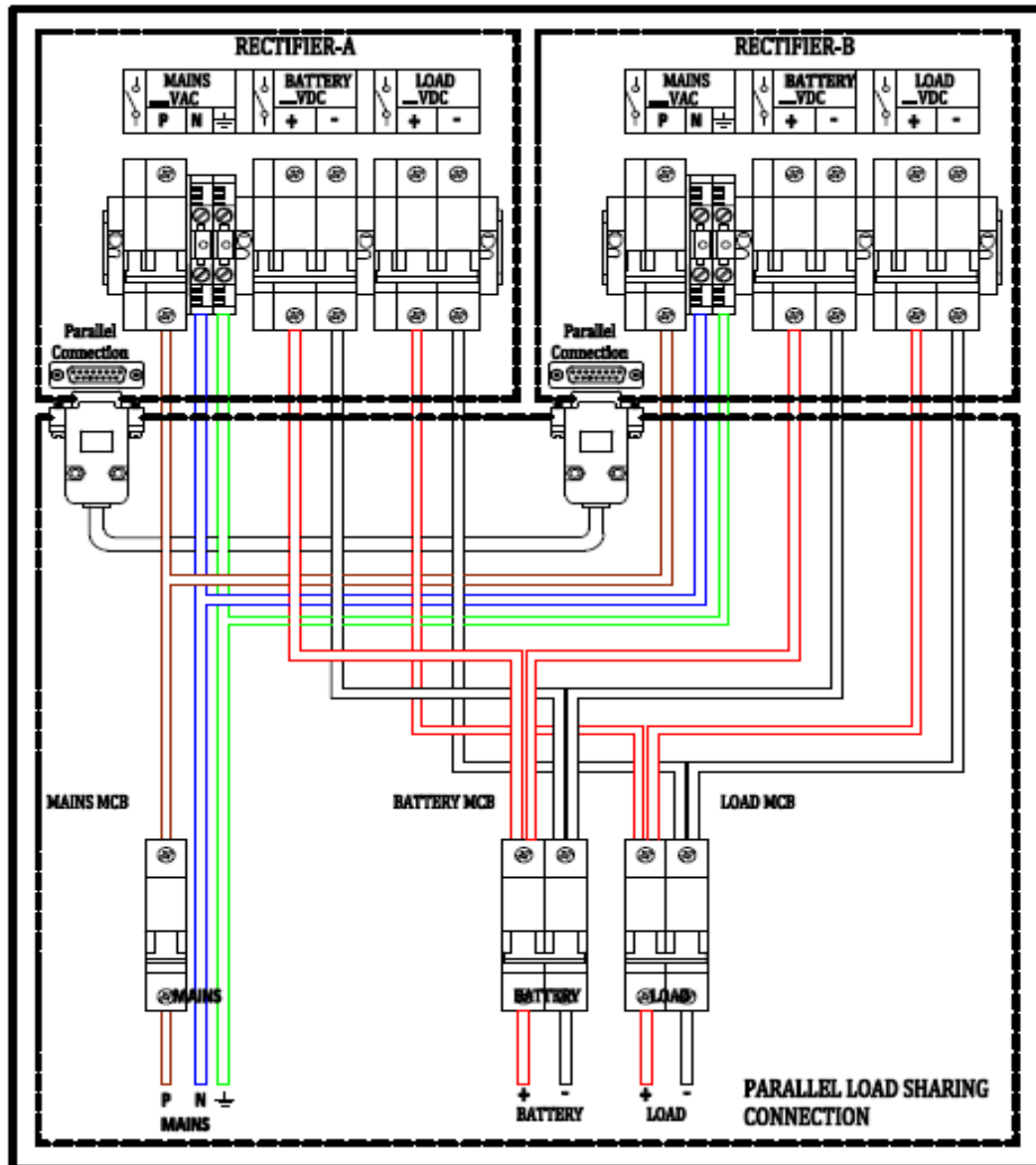


The parallel load sharing connection requires a separate hardware (Blocking Diode, paralleling connection). If blocking diode is not available in the rectifier, this application can not be used.



Line impedance affects the balanced load sharing. Therefore, the cross-section and length of the cable used for the load and battery connection should be equal.

1. Please do the following connection and control the substances specified in “4.1 Preliminary Checks” section. Please turn Mains Input MCCB/MCB/Fuse while all of the input and output MCCBs/MCBs/Fuses are in “OFF” position.



Connection for 1 Phase Input

2. Please turn ON Rectifier-A Mains Input MCCB/MCB/Fuse.
Please turn ON Rectifier-B Mains Input MCCB/MCB/Fuse.
After applying the Mains voltage to the rectifier, Rectifier-A and Rectifier-B will generate DC bus voltage with help of soft start feature and LCD front panel will be energized.
3. Please select the operation mode as “**Slave**” from the “**Menu-12 Manuel/Auto Battery Test and Operation Mode Selection Window**” for any of the rectifier.
Any of the operation mode can be selected for the other rectifier.
4. Please turn ON Rectifier-A Battery MCCB/MCB/Fuse.
Please turn ON Rectifier-B Battery MCCB/MCB/Fuse.
5. Please turn ON Rectifier-A Load MCCB/MCB/Fuse.
Please turn ON Rectifier-B Load MCCB/MCB/Fuse.
6. Please turn ON Battery MCCB/MCB/Fuse.

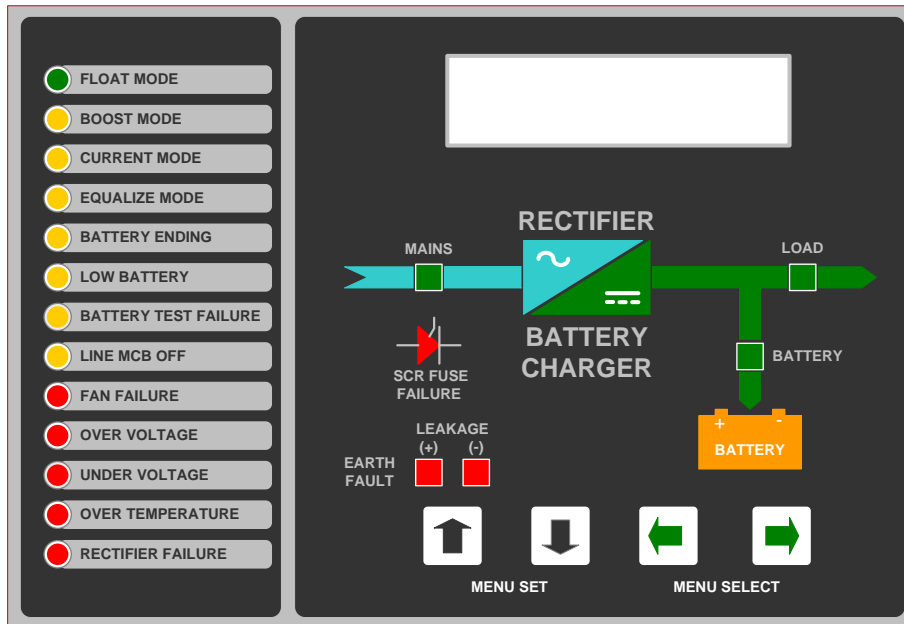
Note: Please check battery charge voltage and current from the LCD front panel.

7. Please turn ON Load MCCB/MCB/Fuse.

Note: Please check load voltage and current from the CD front panel.

Each rectifier will take over half the total current of the load and battery. If any rectifier failed, then the total battery and load current will be supplied through the other rectifier.









5. Usage of LCD Front Panels



	<p>Buttons for MENU SELECTION MENU SELECT buttons are used to skip among the windows.</p>
	<p>Buttons for MENU SETTINGS SET MENU button is used to make parameter settings on the window. Use UP button to adjust the above parameters and use the DOWN button to set the below parameters. To activate the button, it should be hold down for 1 second. After the parameter is set, changes will be recorded if you press the RIGHT button. If the LEFT button of MENU SELECTION is pressed, then the changes will not be saved. The UP button is used to increase parameters. Parameters can be increased until reach its maximum value and then it returns to the its lowest value. Therefore, to reduce any value, it firstly should reach its maximum value.</p>

<p>NOTE-1: All following given values are chosen for Charger with 1Ph Input / 48VDC Output and 3Ph Input / 110VDC Output</p> <p>NOTE-2: The RED values can be set with the SET MENU buttons. After the parameter is set, changes will be recorded if you press the RIGHT button. If the LEFT button of MENU SELECTION is pressed, then the changes will not be saved. To activate the button, it should be hold down for 1 second.</p>	
	<p>Menu-1: Opening Window UP button on this window must be pressed to start the rectifier. When the DOWN button is pressed, the rectifier will be stopped. If battery is connected while the charger is OFF, the charger will continue to work through the battery.</p>
	<p>Menu-2: Input Monitoring Window (L1) Input Voltage, (Iin) Input Current, (f) Frequency and (Vb) battery voltage can be monitored on this window L1-L2 Ph to Ph Input Voltage, L1-L3 Ph to Ph Input Voltage, L2-L3 Ph to Ph Input Voltage and Frequency can be monitored on this window.</p>
	<p>Menu-3: Input Current Monitoring Window (I1) Input Phase Current of L1, (I2) Input Phase Current of L2, (I3) Input Phase Current of L3 and (f) Frequency can be monitored on this window.</p> <p><u>Note:</u> The input current reading is implemented as an option because it requires a separate hardware. If Input current value is "0", it means the device does not have this feature.</p>
	<p>Menu-4: Output Monitoring Window (Main Menu and Screensavers) (Vb) Battery Voltage, (Ib) Battery Charge / Discharge Current, (VI) Load Voltage and (Ir) Total Output Current can be monitored on this window.</p> <p>If there is not dropper circuit in the system, then load voltage and battery voltage will be equal. (Vb=VI)</p>
	<p>Menu-5: Boost and Float Charge Voltage Adjustment Window To adjust the Boost voltage, please use UP button and to adjust the float voltage please use DOWN button on this window.</p> <p>NOTE: The voltage settings should be done according to</p>










		the battery manufacturer original catalogue values.
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> Equalize V= 56.8 set equalize V </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">UP ↑</div> <div style="text-align: center;">DOWN ↓</div> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> Equalize V= 127.8 set equalize V </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">UP ↑</div> <div style="text-align: center;">DOWN ↓</div> </div>		Menu-6: Equalize Voltage Adjustment Window To increase the Equalize voltage please use UP button and to decrease it please use DOWN button. NOTE: The voltage settings should be done according to the battery manufacturer original catalogue values.
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> LOW BAT. V= 42.0 BAT. END V= 43.0 </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">UP ↑</div> <div style="text-align: center;">DOWN ↓</div> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> LOW BAT. V= 95.0 BAT. END V= 96.0 </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">UP ↑</div> <div style="text-align: center;">DOWN ↓</div> </div>		Menu-7: Low Batt. Voltage and Battery Ending Voltage Adjustment Window To adjust Low Battery Voltage, please use UP button and to adjust Battery Ending Voltage, please use DOWN button. If there is LVD protection in the system, the LVD will operate according to the adjusted Low Battery Voltage
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> Disch.I = 7A Disch.T = 10min. </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">UP ↑</div> <div style="text-align: center;">DOWN ↓</div> </div>		Menu-8: Battery Test Parameter Adjustment Window Setting parameters for Battery Test is available in this window. To adjust discharge current, please use UP button and to adjust discharge time, please use DOWN button. NOTE: The real load current value should be higher than set discharge current value. Otherwise the battery test will not function correctly.
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> boost I=6 float I=3 </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">UP ↑</div> <div style="text-align: center;">DOWN ↓</div> </div>		Menu-9: Automatic Boost Function (Autoboost) Adjustment Window Setting parameters for Autoboost is available in this window. In order to switch the rectifier to Autoboost mode, please adjust the current value by pressing the UP button. In order to switch the rectifier to float mode, please adjust the current value by pressing the DOWN button. <u>Operation Mode of Rectifier according to the values of the sample display:</u> While “Autoboost Mode” is selected, if the battery charger current is greater than 6A then the rectifier will automatically pass to Boost mode. After that, when the battery charger current decreases to below 3A then the rectifier will automatically return to Float mode
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> out I = 50 charge I = 3 </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">UP ↑</div> <div style="text-align: center;">DOWN ↓</div> </div>		Menu-10: Output Current and Output Voltage Adjustment Window Please use UP button to adjust rectifier output current (out I) to its upper limit and please use DOWN button to






	adjust battery current (charge I) to its upper limit.
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> a. b. test 17 hr m. boost 8 hr </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">UP </div> <div style="text-align: center;">DOWN </div> </div>	<p>Menu-11: Auto. Battery Test and Manual Boost Time Adjustment Window</p> <p>Automatic battery test period of the rectifier can be adjusted by pressing the UP button. Press the DOWN button on the Manual Boost to set the dwell time of the Manual Boost.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> float ch. mod bat. test = closed </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">UP </div> <div style="text-align: center;">DOWN </div> </div>	<p>Menu-12: Manual / Auto. Battery Test and Operation Mode Selection Window Please use UP button to select the rectifier operation mode. Please use DOWN button to select Manual or Automatic Battery Test.</p> <p>There are 3 options for Battery Test Mode; 1. Close 2. Manual (Start) 3. Automatic</p> <p>There are 5 options for Rectifier Operation Mode; 1. Float 2. Manual Boost (Start) 3. Equalize 4. Slave 5. Autoboot</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> date 3 4 10 time 12 32 55 </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">UP </div> <div style="text-align: center;">DOWN </div> </div>	<p>Menu-13: Date & Time Settings Window The date on the display is 3 of April, 2010 and the time is 12:32:55. These values can be adjusted using the UP and DOWN buttons. Use UP button to scroll through the parameters and use DOWN button to increase the values.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> events 32 1 7 180 3 4 12 35 </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">UP </div> <div style="text-align: center;">DOWN </div> </div>	<p>Menu-14: Event Memory Monitoring Window</p> <p>Events recorded in the memory can be monitored from this window. Up to 250 events are recorded. There are total 30 event codes. All events can be viewed by using UP-DOWN buttons.</p> <p>The first event among the 32 events is displayed on the left window: 7: Event code; 180: Event Value; 3: Day 4: Month; 12: Hour; 35: Minute</p> <p>The all recorded event can be deleted by pressing RIGHT button for 20 sec. with returning the rectifier to factory settings.</p> <p>Description of event codes is given in the following table.</p>

Event Codes Table

EVENT CODES		
1. Line MCB ON	11. Battery OK	82. Slave Mod OFF
2. Line MCB OFF	12. Rectifier Over Voltage	90. Manuel Boost Started
3. Battery MCB OFF	13. Rectifier Under Voltage	91. Auto Boost Started
4. Battery MCB ON	14. Rectifier OK	92. Battery Test Started
5. Load MCB OFF	15. Over Temperature	93. Battery Test Failure
6. Load MCB ON	16. Temperature OK	94. Battery Test OK
7. AC Input Low	33. Earth Fault (+)	95. Battery Test Continued
8. AC Input High	34. Earth Fault (-)	96. Auto Boost Finished
9. AC Input OK	35. Earth Fault OK	97. Manuel Boost Finished
10. Low Battery	81. Slave Mode ON	98. Boost Continued

<p>alarm = ON slave no = 71</p>		<p>Menu-15: Alarm and Communication Window The alarm sound can be turned ON/OFF by using UP button. The RS-485 communication address number can be set by using DOWN button.</p>
<p>Change password 0-0-0-0</p>		<p>Menu-16: Password Window To activate the user password, please create and save a new password by using UP/DOWN buttons. To remove the user password, enter the "current password" and then enter "0-0-0-0" and save. if forgotten the current password, you can reset the password by hold on RIGHT button for 20 seconds with turning the rectifier to factory settings</p>
<p>LED Explanations</p>		
FLOAT MODE	<p>Float Charge: The rectifier output voltage will be equal to the adjusted (through front panel) FLOAT V value in this mode. (Please refer to Menu-11 for the details of switching between modes and related settings details.)</p>	
BOOST MODE	<p>Boost Charge: The rectifier output voltage will be equal to the adjusted (through front panel) BOOST V value in this mode. (Please refer to Menu-11 for the details of switching between modes and related settings details.)</p>	
CURRENT MODE	<p>Current Limit: If this LED is ON, then either the battery charging current or the total output current has reached to its adjusted (through front panel) maximum value.</p>	
EQUALIZE MODE	<p>Equalize Charge: The rectifier output voltage will be equal to the adjusted (through front panel) EQUALIZE V value in this mode. (Please refer to Menu-11 for the</p>	

	details of switching between modes and related settings details.)
 BATTERY ENDING	In case of discharge, this LED will be “ON” if the battery voltage is lower than the adjusted (through front panel) “Battery Ending” value.
 LOW BATTERY	In case of discharge, if the battery voltage decreases to the adjusted (through front panel) “Low Battery” voltage, this LED will be “ON”
 BATTERY TEST FAILURE	The battery capacity can be tested by battery test feature and if the test fails, this LED will be “ON”. (Please refer to Menu-10 for battery test details and parameter settings.
 LINE MCB OFF	If the internal temperature value is higher than the maximum value, this LED will be “ON”.
 OVER TEMPERATURE	Provide information about the position of the Line MCB. If the Line MCB is “OFF”, then this LED will be “ON”.
 FAN FAILURE	If the thyristor cooler temperature exceeds 70 degrees due to fan failure or over temperature, then this LED will be ON. After this indication, if the operator does not take any action, the system will shut down itself automatically in 1.5 minutes with “Over Temperature” and “Rectifier Failure” alarm.
 OVER VOLTAGE	If the Output Voltage exceeds 10% of the adjusted value due to any reason, the rectifier will shut down itself. In this case, “Rectifier Failure” LED will be “ON” along with “Over Voltage” LED.
 UNDER VOLTAGE	If the Output Voltage decreases below 10% of the adjusted value due to any reason, the rectifier will shut down itself. In this case, “Rectifier Failure” LED will be “ON” along with “Over Voltage” LED.
 RECTIFIER FAILURE	The rectifier will shut down itself in case of a failure or critical alarm occurs (red indications). In order to understand the reason, please check the active LEDs along with this LED.

<p>MAINS</p> 	<p>If the Mains Voltage is in the input voltage tolerance limit of the system, this LED will be "ON"</p>
<p>LOAD</p> 	<p>Provide information about the position of the Load MCB. If the Load MCB is "ON", then the LED will be "ON".</p>
<p> BATTERY</p>	<p>Provide information about the position of the Battery MCB. If the Battery MCB is "ON", then the LED will be "ON".</p>
<p>EARTH FAULT</p> <p>LEAKAGE</p> <p>(+) (-)</p>  	<p>This LED will be "ON" if there is (+) or (-) earth fault from DC bus to ground or through the load that is connected to the DC load output.</p>

6. Communication

The communication can be done via 2 options (serial communication and free alarm contact).

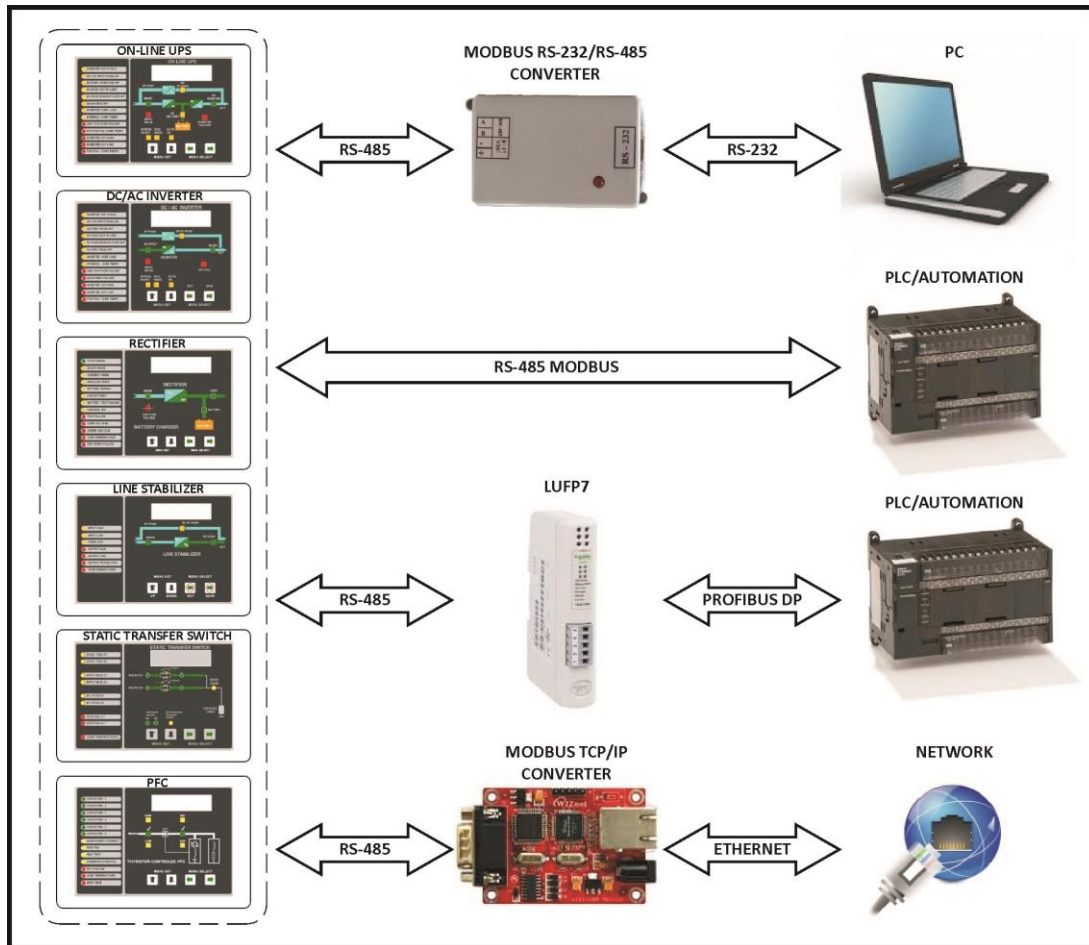
7.1 Serial Communication:

You can access to all information related to the product via serial communication. All measurements (voltage, current, load percentage, etc.), alarm / warning situations and the status of the product at that moment can be monitored.

Since the communication system is interactive, the user can turn OFF / ON the product and make adjustments that he wants.

The product can communicate with computers over RS-485 / RS-232 converter, with PLC / the automation over RS-485 Modbus output, with PLC / Automation over RS-485 / Profibus converter and with a network over RS-485 Modbus / TCP-IP converter.

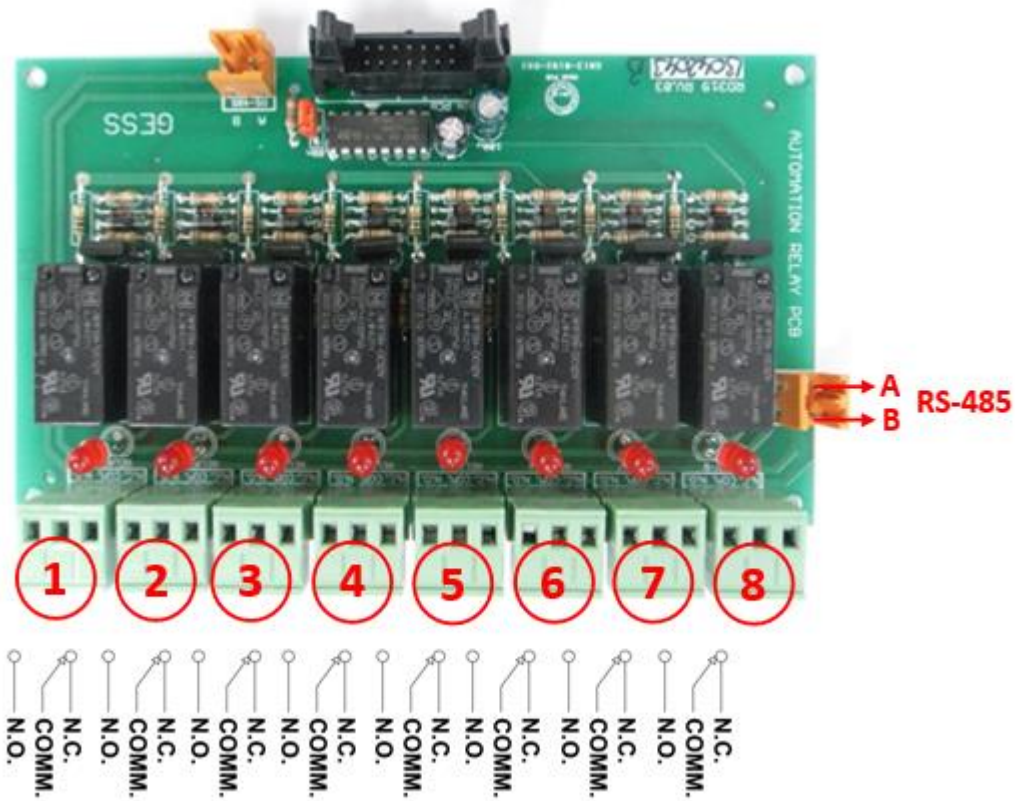
Intermediate hardware and software are provided by PMI. The communication interface is an option. If your device includes the communication interface then you may find program CD inside pocket which is located on the internal side of the product front door.



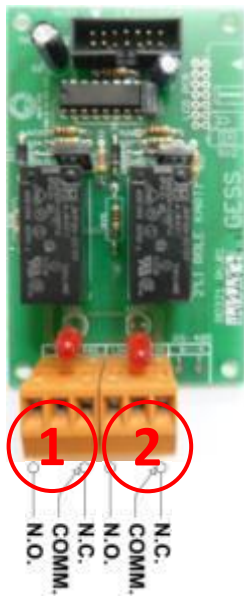
7.2 Free Alarm Contact:

There are 8 units free alarm contacts with automation type products. The warning LEDs' situations, that are on the communication PCB, LCD panel and communication interface, can be monitored via these free contacts.

TECHNICAL FEATURES OF FREE ALARM CONTACT	
Nominal Switching Capacity (Resistive Load)	10A/250VAC, 10A/30VDC
Max. Switching Power (Resistive load)	2.500VA, 300W
Max. Switching Voltage	250VAC, 30VDC
Max. Switching Current	10A



Communication PCB



Standard Type Communication PCB

Free alarm contact outputs are programmed in the factory as follows. The user can program these free alarm contact outputs with the computer interface. The programming of the free alarm contact outputs is explained in the software section.

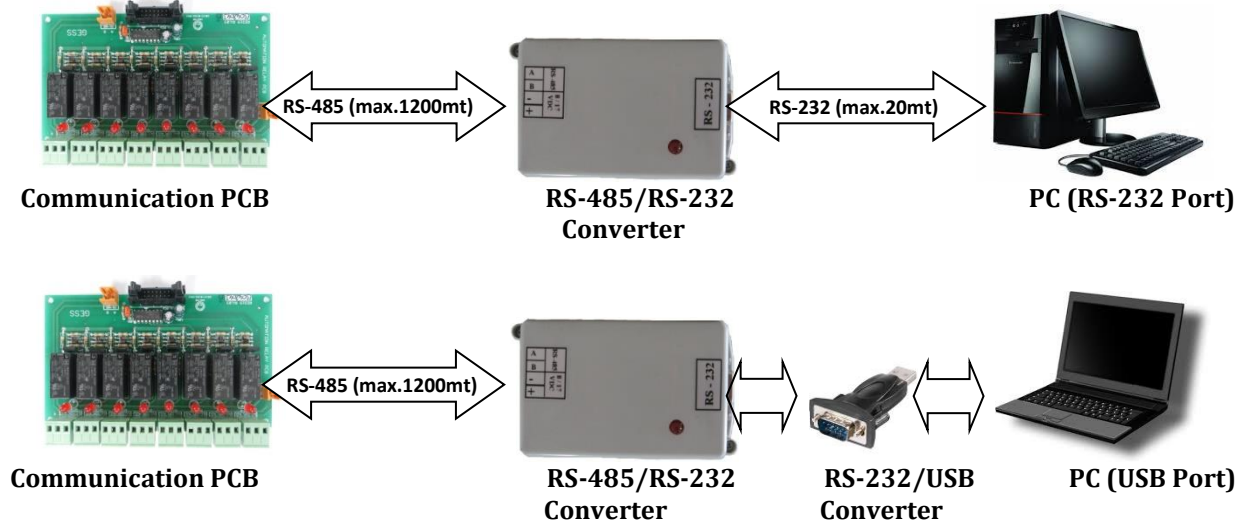
Automation Type Free Alarm Contacts Standard Type Free Alarm Contacts

- 1- Low Battery
- 2- Mains Input Normal / Failure
- 3- Rectifier Failure
- 4- Overtemperature
- 5- Rectifier Overvoltage
- 6- Load MCB ON / OFF
- 7- Battery MCB ON / OFF
- 8- Earth Fault

- 1- Low Battery
- 2- Rectifier Failure

7.3 Hardware And Connection

7.3.1 Connection to Computer:

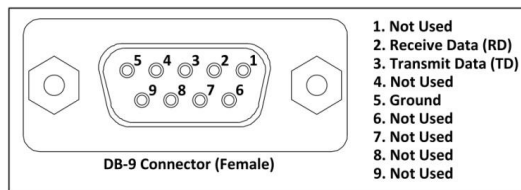
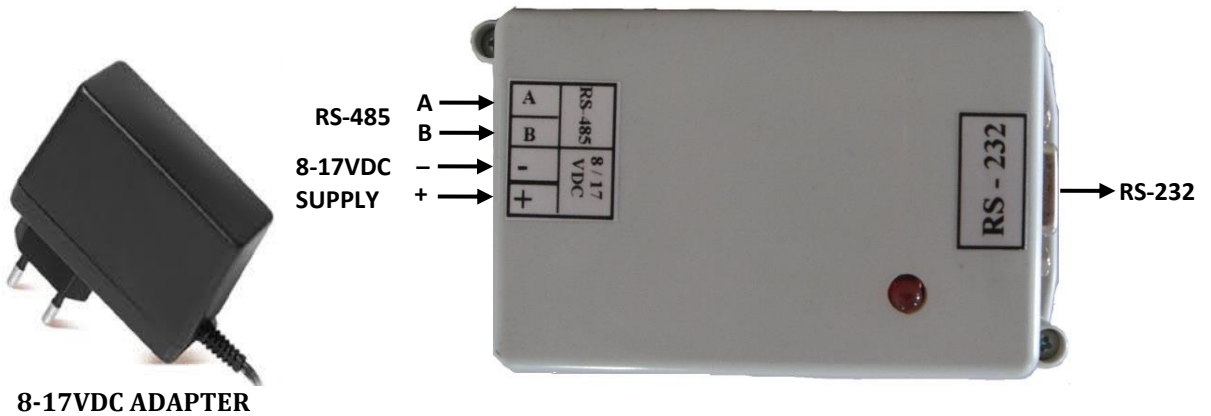


To perform the communication between the computer and the product, you need to make the connection as noted above. DB-9 output of the RS232 on the RS-485/RS-232 converter is female type connector. The user can make the connection between RS-232 port of the computer with a standard type RS-232 cable. The user can use RS-232/USB converter for devices without RS-232 port such as laptops.

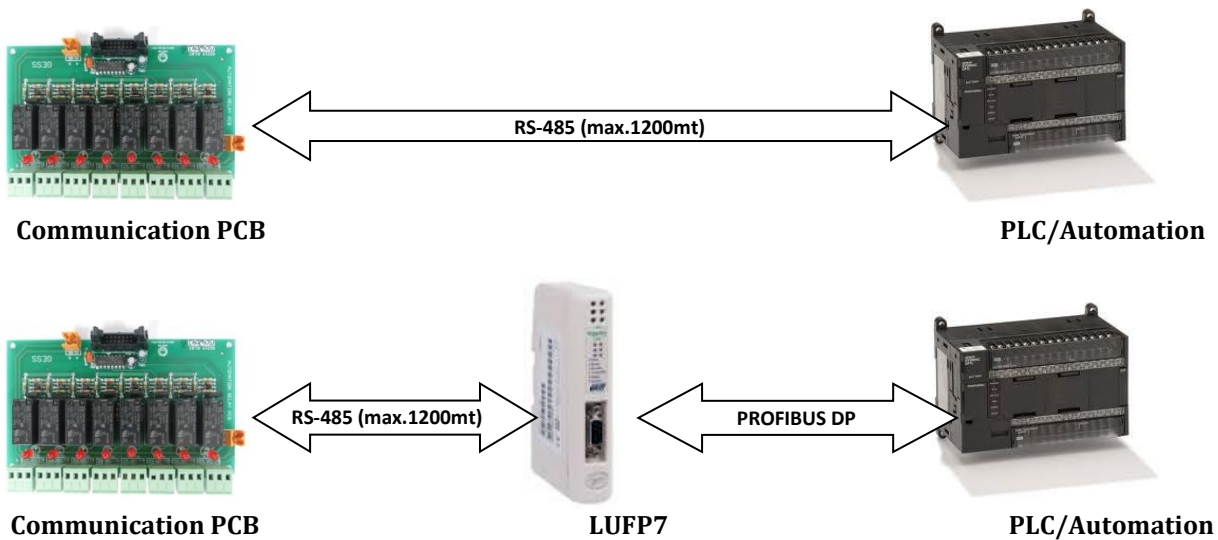
NOTE: RS-485 cable length and quality will affect the communication quality. Please consider the following notes regarding the wiring to ensure quality communication.

- Cross-section: min. 2 x 0.22 mm² or min. 2 x AWG 2
- CAT 5 (shielded)
- Twisted-pair
- UV resistant (only for outdoor use)

7.3.2 RS-485/RS-232 Converter:



7.3.3 Connection to PLC/Automation:



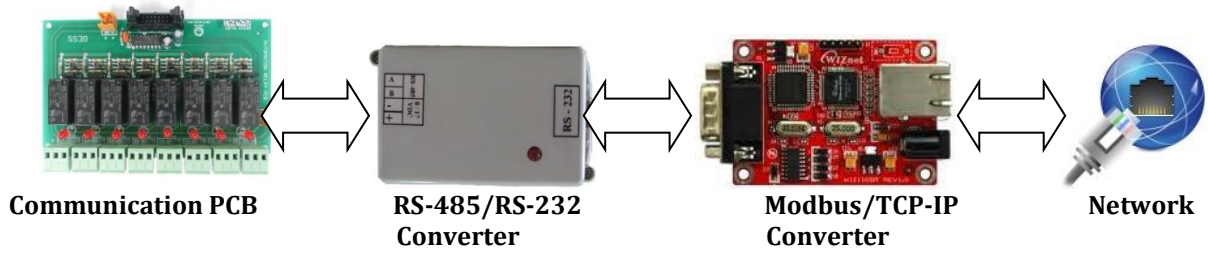
It is possible to communicate with product via Profibus DP protocol by using RS-485 Modbus or LUF7 Modbus / Profibus DP converter for PLC / Automation Applications.

LUF7 Modbus / Profibus DP converter related technical document can be accessed from the following link.

[LUF7 Datasheet](#)

Modbus table for product is given on the last page of the this part.

7.3.4 Connection to Network:



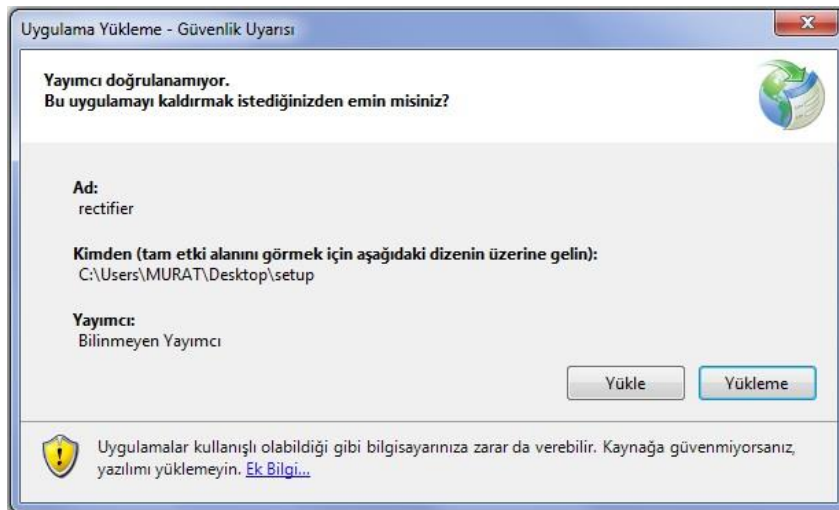
The user should make above connections to communicate with the product via TCP-IP protocol over the network.

7.4 Software

The program is compatible with Windows 7 and XP. The PC connection is done via USB port through RS485/RS232 protocols.

7.4.1 Setup:

- Insert the CD into the computer.
- Open the "Setup" application file located in the Setup folder.
- "Download-Security Application Warning" window will appear as seen below. Please click the "Install (Yükle)" icon to start the process.

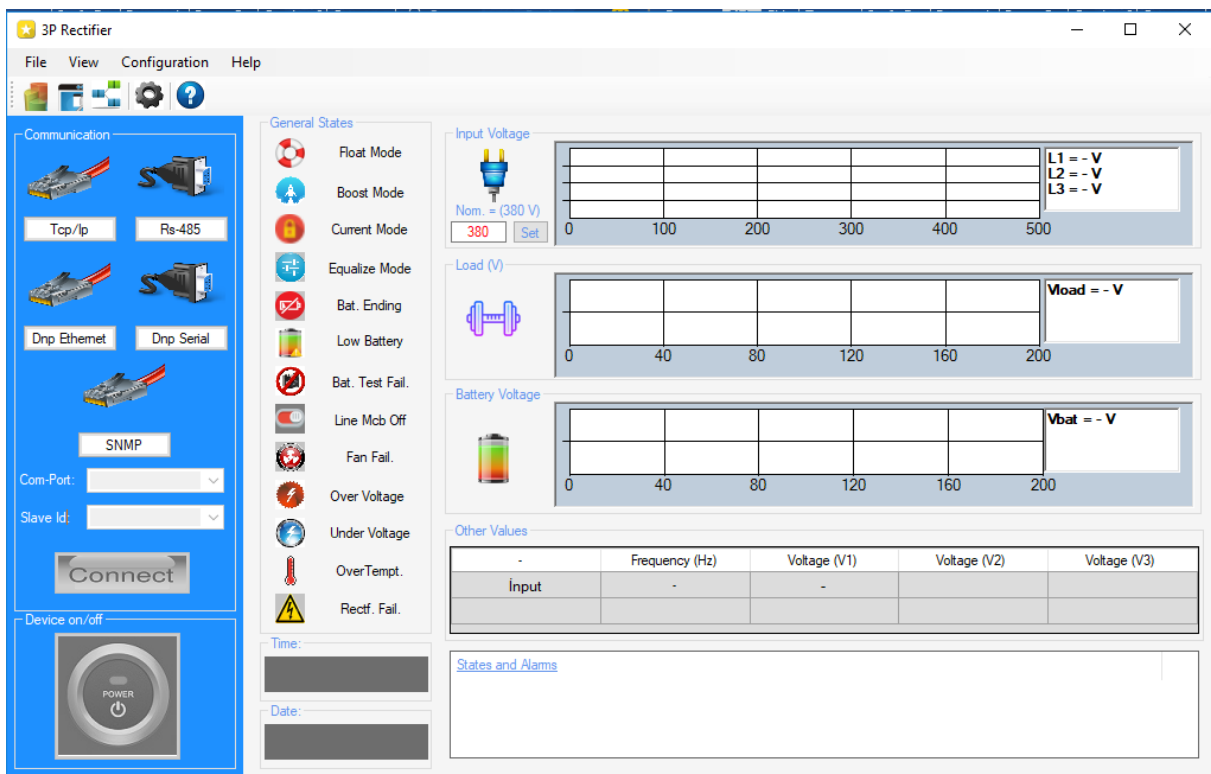


- After installing the program, the following warning message will appear. This message means that the user firstly should select the type of communication when program is opened. Press the OK icon.



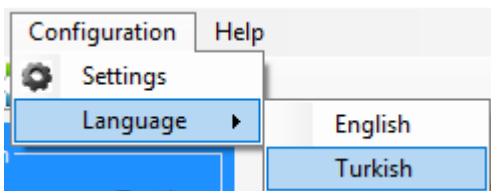
Rectifier shortcut that appears on the left will be created on your desktop during installation. Then you can use this shortcut to run the program.

e. The mimic diagram will be displayed as seen below.



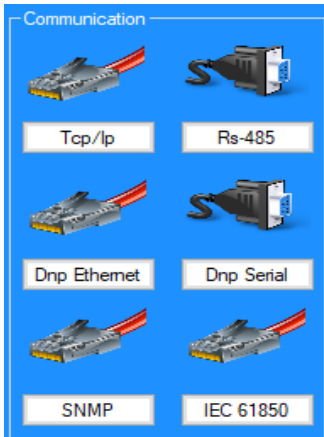
7.4.2 Usage:

a. Language



Select the language by using this option.

b. Communication type



Select the type of communication by using these icons

c. Address-Port

Com-Port:

Slave Id:

For RS485 type communication, please enter the slave ID value that is defined in the front panel of the product and the com port value assigned to your computer.

NOT : For the Com Port value; please check Device Manager \ Connection Ports (COM & LPT) on your computer.

Ip Adress:

Slave Id:

For TCI/IP, DNP3 and SNMP type communication; please enter the slave ID value that is defined in the front panel of the product and the IP value assigned to your converter.

NOTE: In case the serial port (IP) value to be changed as factory setting needs to be changed, it is necessary to use the TCP / IP Converter setting interface in the CD "WIZ1xxSR_config_v3.0.2_install.zip" or by downloading from the internet address given below.

Download link for TCP / IP and DNP3;

http://old.wiznet.co.kr/sub_modules/kr/resources/Download_View.asp?PK_Num=711&page=3&SF_Part=&SF_KeyWord=

Download link for SNMP;

http://old.wiznet.co.kr/sub_modules/kr/resources/Download_View.asp?PK_Num=193&page=1&SF_Part=&SF_KeyWord=

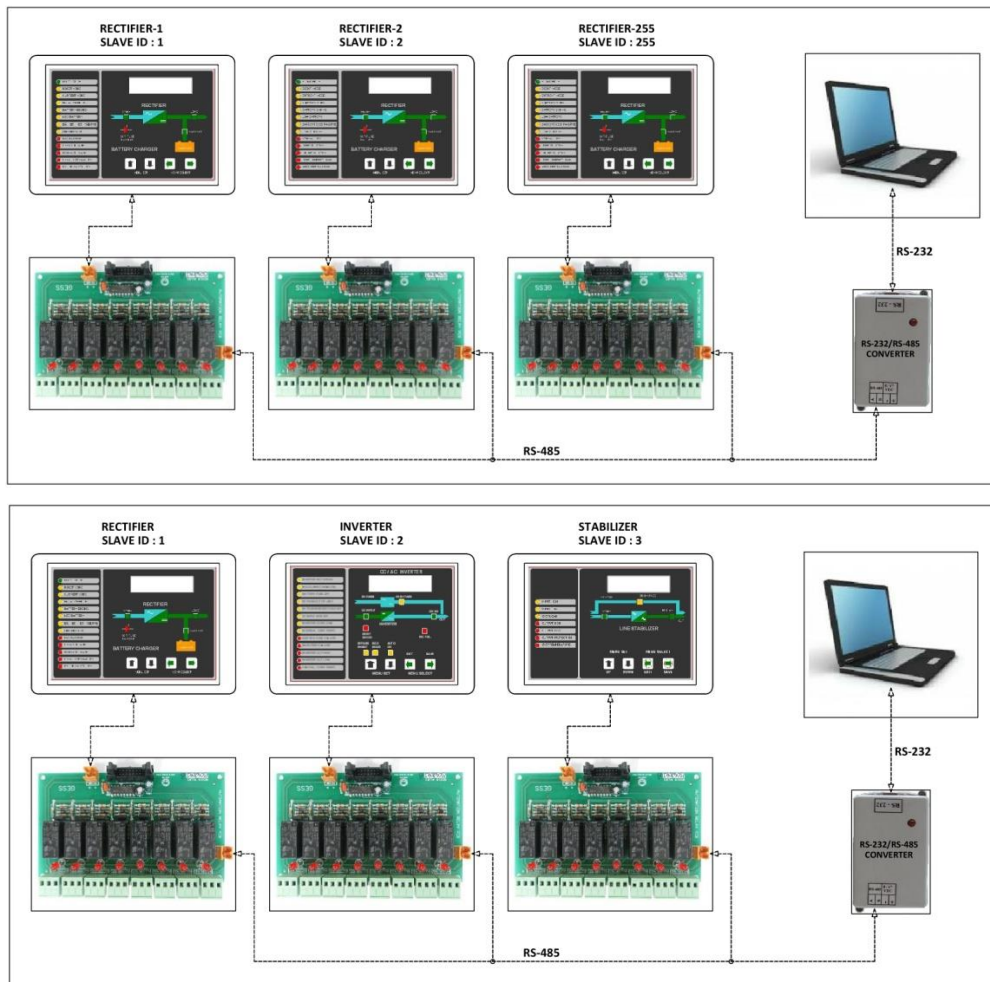
LCD Front Panel Alarm and Communication Window

alarm = ON
slave no = 71



The alarm sound can be turned OFF / ON with UP button. RS-485 communication address value can be set between 0-255 with DOWN button. After the adjustment, please push the right button to save the settings.

The Slave ID should be different for each product in systems where multiple or different types of products are used as seen in the following example blocks.



To communicate with multiple identical or different types of products that are connected to one unit com port, the user must change the Slave ID on the related interface.



The user can start communication with the help of this icon.



The user can finish the communication with the help of this

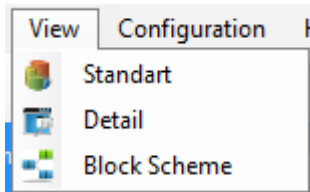
Please start the communication by clicking the “start” icon. Error message will appear on the screen if there is any wrong with the settings you made. In this case, check again the connections and settings you have made. If there is no problem in connection

and setting, data of the product will appear on the screen as seen in the following picture. All parameters and lighted warnings can be monitored on this screen.



The device can be remotely turned on / off with the help of this icon

d. View;



OR



The View Section is divided into 3 sections; **Standart, Detail, Diagram**

➤ **Standart**

The screenshot shows the '3P Rectifier' software interface. The 'General States' section is active, showing 'Float Mode' as the current operating mode. The 'Input Voltage' section displays three phase voltages: L1 = 385.0 V, L2 = 386.2 V, and L3 = 386.2 V. The 'Load (V)' section shows a load of 436.9 V. The 'Battery Voltage' section shows a battery voltage of 436.9 V. The 'Other Values' section contains a table with the following data:

	Frequency (Hz)	Voltage (V1)	Voltage (V2)	Voltage (V3)
Input	50,1	385,0	386,2	386,2

The 'States and Alarms' section shows a warning for 'BATTERY MCB ON'. The interface also includes a 'Communication' panel with options for Top/Ip, Rs-485, Dnp Ethernet, and Dnp Serial, and a 'Device on/off' panel with a power button icon.

Input, Load and Battery voltage can be monitored graphically and numerically in the "Standard" section. In the other values, the same values and frequency values. It is read. The Alarm and Status section contains the latest event information from the rectifier.

➤ Detail

The screenshot shows the '3P Rectifier' software interface with the following data:

- General States:** Float Mode (Active), Boost Mode, Current Mode, Equalize Mode, Bat. Ending, Low Battery, Bat. Test Fail., Line Mcb Off, Fan Fail., Over Voltage, Under Voltage, OverTemp., Rectf. Fail.
- Input Table:**

	Voltage (V)	Frequency (Hz)	Current (A)
Line 1	386.3		0.0
Line 2	385.9	50.2	0.0
Line 3	386.0		0.0
- Output Table:**

	Voltage (V)	Current (A)
Output	438.1	4.8
- Battery Table:**

	Voltage (V)	Current (A)
Battery	438.1	-0.2
- System Values:** 22 System Temp. (C)
- History Values Table:**

	Frequency (Hz)	Voltage (V1)	Voltage (V2)	Voltage (V3)
- Time:** 14:47
- Date:** 27/2/18

In detail, voltage, current and frequency information of Input, Load and Battery are included.

➤ Diagram

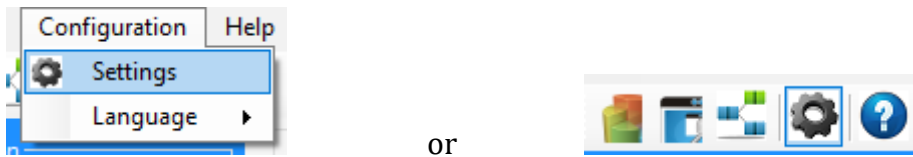
The screenshot shows the '3P Rectifier' software interface with a schematic diagram of the power system. The diagram includes:

- Mains:** AC input source.
- Main MCB:** Main circuit breaker.
- SCR Fuse:** Fuse for the SCR.
- Rectifier:** The DC rectifier unit.
- Battery MCB:** Battery circuit breaker.
- Battery:** The DC battery source.
- Load MCB:** Load circuit breaker.
- Load:** The DC load.
- DC Earth Fault (+) and (-):** Grounding points for the DC system.

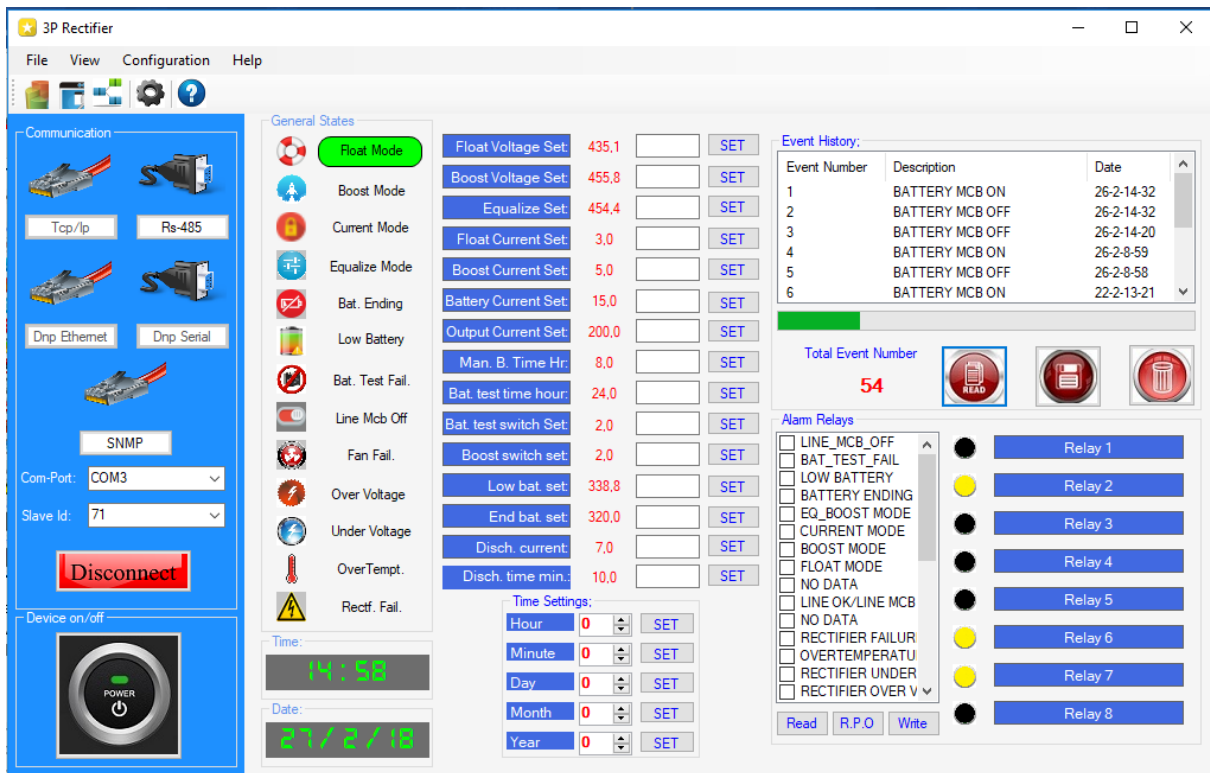
In the diagram part, input energy of device, fuse, SCR, thyristor / rectification part and DC leakage parts are shown as a diagram. Parts with AC energy are blue, parts with DC energy are green. The non-energy parts are off-white. Also in case of DC leak, error mark is visible.

Note: The above sample screen is for Phase Rectifier. For 3 phase rectifier applications, the software will automatically adjust the parameters.

e. Device Settings:



The device settings can be accessed by clicking on the Settings icon in the Configuration / Settings section.



This page is the device parameter setting and event log monitoring screen. The values shown as red (sampled according to 110VDC-30A) are factory settings. You can adjust these values according to the characteristics of your system.

➤ **Change device values;**

Float Voltage Set	435.1	<input type="text"/>	SET
Boost Voltage Set	455.8	<input type="text"/>	SET
Equalize Set	454.4	<input type="text"/>	SET
Float Current Set	3.0	<input type="text"/>	SET
Boost Current Set	5.0	<input type="text"/>	SET
Battery Current Set	15.0	<input type="text"/>	SET
Output Current Set	200.0	<input type="text"/>	SET
Man. B. Time Hr.	8.0	<input type="text"/>	SET
Bat. test time hour	24.0	<input type="text"/>	SET
Bat. test switch Set	2.0	<input type="text"/>	SET
Boost switch set	2.0	<input type="text"/>	SET
Low bat. set	338.8	<input type="text"/>	SET
End bat. set	320.0	<input type="text"/>	SET
Disch. current	7.0	<input type="text"/>	SET
Disch. time min.	10.0	<input type="text"/>	SET

The left red values are factory settings. In order to set a new value please write new value in the empty boxes and click on SET button to save the new value. After this action the RED values will be changed to your new setting. If the entered SET value is an invalid value, then the program will ignore it and will not affect the change.

➤ **Time / Date Settings:**

Time Settings;

Hour	0	SET
Minute	0	SET
Day	0	SET
Month	0	SET
Year	0	SET

The time / date setting of the system can be set from the numerical menu. After setting the hour, minute, day, month and year values, click on SET button to save the new values. The settings can be both changed from the front panel of product and software interface. When any setting is done, it will be recorded, and the user will see the same value in both panels.

➤ **Event Log:**

Event History:

Event Number	Description	Date
1	BATTERY MCB ON	26-2-14-32
2	BATTERY MCB OFF	26-2-14-32
3	BATTERY MCB OFF	26-2-14-20
4	BATTERY MCB ON	26-2-8-59
5	BATTERY MCB OFF	26-2-8-58
6	BATTERY MCB ON	22-2-13-21

Total Event Number **54**

READ [Icon] [Icon] [Icon]

The total number of events will be given under "Total Number of Errors". A total of 255 events are recorded in the memory. Events on the top screen will be displayed as a list with time and date. Any malfunction, change, etc. you can use this screen to get information about the device status.



The "Read" button is used to monitor the event log. Click on this button icon to see the events.

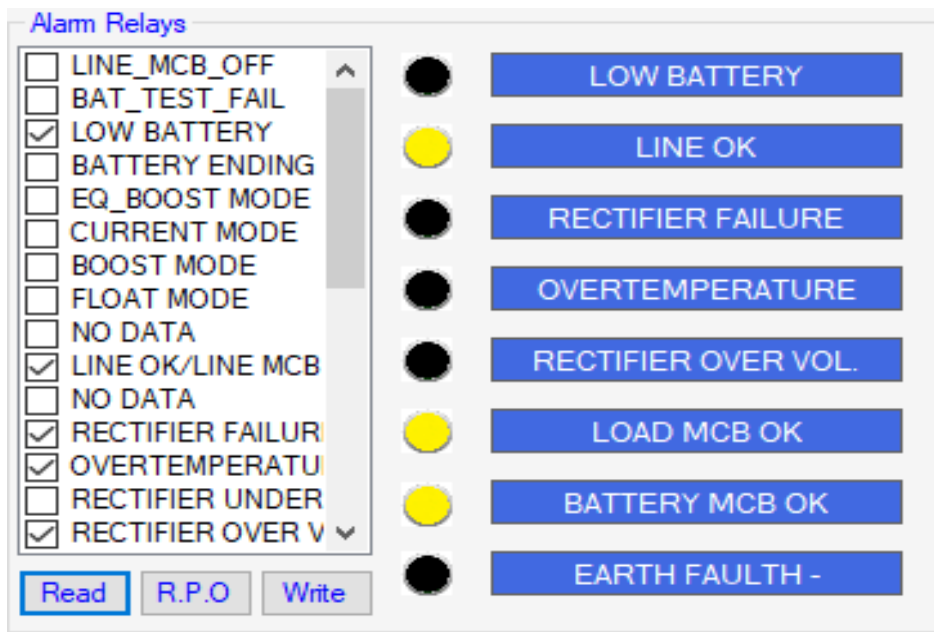




"Delete" button Used to clear the Event log list.



The "Save" button is used to save events as a text file ".txt". The text file is saved to the desired location.

➤ **Programming of the Free Alarm Contacts:**



The free alarm contacts can be programmed via software interface. For settings, firstly press  buttons and read the stored settings from the list, then select the desired free contacts by clickin left side the empty boxes and save settings by pressing  button. Order of the contacts are as in the below list. Maximum 8 unit free contacts can be selected.

- 1- Line MCB OFF/ON
- 2- Battery Test Fail
- 3- Low Battery
- 4- Battery Ending
- 5- Equalize Boost
- 6- Current Mode

- 7- Boost Mode
- 8- Float Mode
- 9- Line Input OK/Fail
- 10- Rectifier Failure
- 11- Over Temperature
- 12- Rectifier Under
- 13- Rectifier Over
- 14- Fan Failure
- 15- SCR Fuse OFF
- 16- Load MCB ON/OFF
- 17- Battery MCB ON/OFF
- 18- Earth Fault
- 19- Remote Power Off

a. Remote Power Off (Optional):

R.P.O

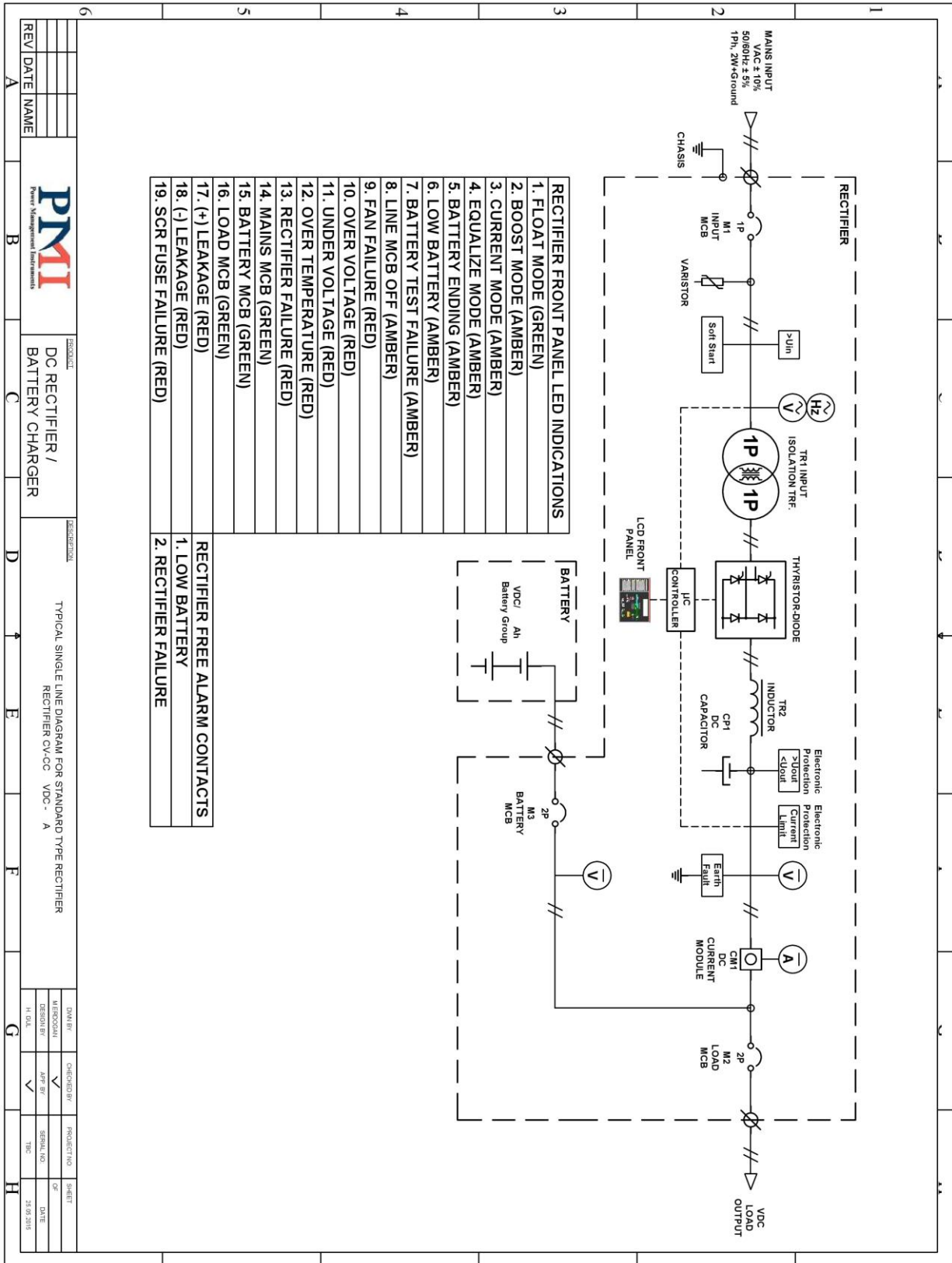
This button is designed to remotely stop the system by controlling an electromagnetic switch for some specific Applications. This icon will be functionless if this feature is not available in the system
 MODBUS device datasheet is given below.

DATA ADDRESS	READ/WRITE	DATA=UNSIGNED INT16	COEFFICIENT	EXPLANATION	EVENTCODE TABLE
0	READ / WRITE	V_FLOAT_SET	x10	battery float charge voltage	
1	READ / WRITE	V_BOOST_SET	x10	battery boost charge voltage	1 LINE MCB ON
2	READ / WRITE	V_LOWBAT_SET	x10	low battery voltage level	2 LINE MCB OFF
3	READ / WRITE	I_FLOAT_SET	x10	return to float from auto boost current level	3 BATTERY MCB OFF
4	READ / WRITE	I_BOOST_SET	x10	current level to go auto boost	4 BATTERY MCB ON
5	READ / WRITE	I_BAT_SET	x10	battery current limit	5 LOAD MCB OFF
6	READ / WRITE	I_OUT_SET	x10	rectifier output current limit	6 LOAD MCB ON
7	READ / WRITE	MAN_BOOST_TIME_HR	x10	manual boost duration in hours	7 LINE LOW
8	READ / WRITE	AUTO_BAT_TEST_TIME_HR	x10	auto battery test period in hours	8 LINE HIGH
9	READ / WRITE	BAT_TEST_SWITCH(1,2,3)	x1	batt. test condition 1=auto, 2=closed,3=manual	9 LINE OK, IN ACCEPTABLE LIMITS
10	READ / WRITE	MODE_SWITCH(1,2,3,4,5)	x1	1=auto boost, 2=float, 3>manual, 4=equalize, 5=slave	10 BATTERY LOW
11	READ / WRITE	EVENT NUMBER	x1	reading event number from event history	11 BATTERY OK
12	READ / WRITE	RECTF.(ON/OFF)(0-1)	x1	rectifier on/off switch 0=off, 1=on	12 RECTIFIER OVER VOLTAGE
13	READ / WRITE	EQ_BOOST_SET	X10	battery equalize boost charge voltage	13 RECTIFIER UNDER VOLTAGE
14	READ / WRITE	END_BATTERY_LEVEL	X10	battery ending voltage level	14 RECTIFIER VOLTAGE OK
15	READ / WRITE	DISCHARGE CURRENT	X1	discharge current during battery test	15 OVERTEMPERATURE
16	READ / WRITE	DISCHARGE TIME MINUTE	X1	min. discharge time in hours during battery test	16 NORMAL TEMPERATURE
17	READ / WRITE	DRY_CONTACT_UPPER	x1	dry contact selection code upper word	
18	READ / WRITE	DRY_CONTACT_UPPER	x1	dry contact selection code lower word	33 EARTH FAULTH +
19	READ / WRITE	NO DATA			34 EARTH FAULTH -
20	READ / WRITE	DAY	x1	day of DATE	35 EARTH FAULTH OK
21	READ / WRITE	MONTH	x1	month of DATE	
22	READ / WRITE	YEAR	x1	year of DATE	81 SLAVE MODE SELECTED
23	READ / WRITE	HOUR	x1	hour of TIME	82 SLAVE MODE CANCELLED
24	READ / WRITE	MINUTE	x1	minute of TIME	

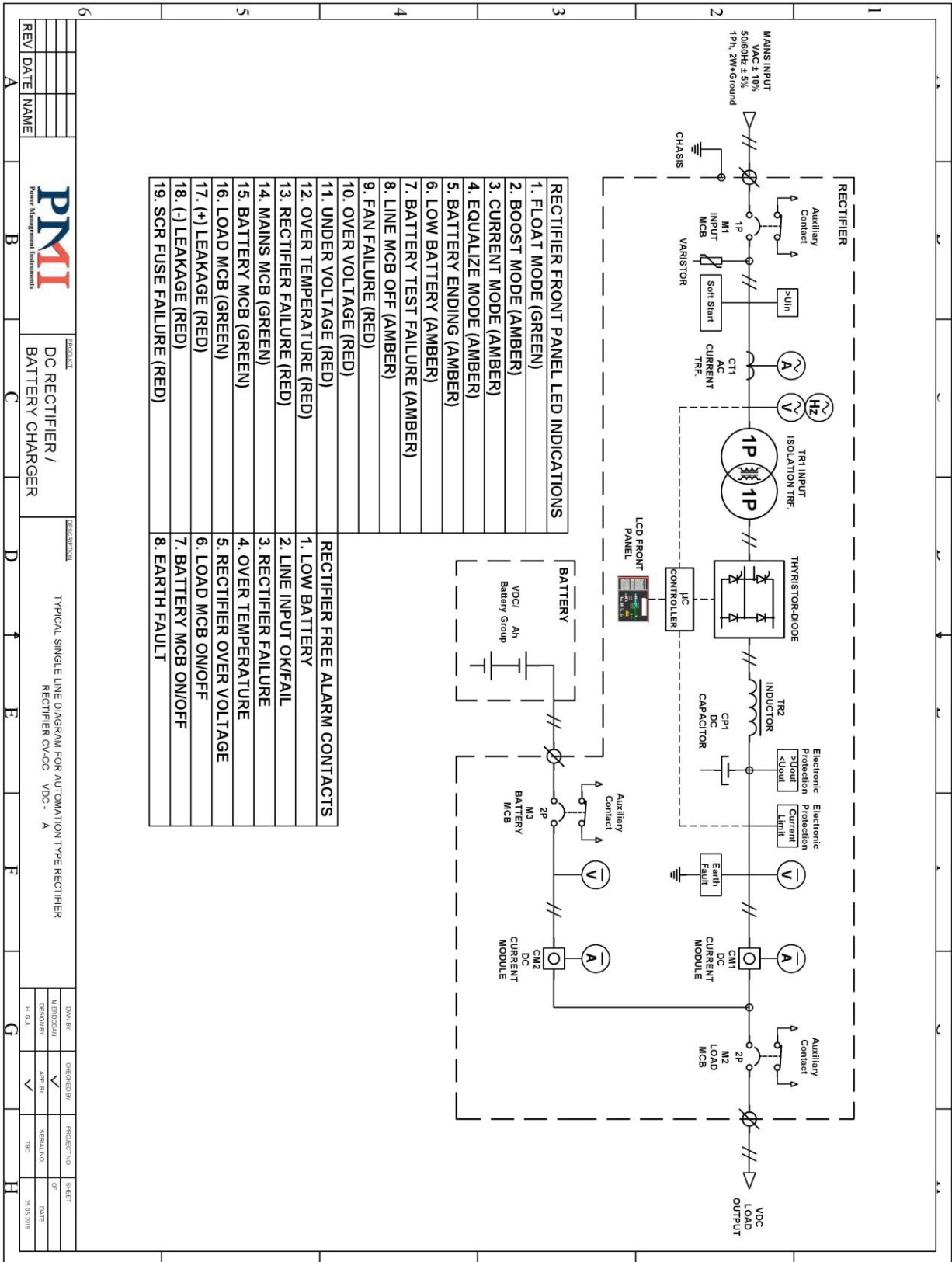
25	READ	FREQ.	x10	line frequency	90	MANUEL BOOST STARTED		
26	READ	V_LINE1	x10	line voltage1	91	AUTO BOOST STARTED		
27	READ	V_BAT	x10	battery output voltage	92	BATTERY TEST STARTED		
28	READ	V_LOAD	x10	load output voltage	93	BATTERY TEST = FAILED BATTERY		
29	READ	I_BAT (signed int16)	x10	battery output current (signed int16)	94	BATTERY TEST RESULT=OK		
30	READ	I_LOAD	x10	load output current	95	BATTERY TEST SKIPPED		
31	READ	LEDS	x1	MONITORING LEDS	96	AUTO BOOST END		
				BIT_0=SCR_FUSE_FAIL	97	MANUEL BOOST END		
				BIT_1=NO DATA	98	BOOST SKIPPED		
				BIT_2=LOAD_MCB_OK				
				BIT_3=NO DATA				
				BIT_4=BATTERY_MCB_OK				
				BIT_5=NO DATA				
				BIT_6=EARTH FAULTH -				
				BIT_7=EARTH FAULTH +				
				BIT_8=NO DATA				
				BIT_9=NO DATA				
				BIT_10=NO DATA				
				BIT_11=NO DATA				
				BIT_12=NO DATA				
				32	READ	LEDS_2	X1	MONITORING LEDS
BIT_0=LINE_MCB_OFF								
BIT_1=BAT_TEST_FAIL								
BIT_2=LOW BATTERY								
BIT_3=BATTERY ENDING								
BIT_4=EQ_BOOST MODE								
BIT_5=CURRENT MODE								
BIT_6=BOOST MODE								
BIT_7=FLOAT MODE								
BIT_8=NO DATA								
BIT_9=LINE OK/LINE MCB OK								
BIT_10=NO DATA								
BIT_11=RECTIFIER FAILURE								
BIT_12=OVERTEMPERATURE								
BIT_13=RECTIFIER UNDER VOLTAGE								
BIT_14=RECTIFIER OVER VOLTAGE								
BIT_15=FAN FAILURE								
33	READ	RECTF.(ON/OFF)	X1	rectifier working or not working				
34	READ	V_LINE2	X10	line voltage2 (observable only 3 phase)				
35	READ	V_LINE3	X10	line voltage3 (observable only 3 phase)				
36	READ	I_LINE	X10	line current (observable only 1 phase)				
37	READ	RELAY OUTPUTS	x1	programmed 8 dry contacts positions				
38	READ	NO DATA						
39	READ	NO DATA						
40	READ	NO DATA						
41	READ	NO DATA						
42	READ	NO DATA						
43	READ	TOTAL EVENT NUMBER	x1	event history total event number				
44	READ	EVENT NUMBER	x1	reading event number from event history				
45	READ	EVENT CODE	x1	event code, check from event code table				
46	READ	EVENT VALUE	x1	not important				
47	READ	DAY /EVENT DATE	x1					
48	READ	MONTH /EVENT DATE	x1					
49	READ	HOUR /EVENT DATE	x1					
50	READ	MINUTE /EVENT DATE	x1					
					PROGRAMMABLE DRY CONTACT TABLE(32 bit code)		DEFAULT	
					BIT_0=LINE_MCB_OFF			
					BIT_1=BAT_TEST_FAIL			
					BIT_2=LOW BATTERY		1.	
					BIT_3=BATTERY ENDING			
					BIT_4=EQ_BOOST MODE			
					BIT_5=CURRENT MODE			
					BIT_6=BOOST MODE			
					BIT_7=FLOAT MODE			
					BIT_8=NO DATA			
					BIT_9=LINE OK/LINE MCB OK		2.	
					BIT_10=NO DATA			
					BIT_11=RECTIFIER FAILURE		3.	
					BIT_12=OVERTEMPERATURE		4.	
					BIT_13=RECTIFIER UNDER VOLTAGE		5.	
					BIT_14=RECTIFIER OVER VOLTAGE		6.	
					BIT_15=FAN FAILURE			
					BIT_16=SCR_FUSE_FAIL			
					BIT_17=NO DATA			
					BIT_18=LOAD_MCB_OK		7.	
					BIT_19=NO DATA			
					BIT_20=BATTERY_MCB_OK		8.	
					BIT_21=NO DATA			
					BIT_22=EARTH FAULTH -			
					BIT_23=EARTH FAULTH +			
					BIT_24=NO DATA			
					BIT_25=NO DATA			
					BIT_26=NO DATA			
					BIT_27=NO DATA			
					BIT_28=NO DATA			
					BIT_29=NO DATA			
					BIT_30=NO DATA			
					BIT_31=NO DATA			
* YOU CAN SELECT 8 RELAY THROUGH 32 INFORMATIONS.								
* YOU CAN USE NORMALLY CLOSED OUTPUTS AS REVERSE INFORMATION.FOR EX; LOAD MCB ON(N.O.)&LOAD MCB OFF(N.C.)								

7. Electrical Schemas

7.1 Standard Type / 1 Phase Rectifier Single Line Diagram

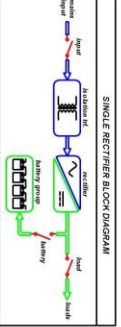
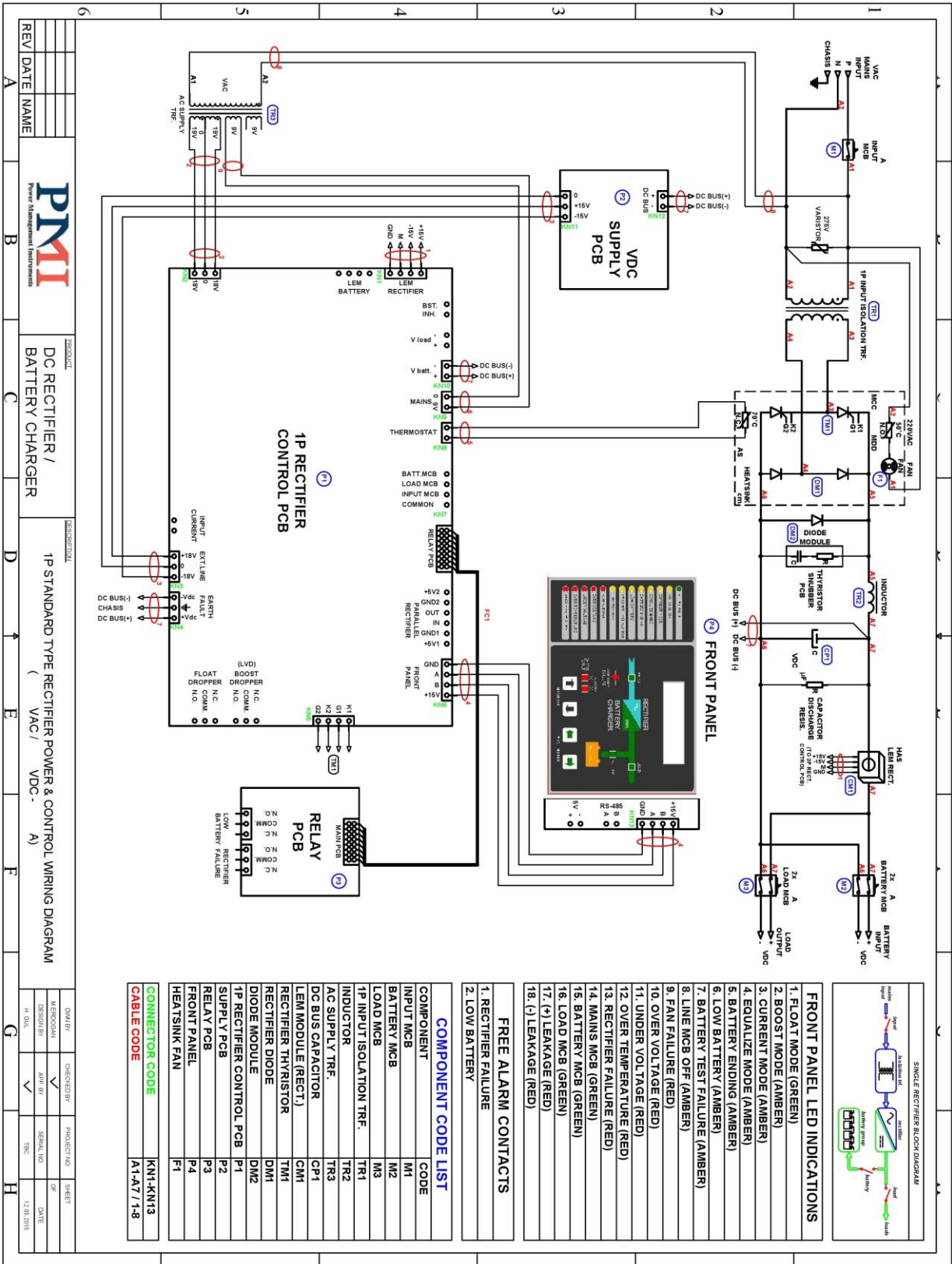


7.2 Automation Type / 1 Phase Rectifier Single Line Diagram



REV	DATE	NAME	DESIGNER	CHECKED BY	PROJECT NO.	SHEET
			DC RECTIFIER / BATTERY CHARGER		TYPICAL SINGLE LINE DIAGRAM FOR AUTOMATION TYPE RECTIFIER	
			RECTIFIER CV-ACC VDC - A			
			DC CURRENT MODULE			
			BATTERY Ah			
			VDC/ Battery Group			
			M3 BATTERY MCB			
			M2 LOAD MCB			
			M1 AC CURRENT TRF.			
			CT1 AC CURRENT TRF.			
			>Uin			
			Soft Start			
			VARISTOR			
			M1 INPUT MCB			
			CHASSIS			
			TRI INPUT ISOLATION TRF.			
			THYRISTOR DIODE			
			THYRISTOR CONTROLLER			
			LCD FRONT PANEL			
			INDUCTOR TR2			
			CAPACITOR CP1			
			Electronic Protection Circuit			
			Electronic Current Limit			
			Earth Fault			
			DC CURRENT MODULE			
			DC CURRENT MODULE			
			Auxiliary Contact M2 LOAD MCB			
			Auxiliary Contact M3 BATTERY MCB			
			VDC LOAD OUTPUT			

7.3 Standard Type / 1 Phase Input Rectifier Wiring Diagram



FRONT PANEL LED INDICATIONS

1. FLOAT MODE (GREEN)
2. BOOST MODE (AMBER)
3. CURRENT MODE (AMBER)
4. EQUALIZE MODE (AMBER)
5. BATTERY ENDING (AMBER)
6. LOW BATTERY (AMBER)
7. BATTERY TEST FAILURE (AMBER)
8. LINE MCB OFF (AMBER)
9. FAN FAILURE (RED)
10. OVER VOLTAGE (RED)
11. UNDER VOLTAGE (RED)
12. OVER TEMPERATURE (RED)
13. RECTIFIER FAILURE (RED)
14. MAINS MCB (GREEN)
15. BATTERY MCB (GREEN)
16. LOAD MCB (GREEN)
17. (+) LEAKAGE (RED)
18. (-) LEAKAGE (RED)

FREE ALARM CONTACTS

1. RECTIFIER FAILURE
2. LOW BATTERY

COMPONENT CODE LIST

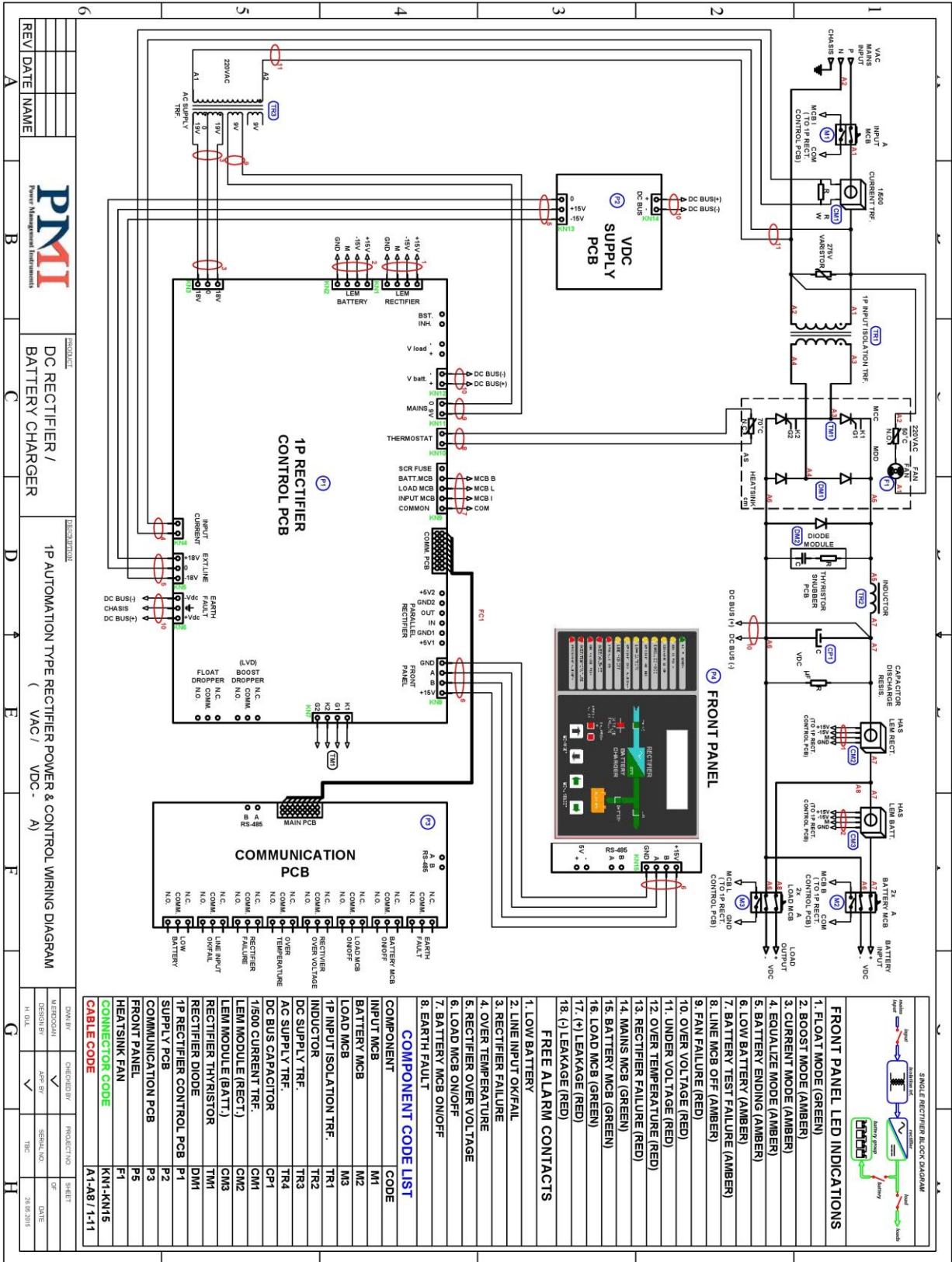
COMPONENT	CODE
INPUT MCB	M1
BATTERY MCB	M2
LOAD MCB	M3
1P INPUT ISOLATION TRF.	TR1
INDUCTOR	TR2
AC SUPPLY TRF.	TR3
DC BUS CAPACITOR	CP1
LEM MODULE (RECT.)	CM1
RECTIFIER THYRISTOR	TM1
RECTIFIER DIODE	DM1
DIODE MODULE	DM2
1P RECTIFIER CONTROL PCB	P1
SUPPLY PCB	P2
RELAY PCB	P3
FRONT PANEL	P4
HEATSIK FAN	F1

CONNECTOR CODE

KN1-KN3
KA1-A7 / 18

REV / DATE / NAME					
PMI Power Management Instruments		DC RECTIFIER / BATTERY CHARGER		1P STANDARD TYPE RECTIFIER POWER & CONTROL WIRING DIAGRAM	
DRAWN BY		CHECKED BY		PROJECT NO.	
DESIGNED BY		APPROVED BY		SHEET NO.	
DATE		DATE		DATE	
TIME		TIME		TIME	

7.4 Automation Type / 1 Phase Input Rectifier Wiring Diagram



8. Cause & Actions & Troubleshooting



- Please check the substance of the safety and warning in "2. General Safety Instructions and Warnings" section, before starting troubleshoot.
- All the necessary interventions must be performed by trained service personnel.

Please perform the following procedures to solve the common failures / problems quickly. If the fault / problem can not be solved by using this table, then please contact the technical service.

Case	Causes	Actions & Troubleshooting
Case 1 The Product is not operating including the front panel!	Mains AC Voltage may not be available	Please check Mains Input MCB. Is it at "ON" position? Please check Mains Input voltage. Are phase-neutral voltage or L1-L2-L3 phase voltages correct?
	Mains Input MCB may be defective.	Please check Mains Input MCB. If it is defective, then please change it with a new one of the same value / characteristics.
	DC Battery Voltage may not be available (for cases where there is not Mains Voltage)	Please check Battery MCB/Fuse. Is it at "ON" position? Please check total Battery Voltage
	LCD front panel connectors can be interruption.	Please check connections of the connectors.
	DC Supply PCB may be defective	Trained service personnel must intervene to this issue. Please contact with the technical service.
	The battery may be deeply discharged with thyristor or diode failure	Trained service personnel must intervene to this issue. Please contact with the technical service.
	Thyristor fast acting fuse (optional) may be open-circuited and battery may be deeply discharged	Trained service personnel must intervene to this issue. Please contact with the technical service.
Case 2 Mains Input MCB OFF	Thyristor or diode may be defective	Trained service personnel must intervene to this issue. Please contact with the technical service.
	Varistor may be short-circuited as a result of high voltage	Please turn ON the MCB by disabling the varistor.
Case 3 Shock when touching rectifier chassis	There may be earthing problem or electrical leakage	Please check grounding line Please check the insulation of the Input Cables.
Case 4 Rectifier smells	Newly started / commissioned	It will reduce and not smell in time
	It has worked for a long time and there is a heavy smell.	Please disconnect the power / turn OFF the Mains Please turn OFF the Battery MCB/Fuse. Please check the battery against the possibility of the short circuit Trained service personnel must intervene to this issue. Please contact with the technical service.
Case 5 DC Load is switched OFF instantly or in	Battery MCB/ Fuse may be defective or at OFF position	Please check Battery MCB/Fuse. If it is defective, then please replace it with a new one of the same value / characteristics.

a short time when power is outage	Battery group may be damaged	Please check battery group. Please change it with a new one of the same value if necessary.
Case 6 There is more sound than normal in rectifier.	Fan may be defective	Please check if the fan is operating
	There could be a short-term noise after a prolonged power outage	The sound will decrease when the charging of the battery is finished If the problem continues, please contact with technical service.
Case 7 Battery MCB / Fuse OFF	There may be a fault that causes drawing an excessive current in the battery	Please check battery group. Please replace it with a new one of the same value if it is defective
	Battery MCB/ Fuse may be defective	Please check Battery MCB/Fuse. If it is defective, then please replace it with a new one of the same value / characteristics.
Case 8 Load MCB / Fuse OFF	There may be a fault that causes drawing an excessive current in the load line or short circuit	Please check the load and load line.
	Load MCB/ Fuse may be defective	Please check Load MCB/Fuse. If it is defective, then please replace it with a new one of the same value / characteristics.
Case 9 Output voltage is too low and the current is maximum.	Load current may be extremely high.	Please decrease the load value
	The battery is not fully charged.	Please check Battery Voltage. It will increase after a while.
Case 10 Charge Current is too low.	Battery may be nearly full discharged	It is a normal situation.
Case 11 The battery can not be fully charged.	Charge current may be set too low.	Please check charger current settings from the LCD front panel.
	Charging time may be too short.	Please check charging time settings from the LCD front panel.
	Equalize voltage may be set incorrectly.	Please check Equalize voltage settings from the LCD front panel.
	Battery MCB/ Fuse may be defective	Please check Battery MCB/Fuse. If it is defective, then please replace it with a new one of the same value / characteristics.
	The battery temperature may be too low.	Please use the battery temperature sensor. (Optional feature)
	The load current may be high according to the battery capacity	Please decrease the load value.
	Battery group may be damaged / defective	Please check battery group. Please replace it with a new one of the same value if necessary.
Case 12 Batteries are discharged very quickly.	Battery capacity may be reduced.	Please charge and discharge the battery a few times. Please check battery group. Please replace it with a new one of the same value if necessary.
Case 13 Batteries are too hot, the gas is coming	There may be defective batteries (Short-circuit between cells)	Please check battery group. Please replace it with a new one of the same value if necessary.

out.	Charge voltage may be very high.	Please check charger voltage settings from the LCD front panel.
Case 14 Over Temperature LED is ON	The cooling fan may be defective.	Please check if the fan is operating.
	Ambient temperature may be high.	Please check the operating environment temperature. If it is high, please take the necessary precautions.
	Fan thermostat may be defective.	Please check the fan thermostat. If defective, please replace with a new one of the same value.
Case 15 Fan Failure LED is ON	The cooling fan may be defective.	Please check if the fan is operating. If defective, please replace with a new one of the same value.
	Ambient temperature may be high.	Please check the operating environment temperature. If it is high, please take the necessary precautions.
Case 16 Over Voltage LED is ON	Over Voltage LED is ON	
	A different source connected in parallel to the rectifier output may cause overvoltage.	Please check the different sources connected in parallel.
	There may be a voltage leakage at rectifier output exposed by external factors	Please check the voltage leakage.
	Thyristor or diode may be defective	Trained service personnel must intervene to this issue. Please contact with the technical service.
Case 17 Under Voltage LED is ON	Rectifier output may be overloading and switching to Current Mode	Please decrease the load value.
	The control PCB may not perceive the feedback voltage.	Trained service personnel must intervene to this issue. Please contact with the technical service.
	Thyristor or diode may be defective	Trained service personnel must intervene to this issue. Please contact with the technical service.
Case 18 Rectifier Failure LED is ON	The rectifier shuts down itself in case of a negative situation and give warning by turning ON Rectifier Failure LED.	In order to locate the source of the failure, other active LEDs should check as well.
Case 19 Mains LED is not illuminated.	Mains Input MCB may be OFF	Please check Mains Input MCB.
	Mains voltage / frequency or generator voltage / frequency may not be within the acceptable range.	Please check Mains voltage / frequency or generator voltage / frequency.
Case 20 Load LED is not illuminated.	Load MCB / Fuse may be OFF	Please check Load MCB / Fuse.
	Auxiliary contacts of Load MCB / Fuse may be defective or there may be an interruption in connections	Please check auxiliary contacts of Load MCB / Fuse and connection.
Case 21 Battery LED is not illuminated.	Battery MCB / Fuse may be OFF	Please check Battery MCB / Fuse.
	Auxiliary contacts of Battery MCB / Fuse may be defective or there may be an interruption in connections.	Please check auxiliary contacts of Battery MCB / Fuse and connection.

Case 22 Earth Fault (+) or (-) LED is ON	There is leakage in DC bus (Battery and Load Line) between (+) or (-) polarity and chassis (ground)	Please determine the leakage between (+) or (-) polarity and chassis (ground) and detect it.
Case 23 Float Mode LED is ON	Rectifier is operating in the Float charging mode.	It is a normal situation.
Case 24 Boost Mode LED is ON	Rectifier is operating in the Boost charging mode.	It is a normal situation.
Case 25 Current Mode LED is ON	Rectifier is operating in the Current mode.	If the load is increased after the "Current Mode" LED is on, then the output voltage of rectifier will start to decrease until reaching to the minimum voltage value. After reaching minimum voltage value, rectifier will shut down itself in order to protect the load and the product. The current limitation due to the battery charge current will be temporary since the battery current will decrease as the battery charged. Battery and load should be checked against to shutdown due to faulty battery and problems in load.
Case 26 Equalize Mode LED is ON	Redresör eşitleme modunda çalışmakta.	It is a normal situation.
Case 27 Battery Ending LED is ON	After this warning LED is ON, if the batteries continue to be discharged, then batteries would have been deeply discharged	This is not healthy for batteries that are not suitable for deep discharge.
Case 28 Low Battery LED is ON	After this warning LED is ON, if the batteries continue to be discharged, then batteries would have been deeply discharged	This is not healthy for batteries that are not suitable for deep discharge.
Case 29 Battery Test Failure LED is ON	There may be defective battery in battery group	Please check battery group. Please replace it with a new one of the same value if necessary.
Case 30 Line MCB OFF LED is ON	Mains Input MCB is OFF. Auxiliary contacts of Mains Input MCB may be defective or there may be an interruption in connections.	Please check Mains Input MCB Please check auxiliary contacts of Mains Input MCB and connection.

9. Maintenance Instructions



There are not any parts in rectifier or battery that the maintenance or service can be done by end user. DO NOT OPEN THE PRODUCT DOOR WITHOUT TECHNICAL SERVICE ASSISTANT.

10.1 Scheduled Maintenance

There are maintenance-free semiconductor components inside the charger. If the environment is kept clean and cool enough, then scheduled maintenance requirement will be at the minimum level. Your device is designed to require minimum maintenance. Users must fulfill the following instructions.

10.2 Daily Maintenance

Please check the charger every day and pay attention to the followings:

1. Check the front panel. All LED indicators and measurement parameters must be normal and there must not be any alarm or warning message on the panel.
2. Check whether there are any symptoms for overheats of the charger.
3. Check the rotation of the cooling fan of the product.
4. Check whether there is a remarkable change in the sound of the charger
5. The ventilation grills must not be filled / closed by dust. If the dust fills these grills, please clean it with a vacuum cleaner.
6. There must be nothing on the charger.

10.3 Weekly Maintenance

1. Check the front panel and record the results.
2. Measure and record the output voltage of charger.
3. Measure and record the output line currents of charger.
4. Cover of the charger can be cleaned with a dry cloth.

If possible, please save the results. Try to find whether there is a significant different between new result and previous ones. If there is a significant different between them, if possible please try to find whether a load was connected to the system in previous maintenance. If load was connected, please try to find load value, place and type of load. These records may help the technical service assistant.

If there is any significant different between two results although there is not any reason, please call for an authorized service immediately.

10.4 Annual Maintenance

Please call for an authorized service once in a year for a healthy and safely operation of the charger and battery.

10. Cabin Weight and Dimensions

PMI / GESS own production cabins are produced under the following process steps.

CAD / Design / R&D

The drawings are prepared according to R & D department's development for the existing products and for the new designs. If the technical drawings of the products are available, then they will be controlled and the manufacturing drawings will be prepared.

CAM / Manufacturing

Cutting: CNC cutting method is determined according to the manufacturing drawings, placement and cutting programs are prepared and transferred to the appropriate cutting unit. The cutting process is completed in precision of CNC Laser, CNC punch and NC guillotine.

Twist: After cutting, twists on the basis of parts are completed with precise CNC bending unit and will be referral to the next manufacturing station.

Weld / Leveling

The welding process will be performed on the twisted product as per specified in the formal manufacturing. The welding process is determined according to the part material (steel, stainless steel or aluminum) and the welding process is completed at appropriate welding station. The welded part will be brought to the appropriate surface quality with one or more of the suitable leveling method and delivered to the next station.

Before Paint / Paint

The levelled part is ready for surface cleaning and zinc-phosphate coating before painting. The steel parts that the surface contaminants and oil is cleaned at the cleaning bath, will be subjected to a zinc phosphate coating to increase the corrosion resistance after rinsed. After drying, the parts will be coated with paint in the appropriate color at powder coating unit and put in the oven at required temperature for a time. Then parts will be left to cool.

Mechanical Assembly

A specialized team will assemble the workpieces that have reached by using special installation equipment. The final version of semi-finished products are shipped to the relevant department for the electrical and electronics assembly. Cabin Features is specified in the table below.

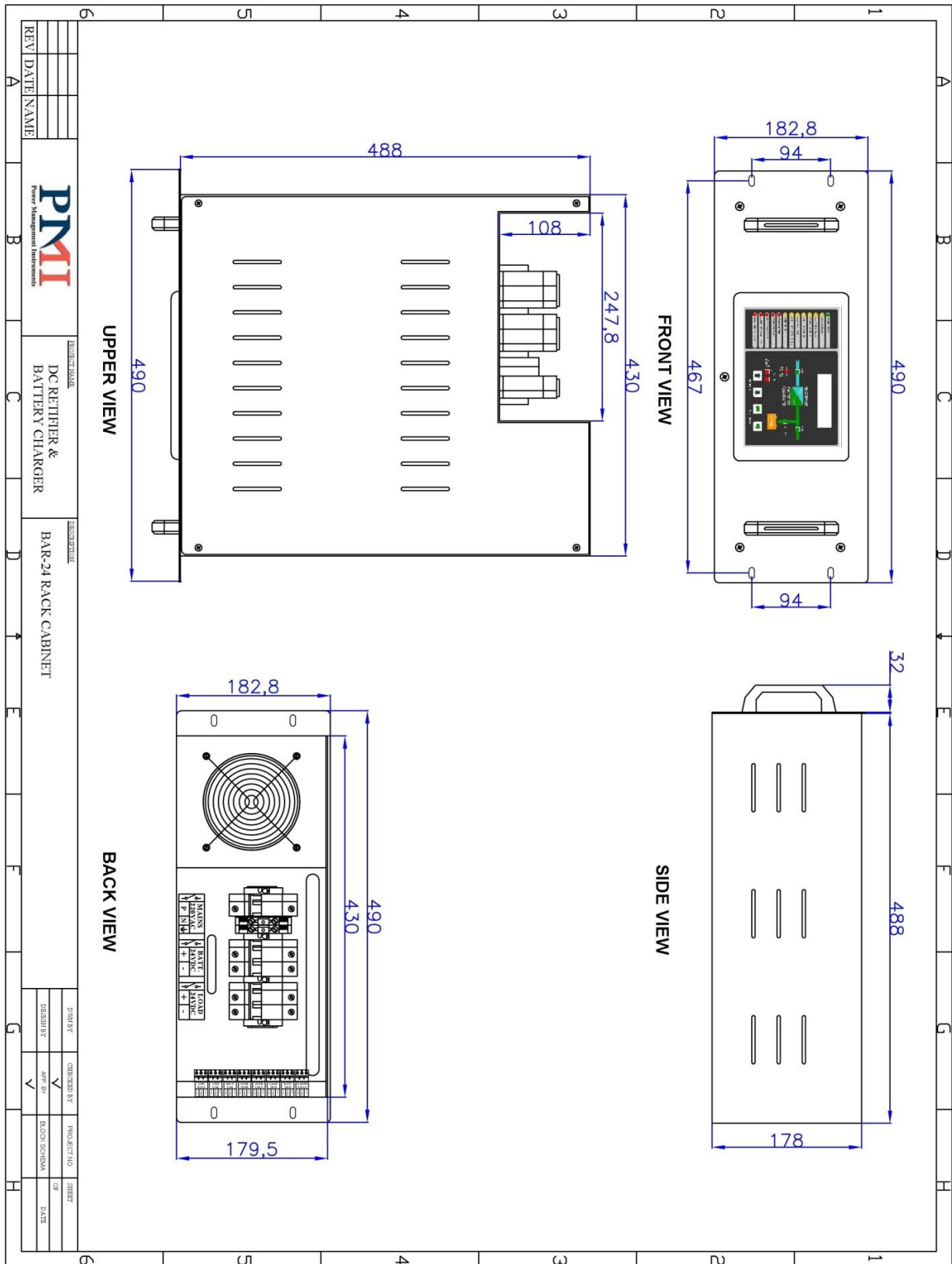
FEATURE	STANDARD	OPTIONAL
Protection Class	IP21	IP31-42-51-54-55
Cabin Color	RAL-7035	RAL 7032-6011 etc.
Cable Entry	Bottom	Top
Ventilation	Forced Fan	Natural / Self ventilation
Cabin Lighting	NO	YES
Cabin Heater	NO	YES

The following table shows the standard equipment and unpacked weight and size (except battery). For weight and size information of industrial custom charger including battery group, please contact PMI.

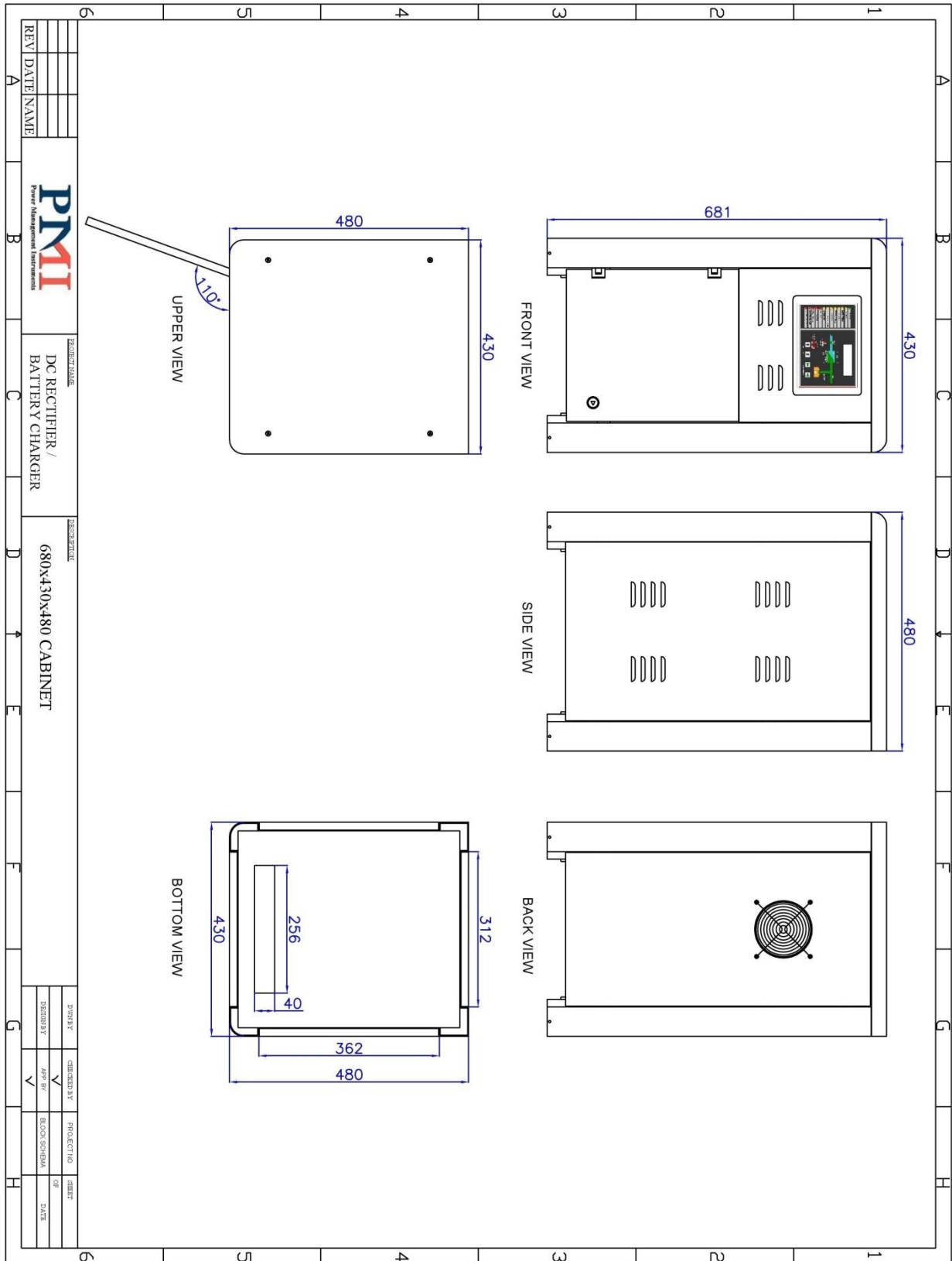
MODEL	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (ADC)	WEIGHT (kg)	DIMENSIONS (H)x(W)x(D) (cm)
RDA 24-10 (BAR-24)	12-24	10	20	BAR-24
RDA 24-30	12-24	30	44,5	68x43x48
RDA 24-60	12-24	60	61	68x43x48
RDA 24-100	12-24	100	95	78x50x53
RDA 24-200	12-24	200	144	103x61x60
RDA 48-10	48	10	20	68x43x48
RDA 48-30	48	30	40	68x43x48
RDA 48-60	48	60	65	78x50x53
RDA 48-100	48	100	188	78x50x53
RDA 48-200	48	200	255	103x61x60
RDA 110-10	110	10	45	68x43x48
RDA 110-30	110	30	90	78x50x53
RDA 110-60	110	60	180	103x61x60
RDA 110-100	110	100	205	103x61x60
RDA 110-200	110	200	260	155x65x80

11.1 Cabinet Drawing

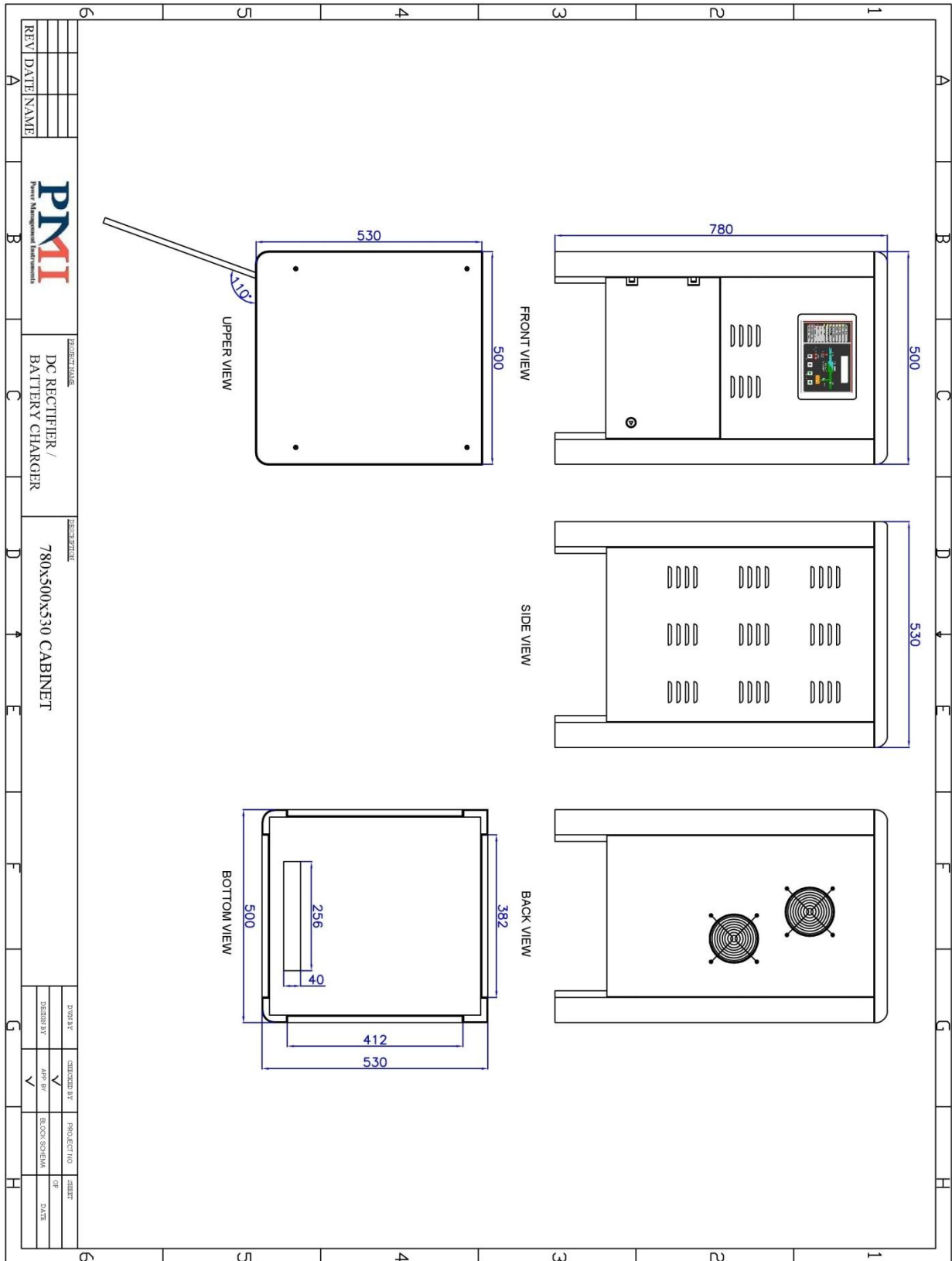
➤ BAR-24 Rack Type Cabin



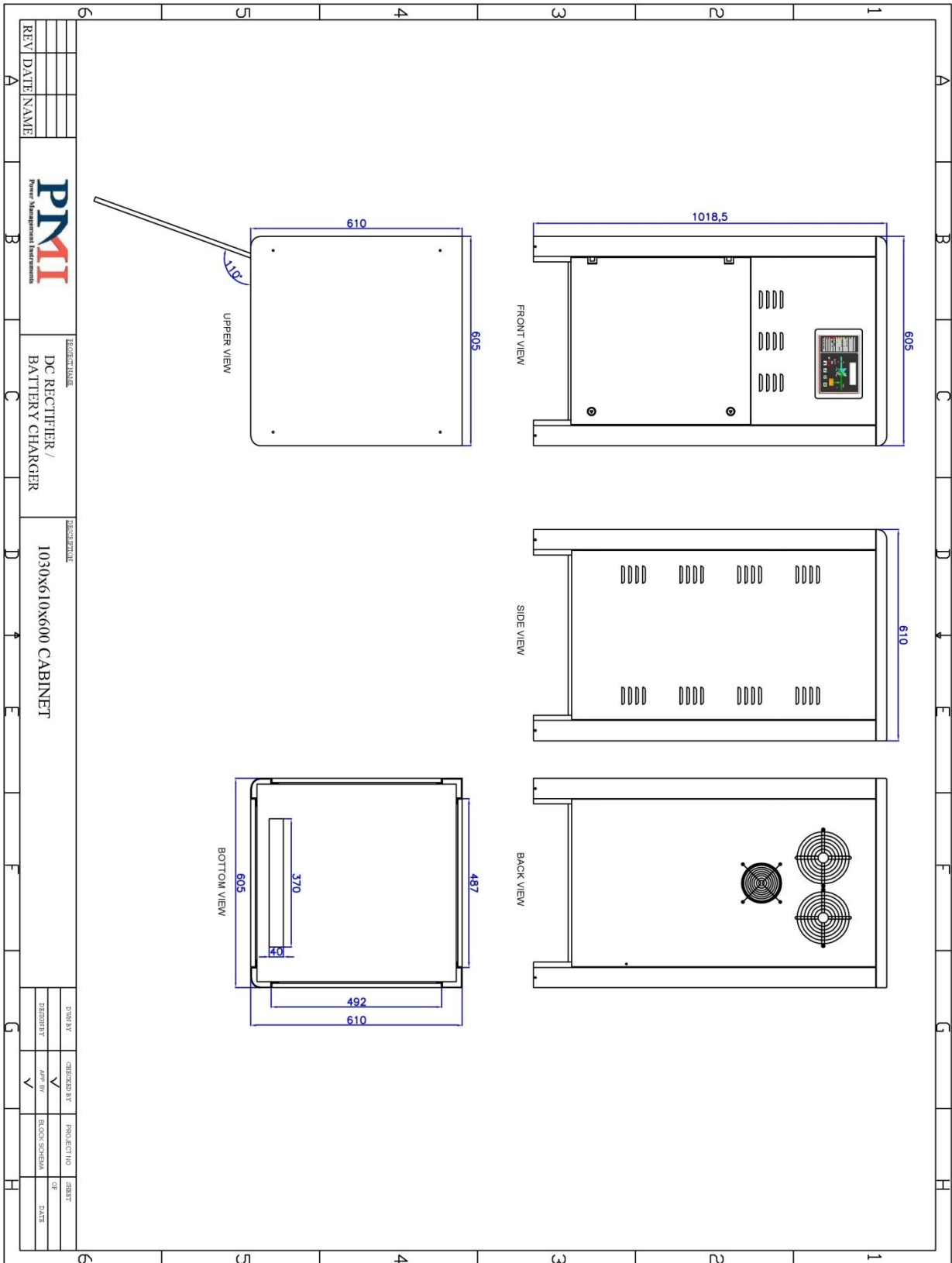
➤ Small Standard Cabin



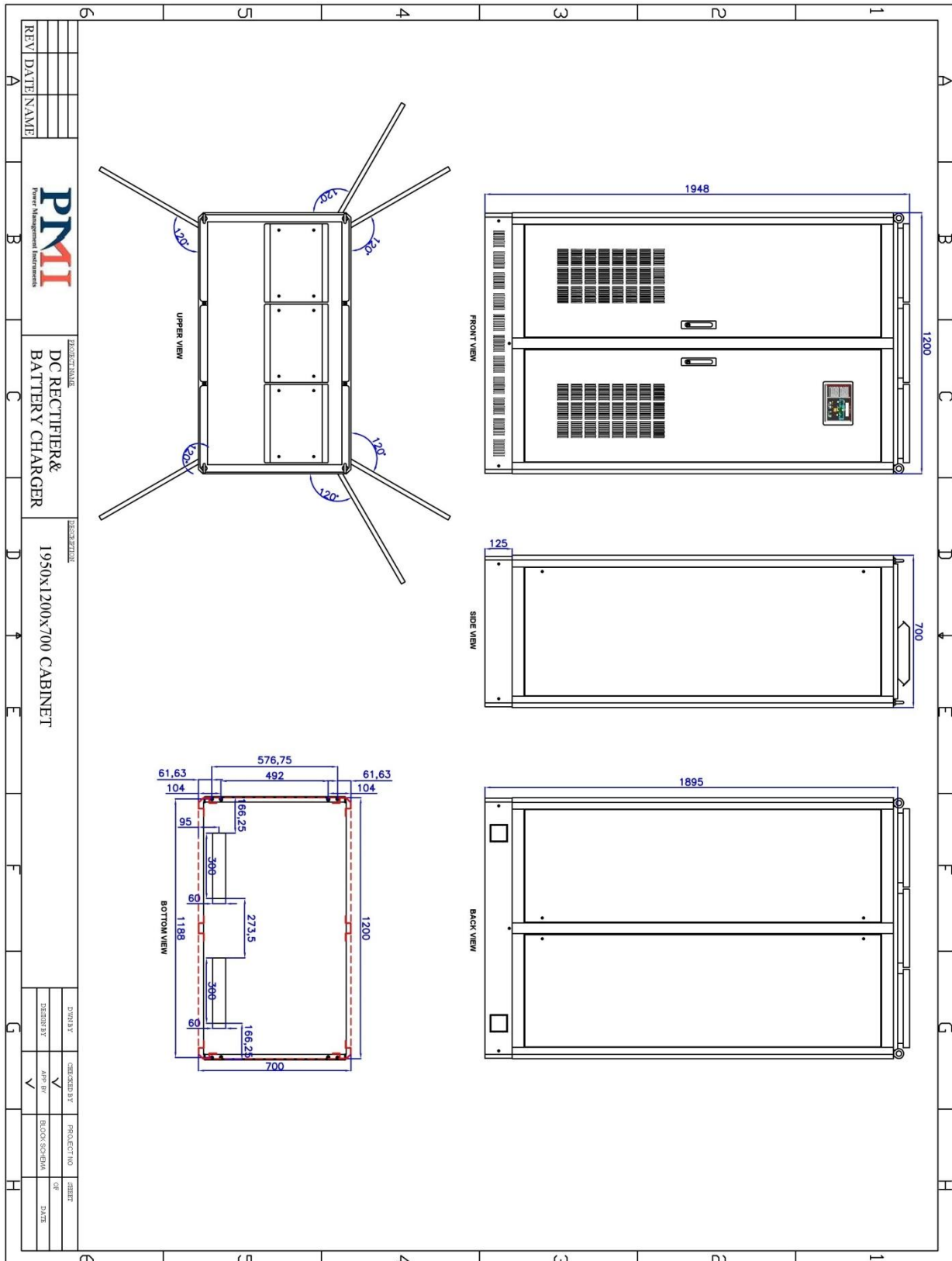
➤ Medium Standard Cabin



➤ Large Standard Cabin



➤ Large Industrial Front Access Cabin (Single Door)



11.2 Cabinet Component Layout

Cabinet component layout can be changed with cabin type and 1Ph rectifier model. Because of this reason, it will be shared with rectifiers own user manuel.



GROUP COMPANIES

Ortadoęu Elektronik Sanayi Ltd. Őti.
PMI Elektrik Sistemleri Dis Tic. Ltd. Sti

SALES & MARKETING

Perpa Elektrokent A Blok
Kat: 11 No:1449-1451
34384, Okmeydani
ISTANBUL / TURKEY

Tel: +90 212 320 35 95 / +90 212 320 35 96
Fax: +90 212 320 35 97
E-mail: info@pmienergy.com

MANUFACTURING PLANT AND R&D

Modern Keresteciler Sanayi Sitesi 1. Cad. 23. Sok.
No:14 Saray / Kazan / ANKARA / TURKEY

www.pmienergy.com