



Genie Smart Panel - UPS Powered Distribution Unit User Manual



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Caution

This user manual is for installation and operation purposes only.

Do not attempt to apply power to the input terminals of the bypass system until factory authorized personnel check connections.

Factory authorized personnel shall inspect installation prior to start up and commissioning to validate warranty.

Failure to follow this directive will void the warranty

1. Important Safety Instructions

READ AND FOLLOW ALL SAFETY INSTRUCTIONS. **SAVE THESE INSTRUCTIONS.**

This manual contains important safety instructions that should be followed during installation and maintenance of the Genie Breaker Panel system and optional packages. Before the installation process begins, we recommend that the installer read through the safety precautions, and the instructions, taking all necessary safety precautions to protect themselves and the equipment being installed.

GENERAL

- Move the Genie Breaker Panel in an upright position, in its original packaging, to its final destination.
- Check the integrity of the UPS equipment carefully.
- If visible damage is evident, do not attempt to install or start the UPS. Contact the transport delivery company immediately, file a claim with the transport company and inform Always On directly.
- Do not use outdoors
- The use of accessory equipment not recommended by Always On may cause an unsafe condition
- **WARNING! RISK OF ELECTRICAL SHOCK:** use extreme caution when removing covers.
- All maintenance and service work should be performed by qualified and trained service personnel.
- Do not use this equipment for other than intended use.

INSTALLATION

- This Breaker Panel is intended for use in a controlled indoor environment free of conductive contaminants and protected against any type of intrusion.
- Do not install the Breaker Panel in an excessively humid environment or near water.
- Avoid spilling liquids and/or dropping any foreign object(s) onto the Breaker Panel.
- The unit must be placed in a sufficiently ventilated area; the ambient temperature should not exceed 40°C (104°F).
- **HIGH GROUND LEAKAGE CURRENT:** ground connection completed before connecting the AC voltage wires on the input!
- Avoid locations in direct sunlight or near heat sources (gas or electric heaters).

STORAGE

- Store the Genie Breaker Panel in a dry location free of contaminants;
- Storage temperature must be within -25°C (-13°F) to 55°C (131°F).

WARNING!

LETHAL VOLTAGES MAY BE PRESENT WITHIN THIS UNIT EVEN WHEN IT IS APPARENTLY NOT OPERATING. OBSERVE ALL CAUTIONS AND WARNINGS IN THIS MANUAL. FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR DEATH. REFER UNIT TO QUALIFIED SERVICE PERSONNEL IF MAINTENANCE IS REQUIRED. NO ONE SHOULD WORK ON THIS EQUIPMENT UNLESS THEY ARE FULLY QUALIFIED TO DO SO. AN INSTALLER SHOULD NEVER WORK ALONE.

THIS SAFETY NOTICE IS ADDRESSED TO THE ALWAYS ON CUSTOMER ENGINEERS WHO PERFORM MAINTENANCE OF THE GENIE BREAKER PANEL.

Electrical Safety

- Maintenance work to be performed by a factory trained customer engineers, or qualified personnel. Extreme caution must be used.
- This manual is designed as an aid tool in diagnosing problems that may arise. Always On does not assume responsibility if information causes injuries.
- Apart from the front door, do not open any other part of the Breaker Panel cabinet without consulting the factory first.

READ AND FOLLOW ALL SAFETY INSTRUCTIONS.
SAVE THESE INSTRUCTIONS.

2. Unpacking

Transport

- Move the Genie Breaker Panel in its original package to the final destination site.
- Do not stack other packages on top.

Delivery

- Upon receiving the Genie Breaker Panel, inspect the packaging integrity and the physical condition of the container carefully.
- In the event that physical damage is visible, the carrier must be informed immediately and a claim filed with them. Inform Always On as soon as the claim has been filed and a copy of claim should be faxed to Always On at (250) 491-9775.
- A detailed report of the damage is necessary for carrier insurance claim.

WARNING

A damaged Genie Breaker Panel must never be installed or connected to the utility without written instruction from Always On Engineering.

Storage

- The Genie Breaker Panel is carefully packed for transport and storage.
- Never leave a Genie Breaker Panel outside the building exposed to the elements and do not place other packages on the top of the Genie Breaker Panel.
- Storing: It is recommended to store the Genie Breaker Panel in its original package in a dry, dust-free room, away from chemical substances, and with a temperature range of -25°C (-13°F) to 55°C (131°F). Exceeding this temperature range may cause damage.

Site and Environment Consideration

The following precautions and recommendations should be checked when considering the site and environment for the Genie Breaker Panel:

- Do not place the Genie Breaker Panel near any heat source, or machinery, which may produce metallic particles, dust or powder. Do not place the Genie Breaker Panel near equipment that will produce corrosive substances or vapor.
- Do not place the Genie Breaker Panel below the shower of a fire extinguishing system.
- The user is required to guarantee the temperature and humidity values of the site into which the Genie Breaker Panel will be installed meet the required and published manufacturer specifications. The Genie Breaker Panel should be installed within the range allowed by these specifications. The Genie Breaker Panel is capable of continuous normal operation within a temperature range of 0°C (32°F) to 40°C (104°F). For optimal performance and reliability the recommended environment temperature is best at 25°C, with humidity < 80% non-condensing.
- Access to the Genie Breaker Panel should be limited to operation and maintenance personnel. The front panel should be kept locked and secure.

- Personnel who operate or maintain the Genie Breaker Panel should be proficient in normal and emergency operational procedures. New personnel should be trained and qualified prior to operation of the equipment.

Unpacking

- Carefully remove all the packaging material of the Genie Breaker Panel and then carefully place the Genie Breaker Panel at the final resting site.
- This Genie Breaker Panel has passed all stages of production testing and final stage QC testing prior to shipment from the factory (report enclosed). The Genie Breaker Panel should be in full operating condition upon receipt. Upon receiving visually check the Genie Breaker Panel for any physical damage that may have occurred during transport. If damage is noticed file a damage report immediately with the transport company and inform Always On.
- Check to ensure all of the accessories/options ordered are received.
- Check and verify the specifications of the Genie Breaker Panel are identical to the specifications of the system ordered. The key items in the specifications you must check are:
 - CIRCUIT BREAKERS INSTALLED
 - VOLTAGE
 - CURRENT RATINGS

3. Genie Breaker Panel Theory

Short Circuit Comparison Study - Thermal Breaker vs “GENIE” Breaker

Short circuits within a system will cause the voltage to drop to ~0V and the current will spike well above the nominal range (1000% and greater) until the short circuit condition has been removed (see Figure 1).

Figure 1: 15A Federal Pioneer Breaker on 100 feet of 14AWG wire

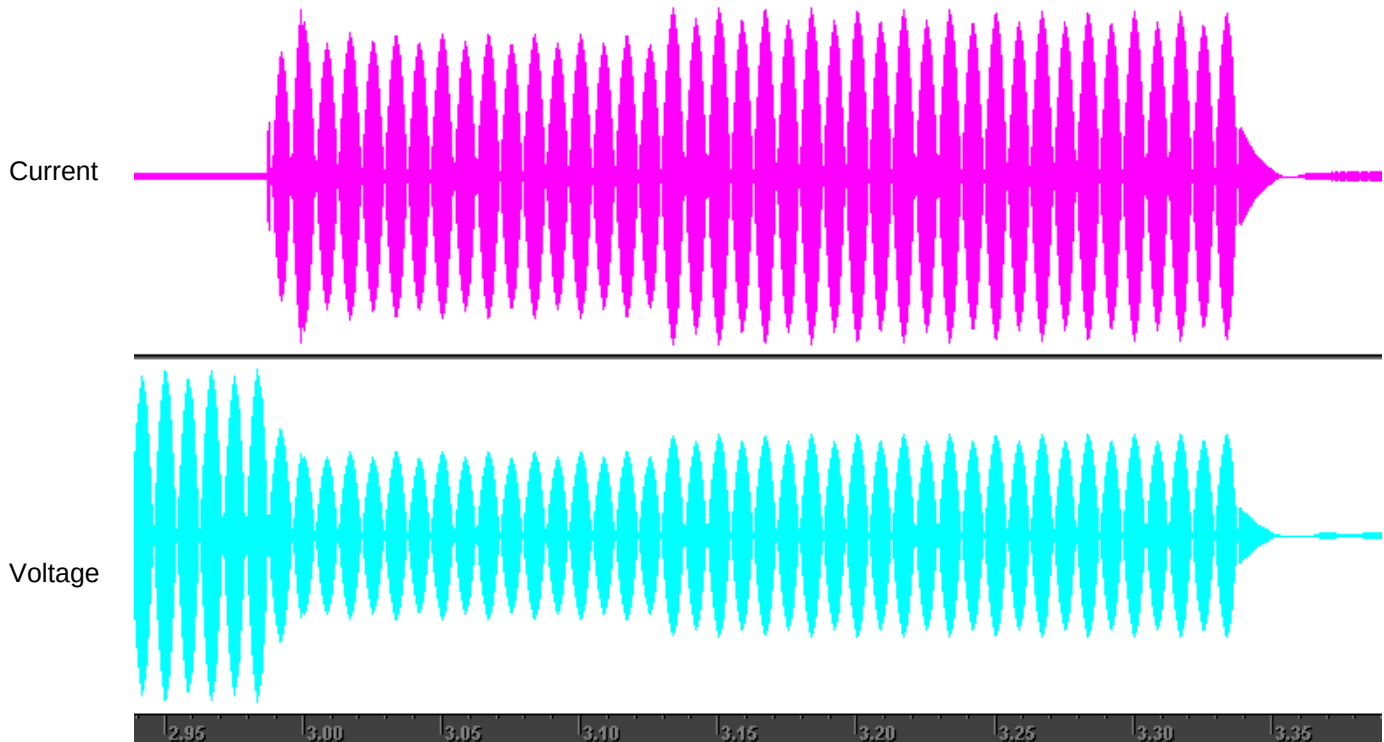


Figure 1: Voltage and Current Waveforms during a typical Short Circuit

As Figure 1 demonstrates, the voltage drops below operating capacity and the current is well above nominal until the breaker trips and clears the fault.

If the load was connected with no disconnect protection, the voltage in Figure 1 would drop to ~0V and the current could rise to thousands of amps until a means of disconnect somewhere in the stream tripped or the equipment burned out.

When an Always On UPS system has been added to the circuit, the UPS has customized operational features that limit the current to a 3:1 crest factor in accordance with Always On specifications.

The crest factor is the maximum current that the inverter will supply over a short duration (approximately 2 ½ cycles). A crest factor of 3:1 means that the inverter can supply 3 times the RMS current rating of the inverter (i.e.: a 2kVA inverter produces a 16A maximum output, so the maximum peak current is 48A).

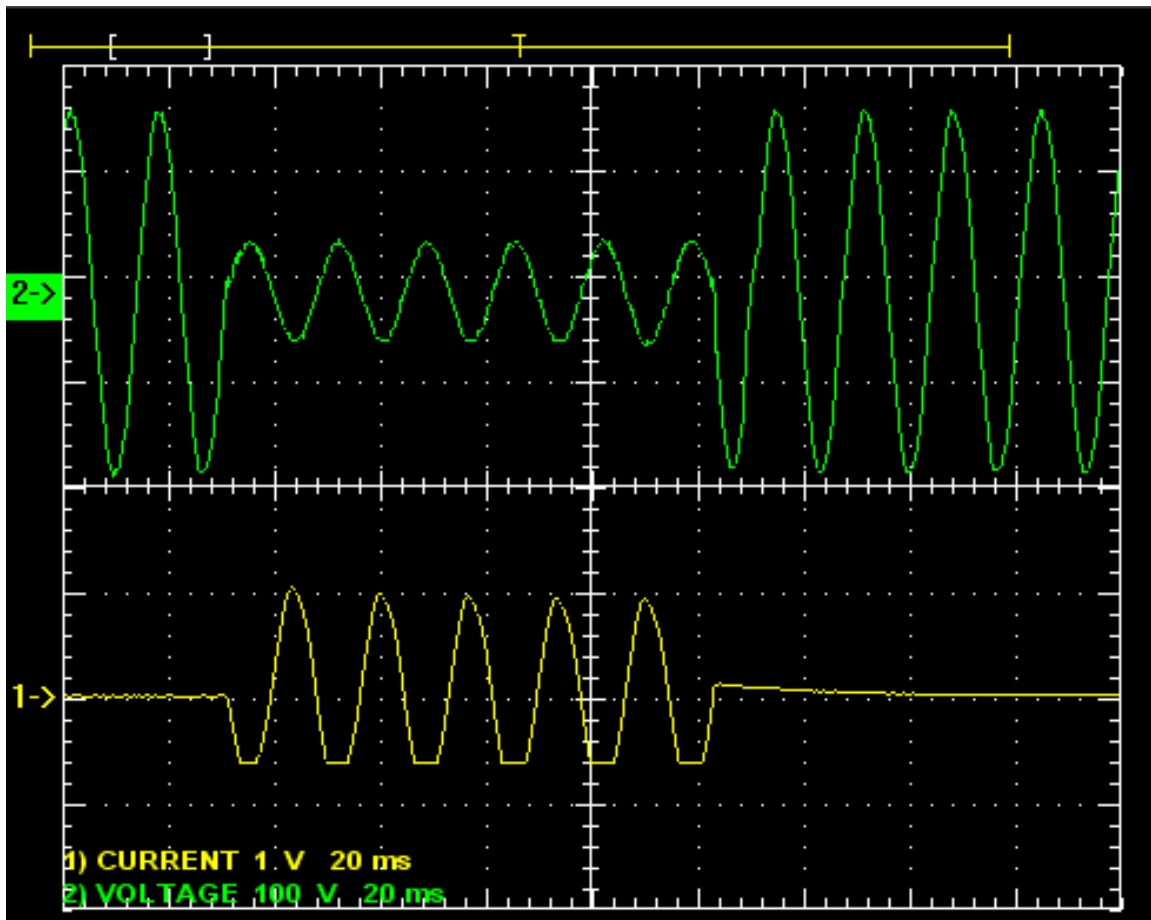


Figure 2: Typical UPS Output Short Circuit Waveform with UPS on bypass

The figures above presume the load is connected to a standard thermal breaker that typically takes 5 to 22 cycles to clear (depending on the manufacturer and model).

The inverter is rated to the current limit for 2 ½ cycles before inverter shutdown. Then, depending on the configuration, the system will either turn off or switch to bypass mode (See Figure 2 for switched to bypass and Figure 3 for system shutdown). In the event that the system is configured to switch to bypass mode, the load is essentially connected directly to the utility and power will be provided until a means of disconnect is tripped or the equipment burned out. This migrates the short circuit to the rest of the power system that affects the other loads.

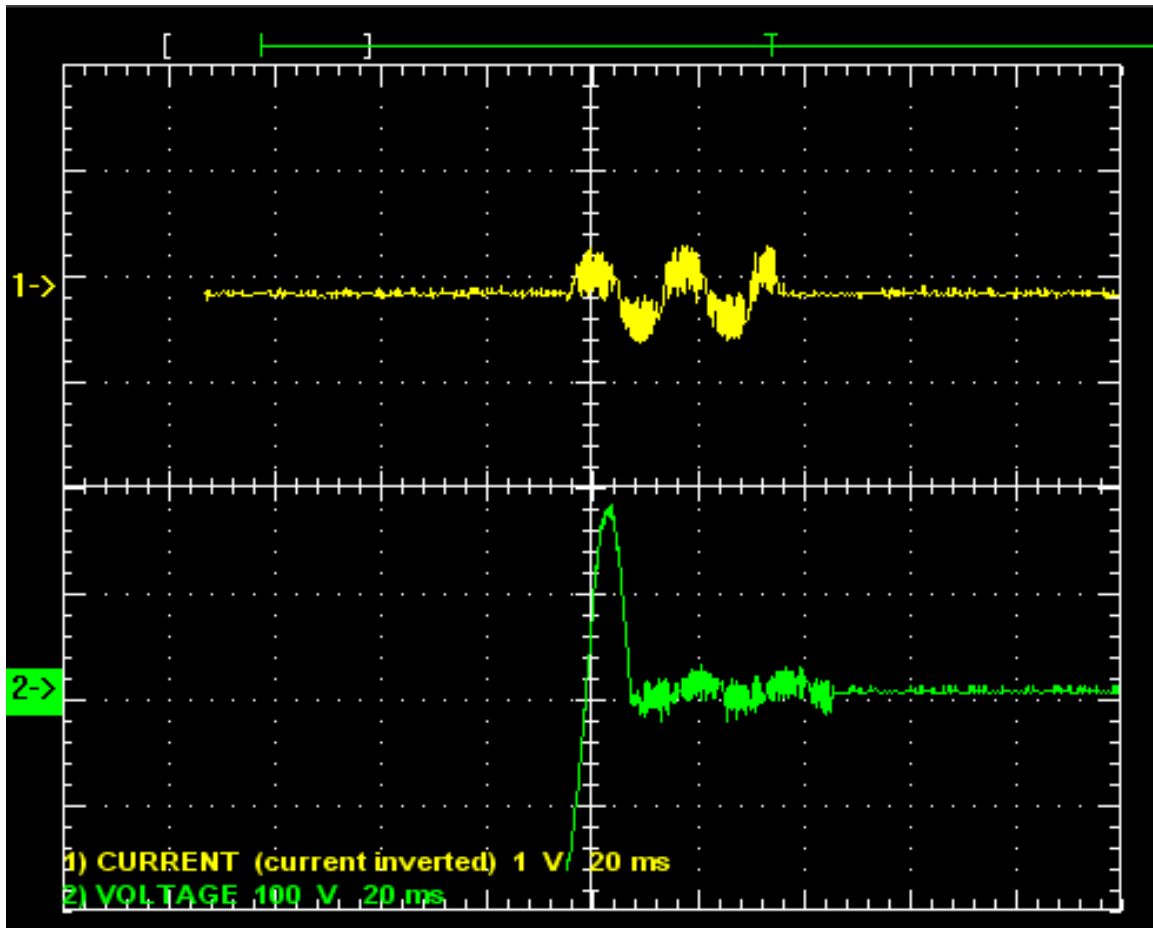


Figure 3: Typical UPS Output Short Circuit Waveform with UPS on inverter only

Both these scenarios will cause any additional loads connected to the distribution panel to shut down due to lack of voltage (simulated blackout).

Always On has designed and patented a new specifically designed breaker (SDB). The SDB incorporates technology to monitor the waveform and compare the symmetry of the positive and negative wave cycle as well as the energy content over that cycle. This allows the SDB to detect a symmetrical waveform from the inverter current (see Figure 4) during a short circuit.

The SDB allows the problem circuit to trip within 1 to 1 ½ cycles. The majority of power supplies are designed and required to comply with the ITI/CBEMA standard, which states that the power supply must be able to withstand a short duration of loss of power. Therefore, in the event of a short circuit, the additional systems connected to the Always On “On” “GENIE” distribution panel will be protected to the maximum level.

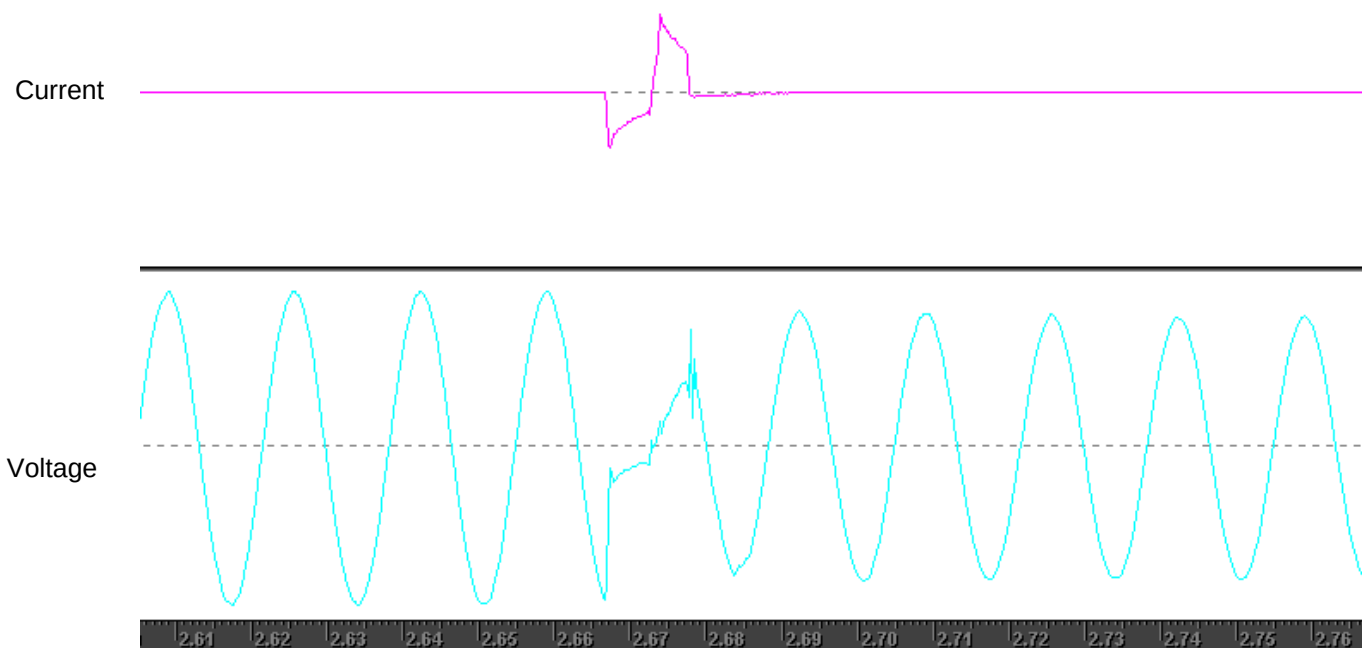


Figure 4: Voltage and Current Waveform of a 15A SDB

Short Circuit Testing: 30kVA

Here are the results of a comparison test performed in our Kelowna factory. The tests were performed on a 30kVA 3-phase UPS system with various types of protection devices.

System Information:

Model : GES – 303NX33

Capacity of UPS: 30kVA 120/208//120/208 VAC

S/N 04049050

Testing Date: 04/10/19

Equipment used:

Tektronix TDS 3012 100MHz, 1.25 GS/s

Current Probe: Fluke 80i-500s AC, 1A to 500A AC RMS

Analyzing Software: WaveStar for Oscilloscopes

Method:

- Line to Neutral short circuit was introduced to the UPS Inverter output.
- Response between fuse, standard breaker and the “GENIE” Breaker were observed.

Note:

Tests performed with a 30kVA 3-phase UPS system.

The UPS system is configured to switch to bypass after three cycles.

Report Prepared by: AA, JA

Short Circuit Inverter Mode Test 1

Tested with a MDL 15A Fuse

Note: UPS stayed in Inverter Mode – fuse opened (0.5 cycle)

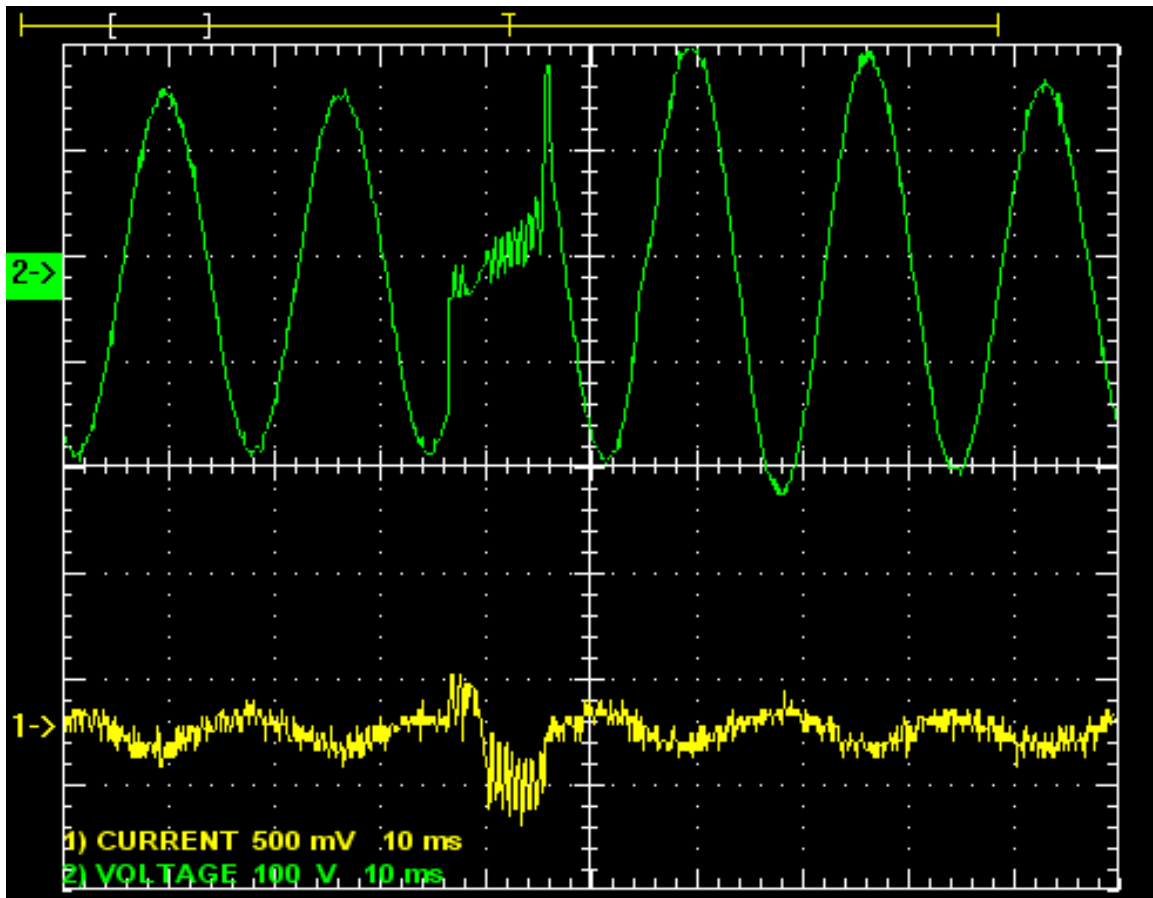


Figure 4: Current and Voltage waveform short circuit MDL 15A Fuse

Short Circuit Inverter Mode Test 2

Tested with a Federal Pioneer 15A breaker

Note: Breaker tripped in 5 ½ cycles.

UPS system went to bypass and waited until breaker cleared.

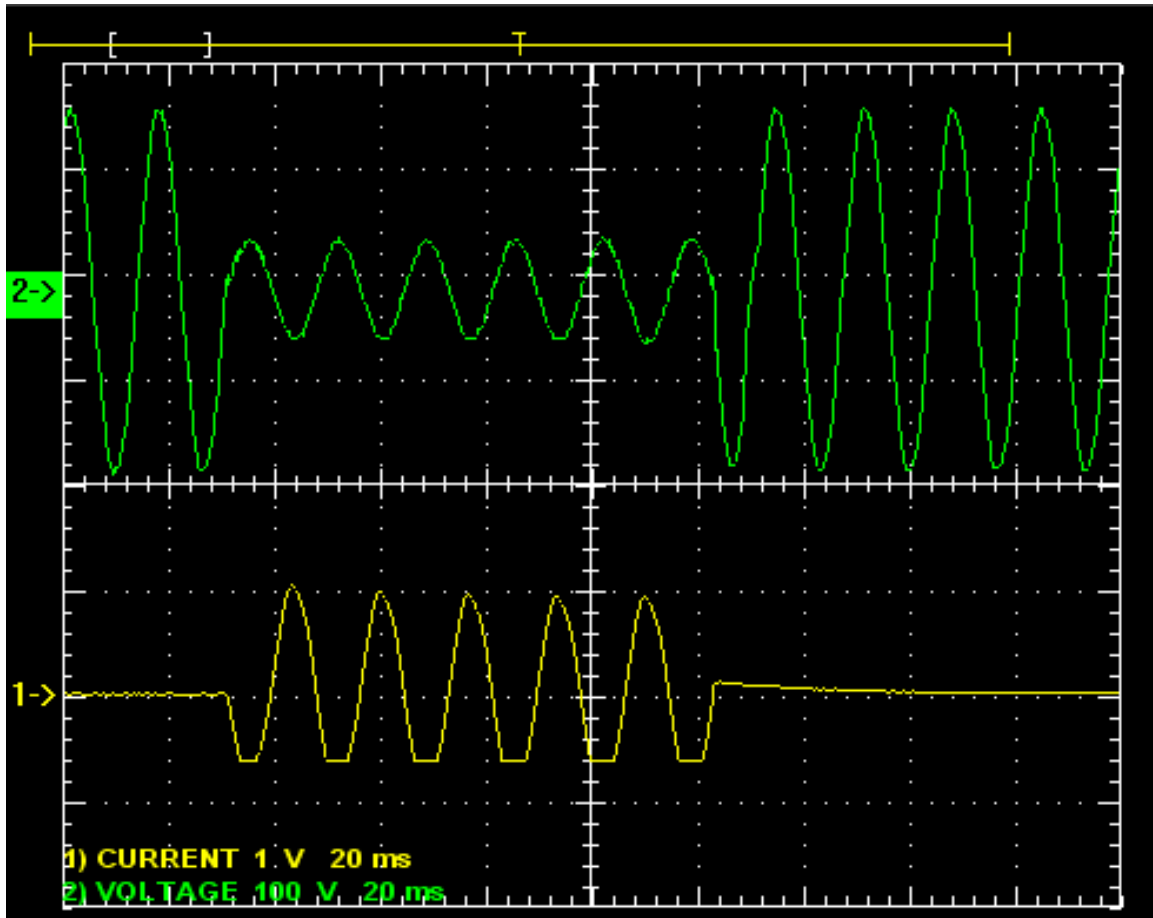


Figure 5: Current and Voltage waveform short circuit Federal Pioneer 15A breaker

Short Circuit Inverter Mode Test 3

Tested with a 15A SDB (Specially Designed Breaker)

Note: UPS stayed in on-line mode (Inverter Mode)

SDB opened within $\frac{3}{4}$ of a cycle.

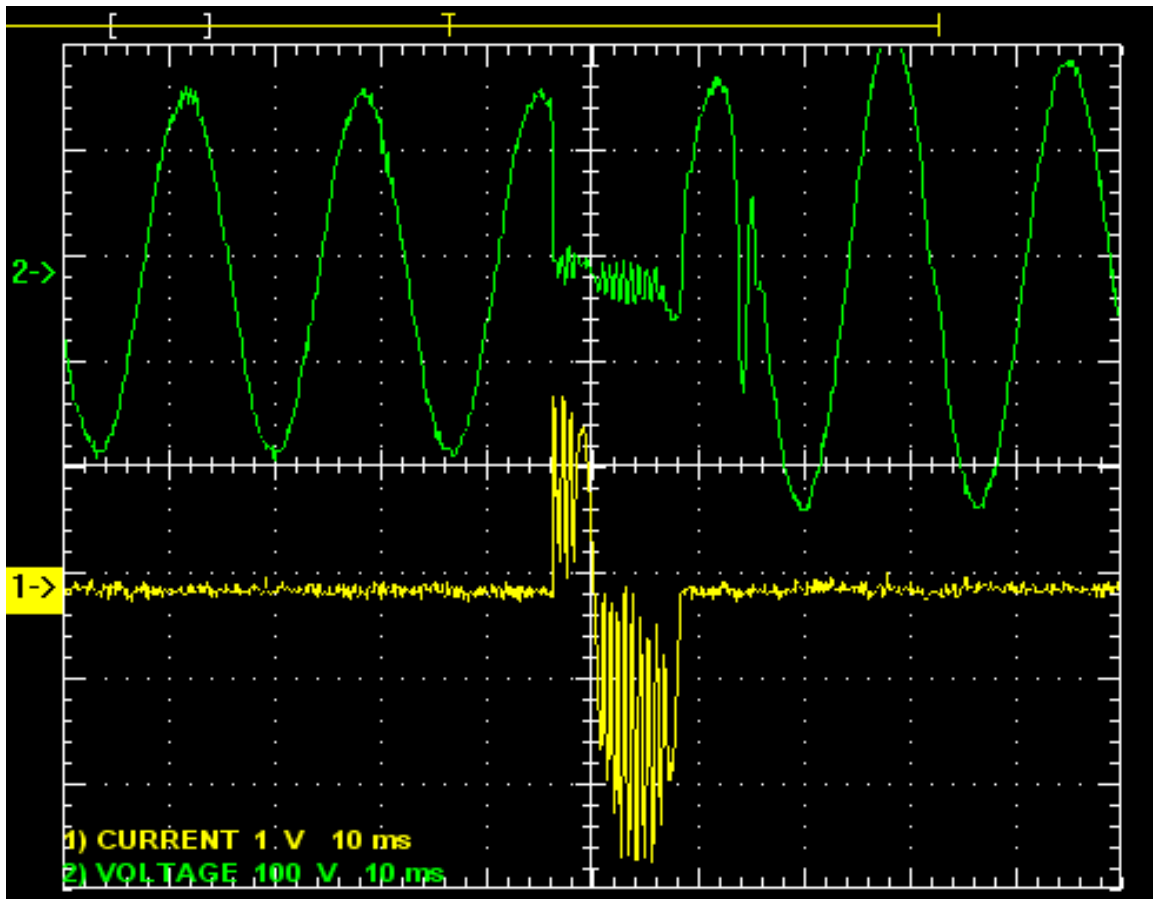


Figure 6: Current and Voltage waveform short circuit 15A SDB

Conclusion:

As the above test results show, the Specifically Designed Breakers (SDB) is easily resettable like a standard breaker. It also incorporates the best attributes of a fuse. The SDB reacts and clears the fault within one cycle, providing the fast reaction time of a fuse, and can be reset the same way as a breaker (after the fault has been cleared). Because of the fast reaction of the SDB, the UPS system supplying the panel remains on-line. The other loads connected to the distribution panel with the SDB's does not detect the short circuit on the problematic branch (Note: based on ITI/CBEMA standard mentioned earlier).

These advantages make the SDB in combination with the "GENIE" panel the most reliable means of distribution for any type of critical environment based on sensitivity or demand (i.e.: hospitals, server rooms, control centres, air traffic towers, etc.).

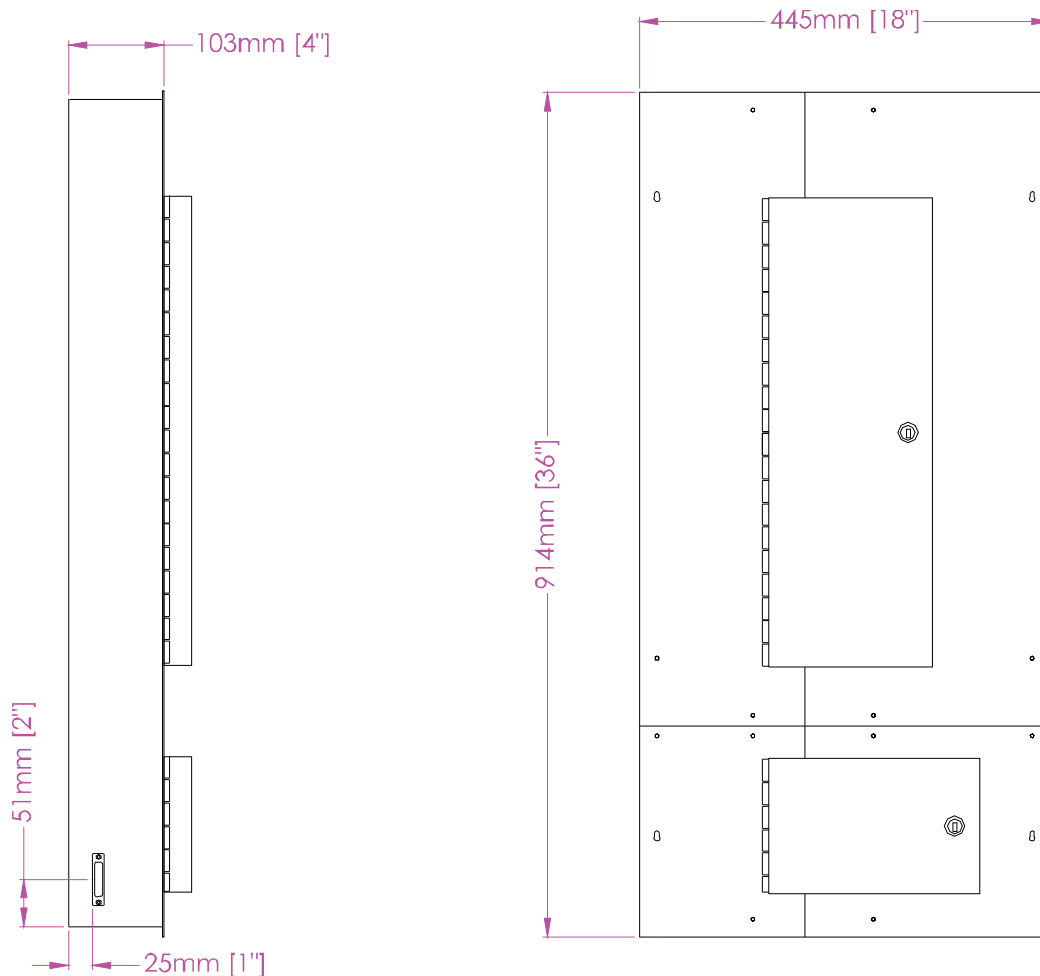
4. Installation

WARNING!

The Genie Breaker Panel should be installed by a qualified technician or personnel and wired in accordance with local and national electrical codes. Be sure the polarities and voltage match the rating of the unit. Check that the loads being protected are within the capacity of the system. Ensure no power has been applied to the systems and nothing has been turned on before proceeding.

FOR PROJECT SPECIFIC DRAWINGS PLEASE REFER TO MANUAL ADDENDUM.

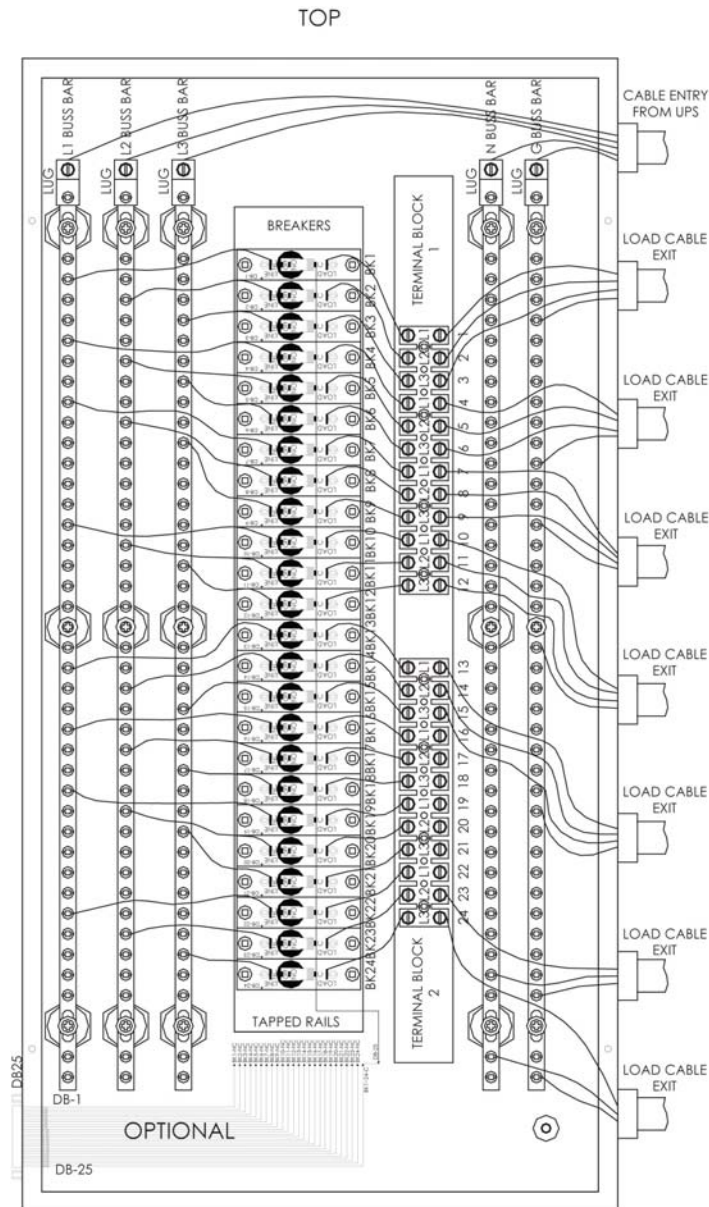
Physical Layout



Mounting

Remove the panel cover and drill holes through the back side where needed. This allows for a variety of installation options.

Generic Wiring Diagram Example



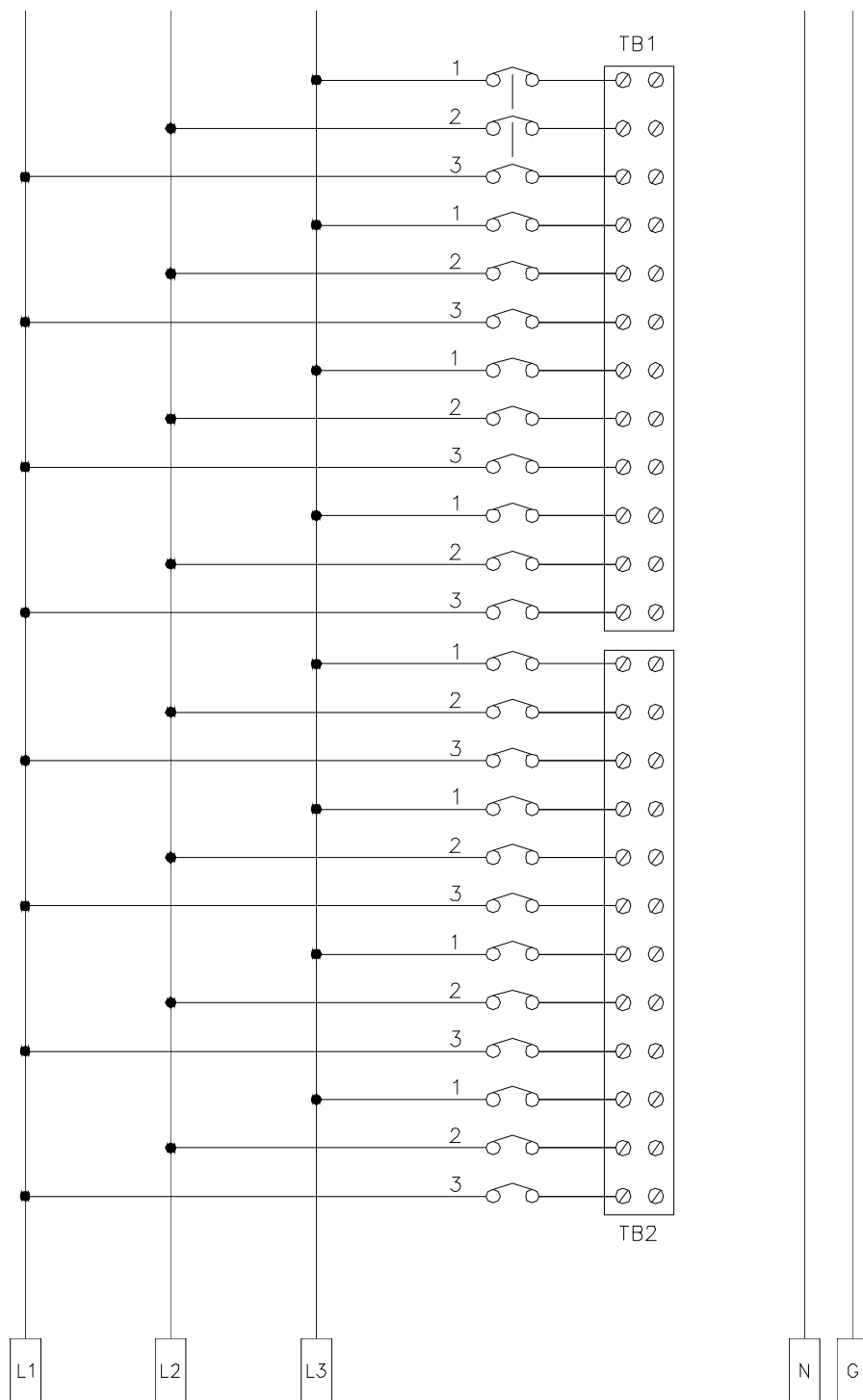
Cable Selection

The cabling of the Genie Breaker Panel has to be sized according to the bypass system power rating. Sizing of circuit breakers, fuses and cables for input utility, output load must meet the requirements of local and national electrical codes.

WARNING

Inadequate cable size and over sized breakers can increase the risk of fire or damage connection cables and internal components.

CAUTION: Do not apply utility power before an Always On representative has confirmed connections.



Generic Riser Diagram Example

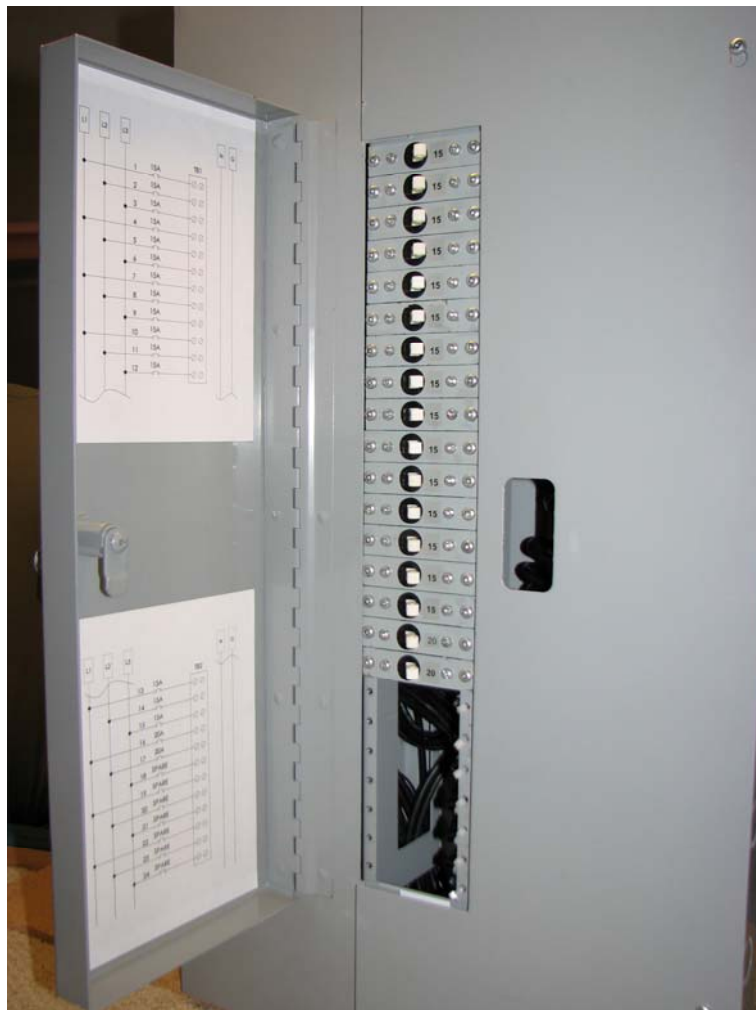
5. Breaker Reset Procedures

Reset a Tripped Circuit Breaker or Turn On Breaker

- Unlock and open door on the front of breaker panel.
- Find circuit breaker that is tripped or in the “OFF” position.
- Push circuit breaker handle to the “ON” position.

Turn Off a Circuit Breaker

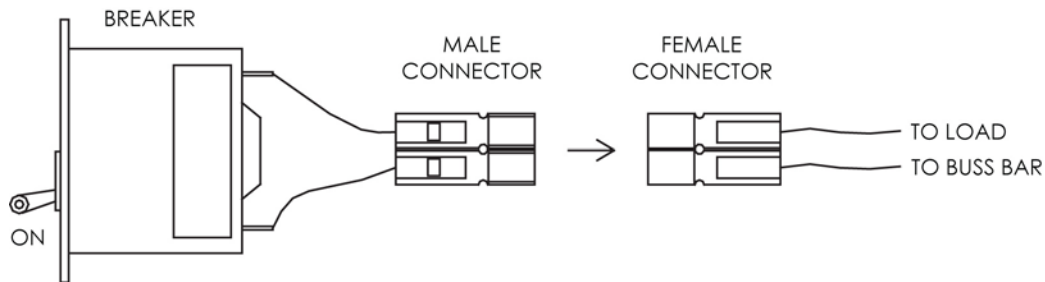
- Unlock and open door on the front of breaker panel.
- Locate appropriate circuit breaker that is to be turned off.
- Push circuit breaker handle to the “OFF” position.



6. Breaker Removal/Replacement Procedures

WARNING: SHOCK HAZARD. ONLY QUALIFIED PERSONNEL SHOULD CONDUCT BREAKER REPLACEMENT PROCEDURES.

A circuit breaker may be replaced or added to the panel for upgrading or maintenance purposes.



To Remove a Circuit Breaker

- Unlock and open front access panel.
- Locate and remove the two self tapping screws to release the breaker from the breaker frame.
- Pull the breaker out of the mounting frame until the connector is exposed.
- Cut the plastic tie strap that secures the connector, disconnect the connectors and remove the breaker.

To Add a New Circuit Breaker:

- Unlock and open front access panel.
- Find an available circuit breaker bay. A cable lead is provided to quickly connect the special Genie circuit breaker.
- Remove the two self tapping screws that secure the bay cover.
- Disconnect the lead from the bay cover.
- Connect the available cable lead to the circuit breaker lead.
- Ensure a bracket is attached to the breaker before inserting.
- Push the leads into the circuit breaker mounting frame and mount the new circuit breaker into the circuit breaker frame with self tapping screws
- Test the circuit breaker and circuit for correct operation.

7. Contact Always On

Mailing Address:

Always On UPS Systems Inc.
100 – 150 Campion Rd,
Kelowna, BC, V1X 7S8,
Canada

Quality Assurance and Warranty Support:

P: (250) 491-9777 Ext 209
F: (250) 491-9775
qa@alwayson.com
www.alwayson.com

Additional Purchases or Upgrades:

P: (250) 491-9777 Ext 451
F: (250) 491-9775
sales@alwayson.com
www.alwayson.com

