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USER MANUAL

DPA 500 External Maintenance Bypass Cabinet (MBC)

Up to 480V, 500kW UL



Document information

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The ABB Group family thanks you for choosing our product for your equipment need. We appreciate the opportunity to supply our customers with the highest quality power products manufactured in the United States. Our products are factory tested to the highest industry standards.

ABB is a leading global technology company in power and automation that enables utility, industry and transport and infrastructure customers to improve their performance while lowering environmental impact. The ABB Group of companies operates in roughly 100 countries and employs about 135,000 people.

As your service partner we can ensure the overall support of ABB power protection portfolio throughout the entire life cycle. We are committed to the reliability of your operations. This is why we make every possible effort to guarantee your power availability - no matter what happens on the power supply side.

We work closely with our research and development organization which enables us to develop the most advanced service for our product portfolio and ensure a pro-active product life cycle management.

Please provide the following information for customer service when you contact the ABB service center:

| | |
|---------------------------|--|
| PART NUMBER: | |
| SERIAL NUMBER: | |
| KVA RATING: | |
| PURCHASE DATE: | |
| INSTALLATION DATE: | |
| LOCATION: | |
| INPUT VOLTAGE/FREQUENCY: | |
| OUTPUT VOLTAGE/FREQUENCY: | |

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1 About this manual

This user manual contains guidelines to check delivery, install and commission a MBC. People who plan an installation, install and commission a MBC, operate or service the MBC are expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.

The MBC system operates with mains, battery or bypass power and contains components that carry high currents and voltages. The properly installed MBC system is grounded to earth and IP 20 rated against electrical shock and foreign objects when all deadfronts, doors, and screens are in place.

1.1 Safety notices

The following safety instructions must be observed when working on the MBC.



CAUTION: REFER TO MANUAL FOR THE SPECIFIC HAZARD

STOP, A HAZARD MAY BE PRESENT. THOROUGHLY READ AND UNDERSTAND THE INFORMATION AND INSTRUCTIONS THAT FOLLOW.

Caution statements are a description of a potentially hazardous situation which if not avoided could result in minor or moderate personal injury.



WARNING: RISK OF ELECTRIC SHOCK

AN ELECTRICAL SHOCK HAZARD IS PRESENT. TECHNICIANS SHOULD OBSERVE ASSOCIATED WARNINGS.

Warning statements are a description of a potentially hazardous situation which if not avoided could result in minor personal injury, serious injury or death.

1.2 Safety precautions

The MBC is designed to receive power from more than one power source (AC line or MBC power). This unit contains hazardous voltages. Hazardous voltages exist within the MBC regardless of the mode of operation. Before making any connections to the unit, make sure that all power sources are turned off and locked out.

As lethal voltage exists within all operating modes of the MBC, maintenance can only be performed by qualified and authorized trained service personnel.

ABB neither recommends nor knowingly sells this product for use with life support applications or other FDA designed critical applications.

All wiring should be performed by qualified electricians and in the accordance with local and national electrical safety codes. Before placing the unit into service, a thorough inspection and supervised start-up should be performed by qualified service technicians.

ONLY AUTHORIZED SERVICE PERSONNEL SHOULD PERFORM MAINTENANCE ON OR SERVICE THE MBC.

1.3 Safety considerations

The MBC cabinet is designed for industrial applications. However, the MBC system is a sophisticated power system and should be handled and operated with appropriate care. The following guidelines should be used to determine where to install the unit:

- The surrounding area should be kept clean and free from excess moisture.
- Do not operate the MBC system close to gas or electric heat sources.
- The system is not intended for outdoor use.
- The operating environment should be maintained within the parameters stated within this manual.
- Keep the cabinet doors closed and locked to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.

1.4 Symbols used in this manual

The following symbols are used in this manual, the list below is describing each symbol.



IMPORTANT (NOTE)

This symbol indicates operator tips, particularly useful or important information for the use of the product. This symbol and wording does not indicate a dangerous situation.



PE – Protective Earth terminal

The PE terminal must be connected to earth prior to making any other connection to the equipment.



AC – alternating current or voltage

A terminal to which or from which alternating current or voltage is applied or supplied.



DC – direct current or voltage

A terminal to which or from which direct current or voltage is applied or supplied.



Battery

This symbol indicates a battery (source of DC voltage and current) which can be both, internal or external to the MBC system and accessories (battery cabinet).



Power ON/OFF or shutdown

Symbol used to indicate the action of Powering ON, Idle or shutdown the MBC.



Recycle



Do not dispose of the item in an ordinary trash receptacle.

2 Shipping, receiving and unloading

This section provides information to personnel receiving the MBC following transport.

2.1 Shipping

The floor mounted MBC cabinets are shipped bolted to a pallet and wrapped in packaging material.

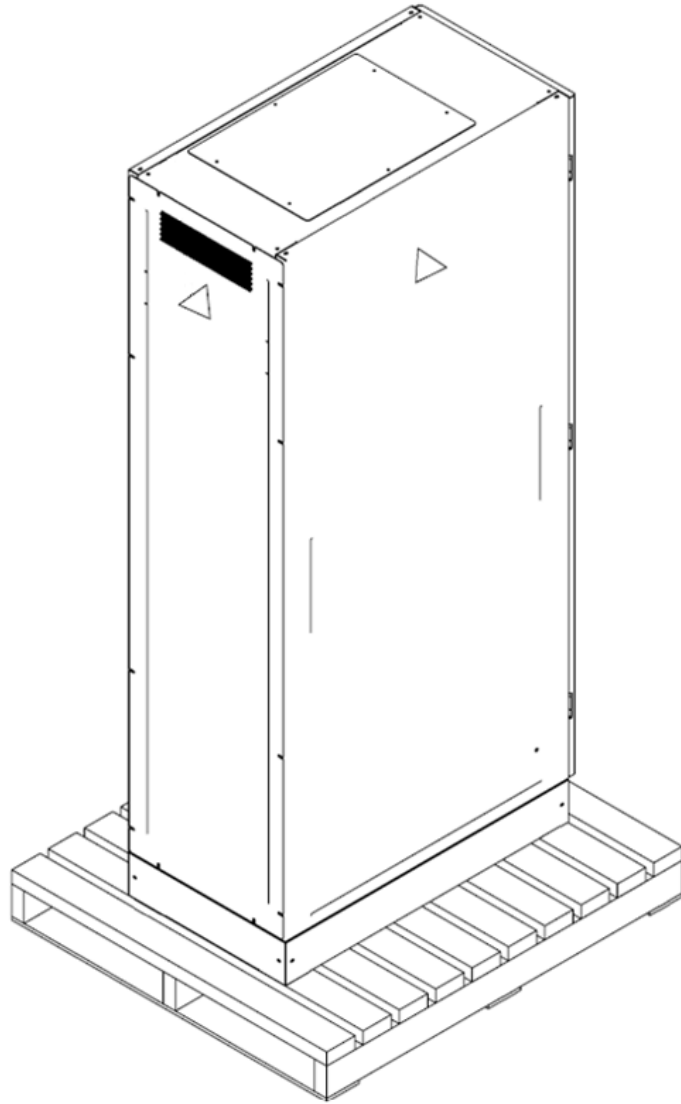


Figure 2-1 Pallet Mounted MBC

2.2 Visual inspection

Before moving the unit/pallet from the receiving area, do the following:

- Make sure that the items on the manifest correspond to the material indicated in the delivery note.
- Inspect the outside of the packing material for obvious damage or rough handling.
- DO NOT remove the packaging material until the MBP is off its pallet and ready for installation.
- DO NOT remove the MBP enclosure from the pallet until all movement is completed.
- A thorough internal inspection should be conducted only after the enclosure has been positioned for installation, and prior to making electrical connections.
- Before moving the load (the unit and transport device, i.e. pallet jack or forklift), make sure that the pathway is wide enough for the load and can support the load all the way to the installation site.

If damage to the MBC is visible or suspected, i.e.



Visible transport damage must be claimed to the carrier immediately after receipt. All other types of shipping damage claims for must be filed immediately and the carrier must be informed within 7 days of receipt of the equipment. Packing materials should be stored/kept to facilitate a future investigation.

2.3 Storage

If the MBC is to be stored for several months prior to installation, keep the original packing on the MBC. The shipping packaging should protect it from mechanical and environmental damage. The storage area should be indoors, in a clean environment, where the MBC can be protected from water and direct sunlight. The storage area must be capable of standing up to the weight of the unit/s.



The recommended temperature for storage of a MBC is between -13°F and 158°F (-25°C and +70°C), humidity < 95% (non-condensing).

2.4 MBC placement

The installation site should meet environmental parameters (temperature, weight, airflow, size and clearance) outlined in this manual. The MBC is designed for restricted access location only. The items in the list that follows should be used to evaluate the MBC setup/installation location. The room/area should:

- Maintain a temperature between 32°F and 104°F (0°C and +40°C).
- Have a relative humidity that does not exceed 95% (non-condensing).
- Be positioned away from direct sunlight.
- Be absent of dust or corrosive/explosive gases.
- Have adequate ventilation (an air tight room is not acceptable).
- Not be above a maximum altitude of 3,281 ft (1,000 m) above sea level.
- Have fire protection.
- Be vibration free.
- Have floor material that is non-flammable and strong enough to support the heavy load.
- Not prevent the input and output cables from being installed to national, state and local codes.
- Have front accessibility of 36 in. (914 mm). Only front access is necessary for service and maintenance. Refer to Figure 2-2 for minimum clearances.
- Leave room on the sides (left and right) to install additional cabinets, such as ABB UPS parallel cabinets for more capacity or added battery cabinets.

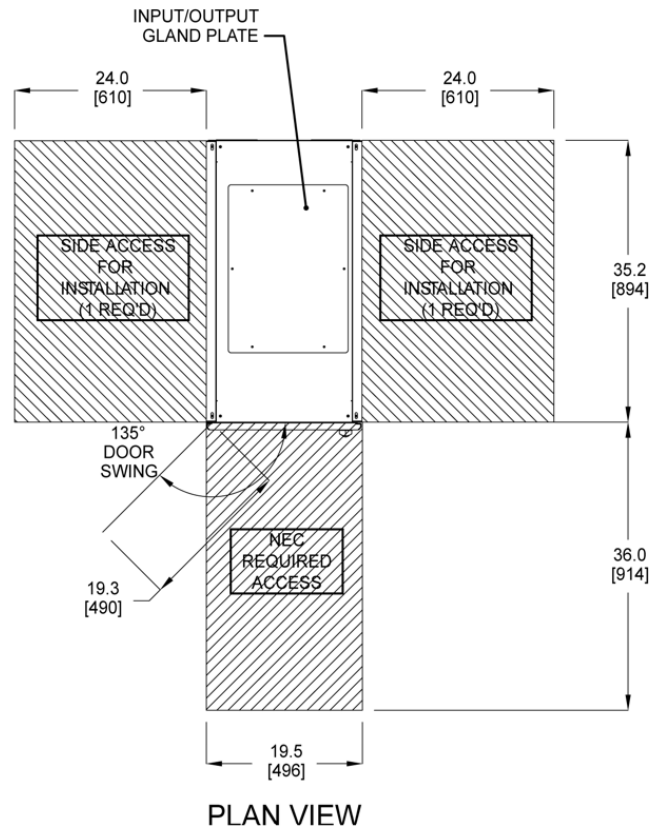


Figure 2-2 Clearances



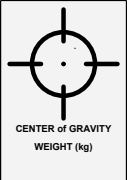
The back of the MBC must have a minimum of 12 in. (305 mm) of clearance for ventilation purposes.

2.5 Unpacking

Prior to unpacking, make sure that the floor surface is solid and suitable for supporting the weight of all the equipment.



WARNING



WARNING: AN OUT OF BALANCE CONDITION COULD OCCUR.

THE MBC CABINET IS HEAVY AND TALL, THEREFORE, THE CENTER OF GRAVITY (COG) MAY NOT BE IN AN OBVIOUS LOCATION. TILTING A UNIT MORE THAN 10 DEGREES CAN CAUSE A HAZARDOUS SITUATION.

WHEN MOVING THE UNIT, ALL MOVEMENT (ACCELERATION, TRANSPORT AND STOPPING) MUST BE SLOW.

EQUIPMENT DAMAGE AND PERSONNEL MAY BE INJURED OR KILLED IF THE MBC FALLS.

The MBC cabinet is bolted to a wooden skid pallet. Do the following to separate the MBC from the pallet:

1. Move the pallet/unit(s) close to their final location.
2. Gain access to and remove the hardware securing the MBC to the pallet.
3. Lift the MBC, from the side, off the pallet and position the MBC to be installed.
4. Remove the protective storage wrapping.
5. Remove the accessories box from the top of the MBC.

3 Mounting

Anchoring the MBC must be accomplished following all national, state and local codes.

3.1 Anchoring the MBC

The MBC rests on four pedestal feet (behind kick plates) and each location is pre-drilled for attaching the unit to floor. The holes on the long sides are 32.6 in. (829 mm) apart and the holes on the short sides are 17.0 in. (432 mm) apart.

Figure 3-1 shows the location of the anchoring holes. Also note in the figure, the unit has pre-cut openings for input or output cables. Figure 2-2. Clearances shows to the opening on the top of the unit for cables.

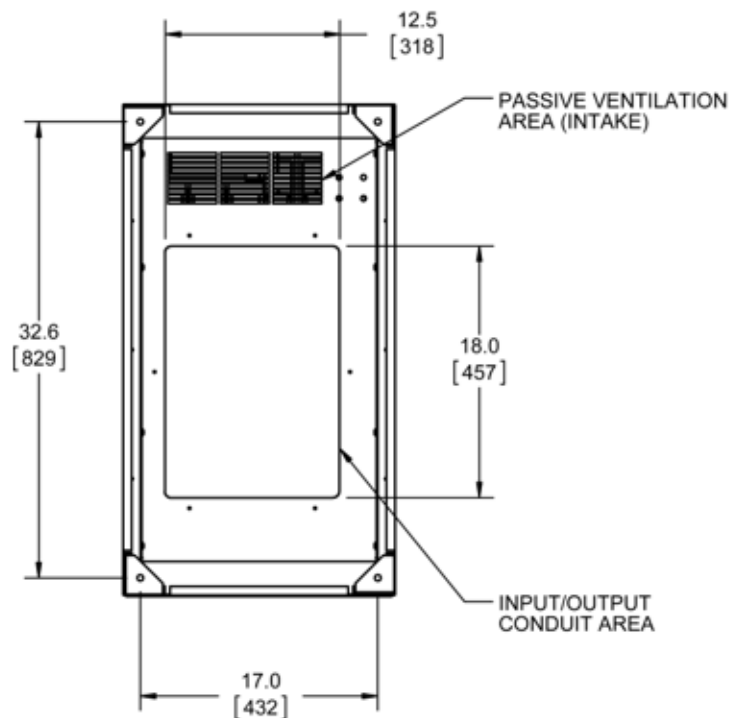
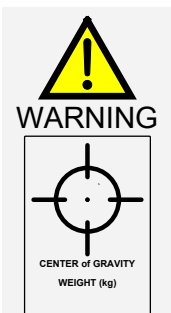


Figure 3-1 Anchor Dimensions (bottom view)

4 Power cables

The Maintenance Bypass Cabinet requires both power and control cabling after it has been anchored in a suitable location. All control cables must be physically isolated from the power cables. Route all control cables in metal conduits or metal ducts that are electrically bonded to the cabinets they are connected to. The cable design must be in accordance with local, state and national electric codes and also take into consideration the environmental conditions such as temperature.



WARNING: RISK OF ELECTRIC SHOCK.

IT IS THE RESPONSIBILITY OF THE INSTALLATION TECHNICIAN TO ENSURE THAT ALL LOCAL, STATE, AND NATIONAL ELECTRIC CODES ARE ADHERED TO. IDENTIFY THE LOCATION AND OPERATION OF THE EXTERNAL ISOLATORS CONNECTING THE INPUT/BYPASS POWER SUPPLY. MAKE SURE THAT THE POWER SUPPLY CONNECTIONS ARE ELECTRICALLY ISOLATED. DISPLAY WARNING/SAFETY TAGS TO PREVENT ACCIDENTAL OPERATION. IF INSTRUCTIONS ARE IGNORED, PHYSICAL INJURY, DEATH, OR DAMAGE MAY OCCUR TO THE UPS OR THE MBC EQUIPMENT.

4.1 Power cable connection procedure

The following are general recommendations only and are superseded by local regulations and codes of practice where necessary:

- Size the grounding conductor according to the type of protection, cable lengths, fault rating, etc. The grounding cable must follow the most direct route when connecting the UPS to the main ground system.
- If necessary, use smaller parallel cables for heavy currents to make the installation easier.

The AC mains input, UPS input, UPS output, and system output cables connect to busbars located on the backside of the UIB and MIB switches as shown in Figure 4-1. All cable connections must use lug type terminations. The connections are only accessible when the power compartment door is open and when the dead fronts or side panels are removed.

4.2 OCPD recommendations

The values in Table 4-1 are design ratings per phase. Consult the values below when selecting appropriate upstream AC Over Current Protective Devices (OCPD). ABB OCPDs are recommended; other manufacturer parts are shown for comparison. Ensure that any selected OCPD will meet the requirements in Table 4-2. To reduce the risk of fire, only connect the MBC to circuits with recommended OCPD.

| MBC Rating (kW) | Voltage | Input Current (A) | | Bypass Current | Output Current |
|-----------------|---------|-------------------|---------|----------------|----------------|
| | | Nominal | Maximum | | |
| 500 | 480 | 614 | 689 | 607 | 601 |
| 300 | 480 | 368 | 413 | 364 | 360 |
| 240 | 415 | 340 | 351 | 336 | 333 |
| 120 | 208 | 340 | 351 | 336 | 333 |

Table 4-1 DPA design rating

| Recommended Upstream Protection Breaker MFR | MFR Part Number | I _{Peak} Let-Through (Amps) | I ₂ T Let-Through X 1,000,000 | Total Clearing Time | Available Source Fault |
|---|------------------|--------------------------------------|--|---------------------|------------------------|
| ABB | T6HQ800W (100%) | 60,250 | 10.80 | 5.95 | 65kA |
| ABB | T6LQ800W (100%) | 75,000 | 11.30 | 4.01 | 100kA |
| Square D | CKHED36808LI | 87,000 | 25.00 | 7.50 | 65kA |
| Square D | PL 800/1000/1200 | 110,000 | 41.30 | 10.20 | 100kA |

Table 4-2 DPA design rating

4.3 Control wiring connection points from MBC to UPS & LIB

| From | To | Notes |
|-----------|-------------------------------|---|
| TB1-1 | NW22085, X1-1 | Kirk key interlock |
| TB1-3 | NW22085, X1-2 | Kirk key interlock |
| TB-MBB-11 | NW22085, X3-7 | Maintenance Bypass Breaker Auxiliary |
| TB-MBB-14 | NW22085, X3-8 | Maintenance Bypass Breaker Auxiliary |
| TB-MIB-11 | NW22085, X3-9 | Maintenance Isolation Breaker Auxiliary |
| TB-MIB-14 | NW22085, X3-10 | Maintenance Isolation Breaker Auxiliary |
| | NW22085, CN4 | Add jumper connector P/N: 48-1500-00000002 |
| TB2-1 | External Battery Cabinet | VRLA UVR Power supply (TB1) or 3rd Party BMS Power L1 |
| TB2-2 | External Battery Cabinet | VRLA UVR Power supply (TB1) or 3rd Party BMS Power L2 |
| TB2-3 | External Battery Cabinet | VRLA UVR Power supply (TB1) or 3rd Party BMS Power L3 |
| TB2-4 | External Battery Cabinet PE/G | VRLA UVR Power supply (TB1) or 3rd Party BMS Power PE/G |

Table 4-3 Breaker control wiring & external battery REPO power supply connections



DUAL INPUT FEED INSTALLATIONS:

BOTH ELECTRICAL SOURCES MUST HAVE EQUAL LINE VOLTAGE, FREQUENCY, PHASE SEQUENCE, PHASE ROTATION, AND WAVEFORM TO BE PROPERLY AND SAFELY SYNCHRONIZED.

4.4 AC wiring instructions

Before proceeding to wire your MBC, make certain that you have read and understood section 4. Power Cables and that the following recommendations are observed:

- The cable sections and fuse ratings must follow all applicable local and national standards. Recommended cable and OCPD ratings can be determined from Tables 4-1 and 4-2.
- No mains voltage is present on the wires.
- All loads are shut down and disconnected.
- UPS is shut down and voltage-free (no battery is connected).
- Centralized mains disconnect(s) are in the open (OFF) position.
- All parallel isolators on UPS are in the open (OFF) position.
- Mains voltage (Input Voltage) and frequency (Input Freq.) correspond to the values indicated on the type plate of the MBC. The type plate is on the inside part of the door.
- Make sure that the total power of the load is equal or lower than the rated power of the MBC (output power) indicated on the type plate of the MBC.
- PE wiring is performed in accordance with the prescribed NEC Standards or with local regulations.
- MBC is connected to the mains through a Low Voltage Distribution Board with a separate mains line (protected with a circuit breaker or fuse) for the MBC.
- A torque wrench shall be used to tighten the cables.

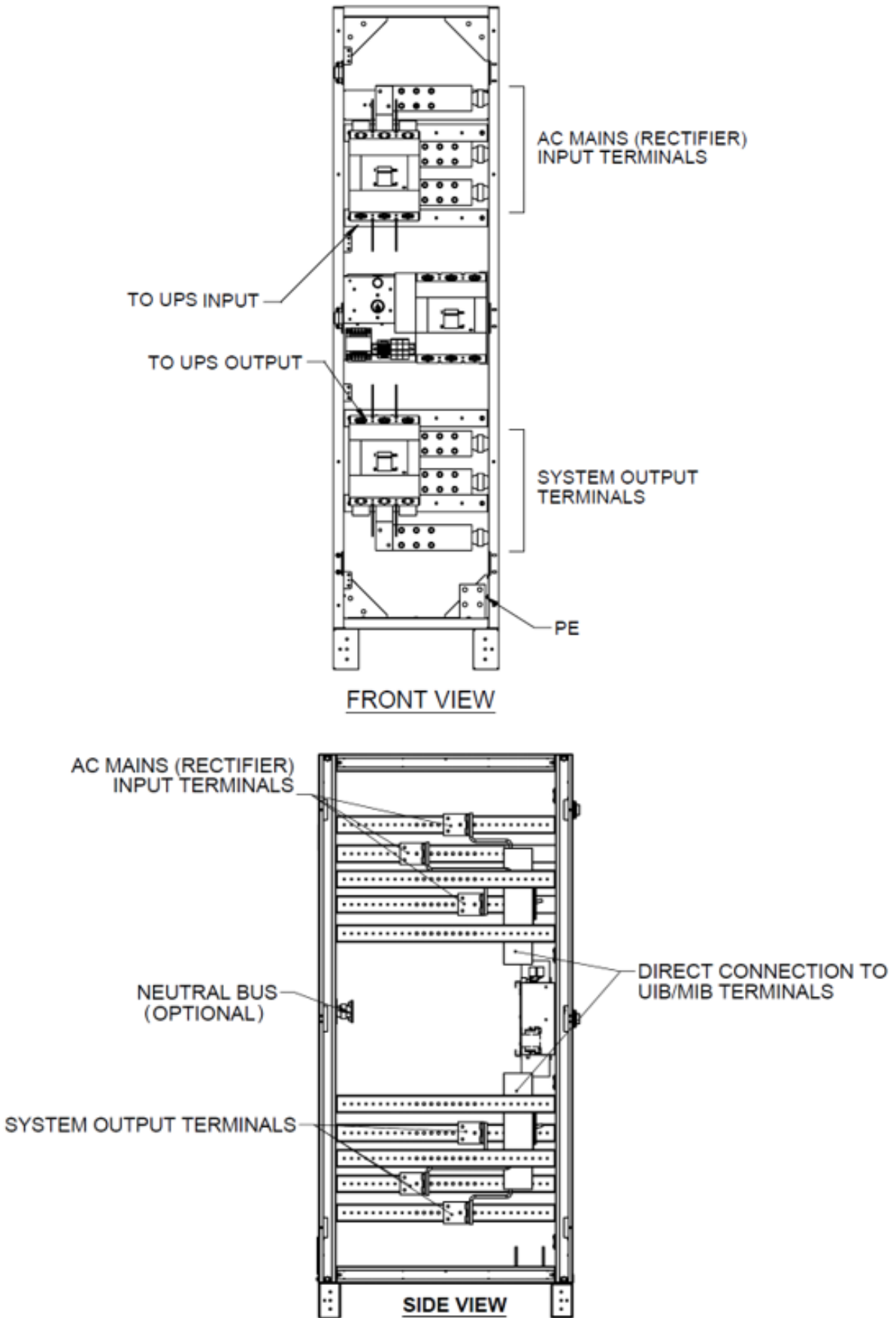


Figure 4-1 Terminal locations (sheet 1 of 2)

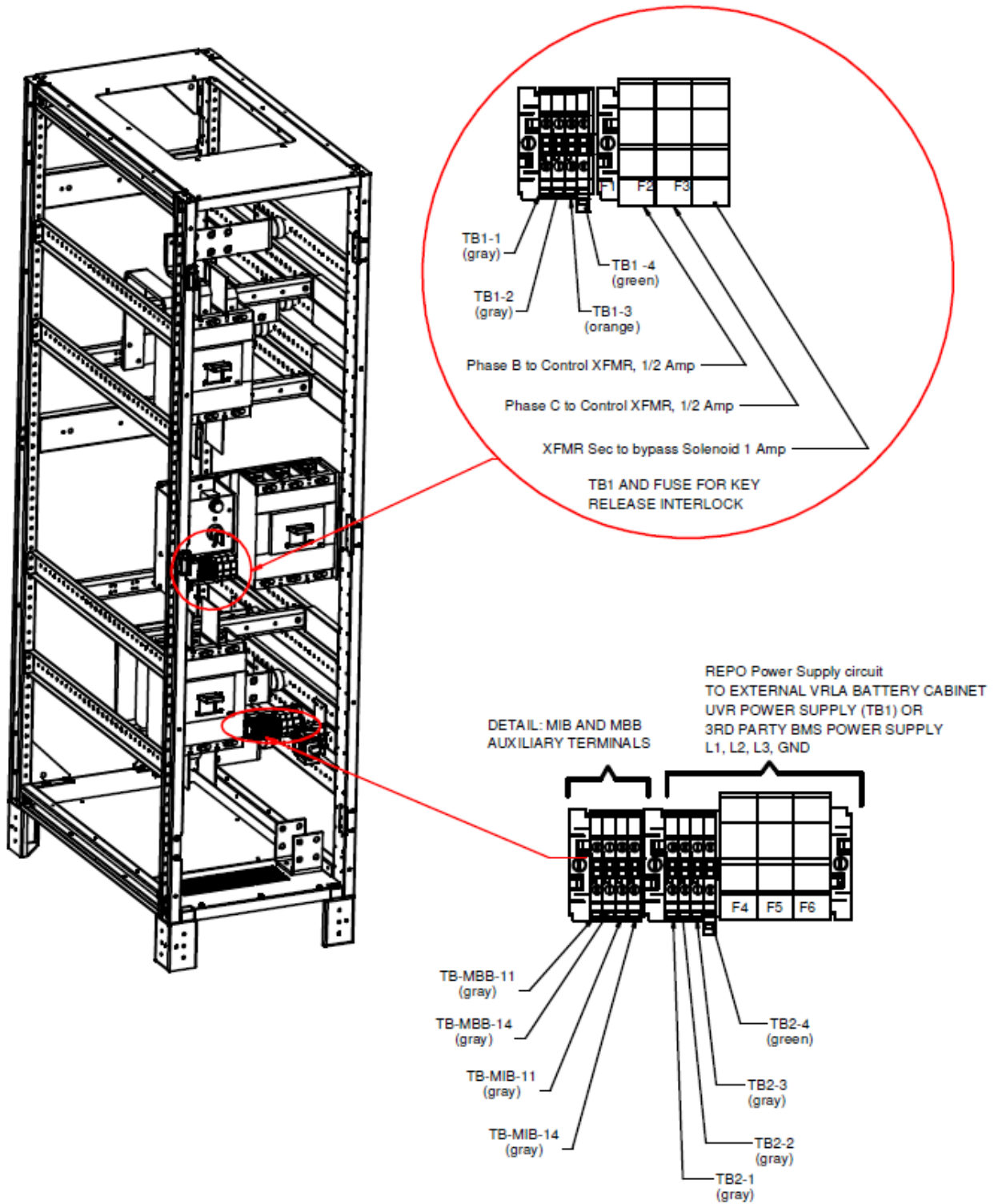


Figure 4-2 Terminal locations (sheet 1 of 2)

5 Product overview

The ABB MBC is used in conjunction with an Uninterruptable Power Supply (UPS) to maintain total continuity of power to connected load circuits when bypass of the UPS equipment is required for performance of regular service and maintenance.

The MBCs are available with power capacities ranging from 120 kW to 500 kW. The units are also available with multiple input voltage options.

5.1 Description

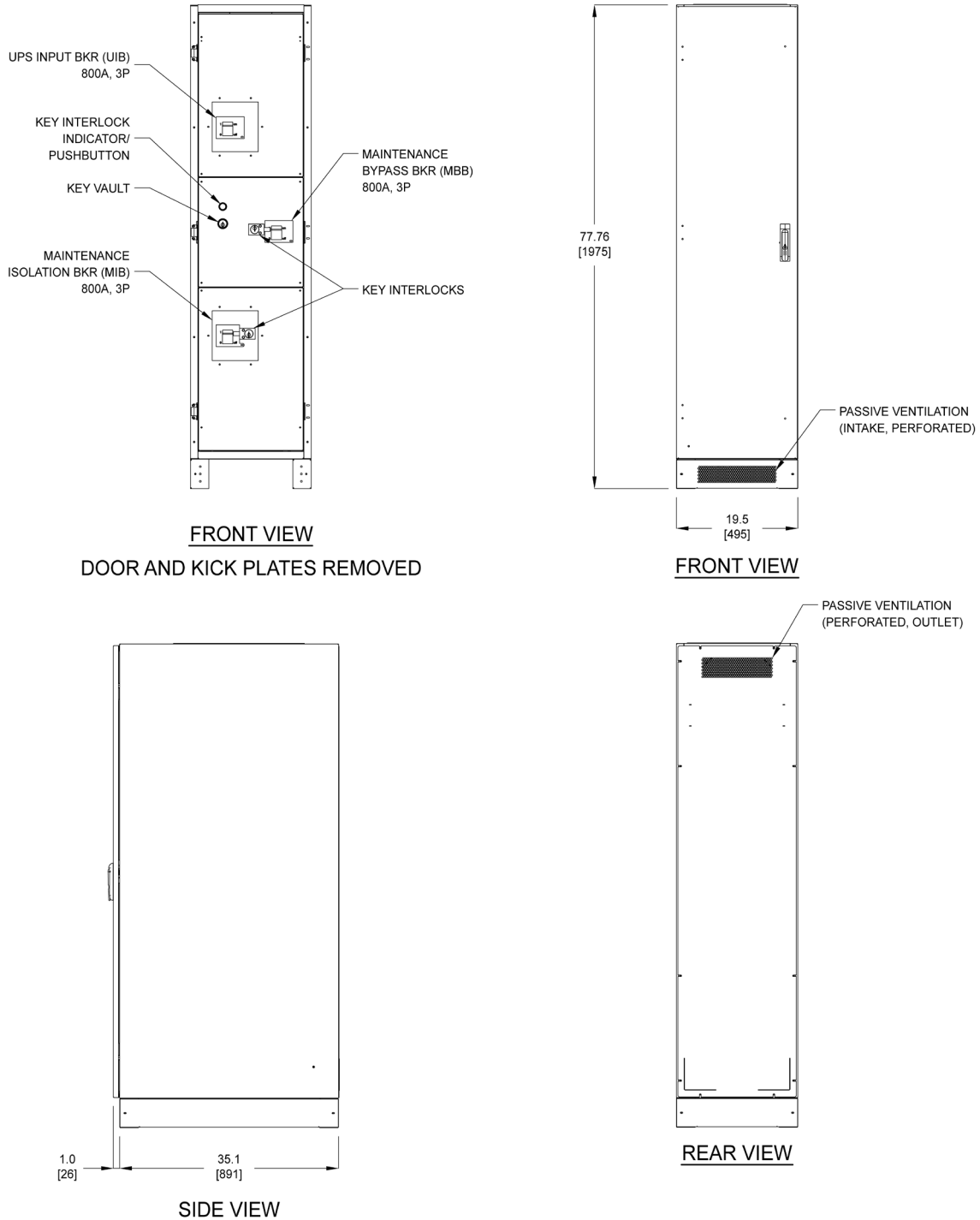


Figure 5-1 Dimensions

As shown in the MBC is 19.5 in. (495 mm) wide (front view), 36 in. (914 mm) long (side view) and 77.75 in. (1975 mm) tall. The cabinet has passive ventilation ports on the front and rear. Adequate clearance must be provided in the two ventilation areas.

Also shown are the locations of the UPS Input Breaker (UIB), Maintenance Bypass Breaker (MBB) and Maintenance Isolation Breaker (MIB). Key interlocks are shown on the MBB and MIB. The three ABB Tmax molded case circuit breakers are protected by a Kirk Key interlock system.

The cabinet is constructed using National Electrical Manufacturers Association 1 (NEMA) (IP20) enclosure standards. 14 gauge steel is used to construct the frame and 16 ga. steel on the panels. The rear and inside panels are galvanized zinc electroplated. The finish on the outer panel is midnight black wrinkle powdercoat.

ABB makes several MBC models; therefore, the weight and size of the units vary. Refer to the table below.

| MODEL | WEIGHT | SIZE (L x W x H) (in. - mm) |
|----------------|------------------|---|
| 500kV, 480 VAC | 550 lbs (250 kg) | 36 in. (914 mm) x 19.5 in. (495 mm) x 77.75 in. (1975 mm) |
| 300kV, 480 VAC | 452 lbs (205 kg) | 36 in. (914 mm) x 19.5 in. (495 mm) x 77.75 in. (1975 mm) |
| 240kV, 415 VAC | 427 lbs (194 kg) | 36 in. (914 mm) x 19.5 in. (495 mm) x 77.75 in. (1975 mm) |
| 120kV, 208 VAC | 427 lbs (194 kg) | 36 in. (914 mm) x 19.5 in. (495 mm) x 77.75 in. (1975 mm) |

Table 5-1 Model characteristics

5.2 System specifications

Input/output Voltage: multiple options are available.

- 208 VAC, 3-Phase, 120 kW, 3W + G (PE), optional 4W + G (PE)
- 415 VAC, 3-Phase, 240 kW, 3W + G (PE), optional 4W + G (PE)
- 480 VAC, 3-Phase, 300 and 500 kW, 3W + G (PE)

(See equipment label for configuration specific information)

System Capacity: 120 kW to 500 kW.

(See equipment label for configuration specific information).

Circuit Breakers: UL Listed, Multiple voltage rating options available, AIC ratings from 25 to 100 kAIC depending on power level.

(See equipment label for configuration specific information).

AC Mains Input, System Output, PE and Neutral (Optional) Terminations: Threaded connections used with terminal lugs.

UIB and MIB Terminations: Lug type terminations.

Wire Size and Type: Per NEC and/or all applicable national and local codes.



Surge Suppression: Overvoltage

When paired with the ABB DPA UPS, the ABB MBC transient levels are acceptable to the levels specified by the ABB DPA UPS manual (refer to, the UPS manual).

When paired with the any other non ABB make/model UPS, the MBC transient levels are not to exceed 2,500V. Above this level requires external Surge Protection Device (provided by Others).

5.3 Fuse ratings

Fuses present with key interlock option. Use class CC fuses.

| | Voltage (V) | Current (A) | ABB Part Number |
|----|-------------|-------------|-----------------|
| F1 | 600 | 1/2 | 08-35-020031 |
| F2 | 600 | 1/2 | 08-35-020031 |
| F3 | 600 | 1 | 420000002000 |

Table 5-2 Fuse ratings

6 System operation

The following user instructions are for a three-circuit breaker MBC configured to be controlled by a 2-Interlock, 1-Key breaker interlock system.

6.1 Normal operation

The MBC UPS Input Breaker “UIB” is Closed/ON.

The Maintenance Bypass Breaker “MBB” is Locked Open/OFF with the interlock locking bolt in the extended position.

The Maintenance Isolation Breaker “MIB” is Closed/ON with the interlock locking bolt in the withdrawn position and Key A1 held captive.

6.2 Transfer to external maintenance bypass

1. Transfer the UPS to the Static Bypass Mode. Make sure that the push button "PB1" is illuminated.
2. To initiate the key, release depress, and hold in the PB1 button (this releases the solenoid lockout) and remove the Key A-1 from the key release interlock.
3. Insert Key A-1 in the interlock on the “MBB” breaker to unlock.
4. Close/Turn-ON the “MBB” breaker (Key A-1 is now held captive).
5. Open/Turn-OFF the “MIB” breaker.
6. Turn, key B-1, in the interlock on the “MIB” breaker to lock the “MIB” breaker in the Open/OFF position (Key B-1 is now free).



It is recommended that Key B-1 be inserted into the key release interlock. Key B-1 would then be captive to the panel until after maintenance on the UPS is complete and the UPS has been brought back on line.

The UPS is now ready for routine maintenance.

If further maintenance requires a total shutdown of the UPS and isolation from the input, the “UIB” breaker must be Opened/Turned-OFF and the battery supply or alternate power source to the UPS must be disconnected. Refer to your MBC manual for proper shutdown procedures.

6.3 Return the UPS and MBC to normal operation

If the "UIB" breaker is Opened/Turned-OFF for maintenance, then follow the UPS manual for proper start-up procedures.



CAUTION: EQUIPMENT CAN BE DAMAGED

THE UPS MUST BE IN THE BYPASS MODE BEFORE PROCEEDING. DAMAGE TO EQUIPMENT CAN OCCUR IF THE PROPER SWITCH SEQUENCE IS NOT FOLLOWED.

1. Make sure that the UPS is in Bypass mode before proceeding.
2. Close/Turn-ON the "UIB" breaker to restore input power to the UPS.
3. Push Button PB1 should be illuminated. If Key B-1 is captive in the key release interlock during the transfer into bypass, initiate key release by depressing PB1. This releases the solenoid lockout. While depressing PB1, remove Key B-1 from the key release interlock.
4. Turn, Key B-1, in the interlock on the "MIB" breaker to unlock.
5. Close/Turn-ON "MIB" Breaker (Key B-1 is held captive).
6. Open/Turn-OFF "MBB" Breaker.
7. Turn, Key A-1, to lock the "MBB" breaker in the Open/OFF position (Key A-1 is now free).
8. Insert Key A-1 into the key release interlock, and turn until the solenoid locks the key.
9. Transfer the UPS from bypass mode to normal mode.

The UPS and MBC are now ready for operation.

7 Additional drawings

Drawings are model specific and included in the MBC packet.

8 Warranty

Contact your certified ABB service provider for product warranty information.



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