SAVE THESE INSTRUCTIONS — This manual contains important instructions for the Maintenance Bypass Switch that must be followed during installation, operation and maintenance of the equipment.

WARNING

OPENING ENCLOSURES EXPOSES HAZARDOUS VOLTAGES. ALWAYS REFER SERVICE TO QUALIFIED PERSONNEL ONLY.

WARNING

As standards, specifications, and designs are subject to change, please ask for confirmation of the information given in this publication.

This is a controlled document. Pages should not individually be removed from this binder.
This manual covers this model:

6410M-9
6421M-9

Maintenance
Bypass Switch

Operating Manual

MGE
UPS SYSTEMS

For service call
1-800-523-0142

86-153815-00 B00 09/02
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Costa Mesa, CA 92626
(714) 557-1636
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How to use this manual

This manual is designed for ease of use and easy location of information.

This manual uses Noteboxes to convey important information. Noteboxes come in four varieties:

**WARNING**
A WARNING notebox indicates information provided to protect the user and service personnel against safety hazards and/or possible equipment damage.

**CAUTION**
A CAUTION notebox indicates information provided to protect the user and service personnel against possible equipment damage.

**IMPORTANT**
An IMPORTANT notebox indicates information provided as an operating instruction, or as an operating tip.

**NOTE**
A NOTE notebox indicates information provided as an operating tip or an equipment feature.
1.0 General description

This manual contains the installation, operation, and maintenance information for the maintenance bypass switch (MBPS). This product is designed for use in the MGE Topaz Inverter Plant, which consists of the equipment rack, MBPS, AC distribution panel, and an inverter. The MBPS allows a load to remain powered while the inverter unit is taken off line for maintenance or other purposes. A schematic diagram of the MBPS is included in this manual (drawing number 6421M-S).

The MBPS contains two major electrical components, a DC breaker (CB1) that provides DC power to the inverter and the maintenance bypass switch (S1) that switches the load between the inverter or static bypass, and utility. For location of the major components see Figure 1-1.

1.1 Specifications

Electrical:

AC Input: 120/220/230/240 VAC, 50/60 Hz
Rating: 6421M - 21 kVA, 6410M - 10.5 kVA
Wires: L1, L2, (Neutral) & Safety Ground
Note: An external AC input circuit breaker or fuse should be used at the AC source.

DC Input: -48 VDC nominal
Rating: 6410M - 2-pole, 175A/pole; 6421M - 3-pole, 250A/pole
Wires: +, -, safety ground
Note: An external DC input circuit breaker or fuse should be used at the DC source.

AC Output: 120/220/230/240 VAC, 50/60 Hz
Rating: 6410M - 10.5 kVA, 6421M - 21 kVA
Wires: L1, L2, (Neutral) & Safety Ground

Mechanical:

Dimensions (in/cm): 12 inches (30.48cm) H x 18.5 inches (47cm) D x 17 inches (43.18cm) W
Mounting: Shipped with mounting brackets for 19"(48.26 cm)/23" (58.42 cm) mounting. 25" (63.5 cm) mounting brackets available as an option
Weight (lb/kg): 52 lbs./23.65kg
Figure 1-1  Major internal components, MBPS

FOR 3/4" (19 mm),
1" (25.4 mm),
1-1/2" (38.1 mm)
CONDUITS (TYP)

MAINTENANCE
BYPASS SWITCH

TOP VIEW
WITH PUNCH OUT HOLES

FRONT VIEW

LEFT SIDE VIEW

REAR PANEL

RIGHT SIDE VIEW

DETAI L A-A
After accepting the shipment from the freight carrier, inspect all exterior surfaces for damage. Damage claims should be filed directly with the carrier.

The maintenance bypass switch (MBPS) may be shipped pre-installed in the Topaz S4 Inverter Plant. If so, installation of the plant is necessary, follow standard Topaz S4 Inverter Plant installation procedures. If the MBPS is shipped as a stand-alone unit, it must be installed in the existing equipment. Using the supplied hardware and Figure 1-1, install the mounting brackets to each side of the MBPS.

The electrical requirements for the MBPS are defined in the specifications section above. Figure 1 shows the location of knockouts and terminals for input and output cabling. Size power cables according to the capacity of the inverter. The MBPS is connected to utility power, DC power, inverter, and the AC distribution panel. Follow the installation instructions provided for the AC distribution cabinet and the inverter, in addition to these instructions.

Before applying any power to the MBPS, check to make sure all wiring is correct. Refer to Table 1-1, Table 1-2, the schematic, and Figure 1-1 for installation and wiring information.
### Power connections (see Note 1)

<table>
<thead>
<tr>
<th>From (external to MBPS)</th>
<th>To (internal to MBPS)</th>
<th>Description (internal to MBPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Power Source (+)</td>
<td>+ (E10)</td>
<td>DC Supply Return</td>
</tr>
<tr>
<td>DC Power Source (-)</td>
<td>- (E11)</td>
<td>DC Supply -48 VDC</td>
</tr>
<tr>
<td>120 / 220 / 230 / 240 VAC (L1)</td>
<td>TB4-1 (L1)</td>
<td>AC Supply Line</td>
</tr>
<tr>
<td>Neutral (L2)</td>
<td>TB4-2 (N, L2)</td>
<td>AC Supply Neutral (L2)</td>
</tr>
<tr>
<td>Safety Ground</td>
<td>TB4-3 (G)</td>
<td>Safety Ground</td>
</tr>
<tr>
<td>Inverter DC + terminal</td>
<td>E10 +</td>
<td>DC Supply Return</td>
</tr>
<tr>
<td>Inverter DC - terminal</td>
<td>E9 -</td>
<td>DC Supply -48 VDC</td>
</tr>
<tr>
<td>Inverter L-In</td>
<td>TB4-11</td>
<td>Bypass Input Line</td>
</tr>
<tr>
<td>Inverter N-In</td>
<td>TB4-12</td>
<td>Bypass Input Neutral</td>
</tr>
<tr>
<td>Inverter N-out</td>
<td>TB4-10</td>
<td>Output Neutral (L2)</td>
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<tr>
<td>Inverter L-out</td>
<td>TB4-9</td>
<td>Output Line</td>
</tr>
<tr>
<td>Inverter Safety Ground</td>
<td>TB4-8</td>
<td>Safety Ground</td>
</tr>
<tr>
<td>Load AC (L1)</td>
<td>TB4-6</td>
<td>AC Distribution Panel &quot;AC Input Line&quot;</td>
</tr>
<tr>
<td>Load Neutral (L2)</td>
<td>TB4-7</td>
<td>AC Distribution Panel &quot;Return&quot; (Neutral) (L2)</td>
</tr>
<tr>
<td>Load Safety Ground</td>
<td>TB4-5</td>
<td>AC Distribution Panel Safety Ground</td>
</tr>
</tbody>
</table>

**Note 1 & 2**

**NOTE 1:** The equipment is preset at the factory for operation at 120 VAC. To configure for 220/230/240 VAC operation, remove the #16 AWG wire from TB2-1 and TB2-3. Refer to the schematic diagram (6421M-S) provided with this manual.

**NOTE 2:** The screw tightening torque for AC input and AC output terminal block (TB4) is 45-50 in. lb. (5.08 Nm - 5.65 Nm).

### Control connections

<table>
<thead>
<tr>
<th>From (external to MBPS)</th>
<th>To (internal to MBPS)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote Alarm Circuit</td>
<td>TB3-1</td>
<td>N.O. contact</td>
</tr>
<tr>
<td></td>
<td>TB3-2</td>
<td>Common</td>
</tr>
<tr>
<td></td>
<td>TB3-3</td>
<td>N.C. contact</td>
</tr>
</tbody>
</table>

**NOTE:** Contacts common — N.O. shall be closed when S1 is switched to SBP or MBP position.
The MBPS is a three position rotary switch. Under normal operating conditions, the handle is in the “NORM” position. This indicates the inverter is providing power to the load (inverter or bypass mode). When the handle is placed clockwise in the “SBP” (static bypass) position, the DC breaker is tripped and the load is powered by utility via the inverter static bypass switch. When the handle is placed clockwise in the “MBP” position, power to the load is provided by the AC input directly through the MBPS, and all power sources to the inverter are electrically removed.

Figure 1-2 shows the front panel. The DC breaker provides input to the inverter. Under normal operating conditions, the handle is in the “ON” position. When the MBPS places the load in maintenance bypass, this circuit breaker is tripped and the handle goes to the “tripped” position. In order to place it back to the “on” position, the handle must be reset to the “off” position first, then placed in the “on” position.

**NOTE**

When the bypass switch is placed in the static bypass (SBP) position, AC utility is still connected to the inverter. Work carefully whenever voltage is present.
### Maintenance Bypass Switch

There are four indicator lamps on the front panel:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC INPUT</td>
<td>Green</td>
<td>On when there is AC voltage at the input terminals of the MBPS</td>
</tr>
<tr>
<td>INV AC OUTPUT</td>
<td>Green</td>
<td>On when the Inverter is providing power to the load (inverter or bypass mode)</td>
</tr>
<tr>
<td>DC INPUT</td>
<td>Green</td>
<td>On when DC Breaker is closed on the MBPS</td>
</tr>
<tr>
<td>BYPASS</td>
<td>Red</td>
<td>On when the AC utility is providing power to the load and the inverter is electrically isolated</td>
</tr>
</tbody>
</table>

Note that the “AC INPUT,” “INV AC OUTPUT,” and “DC INPUT” (grouped as “normal” on the front panel) will be on during normal operating conditions.

#### 1.7 Procedure to bypass the inverter

1. Check that all normal indicator lamps are lit.
2. Turn the MBPS clockwise to the “SBP” position, then to the “MBP” position.
3. Check that DC breaker has tripped and bypass lamp is on. “DC ON” lamp will remain on for a few seconds due to charged capacitors in the inverter and then turn off.

**NOTE:** For your safety, the Maintenance Bypass Switch (MBPS) DC breaker remains tripped and cannot be turned on with the rotary bypass switch in the MBP position (See DC breaker trip reset jumper).

During this process, the form C contacts at TB3 change state. The common and NC terminals were closed prior to the operation and are opened after the operation. The common and NO terminals were open prior to, and are closed after the operation.

#### 1.8 Procedures to return to normal (inverter) operation

1. Turn the maintenance bypass switch counter-clockwise to the “SBP” position, then turn to the “NORM” position.
2. Reset the DC breaker by toggling the handle from the “TRIP” position to the “OFF” position, then to the “ON” position.
3. Check that all normal indicator lamps are lit and the “BYPASS” lamp is off.
4. Follow the inverter startup instructions to turn on the inverter.

During this process, the form C contacts at TB3 change state. The common and NO terminals were closed prior to the operation and are opened after the operation. The common and NC terminals were open prior to, and are closed after the operation.
1.9 DC breaker trip reset jumper

If your application requires DC power to the inverter during the maintenance, DC breaker trip feature may be disabled by removing the jumper on TB2-1&2 inside the MBPS.

When this jumper is removed, the DC breaker can be reset and turned on from tripped position with the rotary bypass switch in the MBP position during maintenance, while the load is supported by utility AC source.

1.10 Maintenance

The MBPS has four indicator lamps on the front panel. These lamps can be removed from the front panel without interrupting power to the load. MGE offers a spare indicator lamp kit for this purpose:

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPARE LAMP INDICATOR KIT</td>
<td>16289MBSK2</td>
</tr>
</tbody>
</table>

If a front panel indicator lamp fails to operate properly and the installation, setup and operation of the MBS have been rechecked, replace lamp with a new one per the following instructions:

**WARNING**

*High voltage is present at the P1 plug. Install or remove P1 by holding the plug on the sides. Do not touch plug if wires are exposed.*

1. Remove four screws from indicator lamp plate (Figure 1-3).
2. Lift indicator lamp plate from the front panel.
3. Carefully disconnect P1 connector from J1. Remove lamp assembly away from MBPS.
4. Remove lamp shield from assembly. Remove quick-disconnect terminals from lamp to be replaced. Remove failed lamp(s). Replace with new lamp(s). Make sure new lamp manufacturer part number is correct (Figure 1-4).
5. Reinstall quick-disconnect terminals (flat side close to the lamp) and secure lamp shield.

**WARNING**

*High voltage is present at the P1 plug. Install or remove P1 by holding the plug on the sides. Do not touch plug if wires are exposed.*
6. Carefully reconnect P1 to J1 connector.
7. Reinstall indicator lamp assembly to the front panel.

If further assistance is required, call MGE hotline service at 1-800-523-0142.

Figure  Indicator lamp plate removal

1-3
Figure Failed indicator lamp replacement

1-4

LAMP, GREEN NEON 250V
IDI PART NUMBER 1053QA5

LAMP, GREEN INCAND 28V
IDI PART NUMBER 1090QA5-28V

LAMP, RED NEON 250V
IDI PART NUMBER 1051QA1

Notes
Maintenance Bypass Switch
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STREET ADDRESS ___________________________________________________________

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