

User and Installers Guide - Hardwired Maintenance Bypass Switches To Suit Eaton Powerware UPS




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Congratulations on the purchase of your Powerware Maintenance Bypass Switch (MBS). This switch has been specifically designed to operate in conjunction with your Powerware UPS, ensuring seamless operation of your critical load during maintenance and testing, or during the unlikely event of a UPS failure.

Please take the time to read these instructions carefully, and ensure they are on hand at all times.

1.0 Important Safety Notices



CAUTION

UPS units are capable of supplying dangerous voltages even when turned off. Before attempting to install this MBS the UPS must be completely switched off and removed from supply, battery isolated (where appropriate), and mains supply isolated.

Powerware Maintenance Bypass Switches must be installed by qualified and trained electricians, strictly in accordance with Australian standards and these instructions.

Failure to properly install and test the Maintenance Bypass Switch may result in severe damage to your UPS or load equipment.

2.0 Introduction

The purpose of a Maintenance Bypass Switch is to isolate all AC input and output supplies from a UPS to allow maintenance technicians to safely work on the UPS, while the critical load equipment continues to be powered from the input supply, normally raw mains.

DC supplies and batteries are not disconnected by the MBS as they are fitted with their own specialised isolators.

In addition to the normal bypass function described above, all Powerware MBS have a “Test” position which allows a Maintenance Technician to apply power to the UPS for test purposes without disturbing the critical load equipment, while it continues to be fed from raw mains. The MBS also has an “Off” position which provides the isolation function required by AS3000 Clause 4.8.4.3.1.

All Maintenance Bypass Switches feature an electrical/mechanical pushbutton interlock to prevent UPS damage due to improper switch operation.

3.0 Description of Operation

Powerware Maintenance Bypass Switches feature 4 positions, at the 10 O'clock, 12 O'clock, 2 O'clock, and 4 O'clock positions. The function of each position is described below.

Note: Figures 1-4 are for descriptive purposes only, for specific wiring, please refer to the relevant wiring diagram at the back of the manual.

“Off.”

In the “Off” position the AC Mains supply, UPS, and critical load equipment are all isolated from each other. In other words all equipment is off. (See Figure 1.)

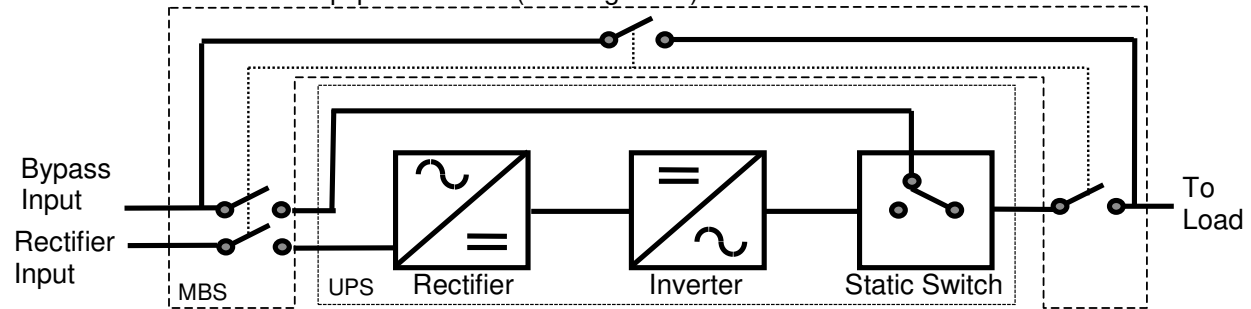


Figure 1. MBS in “Off” position

“Normal”

In the “Normal” position the UPS is fed from the AC Mains supply and the critical load equipment is fed from the output of the UPS. In this position the critical load is protected by the UPS (See Figure 2.)

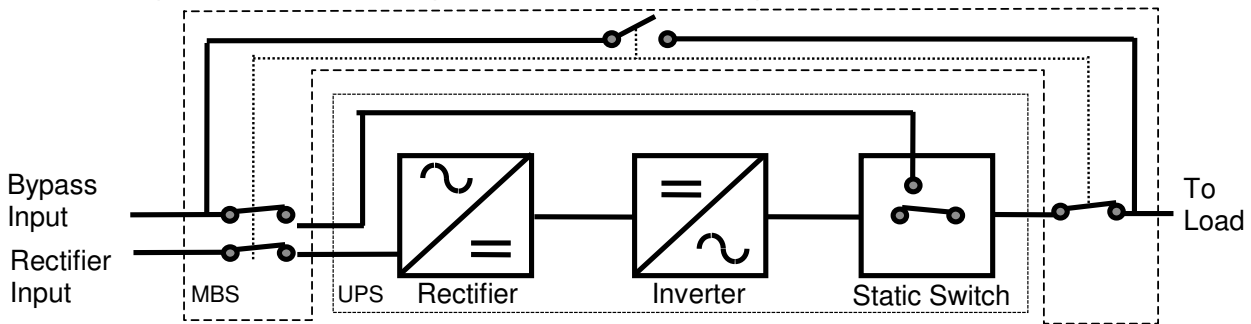


Figure 2. MBS in “Normal” Position

“Test ”

The “Test” position connects the load equipment directly to raw AC Mains supply. AC input power continues to be fed to the UPS to facilitate UPS testing. The output of the UPS is disconnected from the load equipment. The critical load is no longer protected by the UPS. (See Figure 3.)

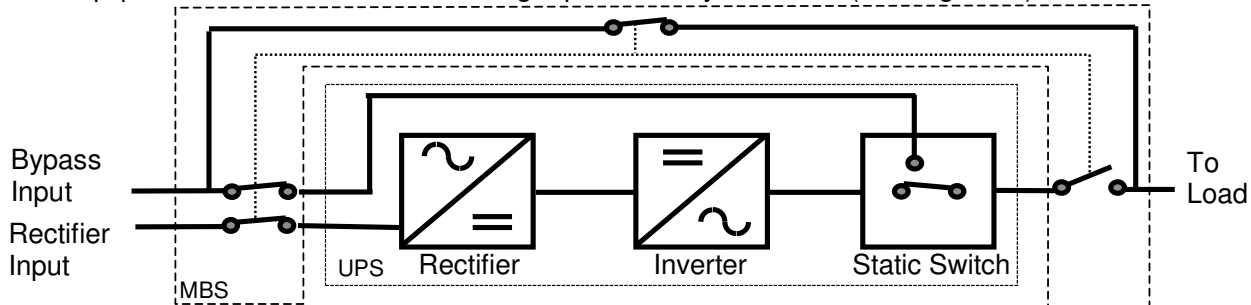


Figure 3. MBS in “Test” Position

3.0 Description of Operation (cont.)

“Bypass”

The “Bypass” position connects the load equipment directly to raw AC Mains supply. AC input power is disconnected from the UPS to facilitate maintenance or component replacement. The critical load is not protected by the UPS. In this position the entire UPS can be removed or replaced without disturbing the load equipment. (See Figure 4.)

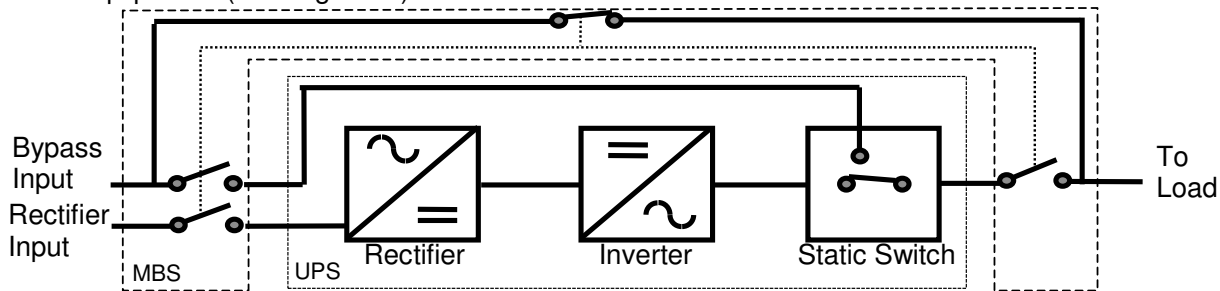


Figure 4. MBS in “Bypass” position

Note: Figures 1-4 show MBS with Separate Bypass Inputs. For MBS without Separate Bypass Inputs, the UPS Rectifier Input terminal is tied to the UPS Bypass Input terminal. For further clarification refer to the relevant wiring diagram in Appendix A.

Powerware Maintenance Bypass Switches are a **Make Before Break** type switch, or **MBB** for short.

This type of switch provides continuity of supply to the load when switching between all positions except “Off”. Load supply continuity is achieved by overlapping the opening and closing of input and output switch contacts when switching between positions. This means that the input supply voltage and output supply are connected together momentarily when switching between the adjacent “Normal” and “Test” positions. When used on a double conversion type UPS the inverter must be off and the load fed from the UPS bypass, or inverter damage is highly probable.

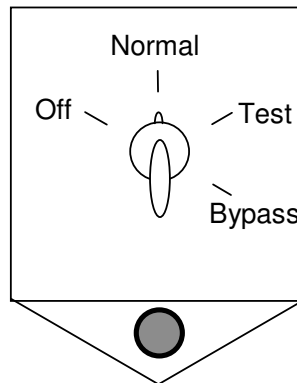
All Powerware MBS feature an interlock to ensure the inverter is turned off automatically before the MBS can be moved between positions. This interlock takes the form of a pushbutton integral to the switch assembly. Depending on which model UPS you have, either a normally open or closed contact on the rear of the pushbutton is connected to the inverter control circuits to allow normal operation while the pushbutton is in the released position (see Sec. 5: Table 1 for type of Inverter Interlock).

The red pushbutton is also mechanically interlocked to the MBS to prevent the switch being physically moved between positions accidentally. When it is desired to change the mode of the MBS the pushbutton must be depressed to release the mechanical interlock. Depressing the pushbutton causes the normally open/closed contact (see Sec. 5: Table 1) connected to the inverter control circuit to toggle positions, causing the inverter to turn off and the critical load to be fed from the UPS bypass.

A keylock can be substituted for the pushbutton interlock at the time of purchase. This option is specified by adding the suffix “KL” to the switch part number.

The different functional positions of the MBB type switches are shown in Figure 5 (see overleaf).

4.0 Installation



**Figure 5. MBB Type MBS with Inverter Interlock
(shown in “Normal” Position)**

Powerware MBS are supplied loose for installation by a licensed electrician. They are rear mounted and are enclosed in metal enclosures providing a degree of protection of IP40 or better. The enclosures are intended for wall mounting via keyhole slots provided. Cable entry knockouts are provided for glanding incoming cables.

Inverter interlock circuits must be wired in 240 VAC rated two-core screened cable of minimum size 1 mm². This cable must be run with a minimum spacing of 50 mm from all AC mains cabling.

4.1 Installation Procedure:

1. Mount the MBS enclosure in a suitable location for safe and convenient operation, adjacent to the UPS. Issues to consider are operator access and visibility and convenience for cabling.
2. Refer to Section 5: Inverter Interlock Types for your Inverter Interlock connection. Refer to Table 2 (on page 8) for the appropriate connection diagram.
3. Remove the gland plate and knockout cable entries that suit your cable glands.
4. Gland and connect cables in accordance with the connection diagram on Table 2: Selection Table. Connection points inside the enclosure are labelled as per the appropriate Connection Drawing.
5. Connect the Earth conductors to the Earth studs on the gland plate. The MBS enclosure will provide Earth continuity, however this **must** be tested.
6. Identify the correct operation label from Table 2 on page 8 and affix to the MBS front panel.

4.0 Installation (cont.)

4.2 Test Procedure:

 **NOTE:**

We strongly recommend that a dummy load be used to commission and confirm correct operation of the MBS before placing it into service. At all stages in the commissioning the output to the load should be monitored to confirm correct phase, voltage and polarity during MBS transfer operations.

Eaton Powerware will accept no responsibility for any damage or loss resulting from an incorrectly installed MBS. Functional tests should be performed in addition to the tests required by AS3000:2000, Wiring Rules.

Our service department can provide commissioning and functional testing services by factory trained service technicians, and it is strongly recommended that you avail yourself of this service.



The Red Button must be pushed before the MBS switch can be rotated.

1. Depress and hold the Red Button, then rotate the MBS switch to the “Bypass” position and apply input power supply. This will allow the critical load to be tested with raw AC power.
2. Place the bypass switch into the “Test” position. The UPS can now be started in accordance with the UPS User’s Manual.
3. Check the Inverter Interlock function by depressing and holding down the Red Button on the front of the MBS. NOTE: Do not rotate the switch. Observe the operation of the UPS. ***The UPS must transfer from Normal Mode to Bypass Mode.***



IF THE UPS DOES NOT TRANSFER TO BYPASS MODE DO NOT PROCEED FURTHER. CONTACT YOUR LOCAL EATON POWERWARE SERVICE REPRESENTATIVE.

4. If the correct Inverter Interlock function is confirmed as per Step 3, the UPS can then be used to support the critical load by depressing and holding the Red Button, and rotating the MBS switch to the “Normal” position then releasing the Red Button. The UPS will revert automatically to “Normal Mode”.
5. The UPS should now operate normally and will support the critical load. Please refer to the relevant UPS manual for information on how to confirm correct UPS operation.

5.0 Inverter Interlock Types

UPS	Inverter Interlock Contact Type
PB1000	Normally Closed
PB4000	Normally Open
PW9120	Normally Closed
PW9155S/N	Normally Open
PW9170	Normally Open
PW9305	Normally Open
PW9340	Normally Open
PW9355	Normally Open
PW9390	Normally Open

Table 1: Inverter Interlock Contact types for various Powerware UPS models.

6.0 Wiring Diagram Selection

STEP ONE:

Identify your MBS unit by its part number:

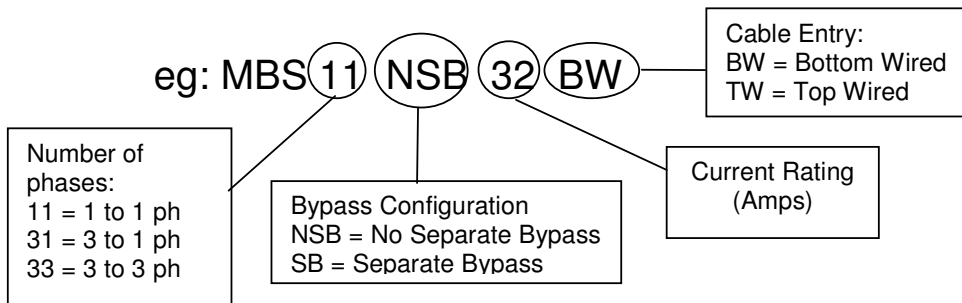


Figure 6: Identifying MBS Part number

STEP TWO:

Identify your UPS model by the model number located on the rating label on your UPS.

Eg:

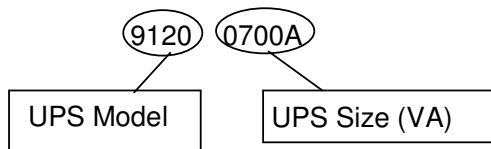


Figure 7: Identifying UPS Part number

STEP THREE:

From Table 2 overleaf, locate your MBS and UPS combination, and select the wiring diagram and operating instructions labels to suit.

WIRING DIAGRAM SELECTION TABLE:

MBS	UPS Type	Wiring Diagram	Page	Operating Label # (included with unit)
1Ø to 1Ø no separate bypass				
MBS11-NSB-XX-BW	9120	A4D0219R2	A1	A4L0136
MBS11-NSB-XX-BW	9155S	A4D0230R1	A2	A4L0169
MBS11-NSB-XX-BW	9170	A4D0231R0	A3	A4L0170
1Ø to 1Ø with separate bypass				
MBS11-SB-XX-BW	9120	A4D0218R4	A4	A4L0136
MBS11-SB-XX-BW	9155S	A4D0229R2	A5	A4L0169
3Ø to 1Ø no separate bypass				
MBS31-NSB-XX-BW	9155N	A4D0224R1	A6	A4L0169
MBS31-NSB-XX-BW	PB1000	A4D0263R1	A7	A4L0169
3Ø to 1Ø with separate bypass				
MBS31-SB-XX-BW	9155N	A4D0213R2	A8	A4L0169
MBS31-SB-XX-BW	PB1000	A4D0264R1	A9	A4L0169
3Ø to 3Ø no separate bypass				
MBS33-NSB-XX-BW	9305	A4D0249R0	A10	A4L0169
MBS33-NSB-XX-BW	9340	A4D0250R0	A11	A4L0169
MBS33-NSB-XX-BW	9355	A4D0251R1	A12	A4L0169
MBS33-NSB-XX-BW	9390	A4D0261R3	A13	A4L0169
MBS33-NSB-XX-BW	PB4000	A4D0252R1	A14	A4L0169
3Ø to 3Ø with separate bypass				
MBS33-SB-XX-BW	9305	A4D0225R3	A15	A4L0169
MBS33-SB-XX-BW	9340	A4D0246R1	A16	A4L0169
MBS33-SB-XX-BW	9355	A4D0247R2	A17	A4L0169
MBS33-SB-XX-BW	9390	A4D0262R3	A18	A4L0169
MBS33-SB-XX-BW	PB4000	A4D0248R2	A19	A4L0169
3Ø to 3Ø Tail End bypass switch				
MBS33-SB-XX-BW	GENERIC	A4D0220R2	A20	special

Table 2: Wiring Diagram & Operating Label Selection Table

Notes:

- 1) XX = Maximum MBS current rating
- 2) Suffix "BW" means Bottom Wired, "TW" means Top Wired. Labels and connection drawings are identical for each type.

7.0 Troubleshooting

If you have a question or problem, or need assistance please contact Eaton Powerware Service on 1300 303 059, or contact your local Eaton Powerware Customer Service office.

Eaton Powerware NATIONAL SERVICE Phone 1300 303 059

When calling please specify:

1. Part Number of MBS and UPS.
2. Serial Number of the unit.
3. Original Date of Purchase of the Maintenance Bypass Switch.

Parts, orders and all correspondence regarding repairs under the warranty should be addressed to Powerware Service Department at the address below, or to the service depot address advised by our Service staff.

Eaton Power Quality Pty Ltd

ABN 44 004 439 178

Office: 13 Healey Road, Dandenong, Victoria 3175

Phone:03-9706 5022 Fax: 03-9794 9150