

**Sync Control for Eaton 9395P and 93PM
User's and Installation Guide**



Powering Business Worldwide

IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS

This manual contains important instructions that you should follow during installation and maintenance of the UPS and batteries. Please read all instructions before operating the equipment and save this manual for future reference.



WARNING

**This is a product for commercial and industrial application in the second environment.
Installation restrictions or additional measures may be needed to prevent disturbances.**

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**Sync Control for Eaton 9395P and 93PM UPS
User's and Installation Guide
P-164000495**

Contents

1	Introduction.....	4
1.1	Conventions Used in This Manual	5
1.2	Safety Warnings.....	6
1.3	For More Information	7
1.4	Getting Help.....	7
2	Installation Plan and Unpacking.....	8
2.1	Creating an Installation Plan.....	8
2.2	Preparing the Site	8
2.2.1	Environmental and Installation Considerations	8
2.2.2	Eaton Sync Control Wiring Preparation.....	10
2.3	Inspecting and Unpacking the Eaton Sync Control.....	10
3	Eaton Sync Control Installation	11
3.1	Installation and Wiring with an Eaton 9395P UPS	11
3.2	Installation and Wiring with an Eaton 93PM UPS	18
4	Eaton Sync Control Operating Instructions	26
4.1	Startup for UPS Systems Equipped with an Eaton Sync Control.....	26
4.2	Understanding Eaton Sync Control Operation	26
4.3	Operation	28
4.4	Customer Monitoring.....	30
4.5	Maintenance Operations.....	31
5	Recycling the used Eaton Sync Control.....	32
6	Warranty.....	33
7	Technical Data	34

1 Introduction

The Eaton® Sync Control maintains the critical load outputs of two separate Eaton UPS systems in synchronization. Use of the Eaton Sync Control provides the uninterrupted transfer of the load from one load bus to another by means of downstream, dual-source, static transfer switches. Without the load sync option, the two system output (critical load) buses could become out of phase with each other. This condition occurs if suitable bypass sources are not available or if the bypass sources feeding each system are not in sync with each other. Examples of this condition are two systems supplied by separate diesel generator sets, or the bypass sources for the two systems are lost.

The Eaton Sync Control can provide customer remote monitoring of sync control operation and alarms. See paragraph 4.4 for detailed information.

Figure 1-1 shows the front view and Figure 1-2 shows the interior view of the Eaton Sync Control.

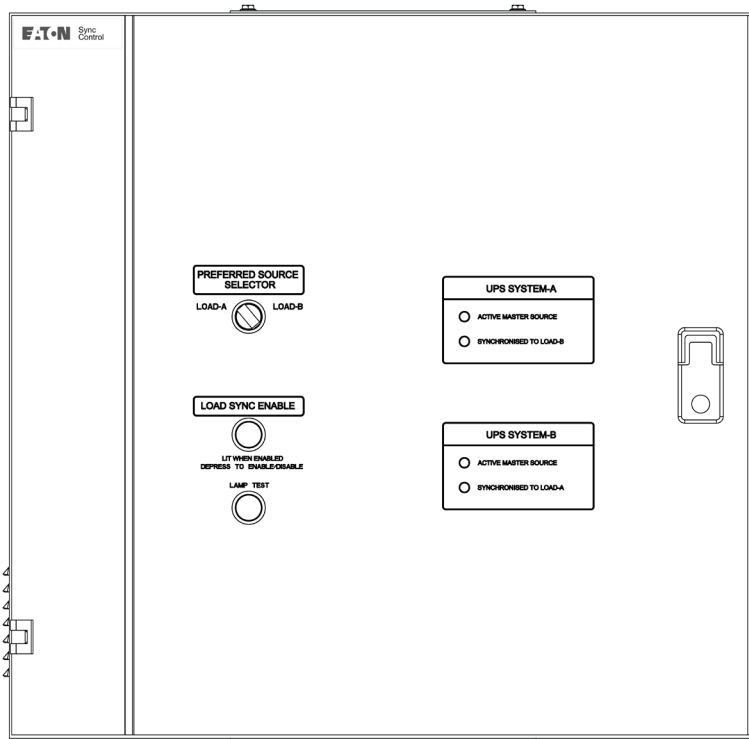


Figure 1-1 Eaton Sync Control

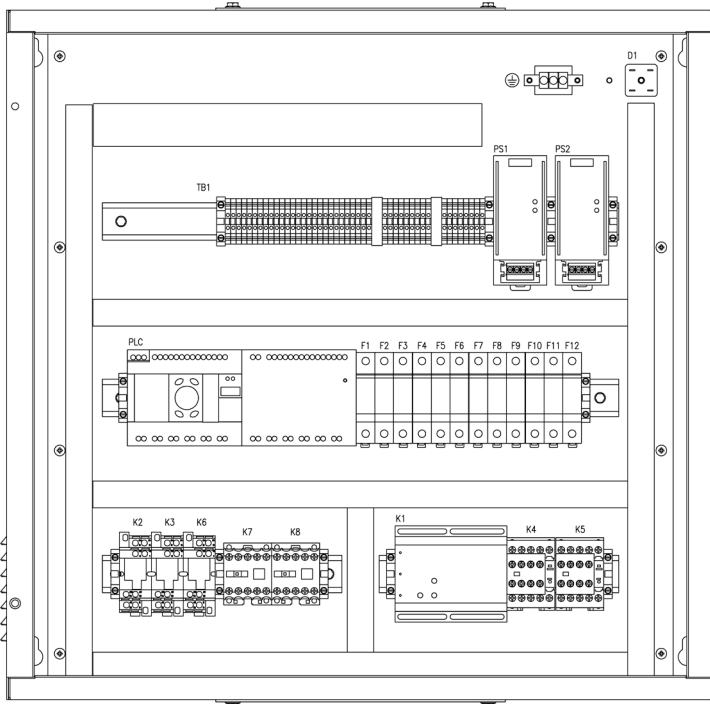


Figure 1-2 Eaton Sync Control with Door Open

1.1 Conventions Used in This Manual

This manual uses these type conventions:

- **Bold type** highlights important concepts in discussions, key terms in procedures, and menu options, or represents a command or option that you type or enter at a prompt.
- *Italic type* highlights notes and new terms where they are defined.
- `Screen type` represents information that appears in the screen or LCD.

In this manual, the term UPS refers only to the UPS cabinet and its internal elements. The term UPS system refers to the entire power protection system – the UPS cabinet, the battery cabinet, and options or accessories installed.

The following are examples of symbols used on the UPS or accessories to alert you to important information:



RISK OF ELECTRICAL SHOCK – Indicates that a risk of electric shock is present and the associated warning should be observed.



CAUTION: REFER TO OPERATOR'S MANUAL - Refer to your operator's manual for additional information, such as important operating and maintenance instructions.



This symbol indicates that you should not discard the UPS or the UPS batteries in the trash. This product contains sealed, lead-acid batteries and must be disposed of properly. For more information, contact your local recycling/reuse or hazardous waste center.



This symbol indicates that you should not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.

1.2 Safety Warnings

IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS

This manual contains important instructions that you should follow during installation and maintenance of the UPS and batteries. Please read all instructions before operating the equipment and save this manual for future reference.

The UPS cabinet is designed for industrial or computer room applications, and contains safety shields behind the doors. However, these units comprise a sophisticated power system and should be handled with appropriate care.



DANGER

This equipment contains LETHAL VOLTAGES. All repairs and service should be performed by AUTHORIZED SERVICE PERSONNEL ONLY. There are NO USER SERVICEABLE PARTS inside the Eaton Sync Control.



WARNING

- **To reduce the risk of fire or electric shock, install this equipment in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum). The system is not intended for outdoor use.**
 - **Ensure all power is disconnected before performing installation or service.**
-



CAUTION

- **Keep the equipment doors closed to protect personnel from dangerous voltages inside the unit.**
 - **Do not install or operate the equipment close to gas or electric heat sources.**
 - **The operating environment should be maintained within the parameters stated in this manual.**
 - **Keep surroundings uncluttered, clean, and free from excess moisture.**
 - **Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.**
-

1.3 For More Information

Refer to the applicable *Eaton 9395P User's and Installation Guide* or *Eaton 93PM UPS 30-200 kW Users and Installation Guide* for the following additional information:

- UPS cabinet, optional components, and accessory installation instructions, including site preparation, planning for installation, and wiring and safety information. Detailed illustrations of cabinets and optional accessories with dimensional and connection point drawings are provided.
- UPS operation, including UPS cabinet controls, functions of the UPS, standard features and optional accessories, procedures for starting and stopping the UPS, and information about maintenance and responding to system events.
- Communication capabilities of the UPS system.

Visit <http://powerquality.eaton.com> or contact your Eaton service representative for information on how to obtain copies of these manuals.

1.4 Getting Help

If help is needed with any of the following:

- Scheduling initial startup
- Regional locations and telephone numbers
- A question about any of the information in this manual
- A question this manual does not answer

Please call your local service representative. Contact information of the closest Eaton service location can be found through www.eaton.eu.

2 Installation Plan and Unpacking

The Eaton Sync Control is shipped as a separate item and can be mounted on any surface that can safely bear its weight. See paragraph 2.2 for weight, dimensions, and wiring preparation.

2.1 Creating an Installation Plan

Before installing the UPS system, read and understand how this manual applies to the system being installed. Use the procedures and illustrations in the following chapters to create a logical plan for installing the system.



Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms specified on page 33 become void. This service is offered as part of the sales contract for the UPS. Contact service in advance (usually a two week notice is required) to reserve a preferred startup date.

2.2 Preparing the Site

For the Eaton Sync Control to operate at peak efficiency, the installation site must meet the environmental parameters outlined in the applicable Eaton 9395P or Eaton 93PM User's and Installation Guide that are listed in paragraph 1.3 on page 7.

2.2.1. Environmental and Installation Considerations

The life of the Eaton Sync Control is adversely affected if the system is not installed in a temperature and humidity controlled indoor area free of conductive contaminants.

Failure to follow guidelines may void your warranty.

Attach the Eaton Sync Control to the wall with appropriate fasteners and washers. The Eaton Sync Control includes 4 x 8mm mounting holes as shown in Figure 2-1. As wall materials vary, fasteners for fixing to the wall are not included.

The equipment operating environment must meet the weight requirements shown in Table 2-1 and the size requirements shown in Figure 2-1 and Figure 2-2. Dimensions are in millimeters (inches).

Table 2-1 Equipment Weight

Eaton Sync Control	Shipping	Installed
Weight [kg] (lbs)	33,4 (73,6)	30,1 (66,4)

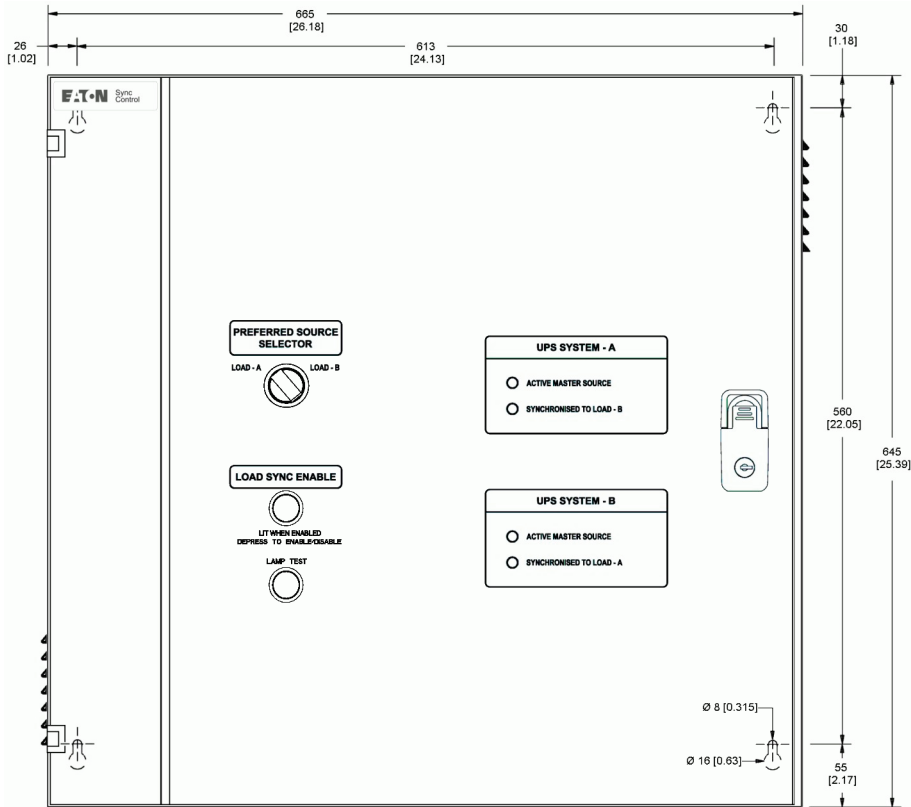


Figure 2-1 Eaton Sync Control dimensions, front view – Dimensions are in millimetres [inches]

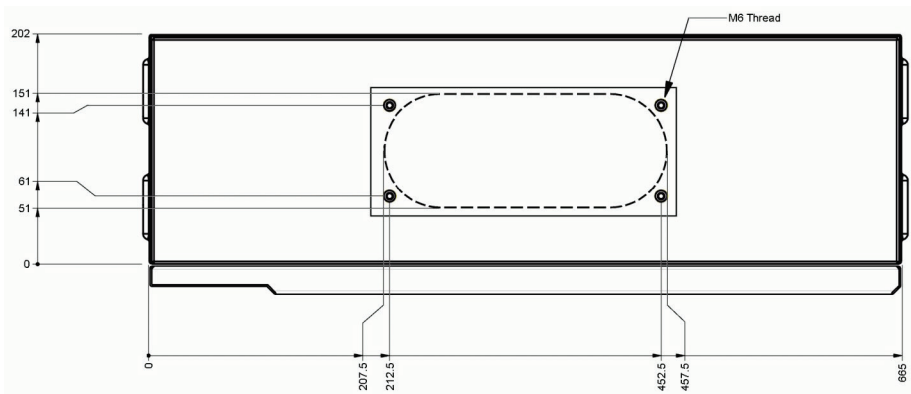


Figure 2-2 Eaton Sync Control dimensions, top – Dimensions are in millimetres

2.2.2. Eaton Sync Control Wiring Preparation

Read and understand the following notes while planning and performing the installation:

- Refer to national and local electrical codes for acceptable external wiring practices.
- Material and labour for external wiring requirements are to be provided by designated personnel.
- For external wiring, use 70°C copper wire with a minimum insulation rating of 400V. If wire is run in an ambient temperature greater than 30°C, higher temperature wire and/or larger size wire may be necessary. See the applicable wiring information in Chapter 3.1 for the Eaton 9395P and in Chapter 3.2 for the Eaton 93PM UPS.
- Use wiring with a minimum insulation rating of 400V for interconnections between the Eaton Sync Control, the UPS, and the customer remote monitoring system.
- Sync Control dry contacts are rated at 5–30 VDC/250 VAC at 2A per contact (maximum load).
- When installing external wiring between the Eaton Sync Control and the UPS, run cables separate from any power cables to minimize risk for inducted noise to the control signals.
- The Eaton Sync Control can be installed up to a maximum of 150 m (500 ft) from the Eaton 9395P or 93PM UPS system.



CAUTION

When connecting the bypass and load voltage from another model UPS to a Eaton 9395P or 93PM UPS using the Eaton Sync Control accessory, connect all three phases from the other UPS to the Sync Control connection point. DO NOT connect the other model UPS Neutral to the Sync Control connection point when connecting to a Eaton 9395P or 93PM UPS.

2.3 Inspecting and Unpacking the Eaton Sync Control

The unit arrives covered with protective packaging material.

1. Carefully inspect the outer packaging for evidence of damage during transit.



CAUTION

Do not install a damaged cabinet. Report any damage to the carrier and contact your Eaton service representative immediately.

2. Remove the protective cardboard covering from the Eaton Sync Control by cutting where indicated using a knife blade no longer than 25 mm (1").
3. Remove the plastic bag and foam packing material, and discard or recycle them in a responsible manner.

3 Eaton Sync Control Installation



WARNING

- **Only qualified service personnel (such as a licensed electrician) shall perform the electrical installation. Risk of electrical shock.**
 - **Shut down all sources of power to the Eaton UPS system before connecting the control wiring to the Eaton Sync Control enclosure and UPS. Hazardous voltages exist inside the UPS and in the Eaton Sync Control enclosure. Check all terminal conductors with a known serviceable voltmeter before connecting the wiring.**
-

When the Eaton Sync Control has been moved to its installed location, unpacked, and inspected, it is ready for installation and wiring.

Use the applicable procedure from the following list to install the Eaton Sync Control to the UPS:

- With an Eaton 9395P UPS, proceed to paragraph 3.1.
- With an Eaton 93PM UPS, proceed to paragraph 3.2.

3.1 Installation and Wiring with an Eaton 9395P UPS

To install and wire:

1. Install the Eaton Sync Control panel to the selected mounting location.
See Figure 2-1 on page 9 for mounting hole dimensions and Figure 2-2 on page 9 for cable entrance locations.
2. Unfasten the front door latches and swing the door open.
3. Complete all control wiring interconnections using Table 3-1 on page 12 or Table 3-2 on page 13 for wiring requirements.
Figure 3-1 on page 14 shows the Eaton Sync Control TB1 terminal block and ground terminal locations. Figure 3-2 on page 15 shows the TB1 terminal block wiring detail.
Figure 3-4 on page 16 shows the typical locations of the UPS TB2, TB3, and TB6 terminal blocks. Figure 3-3 on page 16 shows the TB6 detail.
Refer to the applicable Eaton 9395P UPS Installation and Operation Manual listed in paragraph 1.3 on page 7 for UPS cabinet terminal locations and assignments, termination requirements, cable landing locations, and terminal access instructions.
4. Verify the jumper is installed between Eaton Sync Control terminal TB1-72 and TB1-73 (see Figure 3-2 on page 15).
5. If applicable, complete all customer remote monitoring system wiring interconnections using Table 3-3 on page 14 for wiring requirements.
Figure 3-2 on page 15 shows the TB1 terminal block wiring detail.
6. When all wiring is complete, close the door and secure the latches.



CAUTION

When connecting the bypass and load voltage from another model UPS to the Eaton 9395P UPS using the Eaton Sync Control accessory, connect all three phases from the other UPS to the Sync Control connection point. DO NOT connect the other model UPS Neutral to the Sync Control connection point when connecting to a Eaton 9395P UPS.

Table 3-1 Eaton 9395P UPS System Control Wiring Interconnections for Single UPS

Function	From UPS System A	To Sync Control	Wire Size [mm ²]	Voltage	Note
Bypass Voltage A	TB6-1	TB1-78	1,5	400Vac	
Bypass Voltage B	TB6-2	TB1-79	1,5	400Vac	
Bypass Voltage C	TB6-3	TB1-80	1,5	400Vac	
Output Voltage A	TB6-5	TB1-81	1,5	400Vac	
Output Voltage B	TB6-6	TB1-82	1,5	400Vac	
Output Voltage C	TB6-7	TB1-83	1,5	400Vac	
Bypass Voltage A Return	TB6-8	TB1-84	1,5	400Vac	
Bypass Voltage B Return	TB6-9	TB1-85	1,5	400Vac	
Bypass Voltage C Return	TB6-10	TB1-86	1,5	400Vac	
Building Alarm 1(See Note)	TB3-1	TB1-54	1,5	24Vdc	Twisted pair
Building Alarm 1 Return	TB3-2	TB1-55	1,5	24Vdc	
On Bypass (N.O.)	TB2-5	TB1-52	1,5	24Vdc	Twisted pair
On Bypass Common	TB2-6	TB1-51	1,5	24Vdc	
Function	From UPS System B	To Sync Control	Wire Size [mm ²]	Voltage	Note
Bypass Voltage A	TB6-1	TB1-87	1,5	400Vac	
Bypass Voltage B	TB6-2	TB1-88	1,5	400Vac	
Bypass Voltage C	TB6-3	TB1-89	1,5	400Vac	
Output Voltage A	TB6-5	TB1-90	1,5	400Vac	
Output Voltage B	TB6-6	TB1-91	1,5	400Vac	
Output Voltage C	TB6-7	TB1-92	1,5	400Vac	
Bypass Voltage A Return	TB6-8	TB1-93	1,5	400Vac	
Bypass Voltage B Return	TB6-9	TB1-94	1,5	400Vac	
Bypass Voltage C Return	TB6-10	TB1-95	1,5	400Vac	
Building Alarm 1 ⁽¹⁾	TB3-1	TB1-56	1,5	24Vdc	Twisted pair
Building Alarm 1 Return	TB3-2	TB1-57	1,5	24Vdc	
On Bypass (N.O.)	TB2-5	TB1-53	1,5	24Vdc	Twisted pair
On Bypass Common	TB2-6	TB1-51	1,5	24Vdc	

NOTE:

If Building Alarm 1 is being used for another purpose, any unused building alarm on the UPS TB3 terminal board can be used for the Sync Control. Refer to the applicable Eaton 9395P UPS User's and Installation Guide listed in paragraph 1.3 on page 7 for the UPS TB3 terminal assignments.

Table 3-2 Eaton 9395P UPS System Control Wiring Interconnections for Parallel Systems (Distributed Bypass)

Function	From UPS System A	To Sync Control	Wire Size [mm ²]	Voltage	Note
Bypass Voltage A	System A ⁽¹⁾ Bypass Phase A	TB1-78	1,5	400Vac	
Bypass Voltage B	System A ⁽¹⁾ Bypass Phase B	TB1-79	1,5	400Vac	
Bypass Voltage C	System A ⁽¹⁾ Bypass Phase C	TB1-80	1,5	400Vac	
Output Voltage A	System A ⁽²⁾ Output Phase A	TB1-81	1,5	400Vac	
Output Voltage B	System A ⁽²⁾ Output Phase B	TB1-82	1,5	400Vac	
Output Voltage C	System A ⁽²⁾ Output Phase C	TB1-83	1,5	400Vac	
Bypass Voltage A Return	TB6-8 ⁽³⁾	TB1-84	1,5	400Vac	
Bypass Voltage B Return	TB6-9 ⁽³⁾	TB1-85	1,5	400Vac	
Bypass Voltage C Return	TB6-10 ⁽³⁾	TB1-86	1,5	400Vac	
Building Alarm 1 ⁽⁴⁾	TB3-1 ⁽³⁾	TB1-54	1,5	24Vdc	Twisted pair
Building Alarm 1 Return	TB3-2 ⁽³⁾	TB1-55	1,5	24Vdc	
On Bypass (N.O.)	TB2-5 ⁽³⁾	TB1-52	1,5	24Vdc	Twisted pair
On Bypass Common	TB2-6 ⁽³⁾	TB1-51	1,5	24Vdc	

Function	From UPS System B	To Sync Control	Wire Size [mm ²]	Voltage	Note
Bypass Voltage A	System B ⁽¹⁾ Bypass Phase A	TB1-87	1,5	400Vac	
Bypass Voltage B	System B ⁽¹⁾ Bypass Phase B	TB1-88	1,5	400Vac	
Bypass Voltage C	System B ⁽¹⁾ Bypass Phase C	TB1-89	1,5	400Vac	
Output Voltage A	System B ⁽²⁾ Output Phase A	TB1-90	1,5	400Vac	
Output Voltage B	System B ⁽²⁾ Output Phase B	TB1-91	1,5	400Vac	
Output Voltage C	System B ⁽²⁾ Output Phase C	TB1-92	1,5	400Vac	
Bypass Voltage A Return	TB6-8 ⁽³⁾	TB1-93	1,5	400Vac	
Bypass Voltage B Return	TB6-9 ⁽³⁾	TB1-94	1,5	400Vac	
Bypass Voltage C Return	TB6-10 ⁽³⁾	TB1-95	1,5	400Vac	
Building Alarm 1 ⁽⁴⁾	TB3-1 ⁽³⁾	TB1-56	1,5	24Vdc	Twisted pair
Building Alarm 1 Return	TB3-2 ⁽³⁾	TB1-57	1,5	24Vdc	
On Bypass (N.O.)	TB2-5 ⁽³⁾	TB1-53	1,5	24Vdc	Twisted pair
On Bypass Common	TB2-6 ⁽³⁾	TB1-51	1,5	24Vdc	

NOTES:

- 1. Voltage taken from UPS System input switchgear through N.O. aux contacts of UPS input (bypass) feeders.**
- 2. Voltage taken from UPS System output switchgear, system common output.**
- 3. Connection point in each UPS of a parallel system. Signals can be daisy-chained from one UPS to next.**
- 4. If Building Alarm 1 is being used for another purpose, any unused building alarm on the UPS TB3 terminal board can be used for the Sync Control. Refer to the applicable Eaton 9395P UPS User's and Installation Guide listed in paragraph 1.3 on page 7 for**

the UPS TB3 terminal assignments.

Table 3-3 Customer Remote Monitoring System Wiring Interconnections

Function	From Sync Control	Wire Size [mm ²]	Note
UPS System A – Active Master Source	TB1-63	1,5	Twisted pair
Common Return	TB1-62	1,5	
UPS System B – Active Master Source	TB1-64	1,5	Twisted pair
Common Return	TB1-62	1,5	
UPS System-A – Synchronized to Load B	TB1-65	1,5	Twisted pair
Common Return	TB1-62	1,5	
UPS System-B – Synchronized to Load A	TB1-66	1,5	Twisted pair
Common Return	TB1-62	1,5	
Load Sync Enabled	TB1-68	1,5	Twisted pair
Common Return	TB1-67	1,5	

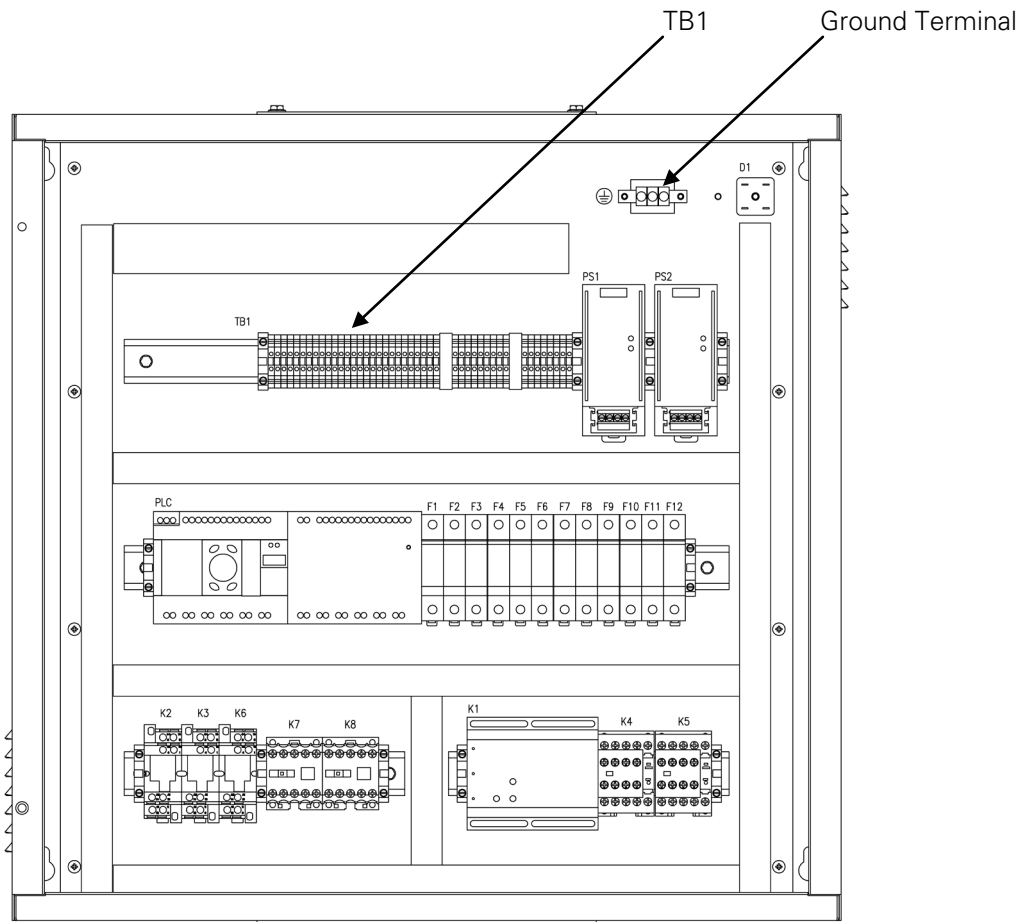


Figure 3-1 Eaton Sync Control Typical Control Wiring Termination Locations

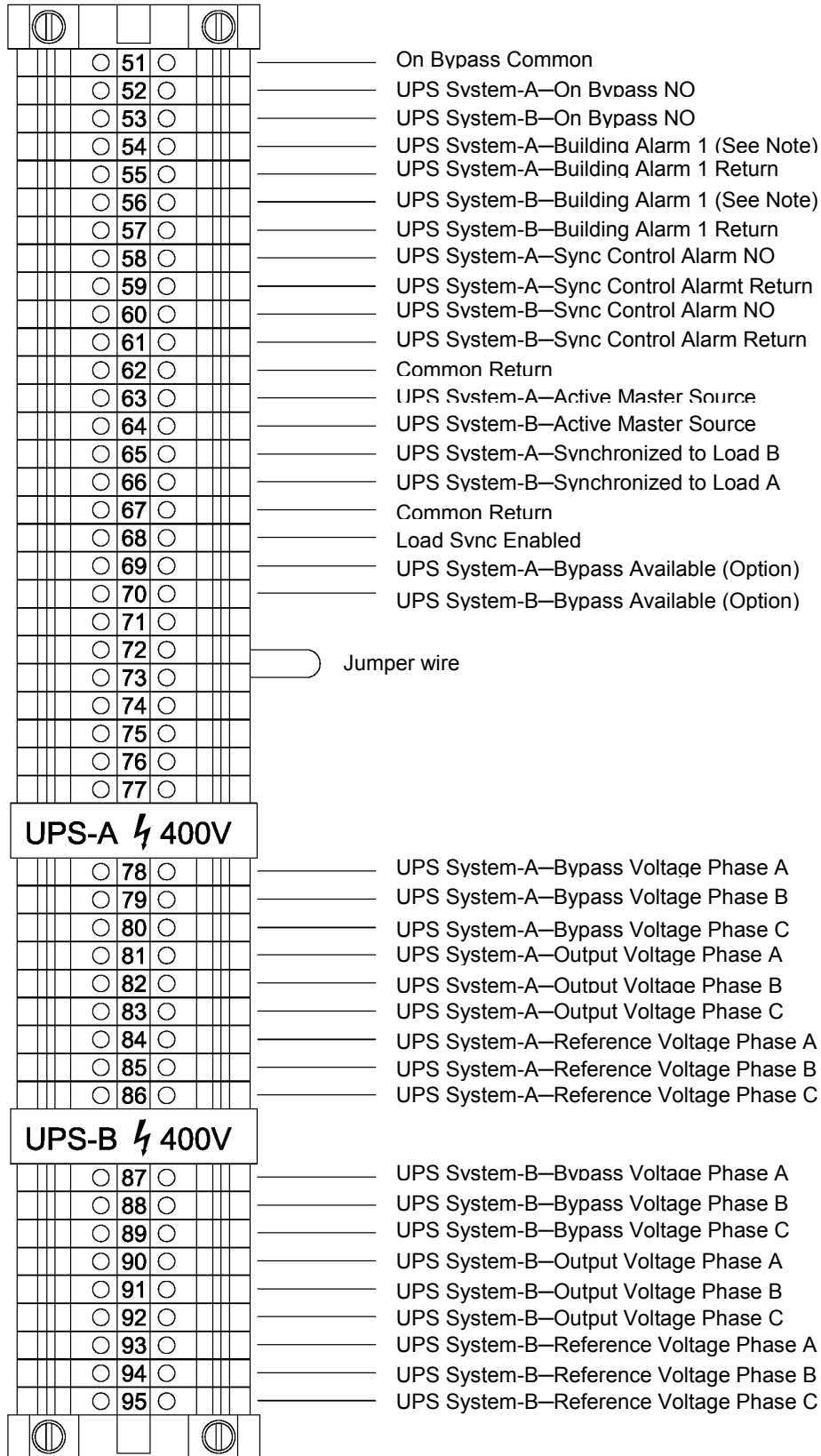


Figure 3-2 Eaton Sync Control TB1 Terminal Block Detail for 9395P

NOTE:

If Building Alarm 1 is being used for another purpose, any unused building alarm on the UPS TB3 terminal board can be used for the Sync Control. Refer to the applicable Eaton 9395P UPS User's and Installation Guide listed in paragraph 1.3 on page 7 for the UPS TB3 terminal assignments.

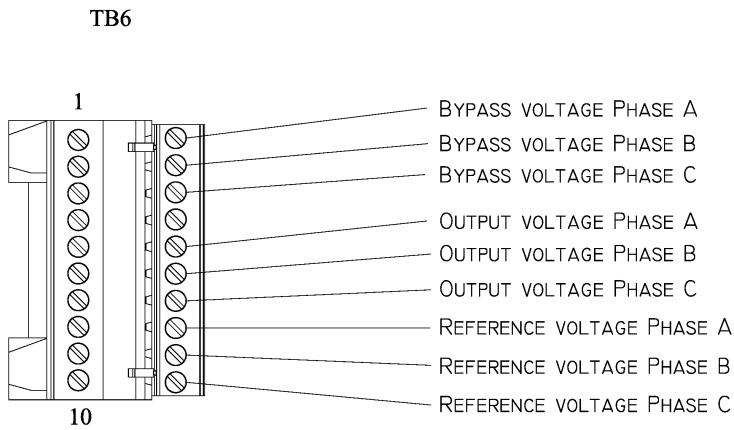


Figure 3-3 Eaton 9395P UPS TB6 Terminal Block Detail

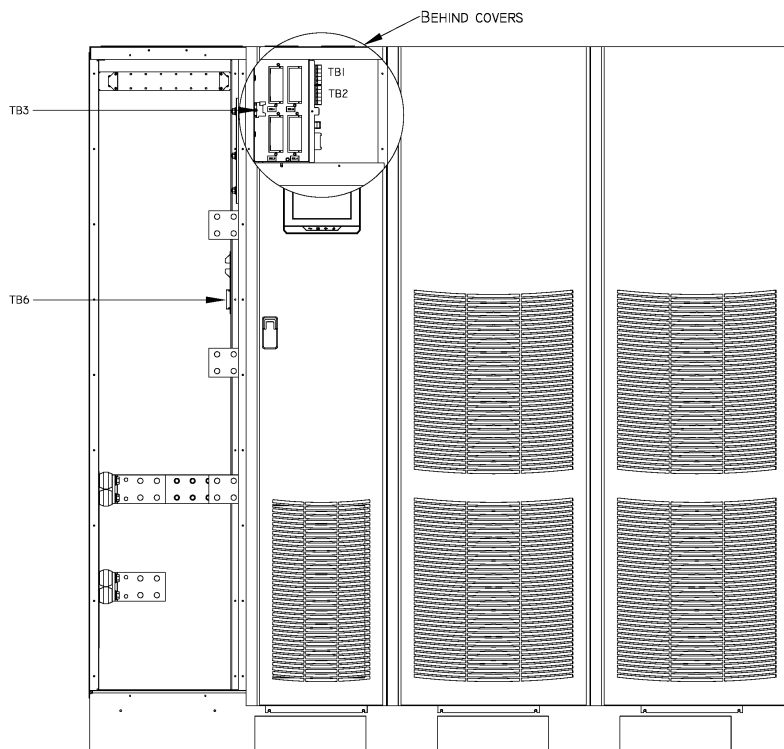
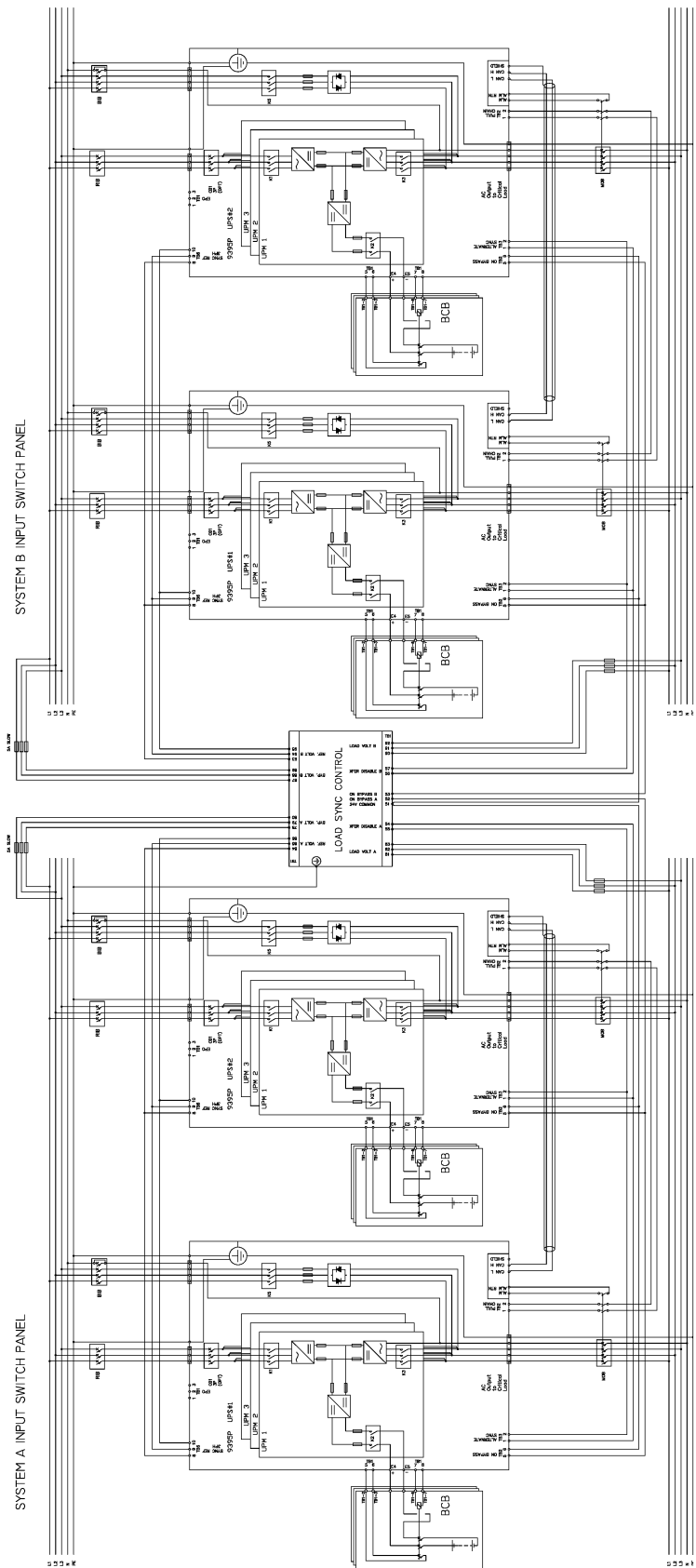


Figure 3-4 Eaton 9395P UPS (500–600 kVA) Interface Locations for Eaton Sync Control



NOTES:

- The bypass phase A, B and C voltage from the system input switchgear is connected to the Eaton Sync Control.
- All signal wires must be protected by appropriate fuses. The fuse rating shall be 5A slow blow.
- The output voltage phase A, B and C are connected to the Eaton Sync Control from the system output switchgear.
- The circuit diagram above shows the interconnecting signal wiring between UPSs in the Eaton 93PM Parallel UPS system.
- Contact your local Eaton representative for further information before planning the installation.

Figure 3-5 Eaton Sync Control Wiring Diagram with a Parallel 9395P UPS System

3.2 Installation and Wiring with an Eaton 93PM UPS

To install and wire:

7. Install the Eaton Sync Control panel to the selected mounting location.
See Figure 2-1 on page 9 for mounting hole dimensions and Figure 2-2 on page 9 for cable entrance locations.
8. Unfasten the front door latches and swing the door open.
9. Complete all control wiring interconnections using Table 3-4 on page 19 or Table 3-5 on page 20 for wiring requirements. Figure 3-6 on page 21 shows the Eaton Sync Control TB1 terminal block and ground terminal locations. Figure 3-7 on page 22 shows the TB1 terminal block wiring detail.
Figure 3-8 on page 23 shows the sync control interface of the 93PM. Figure 3-9 on page 23 shows the typical locations of the UPS Inputs, Outputs and X11 terminal blocks. Figure 3-10 on page 24 shows the X11 detail.
Refer to the applicable Eaton 93PM UPS Installation and Operation Manual for UPS cabinet terminal locations and assignments, termination requirements, cable landing locations, and terminal access instructions.
10. Verify the jumper is installed between Eaton Sync Control terminal TB1-72 and TB1-73 (see Figure 3-7 on page 22).
11. If applicable, complete all customer remote monitoring system wiring interconnections using Table 3-6 on page 21 for wiring requirements.
Figure 3-7 on page 22 shows the TB1 terminal block wiring detail.
12. When all wiring is complete, close the door and secure the latches.



CAUTION

When connecting the bypass and load voltage from another model UPS to the Eaton 93PM UPS using the Eaton Sync Control accessory, connect all three phases from the other UPS to the Sync Control connection point.

Table 3-4 Eaton 93PM UPS System Control Wiring Interconnections for Single UPS

Function	From UPS System A	To Sync Control	Wire Size [mm ²]	Voltage	Note
Bypass Voltage A	X11-1	TB1-78	1,5	400Vac	
Bypass Voltage B	X11-2	TB1-79	1,5	400Vac	
Bypass Voltage C	X11-3	TB1-80	1,5	400Vac	
Output Voltage A	X11-4	TB1-81	1,5	400Vac	
Output Voltage B	X11-5	TB1-82	1,5	400Vac	
Output Voltage C	X11-6	TB1-83	1,5	400Vac	
Bypass Voltage A Return	X11-8	TB1-84	1,5	400Vac	
Bypass Voltage B Return	X11-9	TB1-85	1,5	400Vac	
Bypass Voltage C Return	X11-10	TB1-86	1,5	400Vac	
Building Alarm 1(See Note)	Input1 pin10	TB1-54	1,5	24Vdc	Twisted pair
Building Alarm 1 Return	Input1 pin9	TB1-55	1,5	24Vdc	
On Bypass (N.O.)	Output pin2	TB1-52	1,5	24Vdc	Twisted pair
On Bypass Common	Output pin3	TB1-51	1,5	24Vdc	

Function	From UPS System B	To Sync Control	Wire Size [mm ²]	Voltage	Note
Bypass Voltage A	X11-1	TB1-87	1,5	400Vac	
Bypass Voltage B	X11-2	TB1-88	1,5	400Vac	
Bypass Voltage C	X11-3	TB1-89	1,5	400Vac	
Output Voltage A	X11-4	TB1-90	1,5	400Vac	
Output Voltage B	X11-5	TB1-91	1,5	400Vac	
Output Voltage C	X11-6	TB1-92	1,5	400Vac	
Bypass Voltage A Return	X11-8	TB1-93	1,5	400Vac	
Bypass Voltage B Return	X11-9	TB1-94	1,5	400Vac	
Bypass Voltage C Return	X11-10	TB1-95	1,5	400Vac	
Building Alarm 1 ⁽¹⁾	Input1 pin10	TB1-56	1,5	24Vdc	Twisted pair
Building Alarm 1 Return	Input1 pin9	TB1-57	1,5	24Vdc	
On Bypass (N.O.)	Output pin2	TB1-53	1,5	24Vdc	Twisted pair
On Bypass Common	Output pin3	TB1-51	1,5	24Vdc	

NOTE:

If Building Alarm 1 is being used for another purpose, any unused building alarm on the UPS Signal inputs can be used for the Sync Control. Refer to the applicable Eaton 93PM UPS User's and Installation Guide for the UPS Signal Inputs.

Table 3-5 Eaton 93PM UPS System Control Wiring Interconnections for Parallel Systems (Distributed Bypass)

Function	From UPS System A	To Sync Control	Wire Size [mm ²]	Voltage	Note
Bypass Voltage A	System A ⁽¹⁾ Bypass Phase A	TB1-78	1,5	400Vac	
Bypass Voltage B	System A ⁽¹⁾ Bypass Phase B	TB1-79	1,5	400Vac	
Bypass Voltage C	System A ⁽¹⁾ Bypass Phase C	TB1-80	1,5	400Vac	
Output Voltage A	System A ⁽²⁾ Output Phase A	TB1-81	1,5	400Vac	
Output Voltage B	System A ⁽²⁾ Output Phase B	TB1-82	1,5	400Vac	
Output Voltage C	System A ⁽²⁾ Output Phase C	TB1-83	1,5	400Vac	
Bypass Voltage A Return	X11-8 ⁽³⁾	TB1-84	1,5	400Vac	
Bypass Voltage B Return	X11-9 ⁽³⁾	TB1-85	1,5	400Vac	
Bypass Voltage C Return	X11-10 ⁽³⁾	TB1-86	1,5	400Vac	
Building Alarm 1 ⁽⁴⁾	Input1 pin10 ⁽³⁾	TB1-54	1,5	24Vdc	Twisted pair
Building Alarm 1 Return	Input1 pin9 ⁽³⁾	TB1-55	1,5	24Vdc	
On Bypass (N.O.)	Output pin2 ⁽³⁾	TB1-52	1,5	24Vdc	Twisted pair
On Bypass Common	Output pin3 ⁽³⁾	TB1-51	1,5	24Vdc	

Function	From UPS System B	To Sync Control	Wire Size [mm ²]	Voltage	Note
Bypass Voltage A	System B ⁽¹⁾ Bypass Phase A	TB1-87	1,5	400Vac	
Bypass Voltage B	System B ⁽¹⁾ Bypass Phase B	TB1-88	1,5	400Vac	
Bypass Voltage C	System B ⁽¹⁾ Bypass Phase C	TB1-89	1,5	400Vac	
Output Voltage A	System B ⁽²⁾ Output Phase A	TB1-90	1,5	400Vac	
Output Voltage B	System B ⁽²⁾ Output Phase B	TB1-91	1,5	400Vac	
Output Voltage C	System B ⁽²⁾ Output Phase C	TB1-92	1,5	400Vac	
Bypass Voltage A Return	X11-8 ⁽³⁾	TB1-93	1,5	400Vac	
Bypass Voltage B Return	X11-9 ⁽³⁾	TB1-94	1,5	400Vac	
Bypass Voltage C Return	X11-10 ⁽³⁾	TB1-95	1,5	400Vac	
Building Alarm 1 ⁽⁴⁾	Input1 pin10 ⁽³⁾	TB1-56	1,5	24Vdc	Twisted pair
Building Alarm 1 Return	Input1 pin9 ⁽³⁾	TB1-57	1,5	24Vdc	
On Bypass (N.O.)	Output pin2 ⁽³⁾	TB1-53	1,5	24Vdc	Twisted pair
On Bypass Common	Output pin3 ⁽³⁾	TB1-51	1,5	24Vdc	

NOTES:

- 1. Voltage taken from UPS System input switchgear through N.O. aux contacts of UPS input (bypass) feeders.**
- 2. Voltage taken from UPS System output switchgear, system common output.**
- 3. Connection point in each UPS of a parallel system. Signals can be daisy-chained from one UPS to next.**
- 4. If Building Alarm 1 is being used for another purpose, any unused building alarm on the UPS Signal Inputs can be used for the Sync Control. Refer to the applicable Eaton 93PM UPS User's and Installation Guide for the UPS Signal Inputs.**

Table 3-6 Customer Remote Monitoring System Wiring Interconnections

Function	From Sync Control	Wire Size [mm ²]	Note
UPS System A – Active Master Source	TB1-63	1,5	Twisted pair
Common Return	TB1-62	1,5	
UPS System B – Active Master Source	TB1-64	1,5	Twisted pair
Common Return	TB1-62	1,5	
UPS System-A – Synchronized to Load B	TB1-65	1,5	Twisted pair
Common Return	TB1-62	1,5	
UPS System-B – Synchronized to Load A	TB1-66	1,5	Twisted pair
Common Return	TB1-62	1,5	
Load Sync Enabled	TB1-68	1,5	Twisted pair
Common Return	TB1-67	1,5	

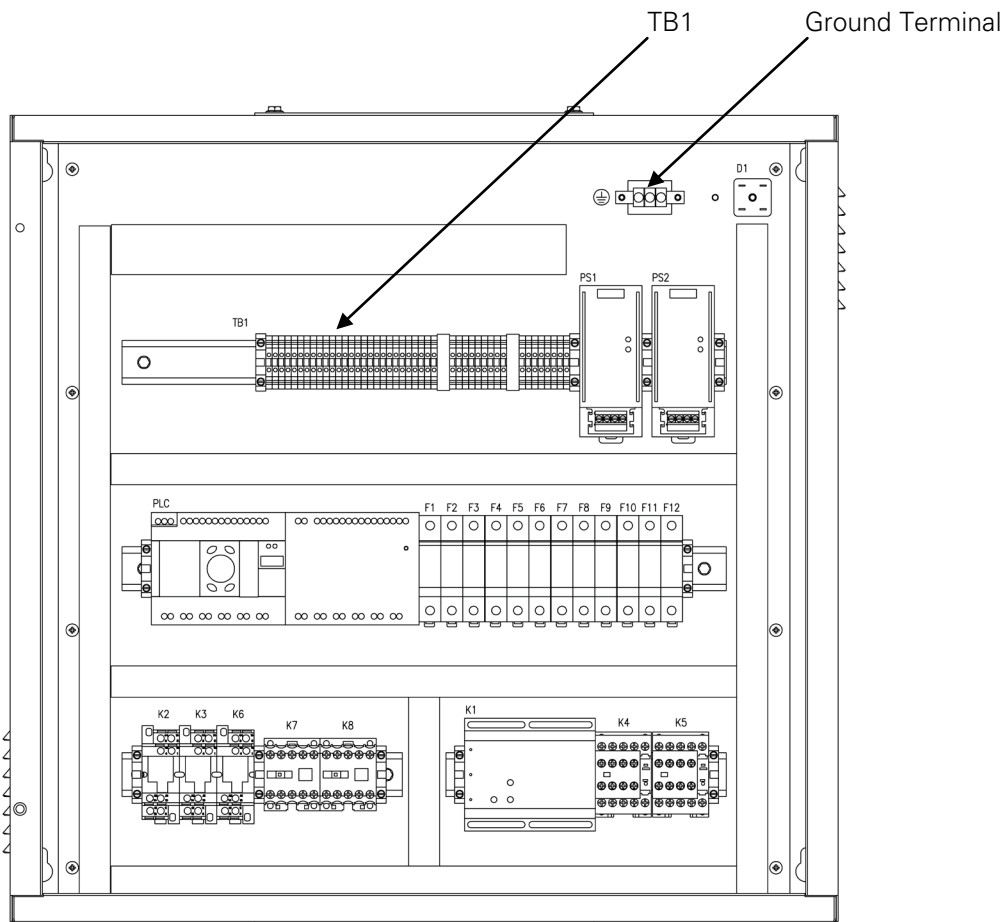


Figure 3-6 Eaton Sync Control Typical Control Wiring Termination Locations

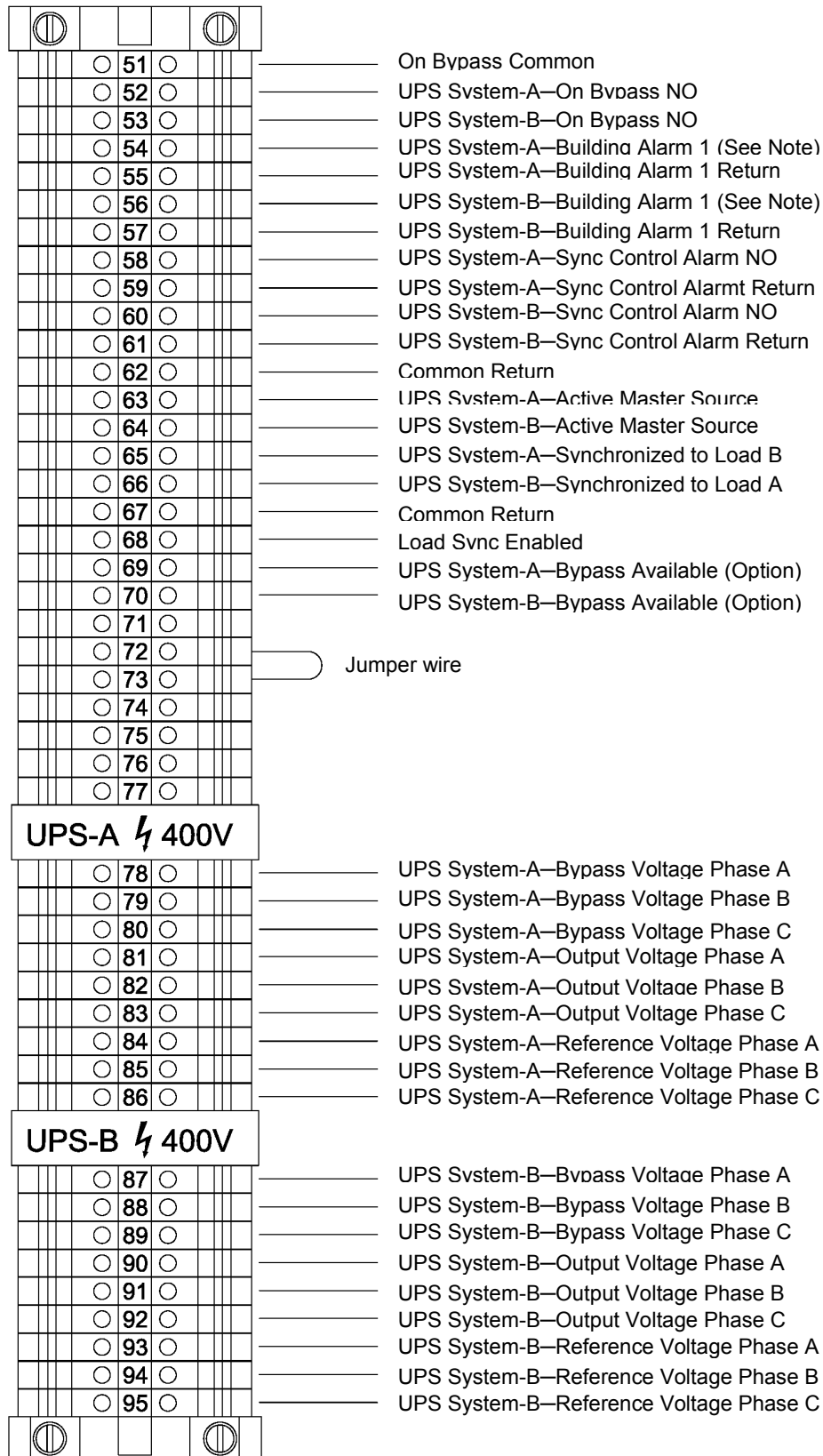


Figure 3-7 Eaton Sync Control TB1 Terminal Block Detail when Used with 93PM

NOTE:

If Building Alarm 1 (Signal input1) is being used for another purpose, any unused building alarm on the UPS Signal inputs can be used for the Sync Control.

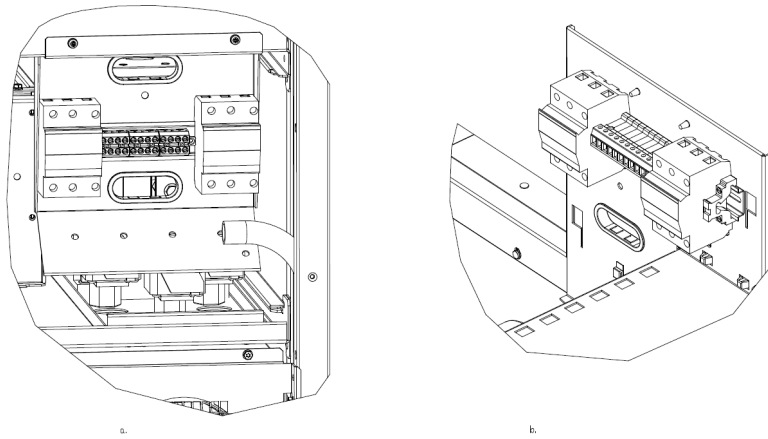


Figure 3-8 Eaton 93PM UPS Sync Control Interface of a. the 100 kW to 200 kW Frame and b. 50 kW Frame.

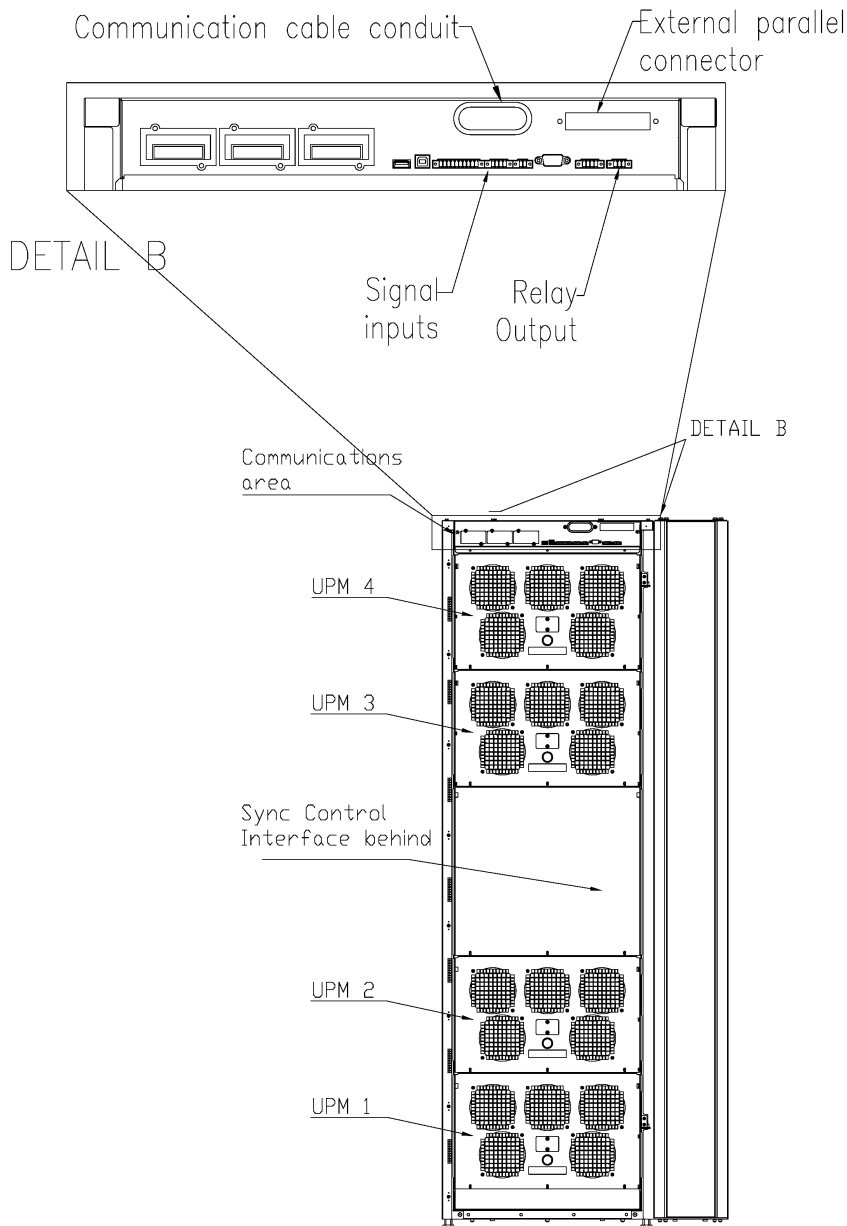


Figure 3-9 Eaton 93PM UPS (160–200 kW) Interface Locations for Eaton Sync Control

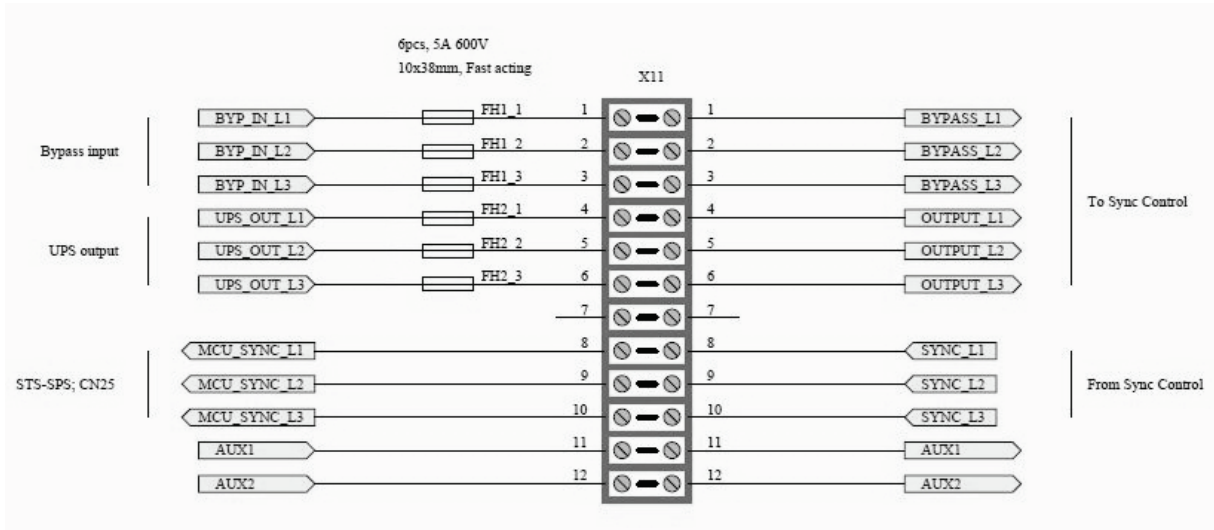


Figure 3-10 Eaton 93PM UPS X11 Terminal Block Detail

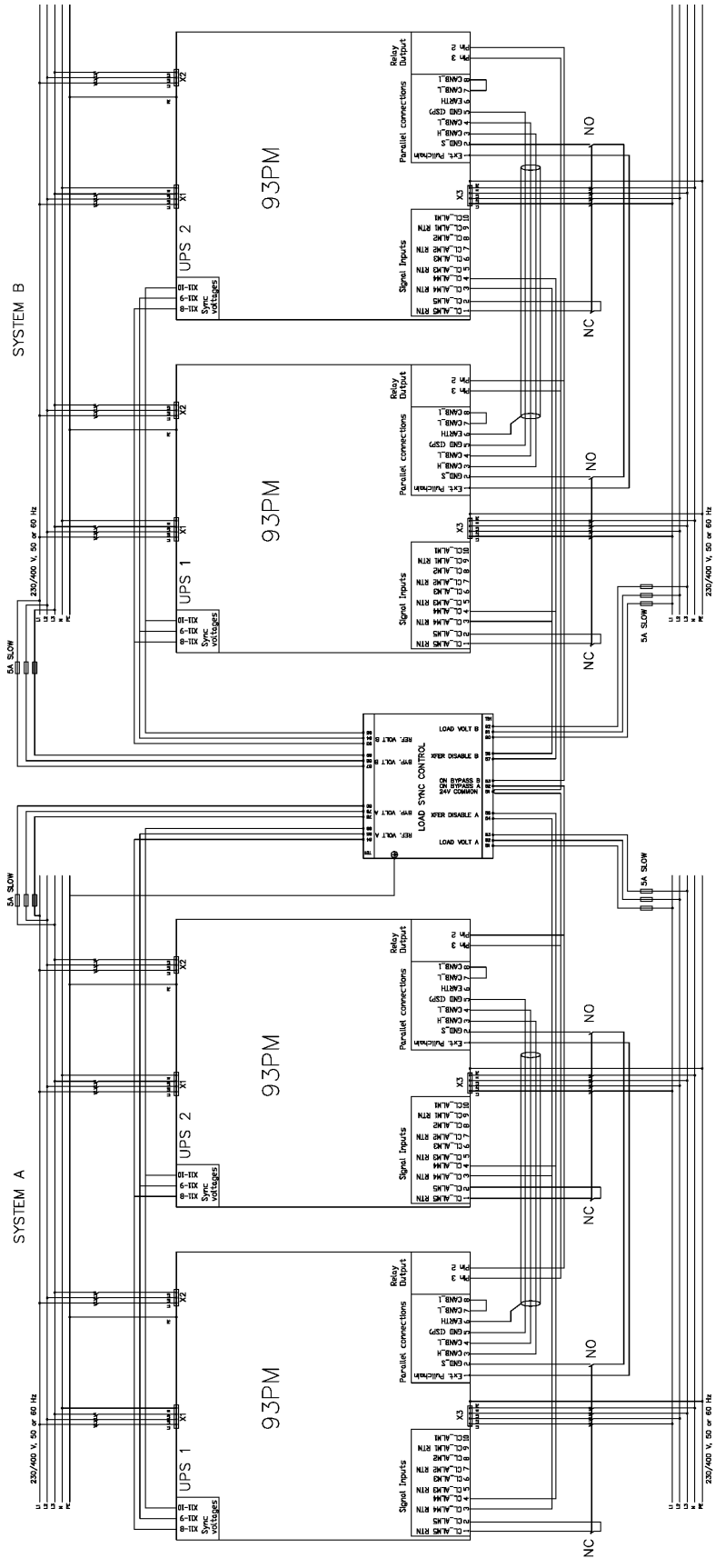


Figure 3-11 Eaton Sync Control Wiring Diagram with a Parallel 93PM UPS System

NOTES:

- The bypass phase A, B and C voltage from the system input switchgear is connected to the Eaton Sync Control.
- All signal wires must be protected by appropriate fuses. The fuse rating shall be 5A slow blow.
- The output voltage phase A, B and C are connected to the Eaton Sync Control from the system output switchgear.
- The circuit diagram above shows the interconnecting signal wiring between UPSs in the Eaton 93PM Parallel UPS system.
- Contact your local Eaton representative for further information before planning the installation.

4 Eaton Sync Control Operating Instructions

This chapter describes the operation of the Eaton Sync Control.

4.1 Startup for UPS Systems Equipped with an Eaton Sync Control

Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms as specified in Paragraph 6 on page 33 become void. This service is offered as part of the sales contract for the UPS. Contact service in advance (usually a two-week notice is required) to reserve a preferred startup date.

4.2 Understanding Eaton Sync Control Operation

The Eaton Sync Control maintains critical load synchronization of two separate Eaton 9395P or 93PM UPS systems. See Figure 4-1 for a typical block diagram of the system. This facilitates the uninterrupted transfer of customer loads from one load bus to another by means of downstream, dual-source, solid state, transfer switches. Enable the automatic synchronization action of the Eaton Sync Control by pressing the Load Sync Enable pushbutton on the front of the panel. When enabled, the Load Sync Enable pushbutton illuminates.

The Eaton Sync Control panel provides a synchronization reference to each system. Each system uses this reference to regulate the inverter phase relationship so that the two system outputs can maintain synchronization with each other. To establish the synchronization reference, each system provides bypass sensing voltage and output (critical load) bus voltage to the Eaton Sync Control.

Under normal operating conditions, bypass sensing voltage from each system is provided back to its inverter through the Eaton Sync Control. As long as the two bypass sources feeding UPS System-A and UPS System-B are available and in phase, each system remains in synchronization with its own bypass source and the two systems remain in synchronization with each other. If the two bypass sources become out of phase with each other ($> 6^\circ$ apart) or one or both sources become unavailable, the Eaton Sync Control provides a new synchronization reference to the non-master system as determined by the Preferred Source Selector switch. The non-master system's new synchronization reference is provided by the Eaton Sync Control from the output (critical load) bus of the system designated as master by the Preferred Source Selector switch. See Figure 4-2 for a diagram of the of the synchronization reference control operation.

When the two bypass sources regain availability and synchronization, the Eaton Sync Control provides the non-master system with its own bypass sensing voltage as a synchronization reference. Before resynchronization occurs, a 15-second pre-set time delay ensures the two bypass sources maintain acceptable synchronization.

To maintain a fault-tolerant arrangement, the Eaton Sync Control accounts for the following fault conditions or abnormal operating conditions:

1. An automatic reassignment of the preferred source (master) is made if the non-master system goes to bypass, regardless of the position of the Preferred Source Selector switch. When the non-master system (as defined by the Preferred Source Selector switch) is on bypass, the non-master system automatically becomes the master. The two systems continue to synchronize to their own bypass source until one of the bypass sources become unavailable or the two bypass sources are no longer in synchronization with each other.
2. If one UPS system loses its critical load bus voltage sensing, each system synchronizes to its own bypass source regardless of the position of the Preferred Source Selector switch.
3. Dual redundant logic power supplies are incorporated within the Eaton Sync Control, ensuring both systems remain synchronized even during the loss of one of the logic power supplies. These power supplies are powered from each system's critical load bus.
4. With a complete loss of logic power to the Eaton Sync Control (due to either component failure or power supply fault), each system synchronizes to its own bypass source.

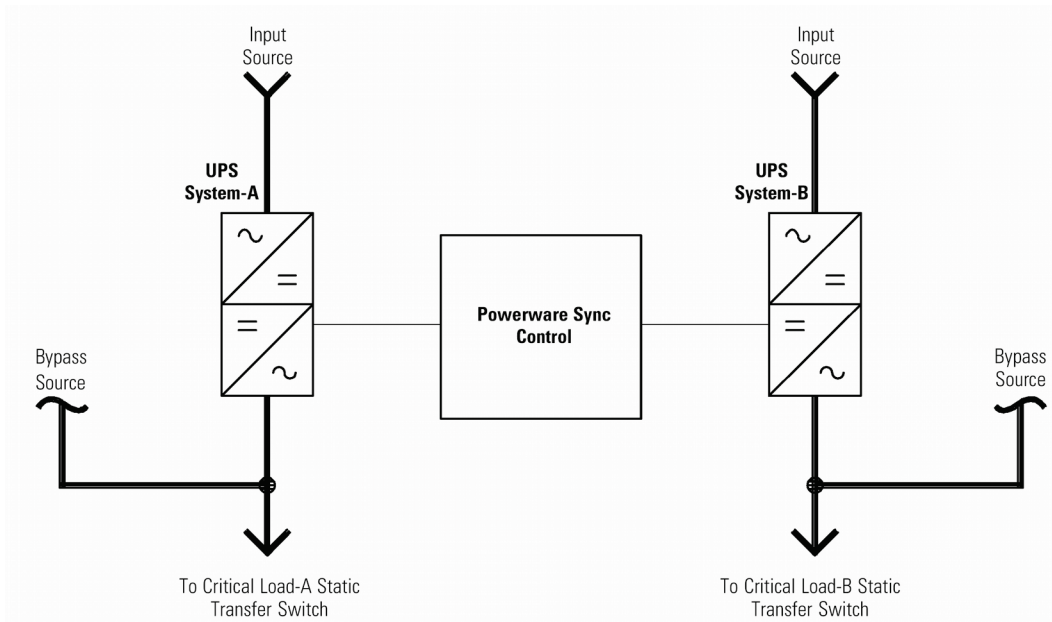


Figure 4-1 Typical Eaton Sync Control Block Diagram with a Eaton 9395P or 93PM UPS System

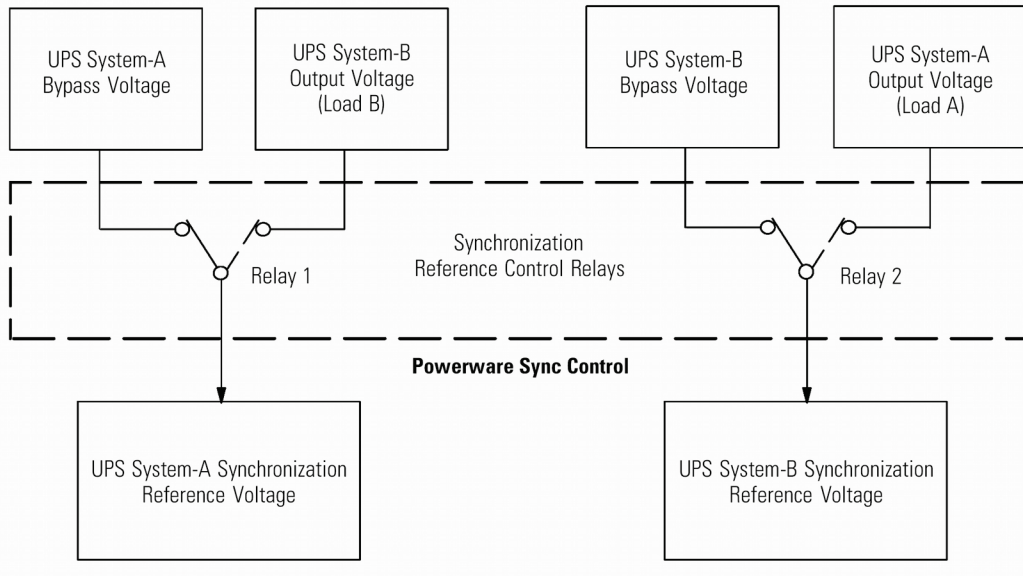


Figure 4-2 Synchronization Reference Control

NOTES:

- **The Synchronization Reference Control relays are shown under normal conditions. Both bypass sources are available and are in synchronization.**
- **Dashed switch position of Synchronization Reference Control Relay 1 shows UPS System-A in the non-master system mode.**
- **Dashed switch position of Synchronization Reference Control Relay 2 shows UPS System-B in the non-master system mode.**
- **At any given time, only one of the UPS systems can be in the non-master system mode.**

4.3 Operation

Perform the following procedures to set up the Eaton Sync Control for operation with your system. See Figure 4-3 and Table 4-1 for the location and explanation of the controls and indicators on the Eaton Sync Control.

1. Place both UPS systems in normal operating mode. Refer to the applicable Eaton 9395P or 93PM UPS Installation and Operation Manual. The manuals are listed in Paragraph 1.3 on page 7.
2. Press the Lamp Test pushbutton to verify all indicators illuminate and are working correctly.
3. Determine which system load bus (A or B) will be used as the master synchronization source. Set the Preferred Source Selector switch to this load bus.
4. Press the Load Sync Enable pushbutton to enable the automatic synchronization control. The pushbutton illuminates when the synchronization control is enabled.
5. To disable the automatic synchronization control, press the Load Sync Enable pushbutton and verify that the indicators, including the Load Sync Enable pushbutton, are off.

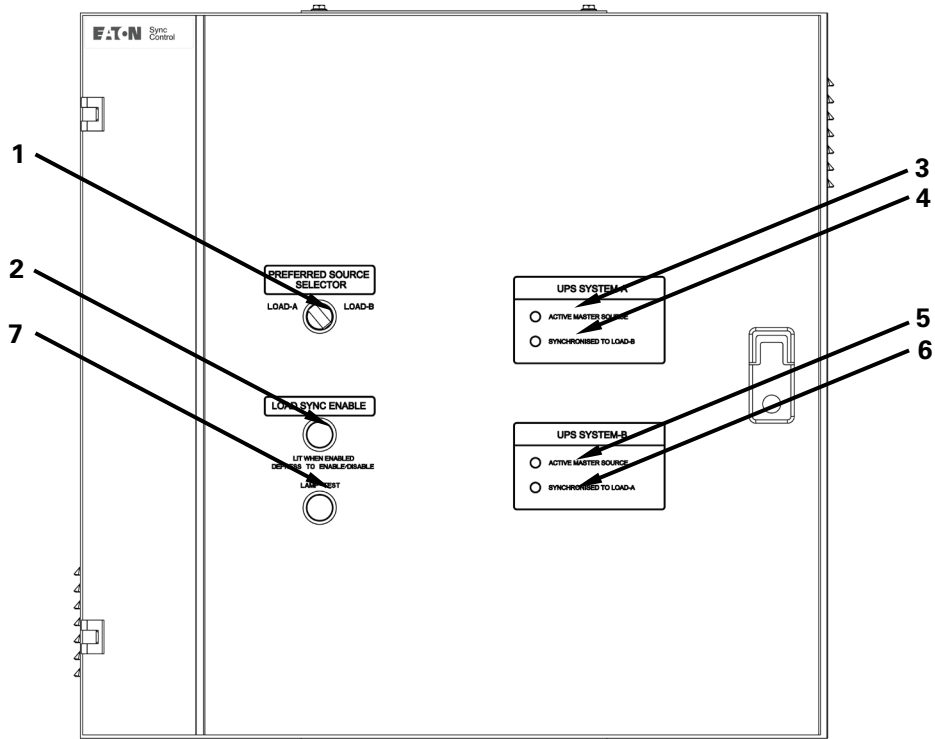


Figure 4-3 Eaton Sync Control Controls and Indicators

Table 4-1 Controls and Indicators

Item	Name	Function and Description
1	PREFERRED SOURCE SELECTOR	Allows either of the two system load buses to be assigned as the preferred source.
2	LOAD SYNC ENABLE	Enables or disables the automatic Eaton Sync Control unit. Switch is illuminated when load sync action is enabled.
3	UPS SYSTEM-A ACTIVE MASTER SOURCE	When illuminated, indicates UPS System-A is the active master source. This indicator may illuminate even if the Preferred Source Selector switch is not set to the corresponding position.
4	UPS SYSTEM-A SYNCHRONISED TO LOAD-B	When illuminated, indicates that UPS System-A is in the non-master system mode and is synchronized to the UPS System-B load bus.
5	UPS SYSTEM-B ACTIVE MASTER SOURCE	When illuminated, indicates UPS System-B is the active master source. This indicator may illuminate even if the Preferred Source Selector switch is not set to the corresponding position.
6	UPS SYSTEM-B SYNCHRONISED TO LOAD-A	When illuminated, indicates that UPS System-B is in the non-master system mode and is synchronized to the UPS System-A load bus.
7	LAMP TEST	Pressing the pushbutton illuminates all indicators on the Eaton Sync Control unit for visual testing.



NOTE

- **If either of the yellow Synchronized To Load indicators is illuminated, the Preferred Source Selector switch is locked out and the master synchronization source cannot be changed.**
 - **If both systems are operating normally, the Active Master Source green indicator illuminates for the selected master synchronization source.**
 - **If one system is in bypass, the Active Master Source green indicator illuminates for the system in bypass, regardless of the position of the Preferred Source Selector switch.**
 - **If, during operation, one or both of the systems lose their bypass sources or if the bypass sources are no longer in synchronization, the yellow Synchronized To Load indicator illuminates for the non-master system.**
-

4.4 Customer Monitoring

The operating status of the Eaton Sync Control is available for the customer's remote monitoring system using dry relay contacts connected to the TB1 terminal strip. Status of the following Eaton Sync Control conditions are provided:

- UPS System-A Active Master Source
- UPS System-B Active Master Source
- UPS System-A Synchronized to Load B
- UPS System-B Synchronized to Load A
- UPS System-A Sync Control Alarm
- UPS System-B Sync Control Alarm
- Load Sync Enabled

The Sync Control Alarm becomes active when the at least one of the following condition is active:

- Failure in one of the redundant auxiliary power supplies.
- Load voltage of either A or B systems is not present
- An error state is active in the PCL.

4.5 Maintenance Operations

Maintenance should be scheduled on a periodic basis, recommended not to exceed one year, to determine if components, wiring, and connections exhibit evidence of overheating or damage. More frequent intervals are recommended if the equipment is subjected to highly repetitive operations.



DANGER

This equipment contains LETHAL VOLTAGES. All repairs and service should be performed by AUTHORIZED SERVICE PERSONNEL ONLY. There are NO USER SERVICEABLE PARTS inside the Eaton Sync Control.



CAUTION

Refer to the maintenance chapter in the applicable Eaton 9395P or 93PM UPS Installation and Operation Manual before beginning maintenance or repairs on the UPS.

5 Recycling the used Eaton Sync Control

Do not discard waste electrical or electronic equipment in the trash.
For proper disposal, contact your local collecting/recycling/reuse or hazardous waste center and follow the local legislation.

These symbols indicate on a product:



Use proper local collecting centers meeting local legislation when handling waste of electrical and electronic equipment.

6 Warranty

The product is warranted against defects in design, materials and workmanship for a period of twelve (12) months from its original date of purchase. The local office or distributor may grant a warranty period different to the above and refer to local terms of liability as defined in the supply contract. The UPS manufacturer is not responsible for

- Any costs resulting from a failure if the installation, commissioning, repair, alternation, or ambient conditions of the equipment do not fulfill the requirements specified in the documentation delivered with the unit and other relevant documentation.
- Equipment subjected to misuse, negligence or accident
- Equipment comprised of materials provided or designs stipulated by the purchaser.

Under no circumstances shall the manufacturer, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, losses or penalties.

The technical data, information and specifications are valid at the time of printing. The UPS manufacturer reserves the right to modifications without prior notice.

7 Technical Data

EATON SYNC CONTROL II

Part number	P-105000071-001
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General Data

Mounting type	Wall-mount
Dimensions (W x H x D)	665 x 645 x 235 mm
Weight	30 kg
Cable entry	Top / Bottom
Degree of protection	IP20
Pollution degree	2
Colour	Black, RAL-9005
Ambient Temperature Range:	0-40°C
Recommended Oper. Range:	20-25°C
Maximum Relative Humidity:	95%, noncondensing

Electrical

Rated voltage U_n	400 V
Rated operational voltage U_e	500 V
Rated insulation voltage U_i	600 V
Rated impulse withstand voltage U_{imp}	2500 V
Rated current of the assembly I_nA	10 A
Rated current of a circuit I_{nc}	5 A
Rated peak withstand current I_{pk}	100 kA
Rated short-time withstand current I_{cw}	1000 A
Rated conditional short-circuit current I_{cc}	1000 A
Rated Diversity Factor RDF	1
Rated frequency f_n	50 Hz
Overvoltage category	II

Certification and Standards

Low-voltage switchgear and controlgear assemblies	IEC/EN 61439-2
CE	In conformance with EMC directive 2004/108/EC and low voltage directive 2006/95/EC