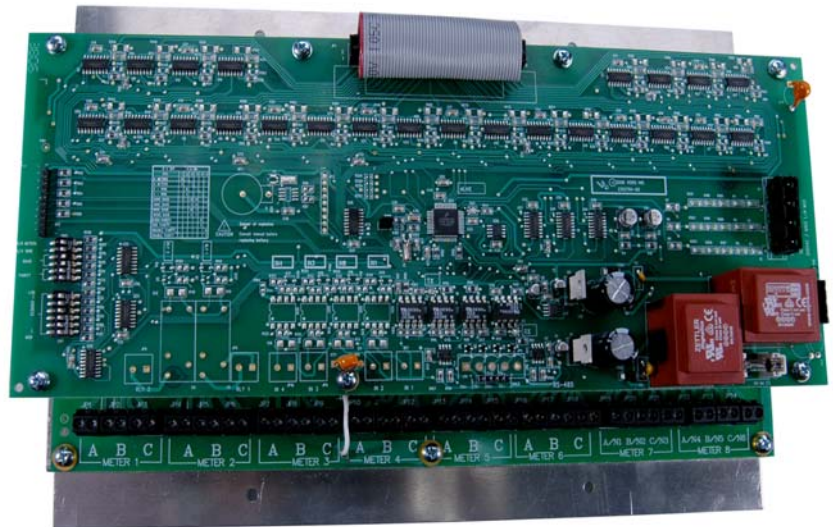


# PowerLogic<sup>®</sup> Multi-Circuit Meter (MCM8364) (E) 63230-216-209

Instruction Bulletin



## HAZARD CATEGORIES AND SPECIAL SYMBOLS



Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

<b>⚠ DANGER</b>
<b>DANGER</b> indicates an imminently hazardous situation which, if not avoided, <b>will result in</b> death or serious injury.

<b>⚠ WARNING</b>
<b>WARNING</b> indicates a potentially hazardous situation which, if not avoided, <b>can result in</b> death or serious injury.

<b>⚠ CAUTION</b>
<b>CAUTION</b> indicates a potentially hazardous situation which, if not avoided, <b>can result in</b> minor or moderate injury.

<b>CAUTION</b>
<b>CAUTION</b> , used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, <b>can result in</b> property damage.

*NOTE: Provides additional information to clarify or simplify a procedure.*

## PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

## FCC NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. This Class A digital apparatus complies with Canadian ICES-003.

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## INTRODUCTION

The multi-circuit meter (MCM8364) is part of a power monitoring system that provides an efficient way of monitoring multiple loads that originate from the same electrical service. The multi-circuit meter can monitor up to eight 3-phase, 3-wire loads or six 3-phase, 4-wire loads with neutral current monitoring.

With one RS-485 connection, the multi-circuit meter provides a Modbus RTU communications output and 72 alarms. Up to 30 multi-circuit meters can be addressed on the same Modbus network.

The multi-circuit meter can provide warnings to the central monitoring computer via its Modbus output using the MNode software provided with your multi-circuit meter. Once the software is installed, the PC can immediately react to situations such as over/under voltage, over/under current, and phase loss.

This document explains how to connect the communication, current and voltage inputs, and power supply to the multi-circuit meter.

For 208 - 230 VAC Power Connection version order catalog number MCM8364(E).

Parts of the Multi-Circuit Meter

Figure 1 shows the parts of the multi-circuit meter. Table 1 describes these parts.

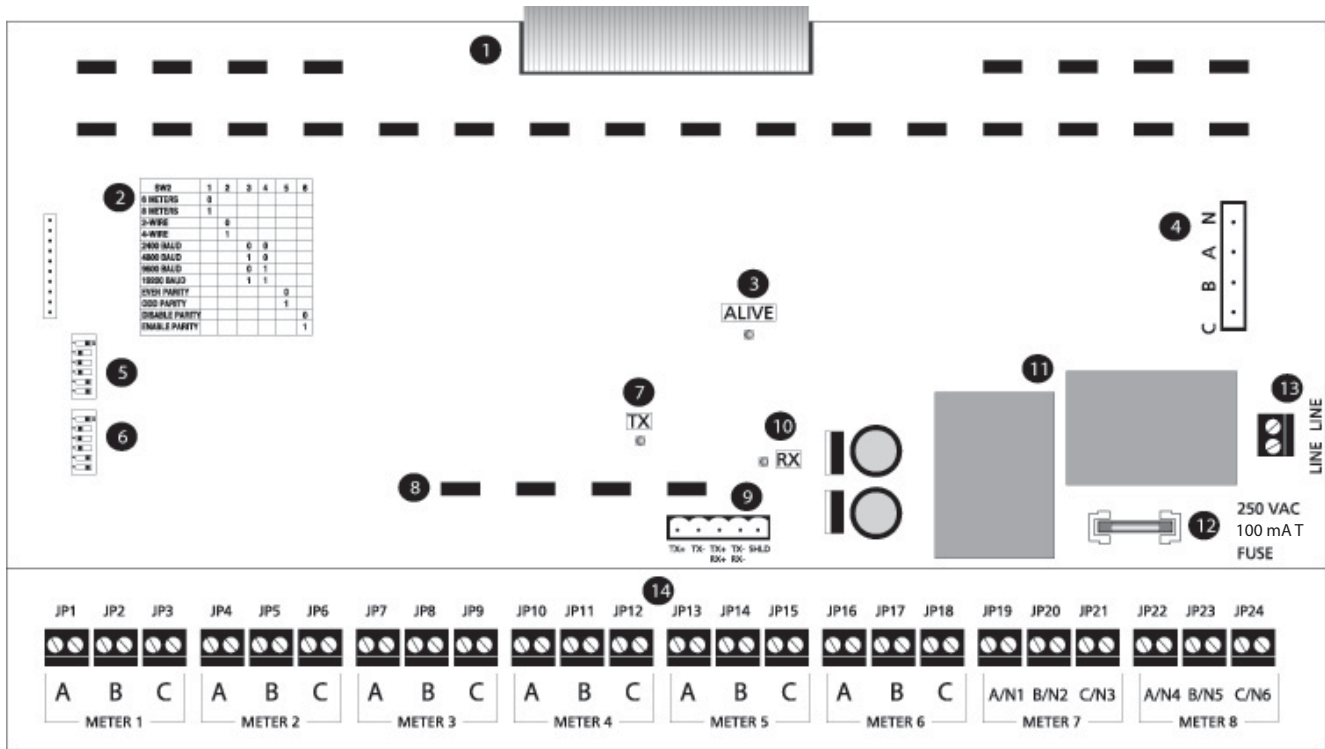


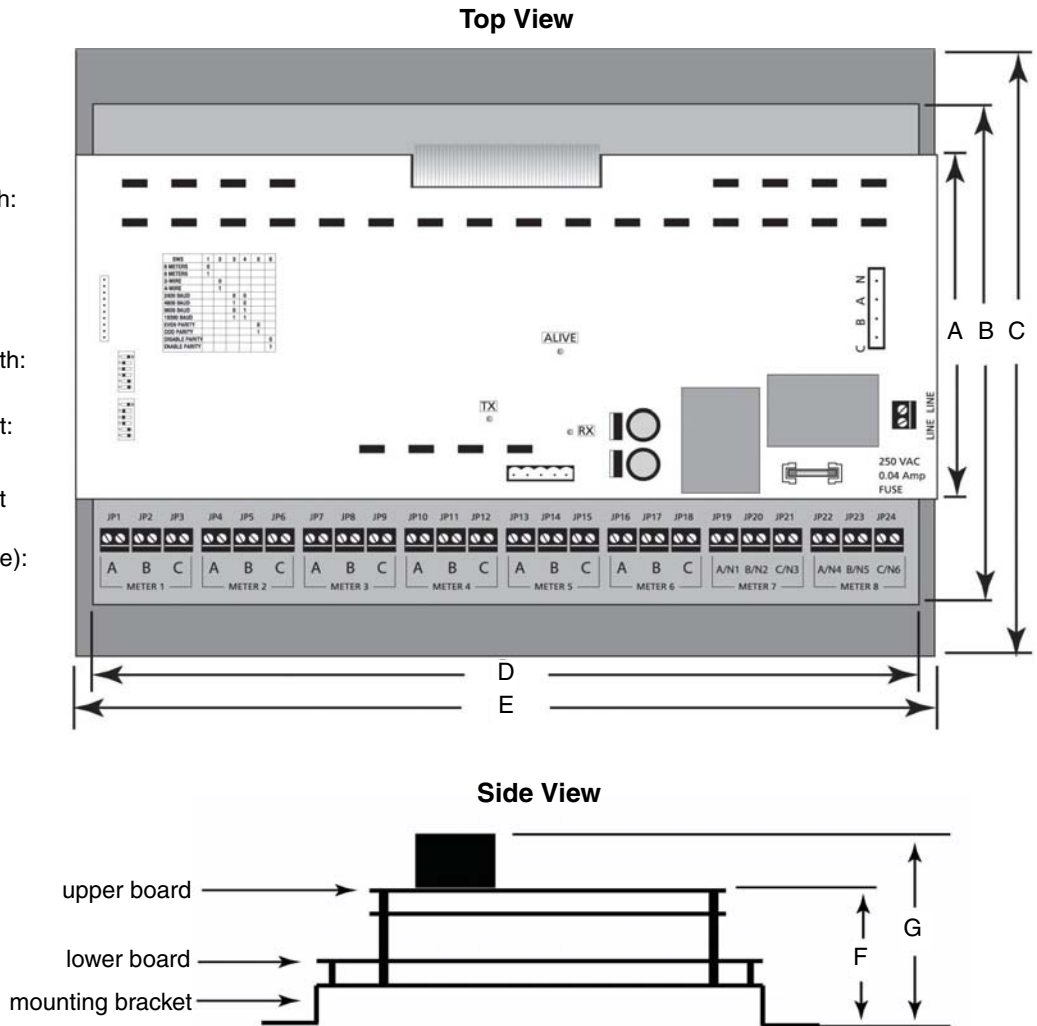
Figure 1: Parts of the Multi-Circuit Meter (MCM8364)

Table 1: Parts Description of the Multi-Circuit Meter (MCM8364)

Part	Description
1	Board connection ribbon cable Connects the transducer and CT circuit boards.
2	Configuration table Quick reference for configuration of service type and communications switches (see item 6).
3	ALIVE LED Flashes every second to indicate proper operation. Stays on continuously to indicate internal system malfunction.
4	Input voltage connection Input line voltage, common for all meter channels, up to nominal of 480 VAC $L-L$ , (300 VAC $L-N$ max).
5	Service type and communications configuration switches Field-selectable service type, 2/4-wire communications, baud rate, and parity.
6	Modbus address switches Each Modbus device must have a unique address. These switches must be set to assign an individual address before the device is connected. Refer to Figure 4 on page 5.
7	Transmit (TX) LED Indicates transmission of information over the Modbus network.
8	Optical isolation An optical isolation barrier is used to separate high voltage from the communications network.
9	RS-485 communications connection Daisy-chain multiple Modbus devices using a 2- or 4-wire Modbus network.
10	Receive (RX) LED Indicates reception of information over the Modbus network.
11	Power transformer Linear power supply for reliability and low noise.
12	Fused power connection 250 Vac, 100 mA fuse for circuit protection. Time Delay (T).
13	Control (Mains) power connection Easy 2-wire, 50/60 Hz. 120 VAC or 208 - 230 VAC.
14	5 A CT terminals CT terminals accept any 5 A CT signal. 2-wire, not polarity sensitive.

**Dimensions**

- A. Upper board width: 5.3 in. (135 mm)
- B. Lower board width: 6.9 in. (175 mm)
- C. Mounting bracket width: 8.9 in. (226 mm)
- D. Lower board length: 12.3 in. (312 mm)
- E. Upper board and mounting bracket length: 12.9 in. (327 mm)
- F. Entire assembly height: 2.9 in. (73 mm)
- G. Entire assembly height (including board connection ribbon cable): 3.9 in. (98 mm)

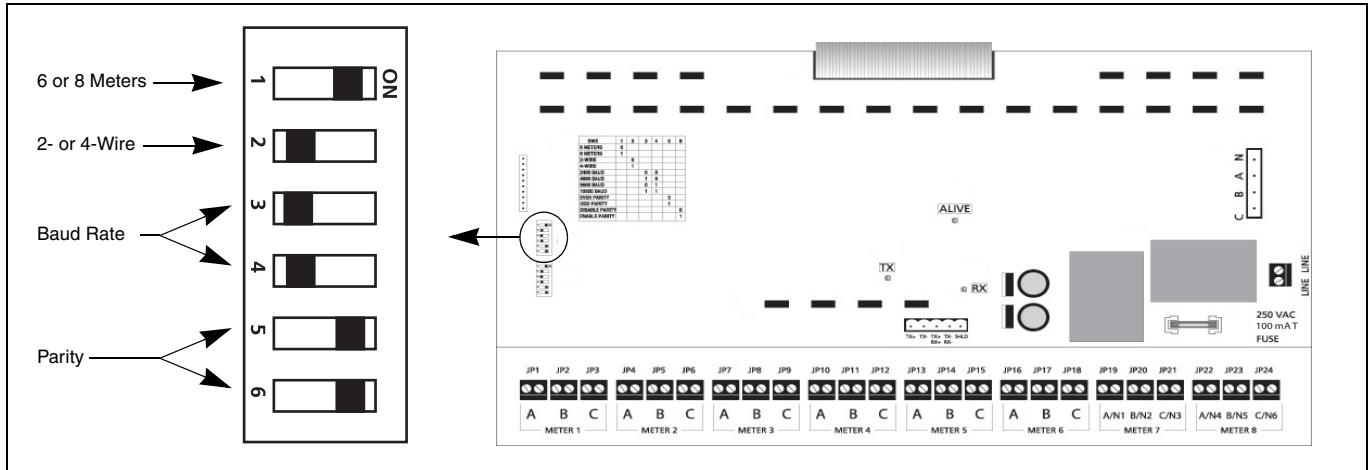


**Figure 2: Multi-Circuit Meter Dimensions**

## COMMUNICATIONS

### Setting the Communication Parameters

On the multi-circuit board assembly, set the DIP switches to configure the communication parameters for the number of meters, wire type, baud rate and parity. Refer to Figure 3 and Table 2.



**Figure 3:** Possible switch settings for the communications parameters

**Table 2:** Switch Settings

Parameter		Switch Number					
		1	2	3	4	5	6
Number of Meters	6	OFF					
	8	ON					
Wire Type (RS-485 Modbus)	2-wire		OFF				
	4-wire		ON				
Baud Rate	2400			OFF	OFF		
	4800			ON	OFF		
	9600			OFF	ON		
	19200			ON	ON		
Parity	Even					OFF	
	Odd					ON	
	Disable						OFF
	Enable Parity						ON

### Selecting the Modbus Network Address

Before each device is connected to the Modbus RS-485 line, the device must have a unique address. If an address conflicts with another device, neither device will communicate.

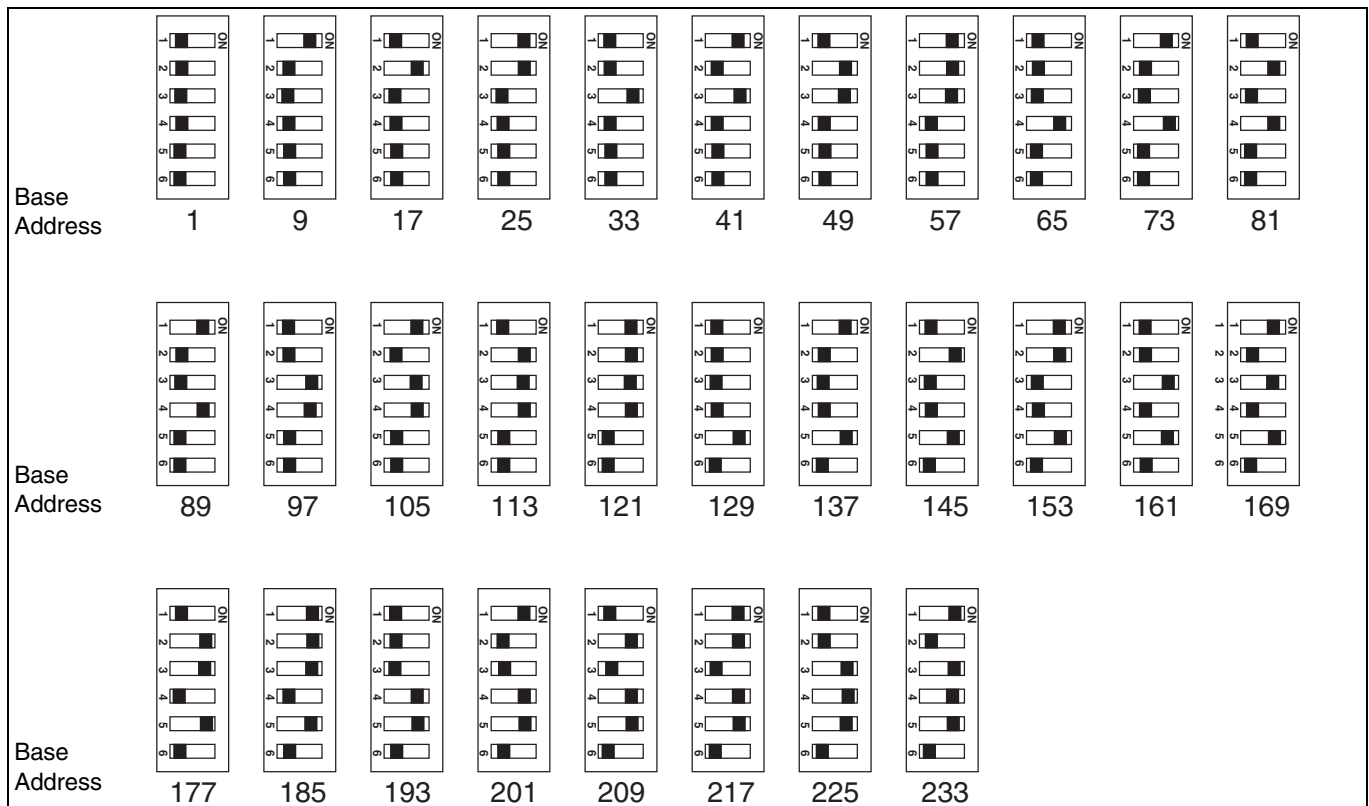
Possible switch settings are shown in Figure 4. You must set the multi-circuit meter to one of the base addresses: 1, 9, 17, and so forth. When you set the base address on the multi-circuit meter, the first device being monitored will be assigned that address and the next seven devices will be automatically assigned addresses in sequential order.

For example, if you set the switches to address 1, the first device will be address 1, and the other devices being monitored will be assigned addresses 2, 3, 4, up to 8 as shown in Table 3. If you select address 9 for the meter, the devices being monitored will be assigned addresses 10, 11, 12, up to 16.

**Table 3: Example of Base Address 1**

Base Address	8 Meters	Address	6 Meters	Address
1	METER 1	1	METER 1	1
	METER 2	2	METER 2	2
	METER 3	3	METER 3	3
	METER 4	4	METER 4	4
	METER 5	5	METER 5	5
	METER 6	6	METER 6	6
	METER 7	7	METER 7	†
	METER 8	8	METER 8	†

† Reserved for use when 8 meters are connected. Connection of 8 meters is possible only when neutral current monitoring is not required.



**Figure 4: Possible switch setting for Modbus address configuration**

## Making the Communications Connections

To make the communications connections, remove the connector on the multi-circuit meter board assembly and reinstall it after you have wired it. To wire the communications, follow these steps:

1. Wire the communications connector of the multi-circuit meter as shown in Figure 5.
- NOTE:** The wire type setting on the communication DIP switch must match this wiring type.
2. Using a small flat blade screwdriver, tighten the connector screws. Torque the connector screws 4 lbs-in. (0.45 N-m).
  3. If the multi-circuit meter is the last device on the daisy chain, terminate it following the instructions in "Terminating the Multi-Circuit Meter (MCM8364)" on page 7.
  4. Reinstall the connector back into the multi-circuit meter board assembly.
  5. Secure the communications cable in the enclosure.

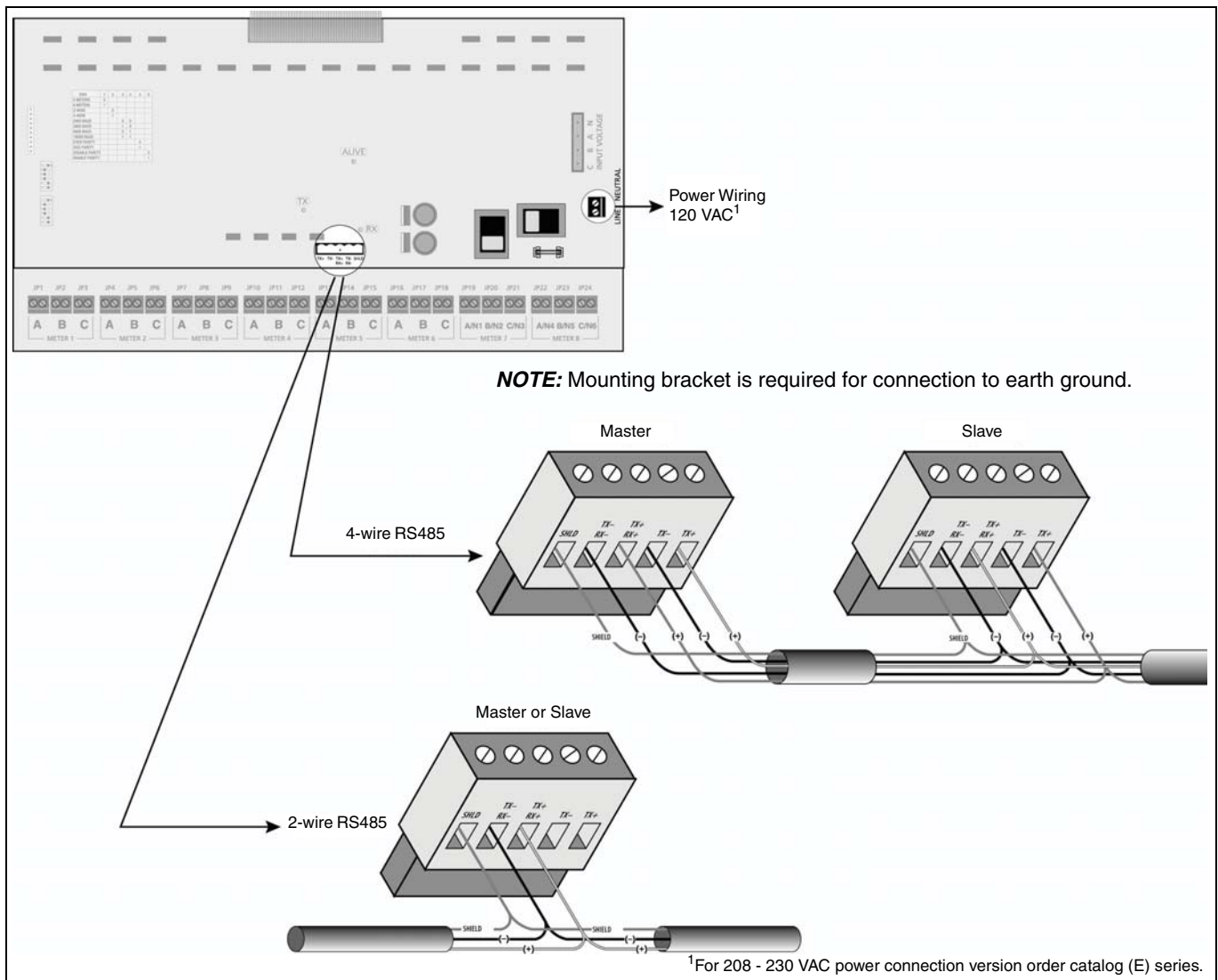


Figure 5: Communications connections

### Terminating the Multi-Circuit Meter (MCM8364)

If the multi-circuit meter is the last device, terminate it using the 3090MCTAS485 terminator to ensure reliable communications. Refer to Figure 6 and follow these steps:

1. Insert the wires of the daisy chain as described in “Making the Communications Connections” on page 6 and insert the wires of the terminator into the holes of the RS-485 communications connector.
2. Using a small flat blade screwdriver, tighten the connector’s screws. Torque the connector screws 4 lbs-in. (0.45 N-m).
3. Reinstall the connector back into the signal acquisition board.
4. Secure the communications cable in the enclosure.

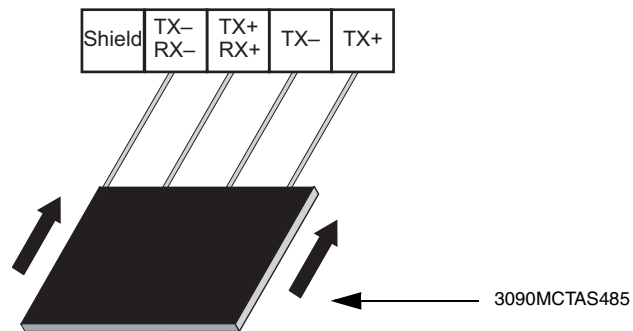


Figure 6: Terminating the Multi-Circuit Meter (MCM8364)

## WIRING

### DANGER

#### HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- This equipment must be installed and serviced only by qualified personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- Replace all device doors and covers before turning on power to this equipment.

**Failure to observe this instruction will result in death or serious injury.**

The multi-circuit meter can monitor up to eight 3-phase circuits without neutral current monitoring, or up to six 3-phase circuits with neutral current monitoring. Single-phase neutral monitoring is also possible, with optional neutral monitoring for up to six circuits. Refer to Figure 7 on page 9 and observe these guidelines for connections:

- Connect the 5 A CT leads to terminal blocks JP1–JP24. For example, for the first monitored service, connect the first set of CTs to JP1–3, the second to JP4–JP6, and so on.
- Wire the CT that is monitoring Phase A to the terminal marked A; Phase B to the terminal marked B, and Phase C to terminal marked C.
- Terminal blocks are compatible with standard 2-wire, 5 A CT outputs.
- Terminal blocks are two position and not polarity sensitive.
- Mounting bracket is required to be connected to earth ground.

## National and Local Standards

The MCM8364 must be installed in an appropriate Electrical and Fire enclosure per national and local electrical codes. UL listed under Standard 508 as an “open type device.”

Installation Category: Cat II or Cat III

An overcurrent or disconnect device should be provided per national and local requirements. For an overcurrent protection device, Square D offers Fuse Kits AH02, AH03, and AH04. Contact Square D or visit [www.us.SquareD.com](http://www.us.SquareD.com).

The disconnect device should be installed in close proximity to this equipment and should be marked as the disconnecting device for this equipment.

For use in a Pollution Degree 2 or better environment only.

A Pollution Degree 2 environment must control conductive pollution and the possibility of condensation or high humidity. Consideration must be given to the enclosure, the correct use of ventilation, thermal properties of the equipment and the relationship with the environment.



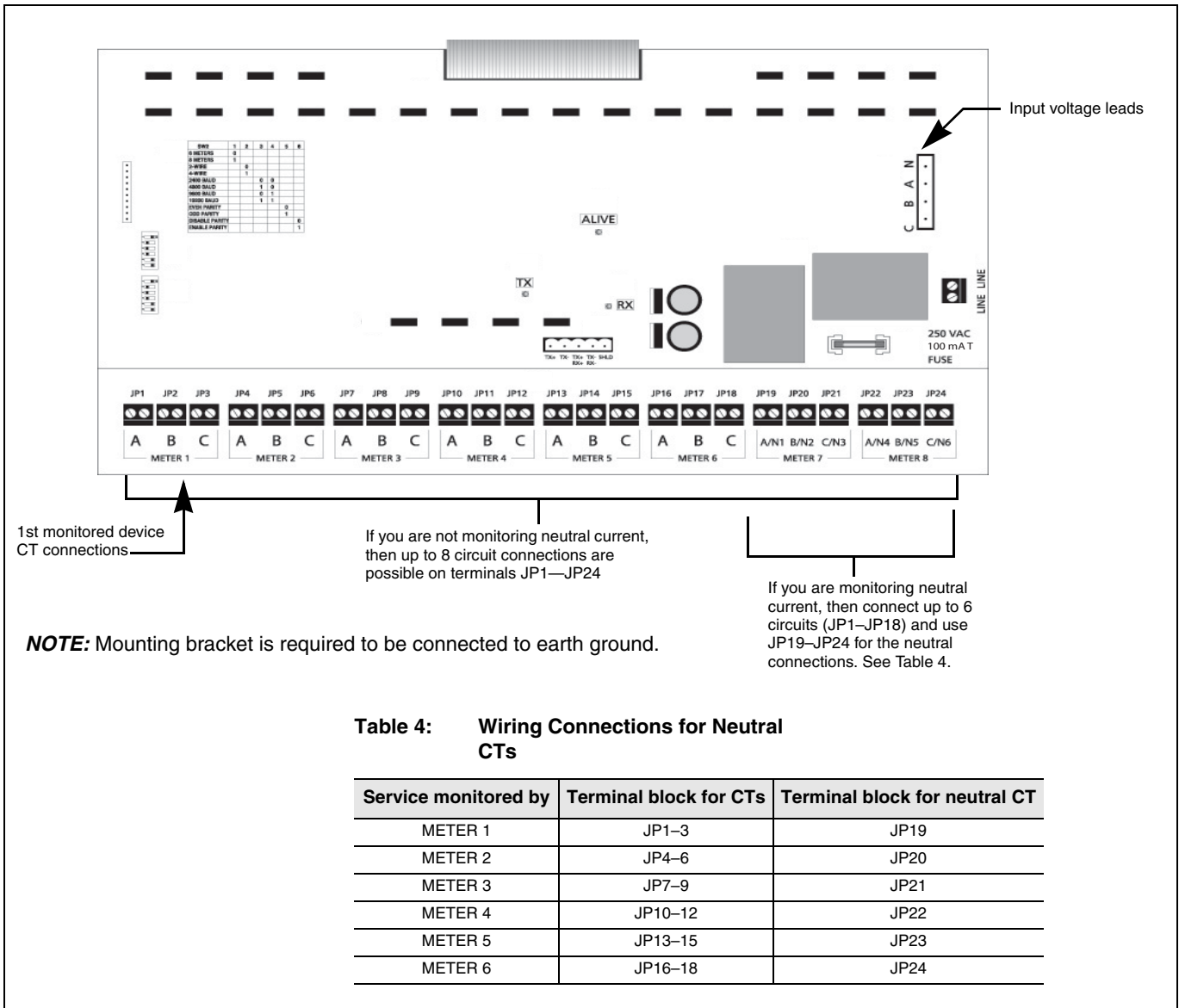


Figure 7: Wiring guidelines

### Wiring Diagram without Neutral Current Monitoring

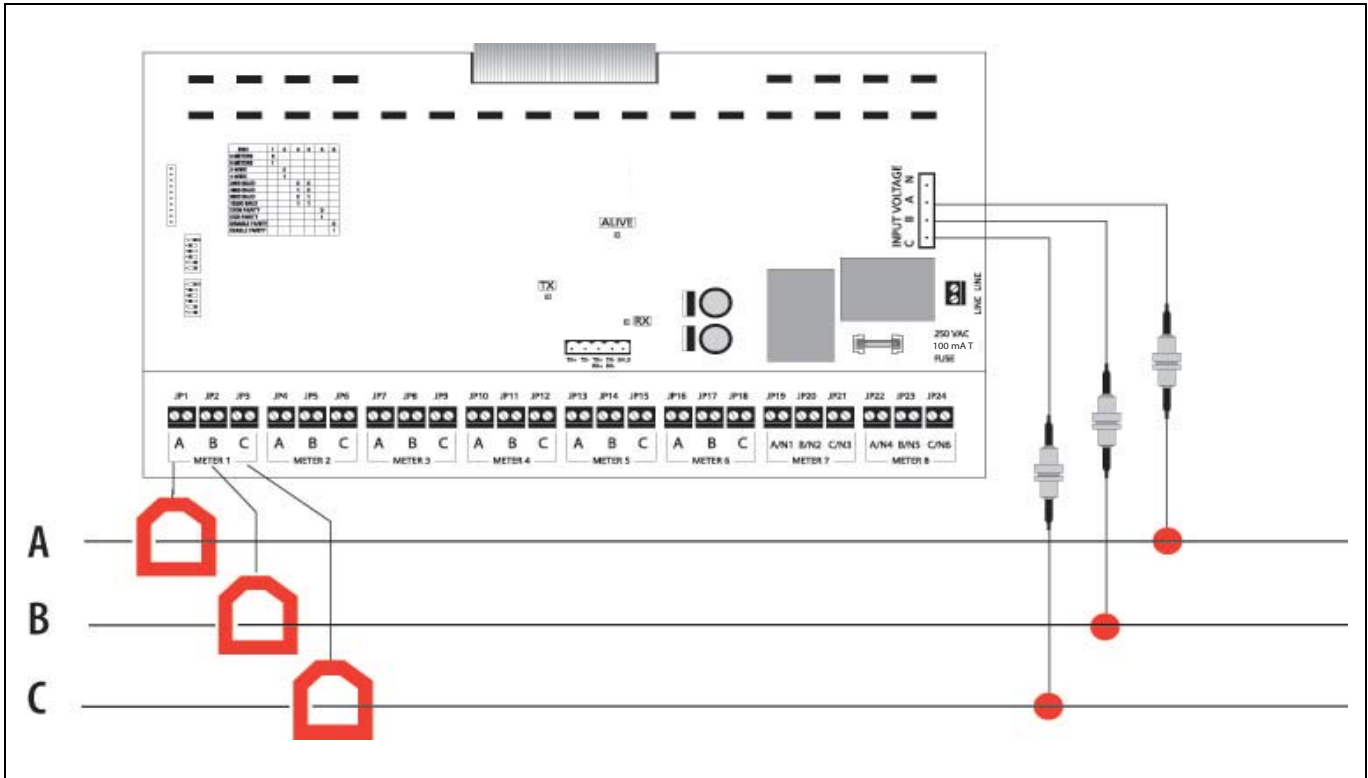


Figure 8: 3-phase, 3-wire (with no neutral current monitoring)

Wiring Diagrams with Neutral Current Monitoring

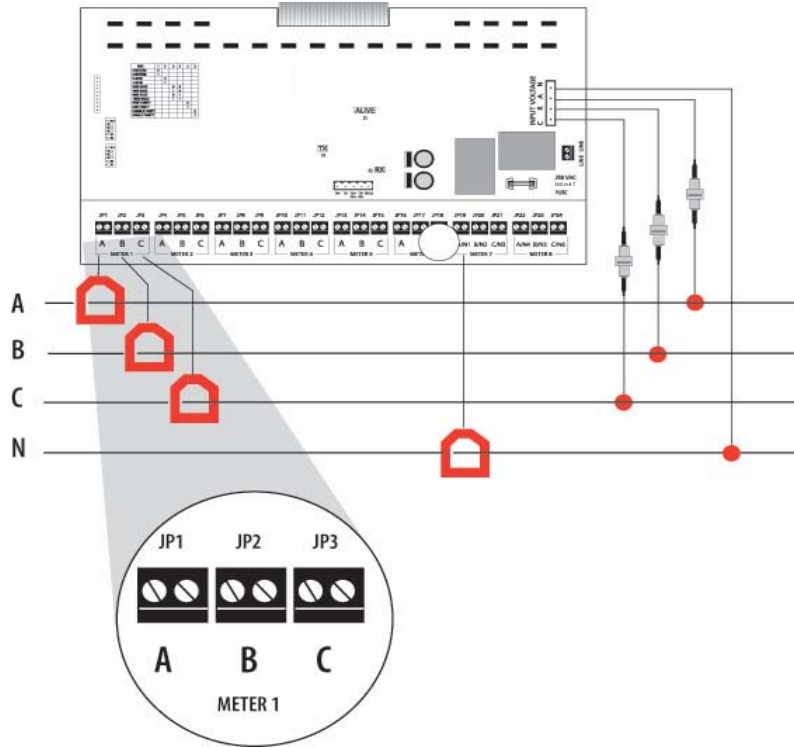


Figure 9: 3-phase, 4-wire (with option of neutral current wiring)

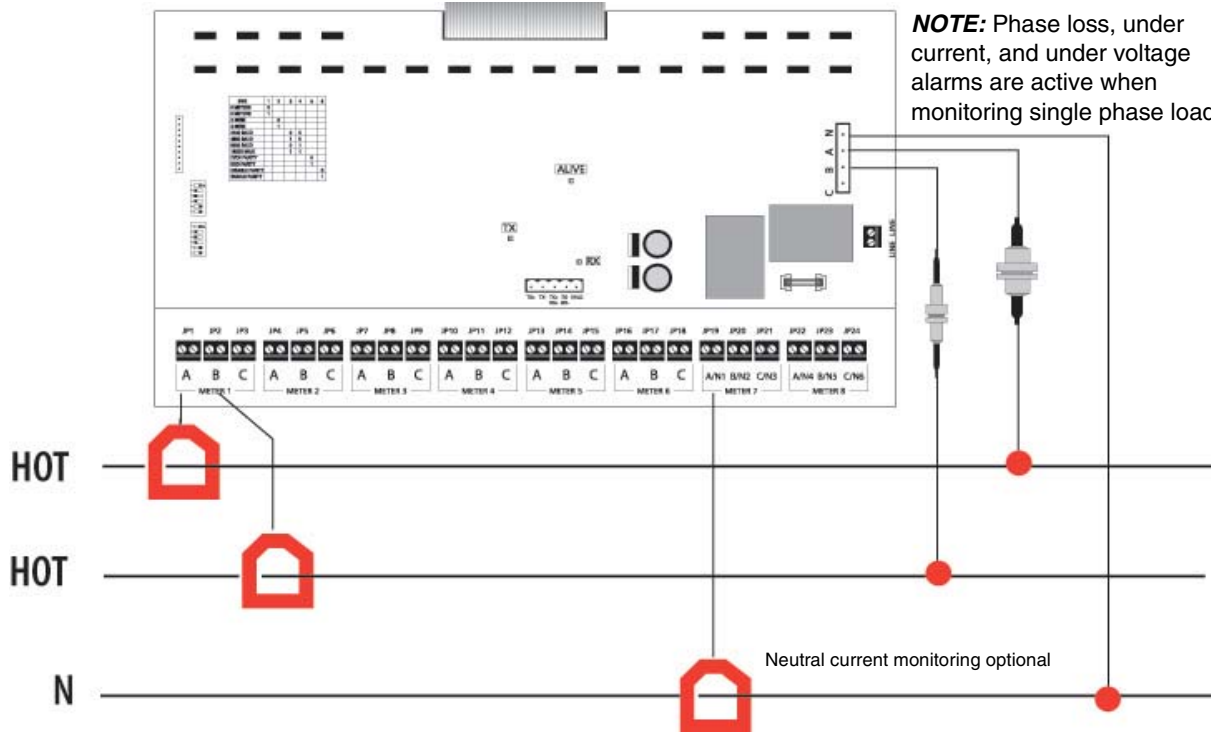


Figure 10: Single-phase, 3-wire (with option of neutral current wiring)

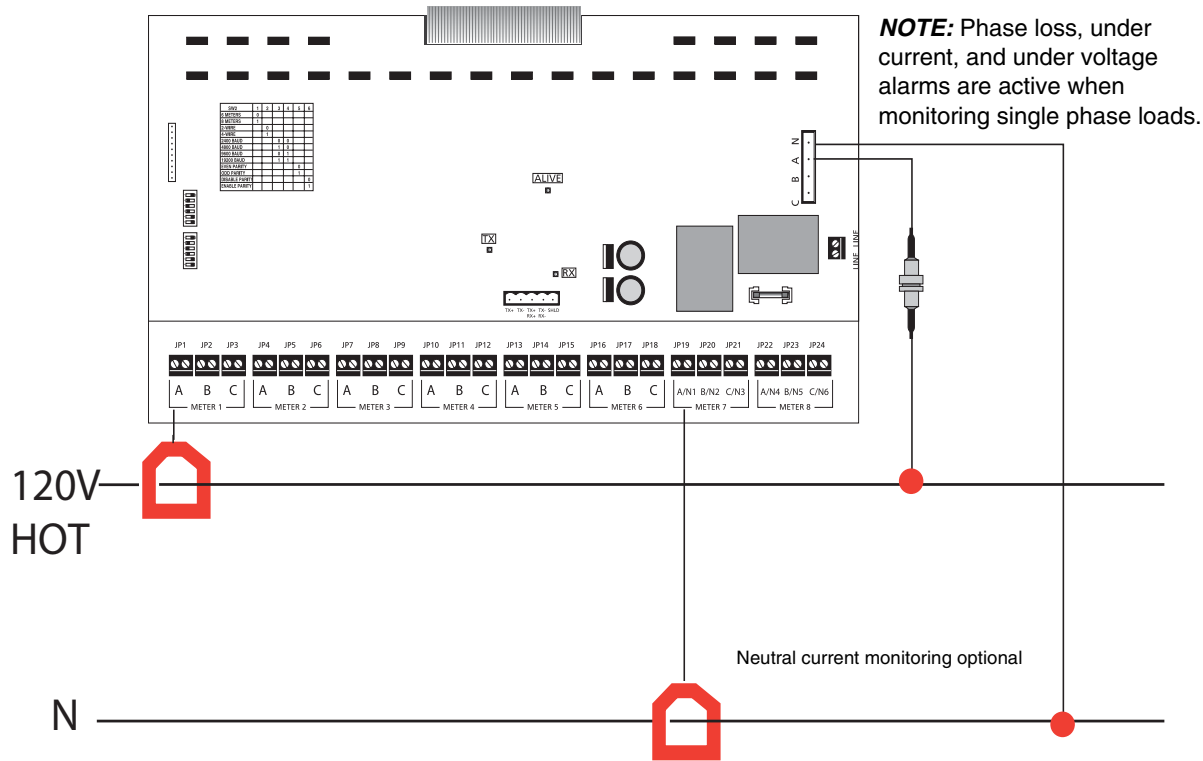


Figure 11: Single-phase, 2-wire (with option of neutral current wiring)

## CONNECTING THE POWER SUPPLY

The MCM8364<sup>1</sup> requires 120 Vac control power only. Any voltage above 120 Vac L-N requires the proper control power transformer for the board power connection. To connect the power supply, refer to Figure 12.

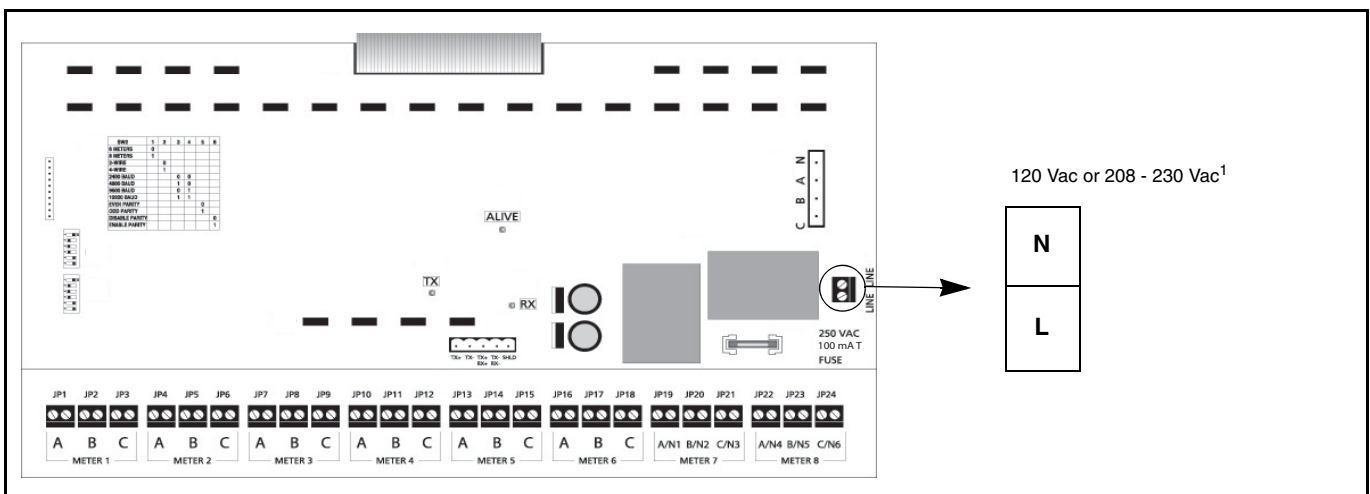


Figure 12: Connecting the power supply

<sup>1</sup>For 208 - 230 VAC Power Connection version order catalog number MCM8364(E).

## CONFIGURING CT VALUES AND ALARM THRESHOLDS

Before your system can use the data coming from the multi-circuit meter, you must configure CT values and alarm thresholds using the MNode software, or you can write registers through Modbus. Table 5 lists the register values in the multi-circuit meter.

**NOTE:** MNode software is provided with your multi-circuit meter.

**Table 5: Register Values**

Parameter	Register Number	Default Value
CT Scale	30	100 A
Over Voltage Alarm Threshold	31	65535 V
Under Voltage Alarm Threshold	32	0 V
Over Current Alarm Threshold Register	33	65535 A
Under Current Alarm Threshold	34	0 A
Over kVA Alarm Threshold Register	35	65535 kVA
Under kVA Alarm Threshold	36	65535 kVA
Phase Loss Threshold	38	0 V
Meter Alarm Status	49	Non Latching

## MAINTENANCE

Before working on this equipment, follow these safety precautions:

### DANGER

#### HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- This equipment must be installed and serviced only by qualified personnel.
- Turn off all power supplying this equipment and the equipment it is mounted in before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- Replace all device doors and covers before turning on power to this equipment.

**Failure to observe this instruction will result in death or serious injury.**

### Changing the Fuse

If the fuse is blown, use only 250 Vac / 100 mA Time Delay, 5x20 mm, Littelfuse® 218 series or equivalent. Follow these steps to replace it:

1. Turn off the power to the multi-circuit meter, and use a properly rated voltage sensing device to confirm that power is off.
2. Remove the old fuse and replace it with the new one.
3. Turn on the power supply to the multi-circuit meter.
4. Replace all device doors and covers before turning on power to this equipment (if applicable).

<sup>1</sup>For 208 - 230 VAC Power Connection version order catalog number MCM8364(E).

## SPECIFICATIONS

Table 6 lists specifications for the multi-circuit meter.

**Table 6: Specifications**

Type	Description
<b>General</b>	
Electrical Services	Six 3-phase, 4-wire or eight 3-phase, 3W circuits. All circuits share a common voltage source.
Installation Category	Cat II or Cat III
Sample Rate	1280 Hz
Operating Temperature Range	0°C to 60°C (< 95% relative humidity, non-condensing)
Storage Temperature Range	-40°C to 70°C
Meter Accuracy	±1%
Variable Update Rate	200 milliseconds for voltages, 1.6 seconds for all other
Altitude of Operation	3km max.
Size	Approximately 7" (178mm) x 13" (330mm) x 13" (330mm)
<b>Measured Voltage Inputs</b>	
Maximum Voltage	480 VAC <sub>L-L</sub> , 300 VAC <sub>L-N</sub>
Frequency	50/60 Hz
Termination	4-position cage clamp terminal block (max. wire size 12 gauge)
<b>Measured Current Inputs</b>	
CT Input Type	5 A
CT Range	Each of 6/8 meters independently adjustable from 1 A:5 A to 9999 A:5A
Termination	6-position cage clamp terminal blocks (max. wire size 12 gauge) for each meter.
<b>Operating Power Inputs</b>	
Power Source <sup>1</sup>	MCM8364 - dedicated 120 VAC, +10%, -25% 100mA Time Delay (T), 5x20mm MCM8364E - dedicated 208 - 230 VAC, +10%, -15% 100mA Time Delay (T), 5x20mm
Frequency	50/60 Hz
Termination	2-position cage clamp terminal block (max. wire size 12 gauge)
<b>Network Communications</b>	
Type	Modbus RTU
Connection	DIP switch-selectable 2-wire or 4-wire
Address	DIP switch-selectable base address (1-233 in increments of 8)
Baud Rate	DIP switch-selectable 2400, 4800, 9600, 19200
Parity	DIP switch-selectable NONE, ODD, EVEN
Communication Format	8-data-bits, 1-start-bit, 1-stop-bit
Termination	5-position depluggable connector

**Table 7: Data Specifications**

<b>Data Output</b>
Energy Consumption (kWhr)
Real Power (kW)
Reactive Power (kVAR)
Apparent Power (kVA)
Power Factor Total
Voltage, L-L, avg. of 3 phases
Voltage, L-N, avg. of 3 phases
Current, average of 3 phases
Real Power, phase A (kW)
Real Power, phase B (kW)
Real Power, phase C (kW)
Power Factor, phase A
Power Factor, phase B
Power Factor, phase C
Line to Line Voltage, phase A-B
Line to Line Voltage, phase B-C
Line to Line Voltage, phase A-C
Line to Neutral Voltage, phase A-N
Line to Neutral Voltage, phase B-N
Line to Neutral Voltage, phase C-N
Current, phase A
Current, phase B
Current, phase C
Frequency (measured from phase A) (Hz)
<b>Modbus Alarms</b>
Over Voltage
Under Voltage
Over Current
Under Current
Over kVA
Under kVA
Phase Loss A
Phase Loss B
Phase Loss C









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