



Reliable Power Meters
A Fluke Company

Multipoint Power Recorder[®]

Installation Guide

PN 2010675

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WARNING

The Multipoint Power Recorder is for use by qualified personnel only. **Do not install the Multipoint on a power line unless you are qualified to do so.** High voltages that can cause burns and lethal shocks are present during power monitoring.

To assure operator safety: When making connections to power lines, always start by connecting the instrument power, which contains the safety earth ground. Be sure to provide adequate strain relief for wires going to the terminal blocks.

Use standard high-voltage, high-current safety precautions.

Workers who open energized power panels are required to abide by the instructions of ANSI/NFPA 70E-1988 [B2] concerning appropriate protective equipment, as well as government regulations codified in ASHA CFR 1910 [B3] and 1926 [B4], and in ANSI C2-1990 [B1].

CAUTION

Communications and digital data connections to the Multipoint Power Recorder must be made with low voltage shielded computer data cables and compatible components must be used.

<p>RADIO INTERFERENCE STATEMENT</p> <p>INFORMATION FOR THE USER</p>	<p>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.</p> <p>The user may find the following publication prepared by the Federal Communications Commission helpful:</p> <p>“How to Identify and Resolve Radio-TM Interference Problems” (Stock Number 004-000-00345-4).</p> <p>Available exclusively from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 (telephone 202-512-1800).</p>
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<p>FCC WARNING</p>	<p>Changes or modifications not expressly approved by the party responsible for compliance to Part 15 of the FC Rules could void the user’s authority to operate the equipment.</p>
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<p>INDUSTRY CANADA</p> <p>ICAN CLASS A DIGITAL EQUIPMENT</p>	<p>This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled “Digital Apparatus,” ICES-003 of the Industry Canada.</p> <p>Cet appareil numerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Classe A prescrites dans la norme sur le materiel brouilleur : “Appareils Numeriques,” NMB-003 edictee par le minstre des Communications du Canada.</p>
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Preface

This guide describes the Multipoint Power Recorder and tells you how to install it and connect it to power.

After installation you will need to connect it to a computer running either the Power Recorder System Software or the Scenario software, and then configure the Multipoint. Configuration tells the Multipoint the specific type of power to be monitored at the installation location and sets the initial monitoring intervals and other settings. For details about configuring the Multipoint Power Recorder, see the *Power Recorder System User Guide* or the *Scenario User Guide*.

Warning Symbols on the Multipoint Power Recorder

Two warning symbols appear on the Multipoint Power Recorder.

When you see this symbol	It means
	<p>There is a risk of electric shock.</p> <p>This symbol appears adjacent to the power and voltage measuring terminals.</p>
	<p>Attention—consult accompanying documents (this <i>Multipoint Power Recorder Installation Guide</i>) for information.</p> <p>This symbol appears adjacent to:</p> <ul style="list-style-type: none">Voltage measuring terminals (pages 12 and 26)Communication port (pages 16 and 28)Current measuring terminals (page 14)Internal battery (page 40)

Introducing the Multipoint Power Recorder

The Multipoint Power Recorder is designed for permanent or semi-permanent installation of a Power Recorder in a non-hostile environment. The Multipoint provides the same quality and features of other Reliable Power Meters power recorders at a lower cost.



Lethal voltages are present. In order to ensure safety the Multipoint Power Recorder must be installed in a protective enclosure that limits access to the electrical connections of the device and requires a tool or key for such access. Multipoint Power Recorders are not weatherproof. If you need a weatherproof unit, contact Reliable Power Meters about obtaining a Power Recorder with a Hostile Environment Enclosure.

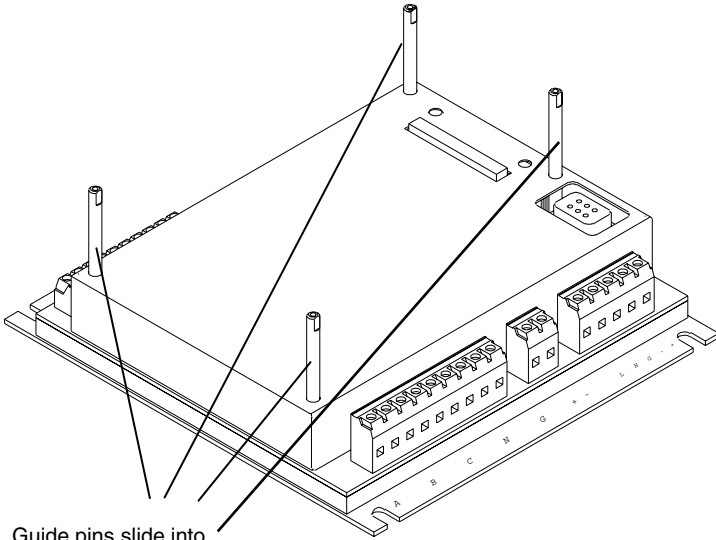
The Multipoint Power Recorder actually contains two units—a Base Unit, and an Acquisition Unit, as shown on page 2. The base unit can be installed permanently—bolted to a wall, shelf, or panel—while the Acquisition Unit is removable to allow for repair or calibration, if necessary, without having to unwire anything or even turn the power off.

Several different models of base and acquisition units are available.

	Description	Model # ¹
Base Unit	Multipoint base with internal metering CTs	1950
Acquisition Units	Multipoint low-speed acquisition unit for use with CTs embedded in Base Unit	1941
	Multipoint hi-speed acquisition unit for use with CTs embedded in Base Unit	1948
	Multipoint low-speed acquisition unit for use with Reliable Power Meters current clamps	1942
	Multipoint high speed acquisition unit for use with Reliable Power Meters current clamps	1949

¹ **NOTE:** The first four digits of the serial number on the Acquisition Unit indicate the “model” number.

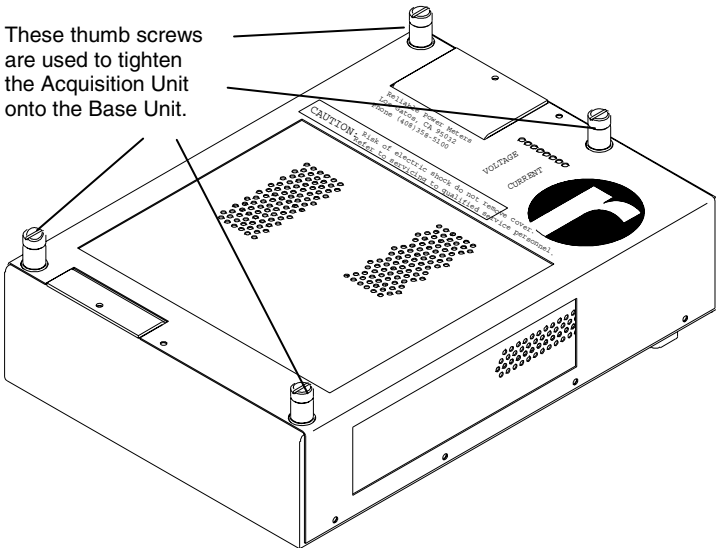
The Multipoint Base Unit



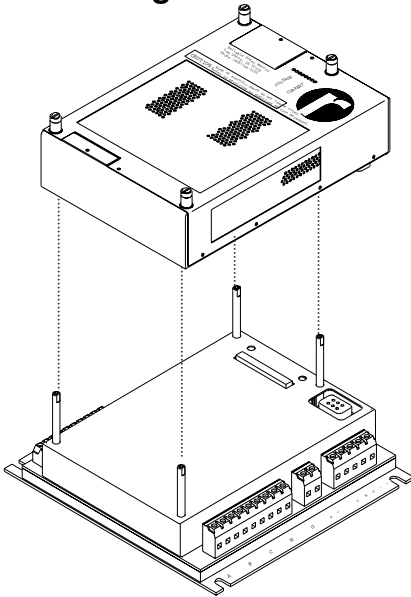
Guide pins slide into the back of the Acquisition Unit.

The Multipoint Acquisition Unit

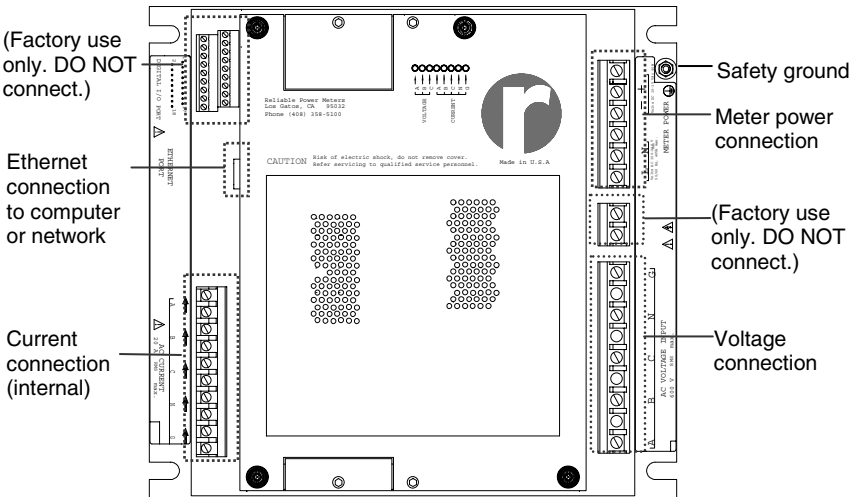
These thumb screws are used to tighten the Acquisition Unit onto the Base Unit.



Combining the Base and Acquisition Units



The Multipoint System Front View



Note: If you're using an Acquisition Unit model 1942 or 1949 with connections for Reliable Power Meter current clamps, you will not use the current connections shown above.

Before You Install

Installation Considerations

Before installing your Multipoint Power Recorder, be sure to consider the following:

1. **Location:** The Multipoint Power Recorder must be installed according to applicable electrical codes. When choosing an installation location, keep in mind that you may need to supply a suitable enclosure, conduit, and other materials.
2. **Instrument Power:** The Multipoint Power Recorder requires single-phase instrument power in addition to the measurement connections.
3. **Location Accessibility:** Make sure that you locate the recorder where connections can be safely made.
4. **Power Type:** You will need to know the power type in order to make proper connections.
5. **Communications Availability:** The Multipoint Power Recorder requires an Ethernet connection.

Tools and Supplies Provided

- Multipoint Power Recorder
- Installation Template
- Clip-On Ferrite Bead for AC connections
- This booklet (*Multipoint Power Recorder Installation Guide*)

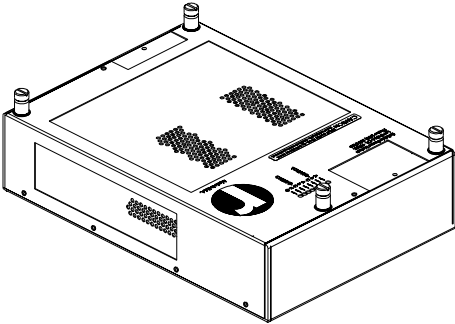
Additional Tools and Supplies Needed

- Mounting hardware
- Screwdriver
- Category 5 Ethernet cable (or a crossover cable, if connecting directly to a PC)
- Suitable wire for connecting to instrument power, voltage, and (for models 1941 and 1948) current, according to applicable electrical codes
- For models 1942 and 1949, appropriate current clamps
- Safety gear
- Tamper seals, if required

Installing the Multipoint Power Recorder

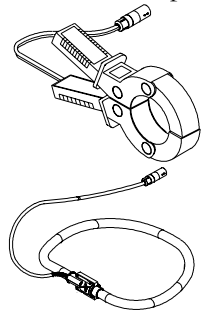
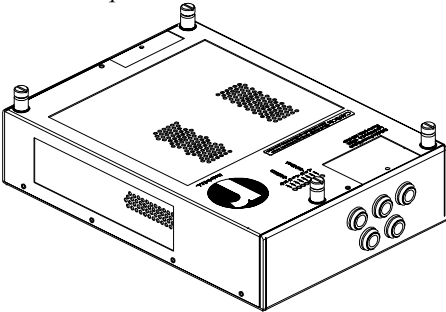
Acquisition Unit Models 1941*, 1948*

To install the Multipoint Power Recorder with Acquisition Unit 1941 or 1948, follow the instructions on **pages 6 through 19**. You use these units with the CTs embedded in the Base Unit.



Acquisition Unit Models 1942, 1949

To install the Multipoint Power Recorder with Acquisition Unit 1942 or 1949, follow the instructions on pages 20 through 38. You use these Acquisition Units with Reliable Power Meter current clamps.



* **NOTE:** The first four digits of the serial number on the Acquisition Unit indicate the “model” number.

Installing the Multipoint with Acquisition Unit Model 1941 or 1948*

Overview of the Installation Process

To install the Multipoint Power Recorder with either Acquisition Unit model 1941 or 1948, follow the process described below. Each of the steps in this process is described in detail on the next pages (pages 7 through 19).

Note: If you're using Acquisition Unit model 1942 or 1949 (for use with Reliable Power Meters current clamps), turn to page 20 for instructions.

- 1. De-energize relevant power** – Make sure that all equipment, wiring, and connections are de-energized. (See page 7.)
- 2. Mount the Multipoint Base Unit** - Put the Multipoint Base Unit in place, mounting it to a panel adequate to support its weight. (See page 8.)
- 3. Connect the Safety ground.** (See page 9.)
- 4. Connect instrument power** - Connect the Multipoint Base Unit to the meter power source. (See page 10.)
- 5. Connect monitored voltage(s)** - Connect the Multipoint Base Unit to the voltage to be monitored. (See page 12.) You'll find diagrams of the wiring for various power configurations in Appendix C.
- 6. Connect monitored current(s)** - Connect the Multipoint Base Unit to the current to be monitored. (See page 14.)
- 7. Connect the Ethernet communications** - Connect the Multipoint to Ethernet. (See page 16.)
- 8. Check the connections.** (See page 17.)
- 9. Restore power.** (See page 17.)
- 10. Put the Multipoint Acquisition Unit in place.** (See page 18.)

* **NOTE:** The first four digits of the serial number on the Acquisition Unit indicate the “model” number.

11. Finish up. (See pages 34-38.)

Note: Mounting hardware and connection wires are not included.

**BEFORE YOU
CAN USE AN
INSTALLED
MULTIPOINT**

In addition to being physically installed at a facility, the Multipoint Power Recorder also needs to be *configured* to measure and store data about a particular site and location. For more information, see “Configuring the Power Recorder” in the *Power Recorder System User Guide* or in the *Scenario User Guide*.

De-energizing Relevant Power

- ▶ **Safety First:** Make sure that all equipment, wiring, and connections are de-energized.

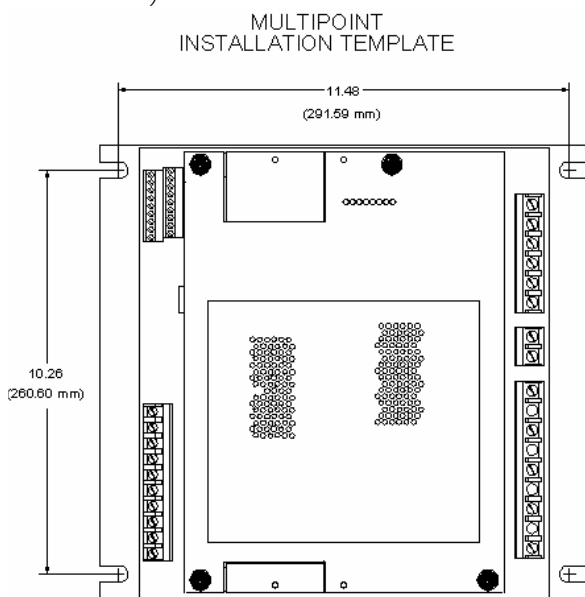


Warning: Before connecting the Multipoint Power Recorder to AC power, potential transformers, or current transformers, be sure these circuits are de-energized.

Mounting the Multipoint Base Unit

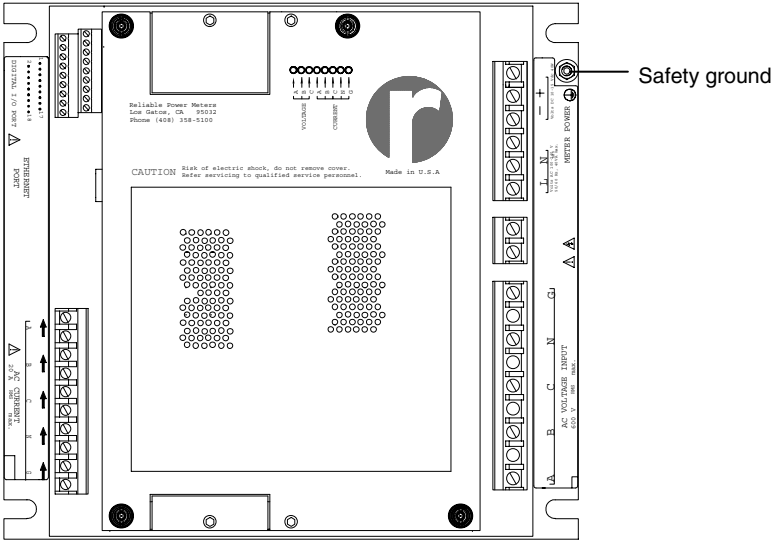
The Multipoint Base Unit must be mounted to a support adequate to support its weight (18.5 pounds/8.39 kg).

1. Use the Multipoint Template included in the package to mark where you need to drill holes on the support panel.
2. Drill the four holes, as marked.
3. Secure the Multipoint Base Unit to the support panel (hardware not included).



Connecting the Safety Ground

- ▶ Connect the ground first. Screw the ground wire securely to the Safety ground stud.



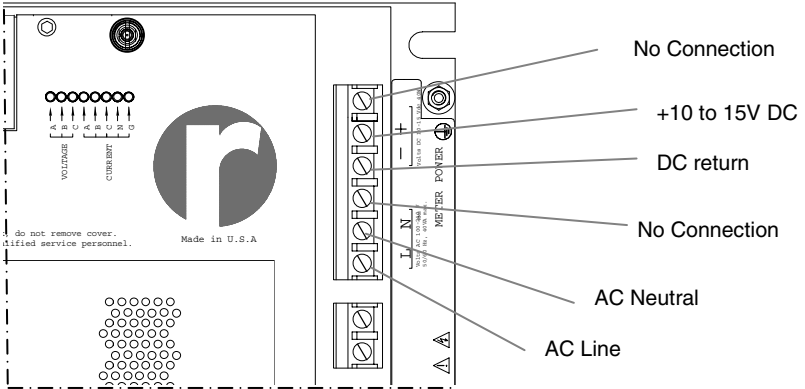
Installing the Multipoint with Acquisition Unit Model 1941 or 1948

Connecting to the Meter Power Source



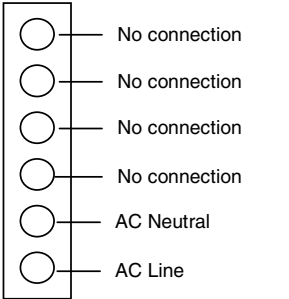
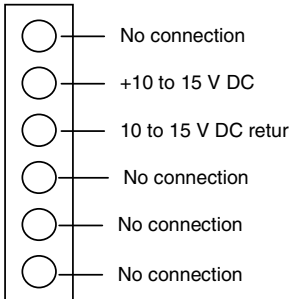
Warning: Before connecting the Multipoint Power Recorder to a power source the ground wire should be securely screwed to the Safety ground stud.

You can connect to the Multipoint meter power using either AC or DC. The meter power requires 10-15 volts DC, negative ground, or 100 -240 volts AC. You may connect to both AC and DC at the same time. No switch settings are required.



To hook up power to the Multipoint Power Recorder

- ▶ Make the connection between the power source and the meter power terminal strip on the Multipoint Base Unit.

For an AC connection, connect line and neutral, , as labeled.	For a DC connection, connect the positive and negative terminals, as labeled.
 <p>○ — No connection ○ — No connection ○ — No connection ○ — No connection ○ — AC Neutral ○ — AC Line</p>	 <p>○ — No connection ○ — +10 to 15 V DC ○ — 10 to 15 V DC return ○ — No connection ○ — No connection ○ — No connection</p>

For AC connections, a Clip-On Ferrite Bead (Reliable Power Meter part number 13-043-0004) is included with the Multipoint Base Unit. Use of this device will ensure compliance with the Class A limits for radio noise emissions. It should be snapped over the Safety ground, AC Neutral, and AC Line wires such that it encloses all three wires simultaneously, and then positioned within 6 inches (150 mm) of the power terminal strip on the Multipoint.

For an AC connection power must be provided through a dedicated UL recognized circuit breaker. The wire used must be UL recognized with a gauge to match the current rating of the dedicated circuit breaker.

DC power is limited by an internal 5-ampere fuse that is not user replaceable.

Connecting to Voltage



WARNING: Make sure that all equipment, wiring, and connections are de-energized before proceeding.

Note: All connections should be wired in accordance with local electrical codes.

1. Starting at the Multipoint unit, attach the voltage wires to the voltage measurement terminal strip on the Multipoint Base Unit.

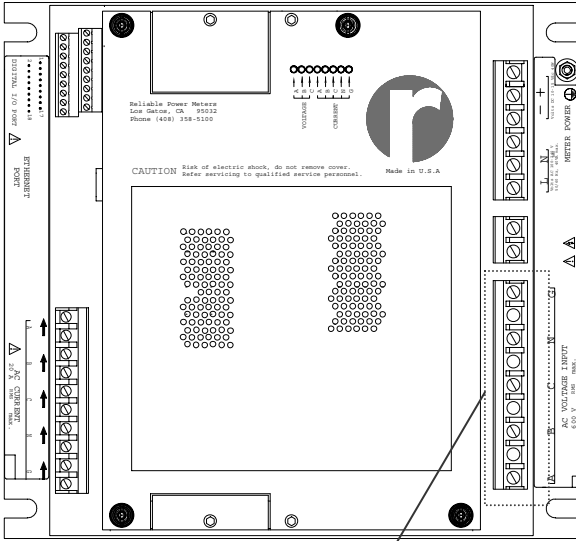
Gauge 20-6 AWG/10 mm²

Stripping length 0.3"/8mm

2. Screw down the wires.
3. Attach the wires to the voltage source being monitored.

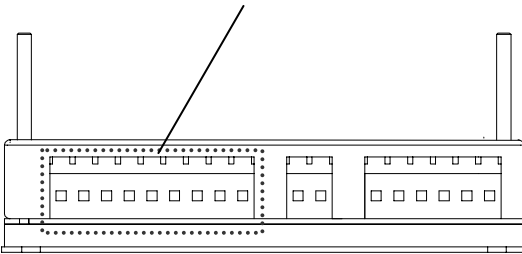
Phase	US Color Code	European Color Code	U.K. Color Code	Single-phase	Split Single-phase	3-phase Wye	3-phase Delta
A	Black	Black	Red	X	X	X	X
B	Red	Red	Yellow		X	X	X
C	Blue	White	Blue			X	X
Neutral	White	Blue	Black	X	X	X	
Ground	Green	Yellow and green stripe	Yellow and green stripe	X	X	X	X

Installing the Multipoint with Acquisition Unit Model 1941 or 1948



Front View

Attach the voltage wires to the voltage measurement terminal strip. (Phase A, B, C, Neutral, Ground, as labeled.)



Side View

Connecting to Current

Following are instructions for connecting a Multipoint Base Unit to a permanently installed CT with a 5 Amp secondary. For other applications, consult with Reliable Power Meters' Customer Service.

Note: If you're using an Acquisition Unit model 1942 or 1949 for use with Reliable Power Meter current clamps, be sure to follow the instructions on pages 20 to 33.

1. If necessary, mount your external metering CTs on the busbar or current source, as required.



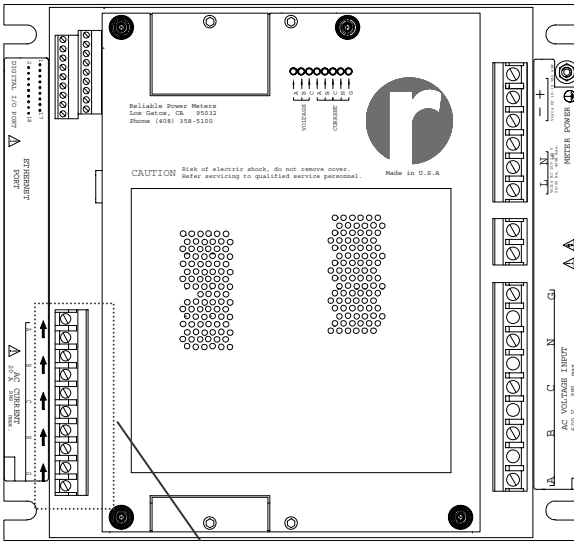
WARNING: To avoid potential injury or equipment damage, the secondary must be kept shorted until permanent connection is made to the Multipoint.

2. Hook up the secondary of the external metering CTs to the current measurement terminal strip on the Multipoint Base Unit.

Gauge 20-8 AWG/0.5 to 6mm²

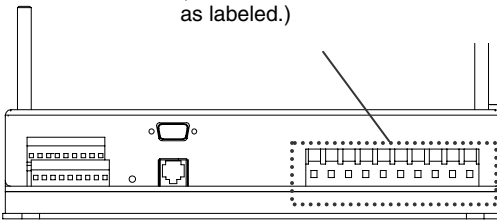
Stripping length 0.28"/7 mm

Installing the Multipoint with Acquisition Unit Model 1941 or 1948



Front View

Attach the current wires of the secondary to the current measurement terminal strip. (Phase A, B, C, Neutral, Ground, as labeled.)



Side View

Wiring Diagrams

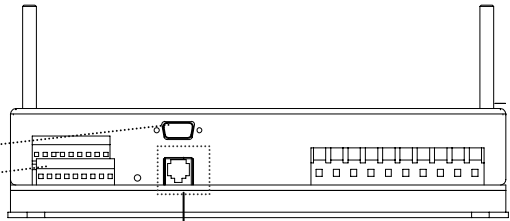
Appendix C contains wiring illustrations for some standard power configurations.

Installing the Multipoint with Acquisition Unit Model 1941 or 1948

Connecting Ethernet

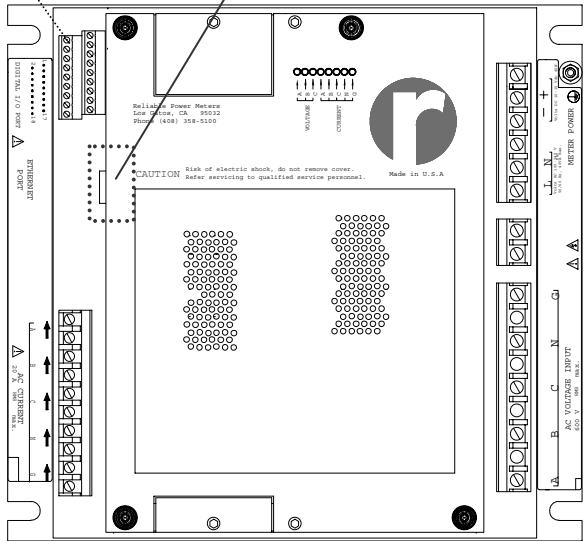
1. Plug a standard Category 5 RJ45 terminated Ethernet patch cable into the Ethernet port on the Multipoint Base Unit.

Note: These connections are for factory use only.



Side View

Ethernet connection



Front View

2. Connect the other end of the Ethernet cable into a 10-Base T network hub.

Tip: If you're connecting the Multipoint directly to a computer, use a cross-over cable. Plug one end of it into the Ethernet port on

the Multipoint Power Recorder and the other end into your computer.

An Ethernet wiring diagram is provided in Appendix D. If you need additional information about proper wiring of Ethernet, consult your network administrator.

Checking Connections Before Restoring Power

Before you restore power, check all the connections:

1. Make sure all terminals are tight.
2. Make sure current and voltage wires are paired correctly.

Restoring Power

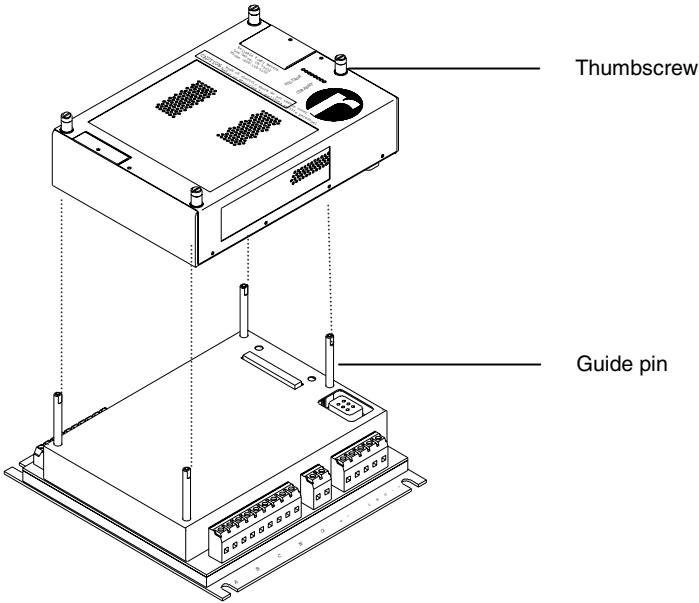


WARNING: To avoid potential injury or equipment damage, make sure you have checked your wiring before restoring power to your system.

You can restore power after connecting voltage, current, and Ethernet to the Multipoint Base Unit.

Putting the Acquisition Unit in Place

1. Slide the Acquisition Unit onto the Base Unit, using the guide pins for proper blind mate connection.



2. Tighten the four thumbscrews to secure the Acquisition Unit in position.

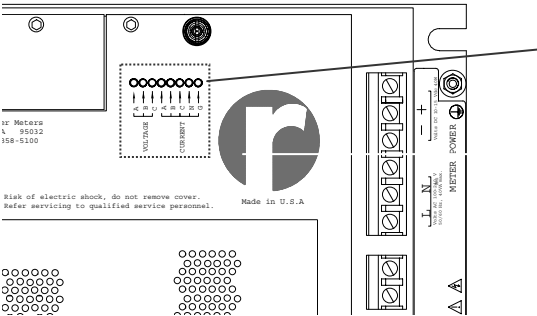
The Acquisition Unit automatically turns itself on; however this process takes a minute or two.

Installing the Multipoint with Acquisition Unit Model 1941 or 1948

3. Notice the power-on sequence of lights as the unit performs a self-test.

All lights blink on, then off.

- In sequence, the individual lights turn on-off, from left to right.
- Finally, the lights remain on or off in accordance with the amount of voltage and current applied.



These LED range lights are used in the power-on test.

What Next?

Turn to page 34 and check the connections.

Installing the Multipoint with Acquisition Unit Model 1942 or 1949*

Overview of the Installation Process

To install the Multipoint Power Recorder with either Acquisition Unit 1942 or 1949 for use with Reliable Power Meter current clamps, follow the process described below. Each of the steps in this process is described in detail on the next pages (21 through 38).

Note: If you're using Acquisition Unit model 1941 or 1948 turn to page 6 for instructions.

1. **De-energize relevant power** – Make sure that all equipment, wiring, and connections are de-energized. (See page 21.)
2. **Mount the Multipoint Base Unit** - Put the Multipoint Base Unit in place, mounting it to a panel adequate to support its weight. (See page 22.)
3. **Connect the Safety ground.** (See page 23.)
4. **Connect instrument power** - Connect the Multipoint Base Unit to the meter power source. (See page 24.)
5. **Connect monitored voltage(s)** - Connect the Multipoint Base Unit to the voltage to be monitored. (See page 26.) You'll find diagrams of the wiring for various power configurations in Appendix C.
6. **Connect the Ethernet communications** - Connect the Multipoint to Ethernet. (See page 28.)
7. **Check the connections.** (See page 29.)
8. **Restore power.** (See page 29.)

* **NOTE:** The first four digits of the serial number on the Acquisition Unit indicate the “model” number.

9. Put the Multipoint Acquisition Unit in place. (See page 30.)
10. Connect the Multipoint Acquisition Unit to current. (See page 32.)
11. Finish up. (See pages 34-38.)

Note: Mounting hardware and connection wires are not included.

**BEFORE YOU
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In addition to being physically installed at a facility, the Multipoint also needs to be *configured* to measure and store data about a particular site and location. For more information, see “Configuring the Power Recorder” in the *Power Recorder System User Guide* or in the *Scenario User Guide*.

De-energizing Relevant Power

- ▶ **Safety First:** Make sure that all equipment, wiring, and connections are de-energized.

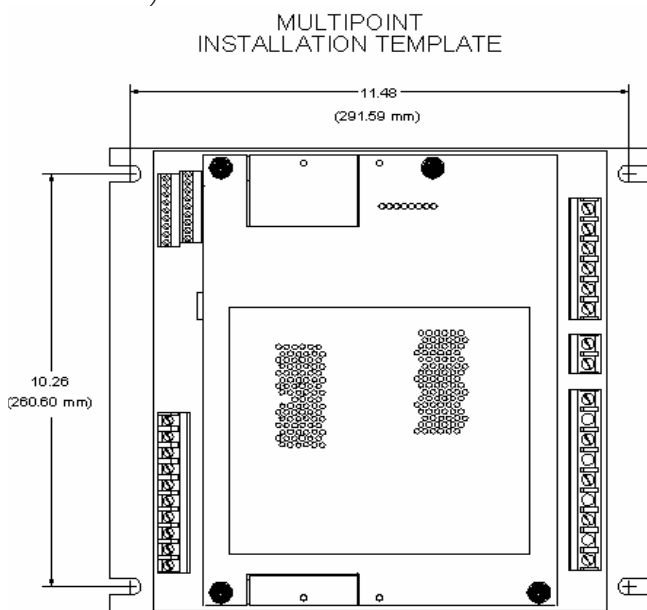


Warning: Before connecting the Multipoint Power Recorder to AC power, potential transformers, or current transformers, be sure these circuits are de-energized.

Mounting the Multipoint Base Unit

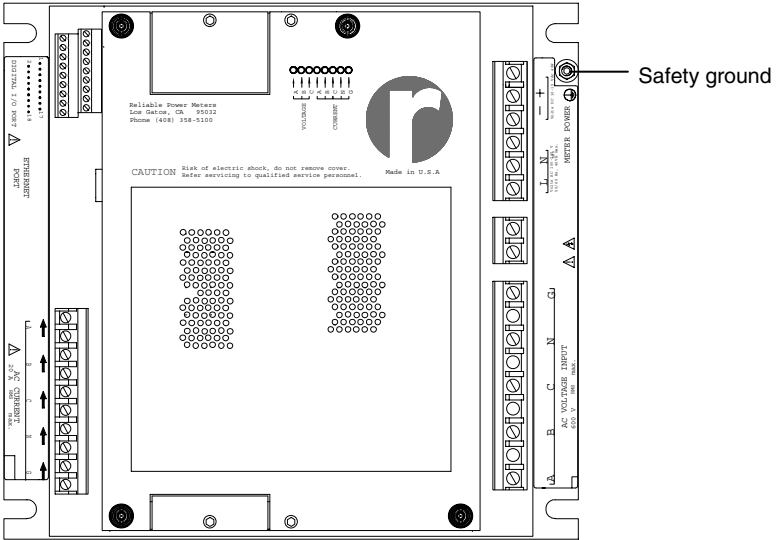
The Multipoint Base Unit must be mounted to a support adequate to support its weight (18.5 pounds/8.39 kg).

1. Use the Multipoint Template included in the package to mark where you need to drill holes on the support panel.
2. Drill the four holes, as marked.
3. Secure the Multipoint Base Unit to the support panel (hardware not included).



Connecting the Safety Ground

- ▶ Connect the ground first. Screw the ground wire securely to the Safety ground stud.



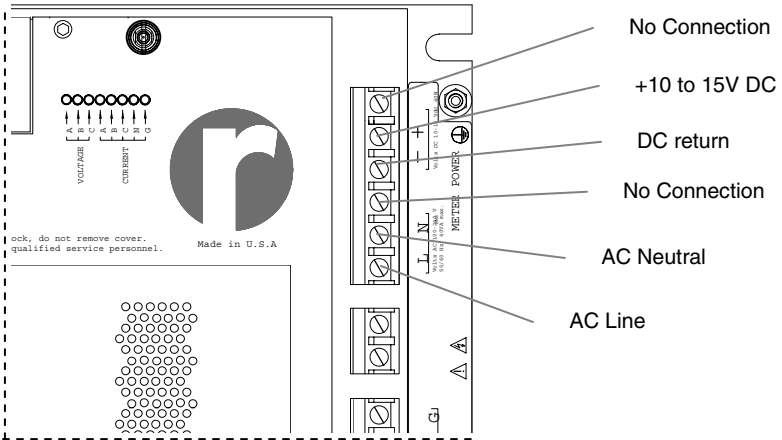
Installing the Multipoint with Acquisition Unit Model 1942 or 1949

Connecting to the Meter Power Source



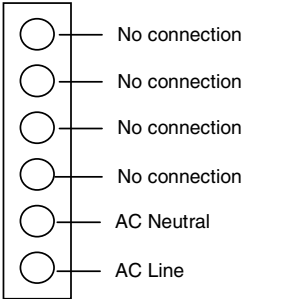
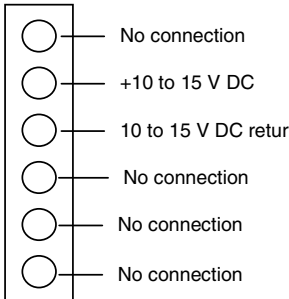
Warning: Before connecting the Multipoint Power Recorder to a power source the ground wire should be securely screwed to the Safety ground stud.

You can connect to the Multipoint meter power using either AC or DC. The meter power requires 10-15 volts DC, negative ground, or 100 - 240 volts AC. You may connect to both AC and DC at the same time. No switch settings are required.



To hook up power to the Multipoint recorder

- ▶ Make the connection between the power source and the meter power terminal strip on the Multipoint

For an AC connection, connect line and neutral, as labeled.	For a DC connection, connect the positive and negative terminals, as labeled.
 <p>○ — No connection ○ — No connection ○ — No connection ○ — No connection ○ — AC Neutral ○ — AC Line</p>	 <p>○ — No connection ○ — +10 to 15 V DC ○ — 10 to 15 V DC return ○ — No connection ○ — No connection ○ — No connection</p>

For AC connections, a Clip-On Ferrite Bead (Reliable Power Meter part number 13-043-0004) is included with the Multipoint Base Unit. Use of this device will ensure compliance with the Class A limits for radio noise emissions. It should be snapped over the Safety ground, AC Neutral, and AC Line wires such that it encloses all three wires simultaneously, and then positioned within 6 inches (150 mm) of the power terminal strip on the Multipoint.

For an AC connection power must be provided through a dedicated UL recognized circuit breaker. The wire used must be UL recognized with a gauge to match the current rating of the dedicated circuit breaker.

DC power is limited by an internal 5-ampere fuse that is not user replaceable.

Connecting to Voltage



WARNING: Make sure that all equipment, wiring, and connections are de-energized before proceeding.

Note: All connections should be wired in accordance with local electrical codes.

1. Starting at the Multipoint unit, attach the voltage wires to the voltage measurement terminal strip on the Multipoint Base Unit.

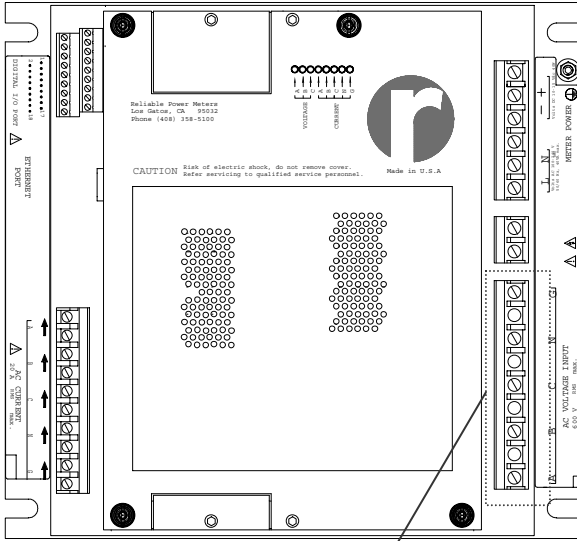
Gauge 20-6 AWG/10 mm²

Stripping length 0.3"/8mm

2. Screw down the wires.
3. Attach the wires to the voltage source being monitored.

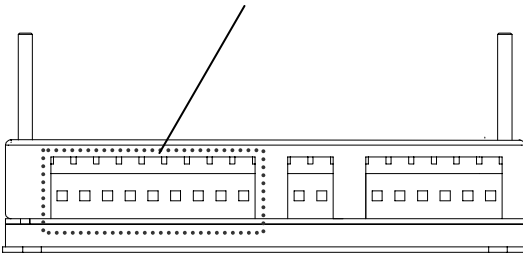
Phase	US Color Code	European Color Code	U.K. Color Code	Single-phase	Split Single-phase	3-phase Wye	3-phase Delta
A	Black	Black	Red	X	X	X	X
B	Red	Red	Yellow		X	X	X
C	Blue	White	Blue			X	X
Neutral	White	Blue	Black	X	X	X	
Ground	Green	Yellow and green stripe	Yellow and green stripe	X	X	X	X

Installing the Multipoint with Acquisition Unit Model 1942 or 1949



Front View

Attach the voltage wires to the voltage measurement terminal strip. (Phase A, B, C, Neutral, Ground, as labeled.)



Side View

Wiring Diagrams

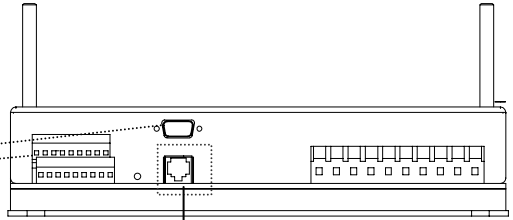
Appendix C contains wiring illustrations for some standard power configurations.

Installing the Multipoint with Acquisition Unit Model 1942 or 1949

Connecting Ethernet

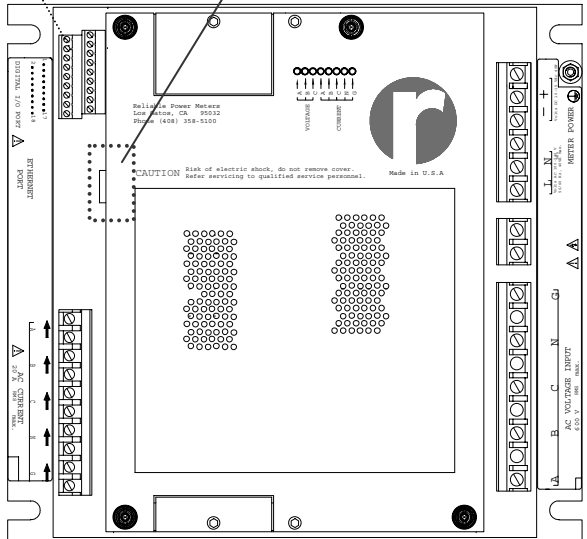
1. Plug a standard Category 5 RJ45 terminated Ethernet patch cable into the Ethernet port on the Multipoint Base Unit.

Note: These connections are for factory use only.



Side View

Ethernet connection



Front View

2. Connect the other end of the Ethernet cable into a 10-Base T network hub.

Tip: If you're connecting the Multipoint directly to a computer, use a cross-over cable. Plug one end of it into the Ethernet port on

the Multipoint Power Recorder and the other end into your computer.

An Ethernet wiring diagram is provided in Appendix D. If you need additional information about proper wiring of Ethernet, consult your network administrator.

Checking Connections Before Restoring Power

- ▶ Before you restore power, check all the connections. Make sure all terminals are tight.

Restoring Power

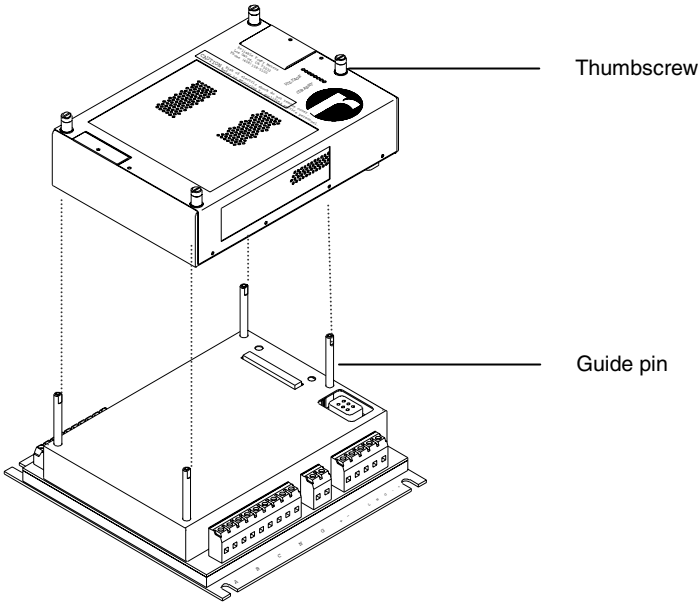


WARNING: To avoid potential injury or equipment damage, carefully check your wiring before restoring power to your system.

You can restore power after connecting voltage and Ethernet to the Multipoint Base Unit.

Putting the Acquisition Unit in Place

1. Slide the Acquisition Unit onto the Base Unit, using the guide pins for proper blind mate connection.

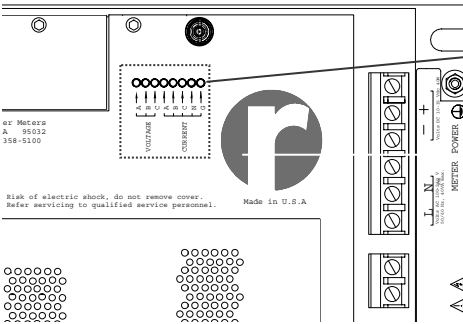


2. Tighten the four thumbscrews to secure the Acquisition Unit in position.

The Acquisition Unit automatically turns itself on; however this process takes a minute or two.

Installing the Multipoint with Acquisition Unit Model 1942 or 1949

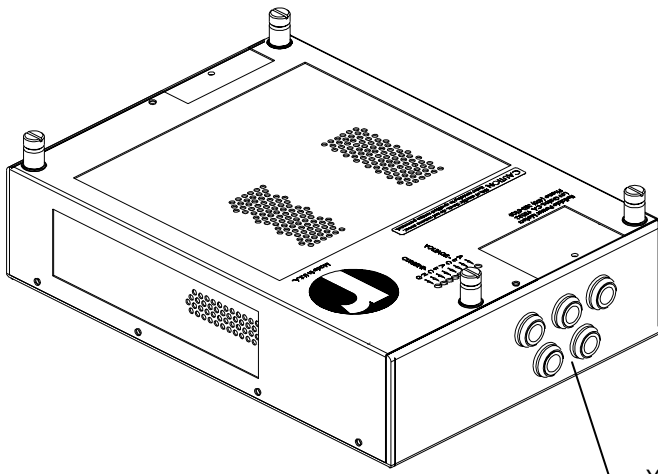
3. Notice the power-on sequence of lights as the unit performs a self-test.
 - All lights blink on, then off.
 - In sequence, the individual lights turn on-off, from left to right.
 - Finally, the lights remain on or off in accordance with the amount of voltage and current applied. (Since you haven't yet connected to current, lights remain on only for voltage.)



These LED range lights are used in the power-on test.

Connecting to Current Using Reliable Power Meter Current Clamps

Acquisition Unit Models 1942 and 1949 have external connections for use with Reliable Power Meter current clamps.



You connect RPM Current clamps to these external connections on units 1942 and 1949.

IMPORTANT: If connections to current have already been made to the internal CTs in the Base Unit, you **DO NOT** need to disconnect them in order to use the external connections to Reliable Power Meters current clamps on these Acquisition Unit models. These Acquisition Units will ignore input from the internal CT connections and will instead measure current through the external connections.

1. Select the current clamps you want to use. (See Appendix B for a table of available current clamps.)

Choose the clamps that are in the range of current you're expecting, and that will fit in the physical space around the wires.

Choose one clamp for each phase, one for neutral (if appropriate), and one for ground.

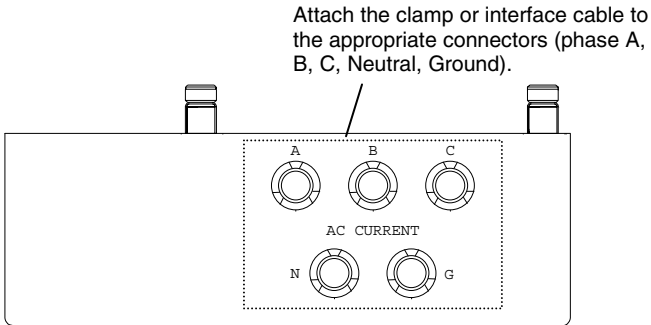
2. Attach the current clamps to the Multipoint Acquisition Unit.

If you're using flexible clamps, attach the clamps directly to the Multipoint Acquisition Unit.

- ▶ Attach each clamp to the appropriately labeled connection on the front end of the Multipoint acquisition unit. You'll feel the self-locking ends snap into place when the connection is made

If you're using rigid style clamps, use the 10-foot interface cable that came with the clamp.

- ▶ Connect the interface cable to the appropriate connection on the acquisition unit, and then connect the other end of the cable to the clamp. You'll feel the self-locking ends snap into place when the connections are made.



3. Install your current clamps or flexi-CT's around the appropriate conductors.



WARNING: Take care when working around high voltages.

What Next?

Turn the page and check the connections.

Confirming Connections and Finishing Up

After connecting the Multipoint, check to be sure that the Multipoint is registering both current and voltage and check to be sure the voltage and current are paired correctly, as described below.

Check the Range Lights (LEDs) for Current

The Multipoint contains range lights for each current connection. When you connect to power, the range lights indicate whether the amount of current in the line is between 5% to 70% of the maximum range (1 to 14 Amps of CT secondary current).

If the current range lights are steady ON, you know the CT to which you've connected is presently within the range of the measured current.

If the current range lights are blinking, the current may be beyond the range.

If the current range lights are OFF, the current is below 5% of the range.



WARNING: Unburdened output from a CT is extremely dangerous. Ensure that the panel is de-energized or use a shorting block prior to making any changes. (Note that Reliable Power Meters current clamps and flexi-CTs have built in burdens; they do not need to be shorted.)

Check the Range Lights (LEDs) for Each Voltage

The connection panel on the Multipoint contains range lights for each phase that indicate when a connection is established.

When the light is ON, you know that the connection is secure and that voltage is present.

When the light is OFF, check to make sure the Multipoint has power. Next check the connection between the lead and the line to make sure it is secure. If the LED still does not light, there may be no voltage in the line. Use a voltmeter to check for voltage.

Make Sure Voltage Phases and Current Phases are Paired Correctly

Measurements are made in pairs and cannot be changed after data is recorded. The voltage and current phases must be properly associated. Each voltage must be associated with its corresponding current.

You can use either the Power Recorder System Software or the Scenario software to confirm whether the voltage and current are paired correctly, as described below. Details about how to do this in the Power Recorder System Software are described below. For details about doing this through Scenario, see the *Scenario User Guide*.

Checking Connections Through Software

In order to confirm that connections have been made properly, you need to check some settings in the Power Recorder System Software.

If you don't have access to a computer running the Power Recorder System Software, contact someone on the network and ask them to perform these steps for you. You will need to provide them with the serial number of the unit.

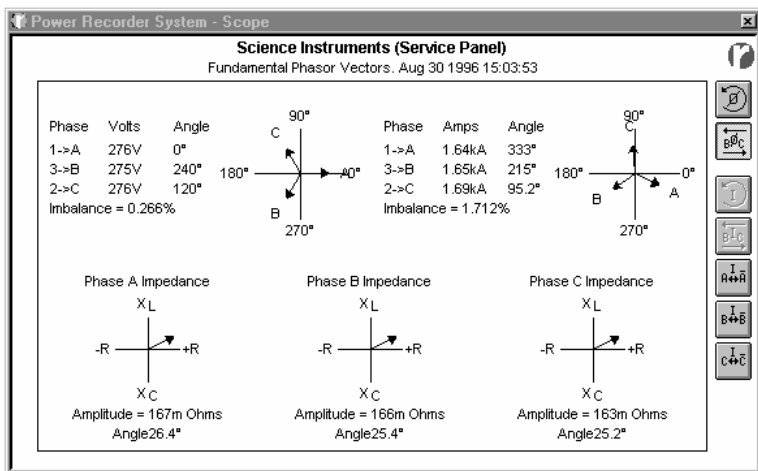
1. Go to a computer that is connected to the network and has the Power Recorder System Software installed.

Checking Connections and Finishing Up

2. Link to the Multipoint from the Power Recorder System Software.
3. If the Multipoint has not yet been configured, use the configuration settings to designate the correct power type.
4. Open the Scope view.

Checking Voltage and Current Pairing

1. Open the Scope Phasor window.



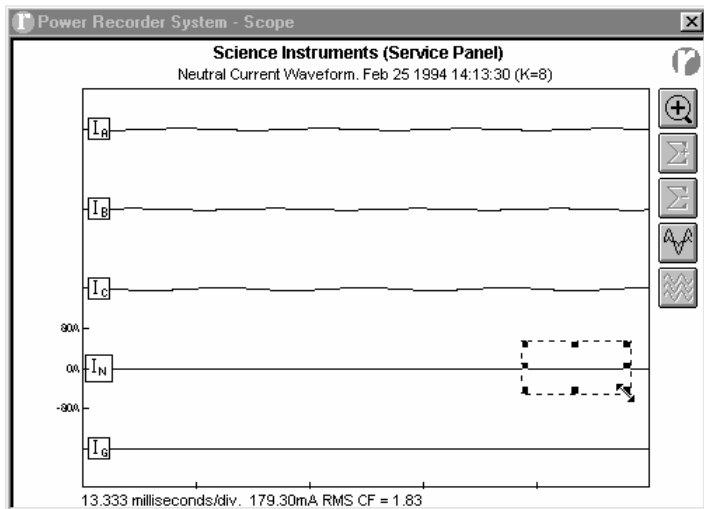
2. Verify the correct pairing and rotation of the currents and voltages.

If the pairing or rotation are incorrect, use the tools in the window to swap connections and change polarity. For more information, see “Using the Phasors Tool to Verify Connections” in the *Power Recorder System User Guide*.

Checking for Ground and Neutral Current Connections

You can use the Waveforms tool in the Power Recorder System Software to check for current.

1. Open the Amps window in the Waveforms view.
2. Select the ground or neutral current trace.
3. Draw a small selection rectangle around the trace.



4. Click the Magnify tool to zoom in and inspect the current trace.

Tip: You can also change the Full Scale settings from the Option menu.

Configuring the Multipoint

While you are linked to the Multipoint, you can configure it, to set power type and other parameters.

For complete information about configuring a Multipoint or other Power Recorder, see the *Power Recorder System User Guide*, or the *Scenario User Guide*.

Finishing Up

Before you finalize the installation, double-check these connections:

1. Make sure that all wires are neatly routed and secured.
2. Be sure to provide adequate strain relief for wires going to the terminal blocks.
3. Check to see whether voltage and current wires are paired correctly. If they are not, you can make changes through the Power Analysis System Software or through Scenario.
4. Confirm that the range lights (LEDs) are correct.
5. Make sure the installation meets all applicable safety codes.
6. Re-install all panel covers as required.



WARNING: Make sure that you have tagged, labeled, and installed appropriate warning signs at the monitoring location. Individuals entering the area may be unaware of the high voltages involved in monitoring.

What Next?

See the *Power Recorder System User Guide* or the *Scenario User Guide* for information about how to perform many of the tasks you may want to do next, including:

- Configure the Multipoint.
- Observe and check the connections.
- Examine initial conditions.
- Set monitoring intervals.

Appendix A. Multipoint Specifications

Measurement Parameters

Voltage

Four (4) Channels:

Input:	100 millivolts to 600 V _{RMS} max.
Accuracy:	± 1% of reading (typically 0.5%)
Impulses:	100 volts peak to 6400 Volts peak ± 2% of full scale. (available only on the high-speed Acquisition unit, model # 1948)
Impedance:	2 megohms to ground
Capacitance:	< 30 PF
Frequency:	60/50 Hz ± 3 Hz
Voltage measurement category (UL):	III
Voltage measurement category (CE):	II

Current

Models 1941 and 1948: Five (5) Channels

Input:	Current Transformer (CT) 5 A _{RMS} nominal, 20 A _{RMS} maximum
Frequency Response:	2.5 kHz
Dielectric withstand to ground:	4 kV _{RMS}
Insertion Impedance:	<0.1 Ohms
Accuracy:	1% of reading or better, ± 1°

Models 1942 and 1949

Specifications depend upon the current clamp used.

Sampling

Voltage and current wave-forms are sampled with a 14 bit analog to digital converter at a rate providing 128 sampled points per cycle at 50 and 60 Hz. Impulses are sampled using a 10 bit analog to digital converter at a software selected rate of 4 or 2 million times per second.

Power Requirements

100 - 240 V_{RMS}, 50/60 Hz

or

10 - 15 VDC

40 VA Max.

Dimensions

Size: 12.39" x 11.56" x 6.0" (31.47 cm x 29.36 cm x 15.24 cm)

Weight: 18.5 pounds (8.39 kg)

Environmental Requirements

For use indoors or in a suitable, protective enclosure outdoors.

Maximum Altitude: 2000 meters

Operating: 0° C to 50° C

Humidity: less than 90% non-condensing

Storage: -20° C to 60° C

Installation category: II

Pollution degree: 2

Calibration

The Multipoint is a microprocessor based instrument utilizing advanced solid-state IC's and A/D converters that are inherently stable with respect to repeatability and time. If your company has a recommended calibration schedule, the Multipoint can be checked for accuracy. Should the instrument not meet the accuracy specifications (1% of reading), the Multipoint may need to be returned to Reliable Power Meters for testing and/or repair. Contact RPM Customer Support.

Batteries

The Multipoint utilizes two sets of batteries. These batteries are not operator replaceable. The clock oscillator uses a lithium battery with a life span of ten years. The second DC source is a nicad battery pack, which is used to power the instrument in the event of a power failure. This battery has been set to power the instrument for five minutes before the instrument will perform an orderly shutdown and is charged when power is applied to the Multipoint. This rechargeable battery pack can only be obtained from Reliable Power Meters. If the battery fails to charge, return the instrument to RPM for repair.

Cleaning or Decontamination Instructions

After removing power from unit, a damp cloth may be used to remove dust particles that may have accumulated on the surface of the instrument.

Fuses Used In the Product

There are no operator accessible fuses in the Reliable Power Meter. Fuse replacement must be performed by service personnel using IEC acceptable fuses.

Resolution vs Recording Time

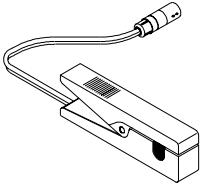
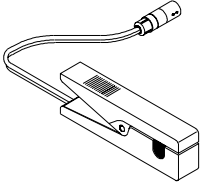
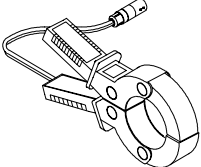
The Multipoint has a user selectable recording period. Based on the period selected, the Multipoint will provide a predetermined resolution of RMS, power, and harmonic data as follows:

Recording Period	Resolution
15 Minute	15 cycle
30 Minute	0.5 second
1 hour	1 second
3 hours	3 seconds
6 hours	6 seconds
12 hours	15 seconds
24 hours	30 seconds
48 hours	1 minute
5 days	3 minutes
1 week	5 minutes
2 weeks	10 minutes
4 weeks	15 minutes
1 month	15 minutes
90 days	1 hour
1 year	4 hours

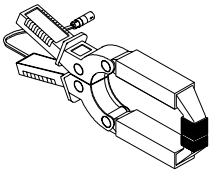
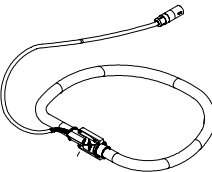
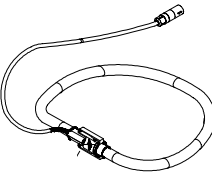
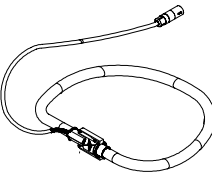
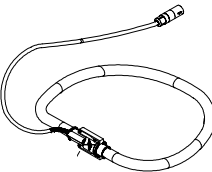
All recordings are performed via the digital signal processor and are If you should have any further questions please contact Reliable Power Meters Technical Support.

Appendix B. Current Clamps

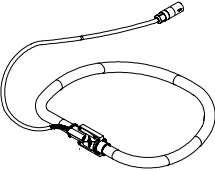
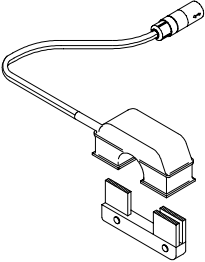
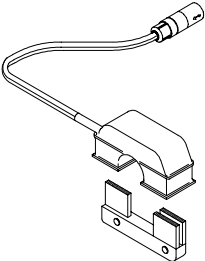
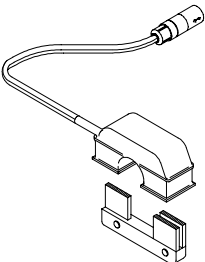
The clamps listed below are for use with Acquisition Unit Models 1942 or 1949 but are not included as part of those models. They are available for purchase separately through Reliable Power Meters.

Current Clamp	Current Range and Opening Size	Uses
 <p>5 Amp (#3005 and #3005R*)</p>	<p>10 mA to 5 Amps RMS</p> <p>Jaw opening 0.47" diameter</p>	<p>Measuring very low currents, such as when connecting to ground conductors.</p> <p>Connecting to a current transformer (CT).</p>
 <p>40 Amp (# 3014 and # 3014R*)</p>	<p>100 mA to 40 Amps RMS</p> <p>Jaw opening 0.47" diameter</p>	<p>Measuring moderate currents such as single-phase branch circuits.</p>
 <p>1000 Amp (# 3100 and # 3100R*)</p>	<p>1 to 1000 Amps RMS</p> <p>Jaw opening 2.0" diameter</p>	<p>Fits most applications.</p> <p>Useful in most cases, except when the space is inadequate</p>

* The "R" version of this clamp includes a 10-foot interface cable required to connect this clamp to the standard model Power Recorder.

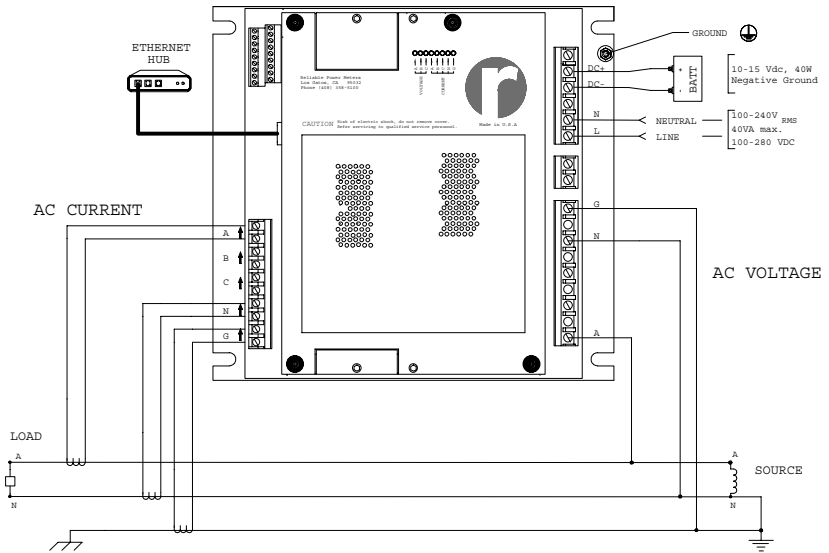
Current Clamp	Current Range and Opening Size	Uses
 <p>3000 Amp (# 3300 and # 3000R*)</p>	<p>1 Amp to 3000 Amps</p> <p>Jaw opening 1.97" x 5.31"</p>	<p>Connecting to high currents with busbars or large wires.</p>
 <p>100 Amp (# 3110)</p>	<p>2 Amp to 100 Amps</p> <p>Flexible current transformer, 24" long.</p>	<p>Getting around cable bundles and large busbars.</p>
 <p>1000 Amp (# 3210)</p>	<p>20 Amp to 1000 Amps</p> <p>Flexible current transformer, 24" long.</p>	<p>Getting around cable bundles and large busbars.</p>
 <p>1000 Amp (# 3212)</p>	<p>20 Amp to 1000 Amps</p> <p>Flexible current transformer, 48" long.</p>	<p>Getting around cable bundles and large busbars.</p>
 <p>5000 Amp (# 3310)</p>	<p>100 Amp to 5000 Amps</p> <p>Flexible current transformer, 24" long.</p>	<p>Getting around cable bundles and large busbars.</p>

Appendices

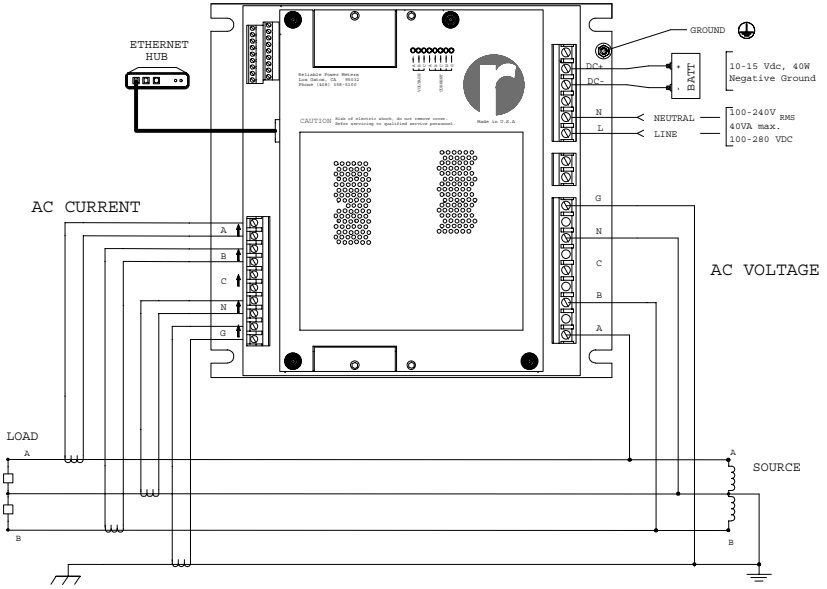
Current Clamp	Current Range and Opening Size	Uses
 <p data-bbox="129 499 360 529">5000 Amp (# 3312)</p>	<p data-bbox="424 317 647 378">100 Amp to 5000 Amps</p> <p data-bbox="424 401 647 496">Flexible current transformer, 48" long.</p>	<p data-bbox="709 317 947 413">Getting around cable bundles and large busbars.</p>
 <p data-bbox="142 854 339 883">10 Amp (# 3583)</p>	<p data-bbox="424 585 647 680">10 Amp current transformer, split-core (red).</p>	<p data-bbox="699 585 942 715">Permanent installation around previously installed wiring.</p>
 <p data-bbox="142 1201 339 1230">40 Amp (# 3584)</p>	<p data-bbox="424 932 647 1027">40 Amp current transformer, split-core (blue).</p>	<p data-bbox="699 932 942 1062">Permanent installation around previously installed wiring.</p>
 <p data-bbox="142 1548 339 1578">100 Amp (#3585)</p>	<p data-bbox="424 1279 647 1374">100 Amp current transformer, split-core (black).</p>	<p data-bbox="699 1279 942 1409">Permanent installation around previously installed wiring.</p>

Appendix C. Wiring Diagrams

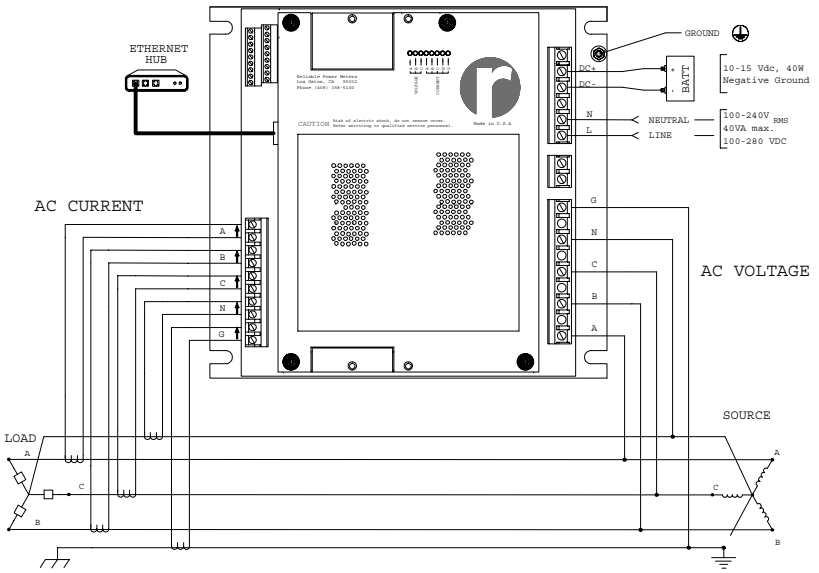
Single-Phase



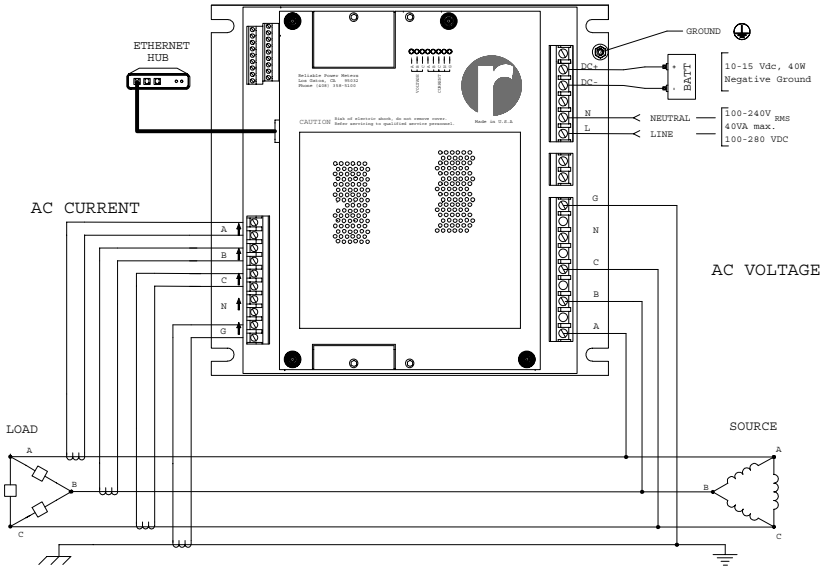
Split Single-Phase



4 Wire Wye (3-Phase Wye with ground)

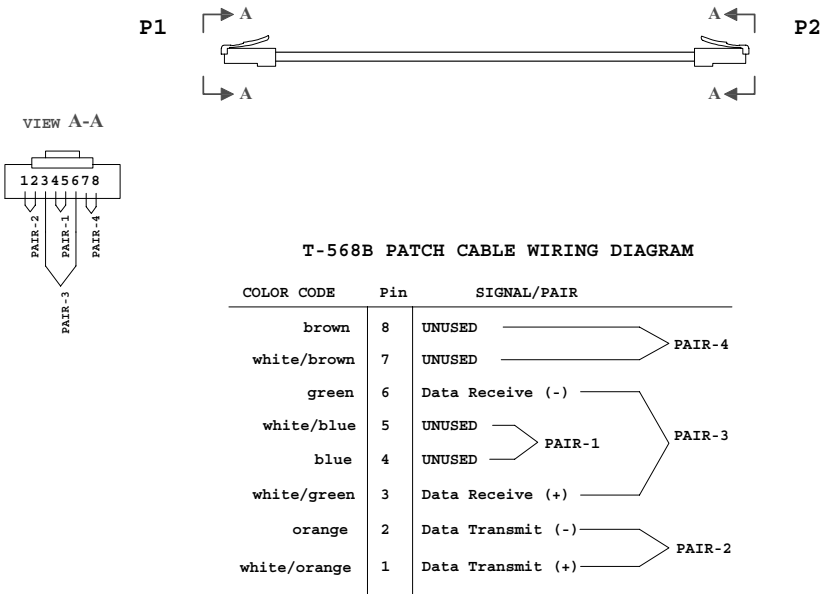


3-Phase Delta



Appendix D. Ethernet Wiring

CAUTION: Networking is a specialized field. The information provided below is a wiring snapshot only and is not intended to provide complete instructions. If you are creating your own cables, make sure you understand how to make them correctly. **If you are uncertain about any aspect of creating networking cables, use a network cable installation contractor or expert, or contact your network administrator.**



Notes:

Important: Standard telephone cable will not work.

- 10Base-T wiring specifies an 8-position jack. All wires need to be installed correctly, even though only pairs 2 and 3 of the EIA/TIA-568 scheme are used. Pair 1 is not used because that position is used in conventional telephone service and carries voltage when the telephone rings. The 100Base-T standard uses all four pairs.
- The wire must conform to EIA/TIA category-5 wire specifications and follow the EIA/TIA-568 wire scheme.

A common description of this wiring is *CAT5 4-pair twisted Ethernet cable*.

Fluke Corporation

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Canada: (800) 363-5853

Other countries: (425) 446-5500

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