



Power Platform® PP1 TASKCard® PQPlus *Quick Reference Guide*

WARNING

Death, serious injury, or fire hazard could result from improper connection of this instrument. Read and understand this manual before connecting this instrument. Follow all installation and operating instructions while using this instrument.

Connection of this instrument must be performed in compliance with the National Electrical Code (ANSI/NFPA 70-2002) of USA and any additional safety requirements applicable to your installation.

Installation, operation, and maintenance of this instrument must be performed by qualified personnel only. The National Electrical Code defines a qualified person as "one who has the skills and knowledge related to the construction and operation of the electrical equipment and installations, and who has received safety training on the hazards involved."

Qualified personnel who work on or near exposed energized electrical conductors must follow applicable safety related work practices and procedures including appropriate personal protective equipment in compliance with the Standard for Electrical Safety Requirements for Employee Workplaces (ANSI/NFPA 70E-2000) of USA and any additional workplace safety requirements applicable to your installation.

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Safety Summary

Definitions


WARNING statements inform the user that certain conditions or practices could result in loss of life or physical harm.


CAUTION statements identify conditions or practices that could harm the Power Platform, its data, other equipment, or property.


NOTE statements call attention to specific information.


Symbols


The following International Electrotechnical Commission (IEC) symbols are marked on the top and rear panel in the immediate vicinity of the referenced terminal or device:

 Caution, refer to accompanying documents (this guide).

 Alternating current (ac) operation of the terminal or device.

 Direct current (DC) operation of the terminal or device.



 Protective conductor terminal.

Warranty

Dranetz-BMI warrants that the Power Platform will be free from defects in workmanship and materials for a period of one year from the date of purchase. Dranetz-BMI will, without charge, replace or repair, at its option, any warranted product returned to the Dranetz-BMI factory service department.

Dranetz-BMI shall not be held liable for any consequential damages, including without limitation, damages resulting from loss of use, or damages resulting from the use or misuse of this product. Some states do not allow limitations of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific rights and you may also have rights which vary from state to state.

***Exclusions:** This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized repairs or alterations.*

Need Help?

How to Contact Dranetz-BMI

Regardless of your location, Dranetz-BMI sales and product support are within easy reach through an established network of representatives and distributors worldwide.

For Sales, Technical Support, or the name of a Dranetz-BMI Sales Representative in your area, call:

1-800-372-6832 or 732-287-3680

Fax: 732-248-1834

Web site: www.dranetz-bmi.com

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Impatient's Guide to Power Monitoring

Power Platform Monitoring Procedure

This outline is not meant to be all-inclusive and does not cover all aspects of monitoring setup. It is meant to make sure that the basic procedural issues on power monitoring are explained and understood to minimize the learning curve. The procedures below are discussed in detail in the next chapters.

Starting A New Session:

1. Reset To Factory Configuration [Memory Functions]
NOTE: Skip this step if you wish to maintain Input Configurations and Thresholds.
2. Make sure unit is set to Auto-transfer Disabled [Memory Functions]
3. Make sure Monitoring is Off [Setup Menu]
4. Clear Event Memory [Memory Functions]
5. Insert Memory Card (If you are using one)
6. Format Memory Card [Memory Card Functions]
NOTE: All data on card will be lost. Save important data on computer hard disk.
7. Set desired Site Name [Set Programmable Features]
8. Set Memory Mode: [Memory Functions]
Fill and Stop: Monitoring will stop when Internal Memory fills up. Does not take advantage of Memory Card.
Overwrite: Internal memory will overwrite old data as it fills. If auto-transfer is enabled, card will fill until full and then stop. Card will not overwrite. Internal memory will continue to overwrite when card is full.
NOTE: Overwrite is recommended with Memory Card use.
9. Run Easy Start [Setup Menu]
You will need to know a) circuit type, b) the nominal measurement voltage, c) which current probe you are using, and d) nominal current.
NOTE: PT and CT setup are beyond the scope here, refer to User's Manual.

Impatient's Guide to Power Monitoring

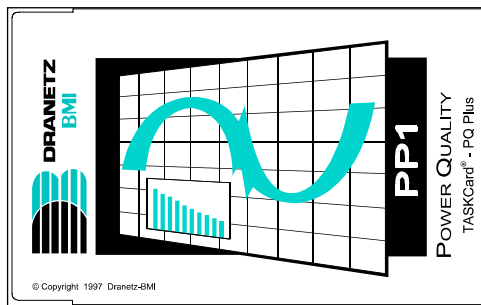
10. Set Waveform Capture [Advanced Setup Options][Set Thresholds]
Make sure Waveform Capture is ON-ON for all the parameters important to you. At least V Hi, V Lo, I Hi, I Lo, V Trans, I Trans.
11. Set Waveform Capture for Timed Events [Advanced Setup Options] [Set Input Configurations]
This is recommended for problem analysis but will consume memory.
12. Enable Auto-transfer to Memory Card [Memory Functions]
This may take several minutes with a 4 meg card. The unit is setting up the auto transfer file on the memory card called {sitename}.mdb. Available space will read minimal even though the card is empty.
NOTE: NEVER change the site name after enabling auto-transfer. You will not collect data.
13. Check Meter Mode and make sure the measurements make sense.
14. Check the Phasor Diagram and make sure it matches the diagrams shown in this Quick Reference Guide for your specific circuit type.
15. Clear Event Memory
16. Turn Monitoring on
17. Check View Data after 15 to 30 minutes
Check Time Plots
View Events by Number. If you see a number of events of the same type you have either solved the power problem or you may need to adjust the Threshold.

Introduction & General Description 1

Power Platform PP1 and TASKCard PQPlus

The Dranetz-BMI Power Platform introduces a new concept in power monitoring equipment by allowing you to change the type of monitoring the unit does by changing a TASKCard.

A TASKCard is a removable memory card that is installed in the rear panel of the Power Platform and contains an operating system that is designed for a specific application (task). The PQPlus TASKCard, shown below, changes the Power Platform to a power quality monitor so that it can record sags, swells, transients, outages, plus demand, energy and harmonics.



Unpacking the Unit

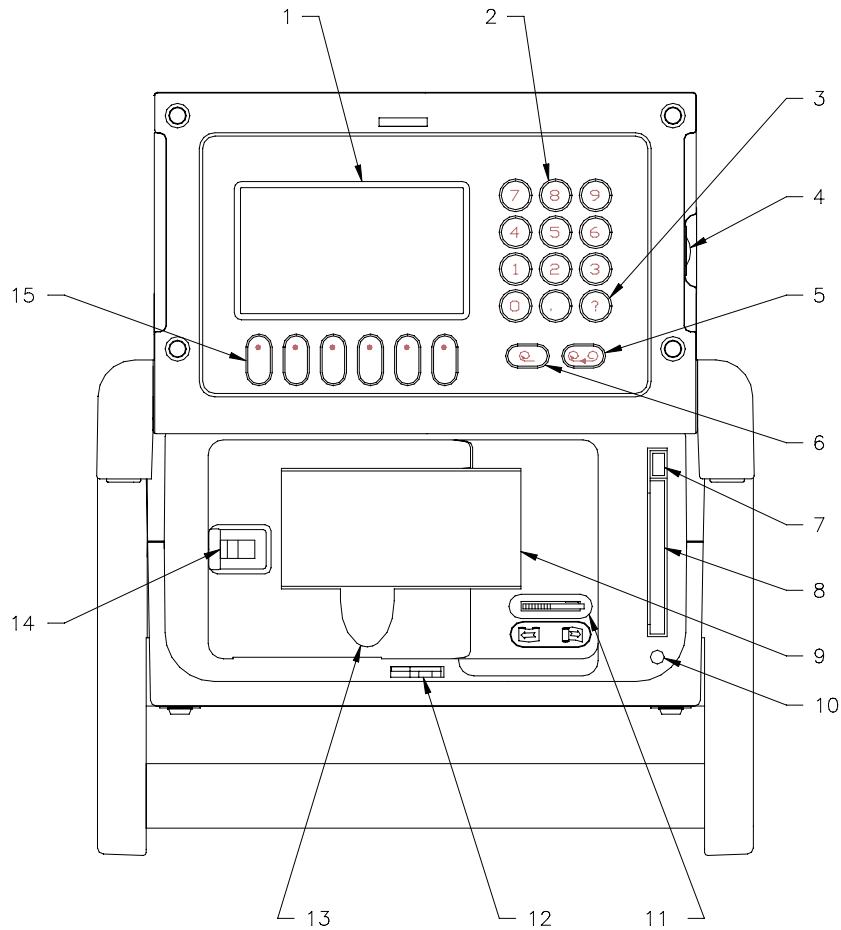
Unpack the Power Platform from the carton as follows:

1. Remove any remaining literature inside the top of the carton.
2. Carefully remove the Power Platform from its shipping carton.
3. Remove all accessories inside the carton. Check that the Standard Accessories are included. Pages 65-66 list the Part Number and Description of the Standard and Optional Accessories.
4. Place all of the shipping materials back into the carton, close its flaps, and store it away. **DO NOT** throw away the carton and packing materials. Save the carton and packing materials in case you have to return the Power Platform to Dranetz-BMI for maintenance, repair, or calibration.

1 Introduction & General Description

Front Panel

The front panel, including screen, keypad, printer, and memory card is protected by a locking, flip-top type display housing. The padded bail handle can be used as a carrying handle or as a means to position the unit.



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- 1 Liquid Crystal Display (LCD)** Provides 2 3/4 x 4 1/2 inch (5 x 10 cm) display consisting of 240 by 128 pixels (dots) of text and graphic information. Has electroluminescent (EL) back lighting for low light level viewing.

Introduction & General Description 1

- 2 **Numeric Keypad** Consists of keyboard keys 0 thru 9 and decimal point (.). Permits menu selection and numerical data entry.
- 3 **Question Mark Key** Provides selection of User Guide to display help screens with reference to screen displayed at any time.
- 4 **Contrast Control** Provides contrast range control for LCD viewing.
- 5 **Paper Feed** Controls paper feed and take up to advance the paper uniformly across window from right to left.
- 6 **Paper Take-up** Controls paper slack.
- 7 **Data Card Release** Ejects data (memory) card.
- 8 **Data Card Holder** Holds and connects data (memory) card to internal circuitry.
- *9 **Thermal Paper Printout** High-resolution thermal print of real-time data and report information.
- 10 **Data Card Busy LED** Yellow LED indicates data (memory) card is being accessed.
- *11 **Run/Load Printhead Control** Lever in left position for normal run operation. Lever in right position lifts printhead from paper for loading or paper pulling.
- 12 **Keylock** Secures front panel in locked shut position.
- *13 **Finger Groove** Access to grasp and pull paper out for viewing.
NOTE: Printhead control must be in LOAD position before paper is pulled.
- *14 **Printer Door Latch** Moves to right to unlock printer door.
- 15 **Function Keys** Used to select options that appear on bottom of screen.
Function selected varies with screen displayed.

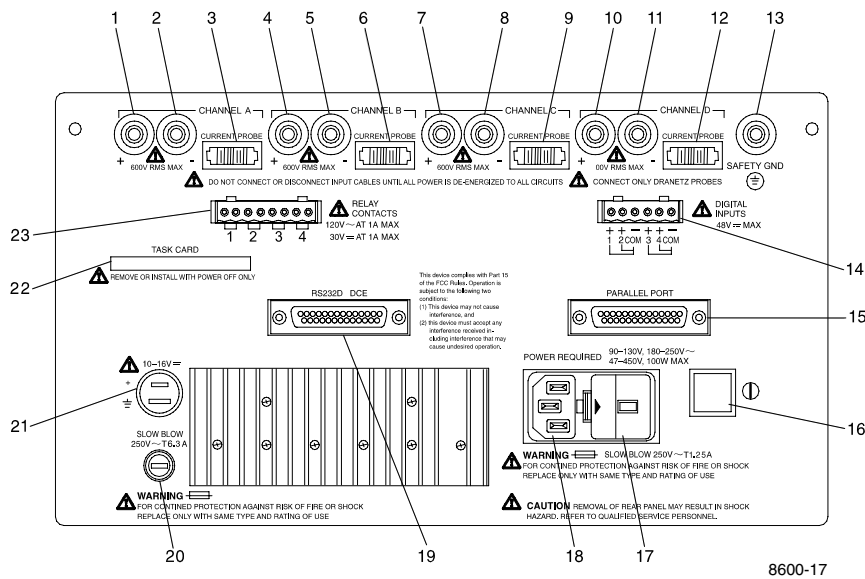
**Part of PPI with printer.*

1 Introduction & General Description

Rear Panel

The rear panel contains the input and output connectors including the slot for the TASKCard. See Chapter 2 for rear panel cable connections.

Dranetz Model PP1



- 1 CHANNEL A, + Differential Voltage Input Connector; color red.
- 2 CHANNEL A, - Differential Voltage Input Connector; color white.
- 3 CHANNEL A CURRENT PROBE Input Connector.
- 4 CHANNEL B, + Differential Voltage Input Connector; color yellow.
- 5 CHANNEL B, - Differential Voltage Input Connector; color white.
- 6 CHANNEL B CURRENT PROBE Input Connector.
- 7 CHANNEL C, + Differential Voltage Input Connector; color blue.

Introduction & General Description 1

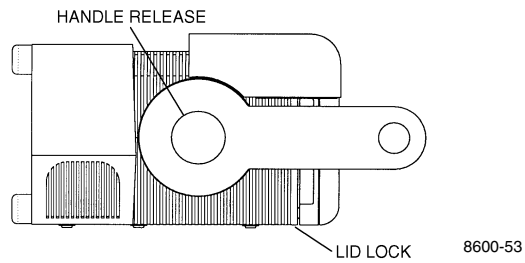
- 8 **CHANNEL C, - Differential Voltage Input Connector;** color white.
- 9 **CHANNEL C CURRENT PROBE Input Connector.**
- 10 **CHANNEL D, + Differential Voltage Input Connector;** color grey.
- 11 **CHANNEL D, - Differential Voltage Input Connector;** color white.
- 12 **CHANNEL D, CURRENT PROBE Input Connector.**
- 13 **SAFETY GROUND Connector;** color green.
- 14 **DIGITAL INPUTS, 12-48 VDC.** Four channels of digital signal inputs.
- 15 **PARALLEL PORT,** Parallel data port.
- 16 **On/Off Switch. 1 = ON, 0 = OFF.**
- 17 **Fuseholder (Main Power). SLOW BLOW 250 VAC T1.25A 5x20 mm.**
- 18 **POWER REQUIRED, 90-130 VAC 180-250 VAC, 47-450 Hz, 100 W MAX. Input power plug.**
- 19 **RS232D DCE, Serial data port.**
- 20 **Internal/ External battery fuse. SLOW BLOW, 250 VAC T6.3A 5x20 mm.**
- 21 **10-16VDC, External DC voltage source input.**
- 22 **TASK CARD,** connector slot.
TASKCard Protective Cover, mounted with screws after TASKCard is installed. (Not shown)
- 23 **RELAY CONTACTS, 120 VAC AT 1A MAX, 30 VDC AT 1A MAX. Four sets of relay contacts.**

1 Introduction & General Description

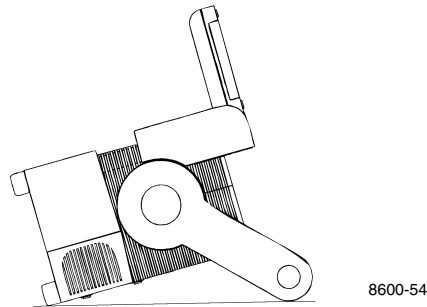
Positioning the Unit

Handle releases, in the pivots of the handles, must be pressed inwards together to unlock the handles. Once released, the handles can be positioned in three positions: one for carrying the unit, and two for viewing the display at 15 or 45 degrees. At each position the handles will lock and must be released again to be repositioned.

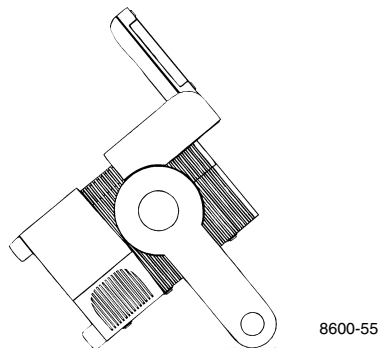
Handle release location and carrying position



45° Viewing Position



15° Viewing Position



Cable Connections 2

This chapter displays the connection of the various voltage and current devices that can be used when making measurements. Before working on the cable connections, follow the Warning advisory and all Safety Precautions below.

WARNING

Death, serious injury, or fire hazard could result from improper connection of this instrument. Read and understand this manual before connecting this instrument. Follow all installation and operating instructions while using this instrument.

Connection of this instrument must be performed in compliance with the National Electrical Code (ANSI/NFPA 70-2002) of USA and any additional safety requirements applicable to your installation.

Installation, operation, and maintenance of this instrument must be performed by qualified personnel only. The National Electrical Code defines a qualified person as “one familiar with the construction and operation of the equipment and the hazards involved.”

Safety Precautions

- Connect the green safety (earth) ground first, before making any other connections.
- When connecting to electric circuits or pulse initiating equipment, open their related breakers. DO NOT install any connection of the instrument on live power lines.
- Connections must be made to the instrument first, then connect to the circuit to be monitored.
- Wear proper Personal Protective Equipment, including safety glasses and insulated gloves when making connections to power circuits.
- Hands, shoes and floor must be dry when making any connection to a power line.
- Make sure the unit is turned OFF before connecting probes to the rear panel.
- Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

2 Cable Connections

Connecting a Voltage Probe

The voltage measurement probe is made up of eight, 8-foot channel measurement cable assemblies.

Measurement Cable Set

Part Number: All items below are packed and labeled as Measurement Cable Set with Part Number 115815-G1 (Domestic), 115815-G2 (Euro), or 115815-G3 (UK). The voltage probes, jumpers, and power cord are provided as standard accessories and are stored in a cable pallet as part of the measurement cable set.

Voltage Safety Clips. Each clip comes with a detachable, crocodile jaw, safety clip assembly. The safety clip assemblies are red (+) and black (-) for each of the four channels.

Probe Cables. One probe assembly each of red (channel A), yellow (channel B), and blue (channel C) and five each of black are provided.

Jumpers. Four 1-foot blue or black jumpers for input connector jumpering.

Shielded power cord.

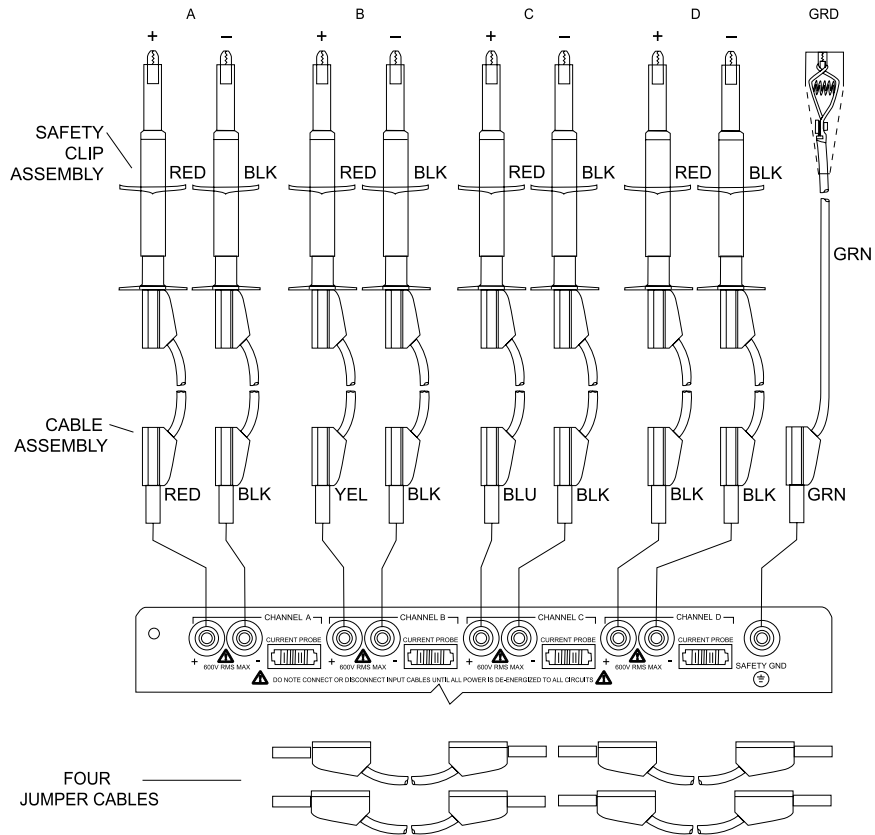
See figure next page. A pallet for storage of the cables and the input power cord are included in the contents of the measurement cable set but are not shown in the figure.

Voltage Rating

Direct connection of all voltage probes for measurement are rated at 600 Vrms max. For measuring voltages greater than 600 Vrms Potential Transformers (PTs) must be used.

Cable Connections 2

Voltage Measurement Cable Set



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Part Number: 115815-G1 (Domestic)

115815-G2 (Euro)

115815-G3 (UK)

NOTE: Pallet and Input power cable not shown.

2 Cable Connections

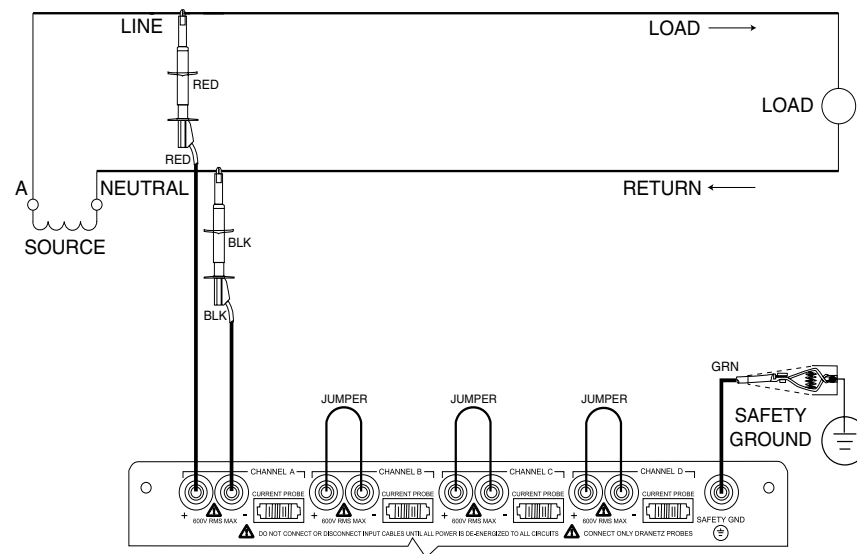
Connection Guidelines

Follow these guidelines when making voltage connections.

- Refer to the measurement test set figure for color coding of probes that connect to input channel connectors A, B, C, and D.
- Each channel input has plus (+) and minus (-) differential inputs of 60 to 600Vrms max. Unused voltage channel differential inputs must be jumpered together using the blue or black jumpers provided.
- Channel D has an additional low voltage range of 0 to 60 Vrms max. for low voltage measurements.

Sample Single Phase Connection

The following figure shows a voltage connection to a single phase circuit for channel A. Jumpers are used to connect the differential inputs of channels B, C, and D together as shown to prevent erroneous data. The green cable is always connected to a secure ground (earth) connection as a safety ground.

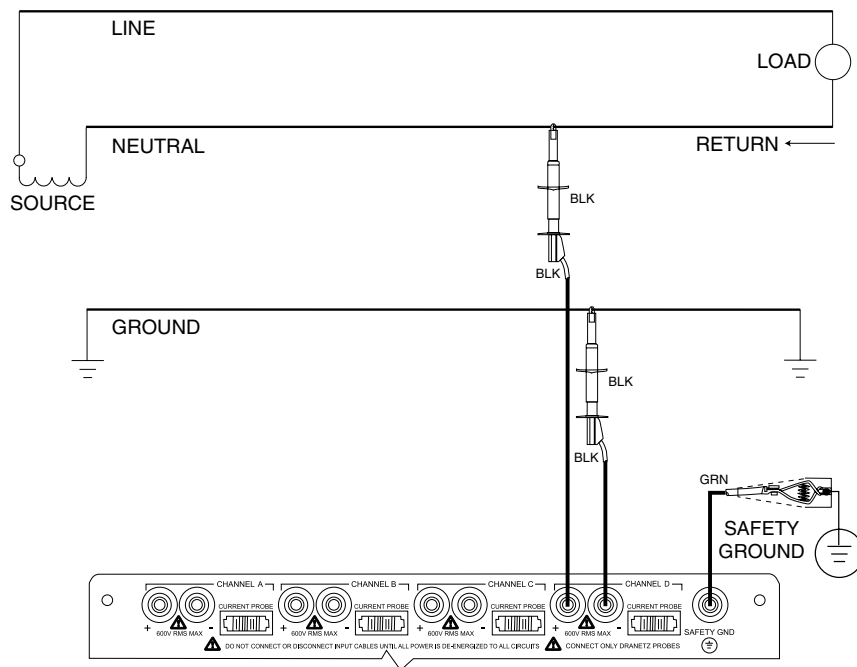


8600-18

Cable Connections 2

Sample Neutral to Ground Connection

The following figure shows a voltage connection using channel D as a differential input for a single phase connection. Connections are identical for split phase, delta, and wye configurations. One probe connects the source neutral line to the D+ input. Another probe connects the safety ground to the D- input. Any channel input may be used to perform this measurement but Channel D is usually used because it provides a low voltage range of 0 to 60 Vrms.



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2 Cable Connections

Connecting to a Potential Transformer

A potential transformer (PT), also referred to as a voltage instrument transformer, provides the necessary step-down ratio to reduce the high voltage of circuits above 600 Vrms to a level for safe measurement. A PT also provides isolation and proper connections for instrument attachment.

WARNING: Refer to the manufacturer's instructions for exact information on probe connection of the PT for voltage monitoring. **Do not exceed 600 Vrms input to the PP1 Voltage inputs.** Potential transformers are not manufactured by Dranetz-BMI.

Connection Guidelines

PTs are usually fixed in position and require that the voltage probe(s) be connected to their terminal connections. Follow these steps to connect voltage probes to a potential transformer.

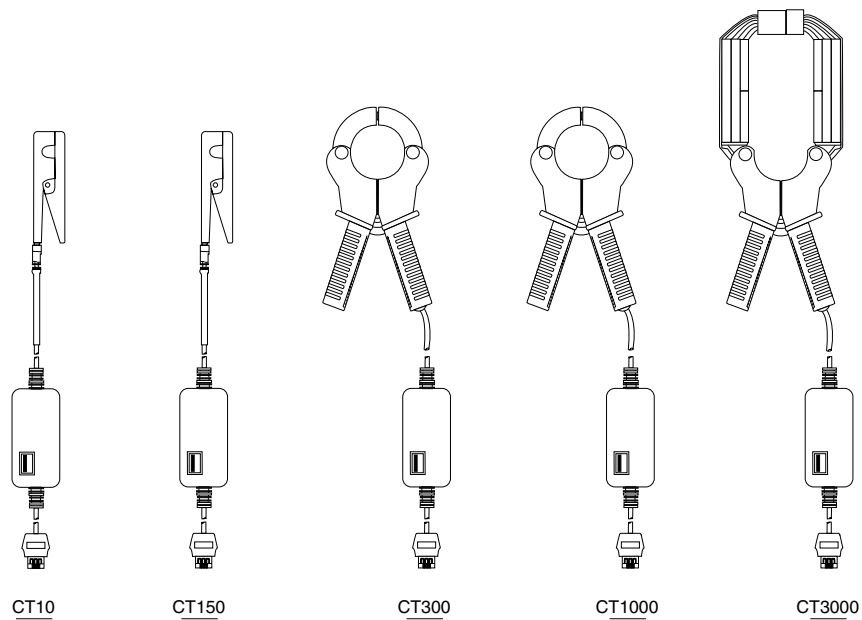
1. Turn off power to the PT.
2. Connect the green ground connector to the Safety Ground connector on the rear panel of the Power Platform.
3. Connect the green ground connector to a solid ground point at or near the PT in accordance with the PT manufacturer's instructions.
4. Connect the colored voltage probes to the PT's connections in accordance with the manufacturer's instructions.
5. Connect the colored voltage probes to the channel inputs designated for monitoring.
6. Turn on power to the PT.

Cable Connections 2

Connecting a Current Probe

Several types of current probes (clamp-on current transformers) are available as optional accessories. Dranetz current probes are available in various sizes.

Dranetz Current probes



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WARNING: When using either the CT-10 or CT-150 current probe, DO NOT connect the probe jaws around a non-insulated wire. These probes are to be used to monitor current of insulated wire only.

2 Cable Connections

Specifications

The following table lists the operating specifications for all optional Dranetz current probes.

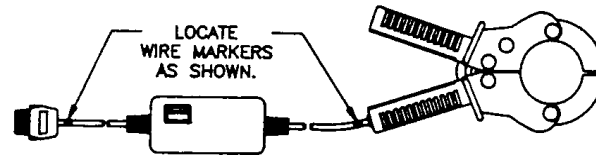
	CT10	CT150	CT300	CT1000	CT3000
Current Range for Amplitude Accuracy (Arms) of 0.5%	1 to 10	3 to 125	10 to 300	50 to 1000	200 to 3000
Current Range for Phase Accuracy of 0.2° (Arms) at Calibration Point ()	2 to 10 (5)	5 to 125 (30)	15 to 300 (200)	100 to 1000 (200)	300 to 3000 (300)
Frequency Range (Hz)	45 to 10,000	45 to 10,000	15 to 10,000	30 to 50,000	30 to 5000
Impulse Width	Typically -3dB at 1 µsecusec at one-half sine wave.				
Output Signal of 3 Vrms at	10 Arms	150 Arms	300 Arms	1000 Arms	3000 Arms
Maximum Conductor Size	0.47" (12mm)	0.47" (12mm)	2.13" (54mm)	2.17" (55mm)	2.56" (65mm) or 1.97" x 5.3" (50 x 135 mm) or 2.56" x 3.94" (65 x 100 mm)

Cable Connections 2

Wire Marker Kit

The wire marker kit, supplied as a standard accessory, helps you identify which current probe is connected to each current channel input. This kit, Part Number 155520, contains adhesive backed color-coded marker labels to attach to the probe handle and the plug end of the probe. Use red label for channel A, yellow for B, and blue for C. Channel D is left unmarked. See figure below for proper wire marker placement.

Wire marker placement



8600-62.pcx

Connection Guidelines

Each probe has a polarized plug to fit any one of the four current input connectors (A, B, C, or D) on the rear panel of the Power Platform.

An arrow marking on the handle is a guide to ensure that you position the probe with the arrow pointing towards the load. Correct position of the probe is necessary for correct power measurements.

Follow these guidelines when making current connections.

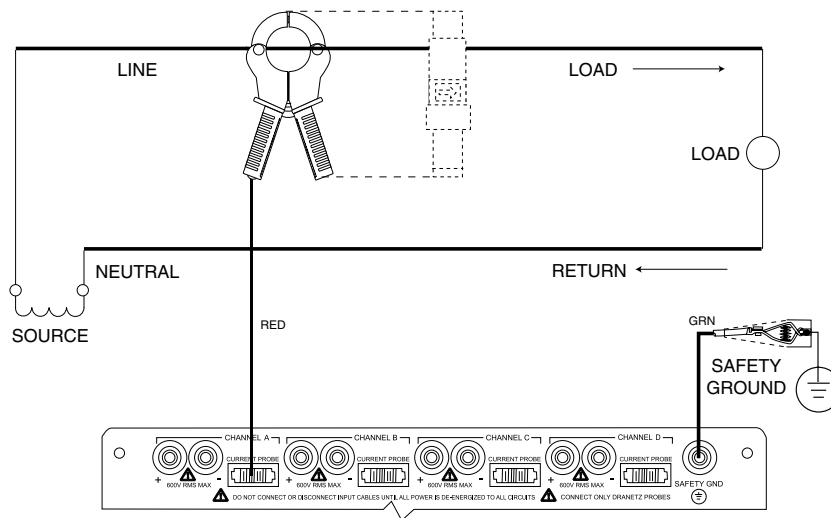
- Position the probe with the arrow on the handle facing the load.
- For greatest accuracy, use a probe that is rated at no more than twice the nominal value you expect to measure.

See figure next page showing how to connect a current probe to channel A for current monitoring of a single phase line.

2 Cable Connections

Sample Single Phase Connection

The current probe may be connected to the return line if desired to measure the return current when checking for load current leakage, loop current relationships, etc.



8600-20

NOTE: The connection shown above is not recommended without a voltage connection to ensure frequency synchronization.

Cable Connections 2

Connecting to a Current Transformer

Current transformers, also known as instrument transformers, reduce high level currents to low level currents so they can be safely monitored. These devices are similar to PTs used for voltage measurements in that both reduce values for safe measurement. The reduction, or step-down ratio, is stated as a scale factor that is used by the PP1-PQPlus to step-up the measured value to its original value.

Safety Precautions

The following safety precautions apply to current transformer (CT) connections in addition to the Safety Precautions stated on page 9.

- Never energize a CT with the secondary open.
- Never disconnect the secondary of a CT with primary energized.

WARNING: Refer to the manufacturer's instructions related to the CT for exact information on connections for current monitoring. **Do not exceed manufacturer's ratings.** Potential transformers are not manufactured by Dranetz-BMI.

Types of CTs

There are single-phase CTs and polyphase CTs dependent on the source transformer used. Current reduction ratios vary widely and are also dependent on the source transformer used. Rating plates attached to the CT provide information as to the ratio and current limitations.

2 Cable Connections

Connecting to an Isolated Current Transformer (ISO)

Low current monitoring devices made by Dranetz are called isolated current transformers or ISO boxes for short. They are typically used to monitor the output of existing CTs. Dranetz makes two types of ISO boxes; one model (ISO-1A) monitors up to 1 amp rms of current maximum, the other model (ISO-5) up to 5 amps rms maximum. Both are available as optional accessories.

Safety Precautions

The following safety precautions apply to current transformer (CT) connections in addition to the Safety Precautions stated on page 9.

- Never energize a CT with the secondary open.
- Never disconnect the secondary of a CT with primary energized.

WARNING: Physical injury or equipment damage could result if ISO boxes are improperly connected. **Do not connect an ISO box between two conductors which are at different voltage potentials.**

Connection Guidelines

ISO boxes can be used in a number of ways. These methods include:

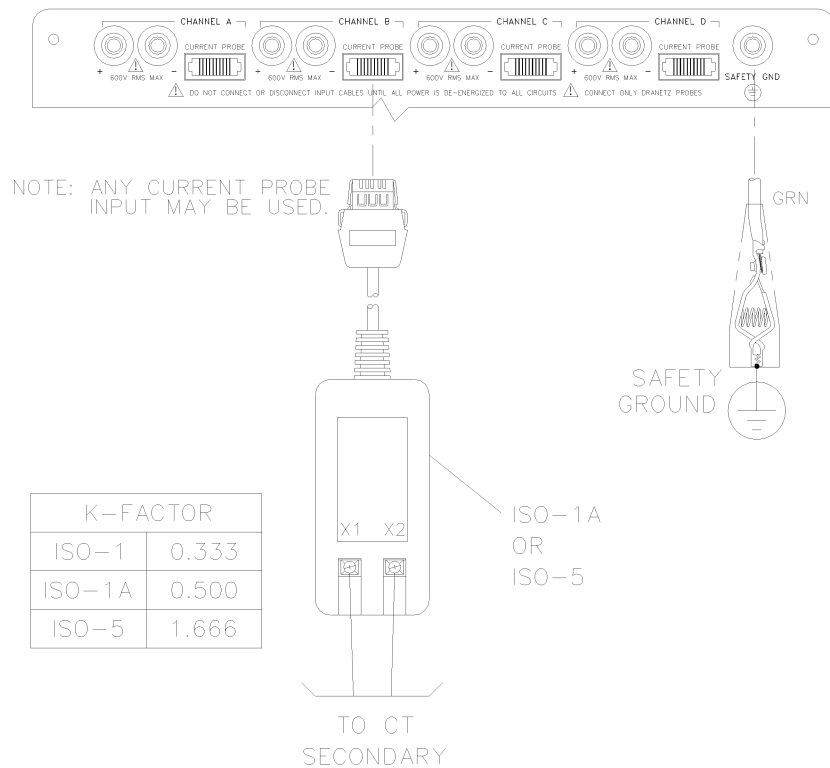
- connecting them to the secondary of CTs for metering by the PP1-PQPlus
- inserting them in series with the load current to measure low current values
- connecting them to a non-Dranetz clamp-on current transformer and using that CT to monitor current with the PP1-PQPlus.

See figures displayed in the next pages showing the different ways to connect ISO boxes.

Cable Connections 2

Sample ISO box connection to a current transformer

The figure below shows an ISO box connected from Channel B current input to a permanently installed CT. Polarities of the ISO box and CT are kept in-phase by matching markings. Scale factors of both devices must be multiplied together to get the resultant scale factor.

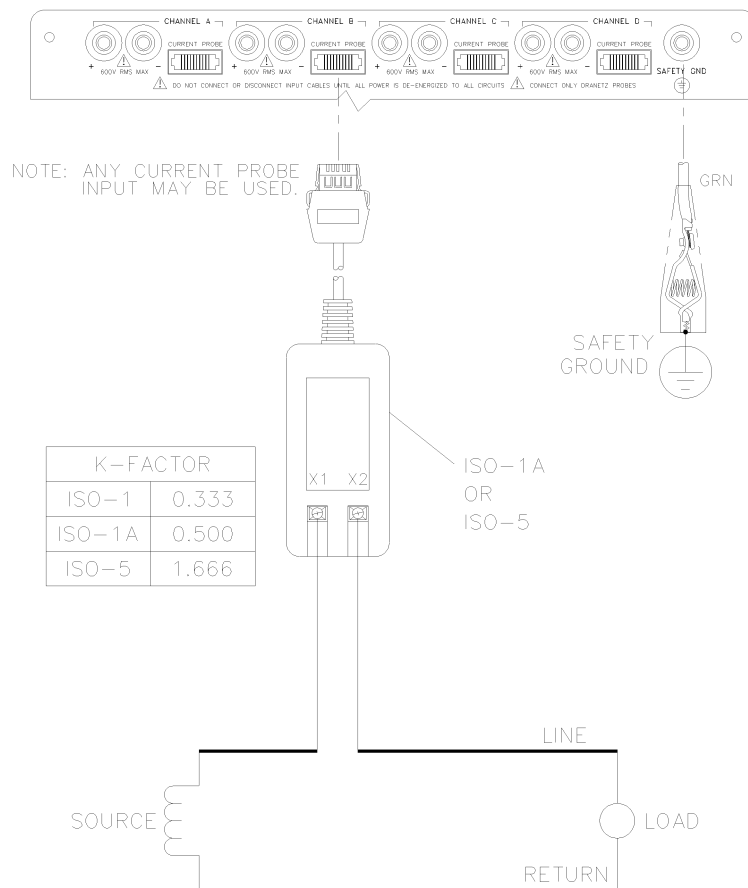


8600-24

2 Cable Connections

Sample ISO box in-line connection

The figure below shows the ISO box connected in series with the load of a single-phase line. The connection is made with the X1 terminal connected to the source input line and X2 connected to the load line. The scale factor is that of the ISO box only.



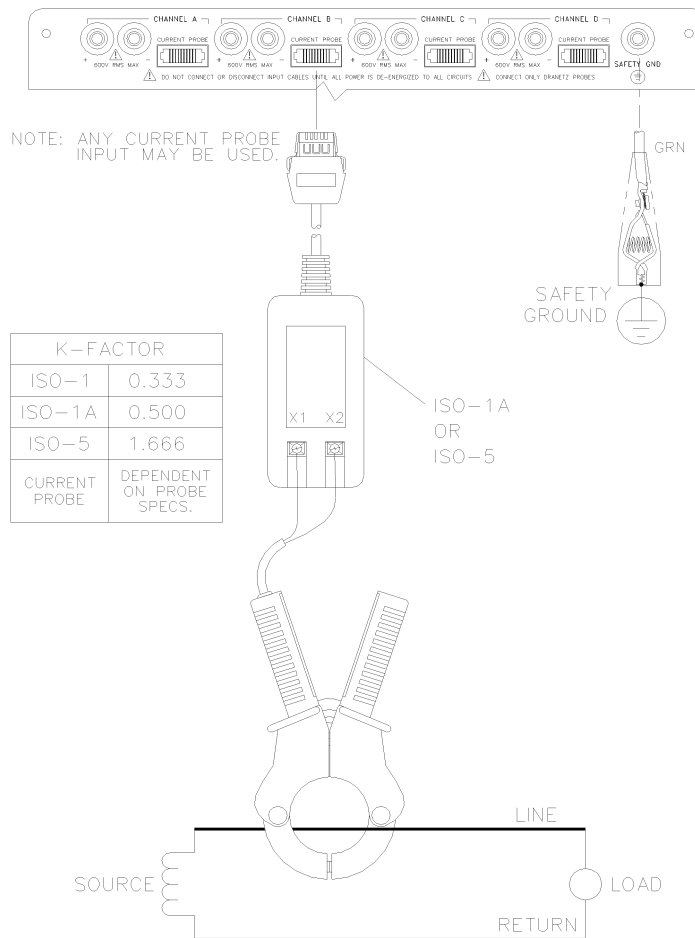
8600-25

Cable Connections 2

Sample ISO box connecting to a non-Dranetz current probe

The figure below shows the ISO box connected to a non-Dranetz clamp-on current transformer. In this case the scale factor is the product of the ISO box and the CT. Refer to manufacturer's literature to determine the CT scale factor.

WARNING: Refer to the manufacturer's instructions related to the CT for exact information for connections for current monitoring. **Do not exceed manufacturer's ratings.**



2 Cable Connections

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Easy Start Setup 3

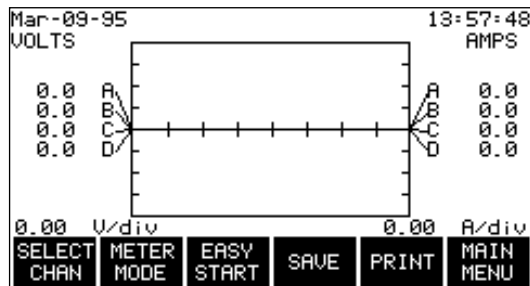
This chapter provides information on using the Easy Start function of the Power Platform-PQPlus. Easy Start is a series of screens that prompts you for information about the circuit you will be monitoring. The PP1-PQPlus then automatically turns on the correct channels, sets the monitoring thresholds, and chooses the types of reports that it will print out.

Turning the Unit On

Follow these steps to turn on the Power Platform.

1. Plug unit into an ac power source.
2. Verify that the PQPlus TASKCard is inserted into the slot on the rear panel.
3. Turn on the unit.

Result: If the TASKCard is inserted correctly, the unit will perform internal diagnostics, momentarily display the message “TASKCard Found, Loading PQPlus Vxx”, then display the scope mode screen shown below.



NOTE: If the TASKCard is not inserted correctly, or if the TASKCard is corrupted, an error message will be displayed indicating TASKCard or downloading failure. See next page for a list of the error message types and what to do next.

4. Pressing PRINT will print a copy of the empty display as shown.

3 Easy Start Setup

Possible TASKCard Error Messages

The following describes the possible error messages when loading the TASKCard and the corrective action to take for each.

Error Message

TASKCard Not Found.
Booting From ROM.

What to Do Next

TASKCard may not be installed or is installed incorrectly. Turn off power and recheck TASKCard installation.

Corrupt TASKCard.
Booting from ROM.

A TASKCard was found but it was not recognized as a valid TASKCard. Turn off power and recheck TASKCard. If the TASKCard is properly inserted, there may be a problem, notify Dranetz.

WARNING:

The TASKCard found:
(now installed) Is the unit
different than last used:
(previous TASKCard)
CHANGING TASKCARDS
MAY ERASE MEMORY!

Press any key to continue or turn off and reinstall the last TASKCard used.

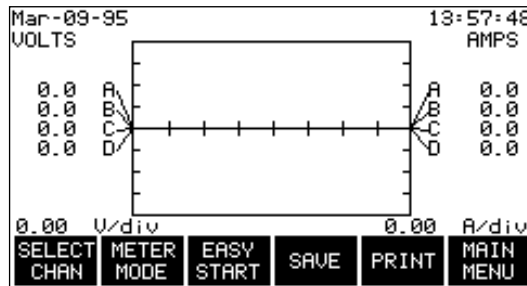
Any of the following:
I/O Processor - Download Failed
ACP Processor - Download Failed
I/O Processor - Will Not Respond
ACP Processor - Will Not Respond

TASKCard download problem.
Notify Dranetz for further assistance.

Easy Start Setup 3

Viewing Scope Mode

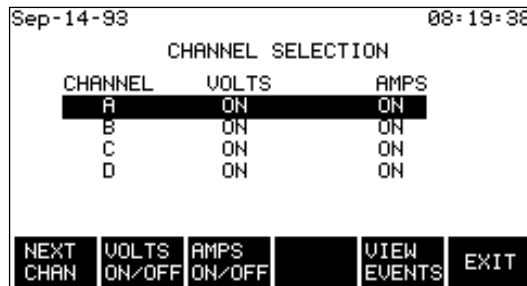
Scope Mode allows you to view real-time voltage and current waveforms for up to four channels. To display the screen below, from Main Menu, select item 2, Scope Mode.



How to Select Channels for display

1. In Scope Mode display, press SELECT CHAN.

Result: The following screen will appear.



2. Press VOLTS ON/OFF to toggle selected channel On or Off for voltage waveform display.
3. Press AMPS ON/OFF to toggle selected channel On or Off for current waveform display.
4. Press NEXT CHAN to select channels A, B, C, and/or D.
5. Repeat steps 2 through 4 for each channel to be selected.
6. Press EXIT to display the channels selected.

3 Easy Start Setup

Viewing Meter Mode

In addition to monitoring for power disturbances, the PP1-PQPlus is a true RMS voltmeter and true RMS clamp-on ammeter. Voltage and current measurements, along with all other calculated parameters, are displayed on the Meter Mode screens. The PP1-PQPlus also functions as a phase angle meter, wattmeter, VAR meter, PF meter, and frequency meter.

In meter mode, you can select any one channel for viewing with all parameters displayed, or you can select an individual parameter for viewing with all channels displayed.

Channels that can be viewed

Channels A, B, C, or D can be viewed individually or collectively for single phase monitoring. For Delta mode the sequence is: A-B, B-C, C-A, D, and ABC.

Available Parameters

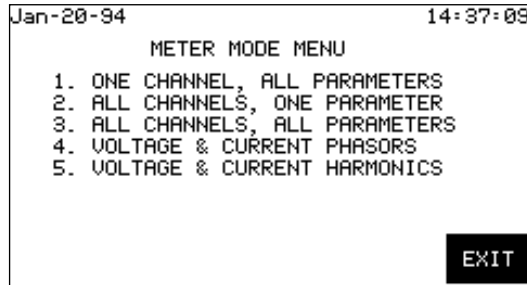
The following table lists the parameters that can be viewed in meter mode.

<i>Parameter</i>	<i>Symbol</i>
Volts RMS	V
Amps RMS	I
Watts	W
Volt-amps	VA
Volt-amps Reactive	VAR
Power Factor (True)	PF
Voltage Frequency	Hz
Voltage Unbalance	Vunb%
Volts, Total Harmonic Distortion	Vthd
Amps, Total Harmonic Distortion	Ithd
Current Crest Factor	Icf
k-Factor	KF
Demand	Dmd
Energy	WHR
Volts, Harmonic Number	V harm n
Amps, Harmonic Number	I harm n

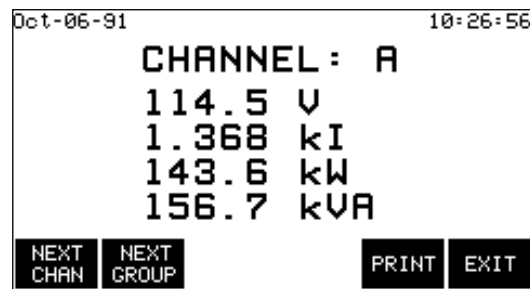
Easy Start Setup 3

How to View Meter Mode displays

1. In Scope Mode display, press METER MODE to view the Meter Mode Menu below.

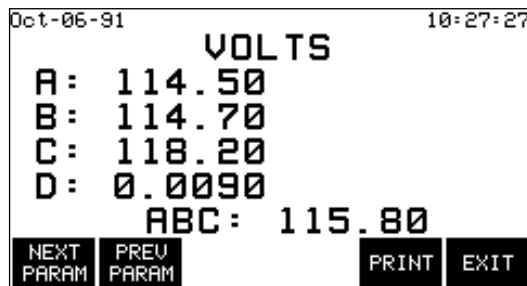


2. Press 1 if one channel and all parameters are to be viewed.



Press NEXT CHAN to display next channel parameters.
Press NEXT GROUP to display the next group of data for the channel selected.

3. Press 2 if all channels and one parameter are to be viewed.



(Continue next page)

3 Easy Start Setup

(Cont. - How to view Meter Mode displays)

4. Press 3 for the all channels, all parameters display.

```
Oct-06-91 10:37:07
ALL CHANNEL REPORT
CHAN VOLT AMP WATT VA
A 114.5 1.368k 143.6k 156.7k
B 114.7 1.478k 160.3k 169.5k
C 118.2 1.411k 155.1k 166.8k
D 0.000 0.000 0.000 0.000
ABC 115.8 4.258k 459.0k 492.7k
NEXT PRINT EXIT
GROUP
```

Using Easy Start

The Easy Start function prompts you for information about the circuit you want to monitor and then automatically sets up the Power Platform for monitoring and reporting.

CAUTION: The Easy Start process will change previously programmed instrument settings and configurations. Monitoring is also shut down during Easy Start programming.

Follow these steps if you are using the Easy Start function of the PP1-PQPlus.

1. From the scope mode screen, press EASY START.

Result: The following screen will appear.

```
Sep-13-93 14:03:59
** CAUTION **
THE EASY START PROCESS WILL CHANGE
PREVIOUSLY-PROGRAMMED INSTRUMENT
SETTINGS AND CONFIGURATIONS.
MONITORING IS ALSO SHUT DOWN
DURING EASY START PROGRAMMING.
PRESS 'CANCEL' IF YOU DO NOT WANT TO
CHANGE EXISTING SETTINGS.
CON- CANCEL
TINUE
```

2. Is the unit connected to a circuit and collecting data?

If yes, press CANCEL and save data to a memory card before proceeding.

If no, press CONTINUE and enter the required information as you proceed through the Easy Start screens.

Easy Start Setup 3

Monitoring Combinations

The following table lists the input channels that will be turned on based on the circuit type that you choose, monitor current setting, and neutral to ground setting.

<i>Monitor Current</i>	<i>Neutral to Ground</i>	<i>Single Phase</i>	<i>Split Phase</i>	<i>3 Phase (Wye or Delta)</i>
ON	ON	Va, Vd, Ia, Id	Va, Vb, Vd, Ia, Ib, Id	Va, Vb, Vc, Vd, Ia, Ib, Ic, Id
ON	OFF	Va, Ia	Va, Vb, Ia, Ib	Va, Vb, Vc, Ia, Ib, Ic
OFF	ON	Va, Vd	Va, Vb, Vd	Va, Vb, Vc, Vd
OFF	OFF	Va	Va, Vb	Va, Vb, Vc

Parameter Thresholds

The following table lists the settings for the parameters in the Easy Start setup. All other parameters are turned off.

<i>Parameter</i>	<i>Setting</i>
V HIGH RMS	+ 10%* from nominal
V LOW RMS	- 10%* from nominal
V TRANSIENT	150% of nominal
V THD %	10%
V FREQ	2.0 Hz
I HIGH RMS	+ 10%* from nominal
PF LOW LIM	0.85
V SENS OUT LIM	5
V TRANS % RAISED	50%
I TRANS % RAISED	50%

* This number is the default percent tolerance of Easy Start.

3 Easy Start Setup

Waveform Capture Settings

The following table lists the parameters that will have waveforms saved to memory when the corresponding threshold is exceeded. All other parameters are turned off.

<i>Parameter</i>	<i>Waveform Capture</i>	<i>Record All Channels</i>
V LOW RMS	ON	ON
V TRANSIENT	ON	ON
V THD %	ON	OFF
#nTH V HARM %	ON	OFF
#nTH I HARM %	ON	OFF

NOTE: Waveform Capture set to ON means that the waveform for the channel that the event occurred on will be saved. Record All Channels set to ON means that waveforms for all channels will be saved when an event occurs.

Example: From the table above, if the V LOW RMS limit is crossed on Channel C, then waveform data will be saved for that channel and all other active channels. However, if the V THD % limit is crossed on Channel C, then waveform data will be saved for that channel only.

See page 47 for the default parameter settings of the Easy Start setup.

Easy Start Setup 3

Automatic Report Settings

The following table list the reports that will be printed out based on the values that you entered into easy start. All reports will be printed out daily at mid-night.

Report	Monitoring Circuit Type			
	Single Phase	Split Phase	3 Phase Delta	3 Phase Wye
	V / V+I	V / V+I	V / V+I	V / V+I
Time Plot Ch A Vrms	X / X	X / X	X / X	X / X
Time Plot Ch B Vrms		X / X	X / X	X / X
Time Plot Ch C Vrms			X / X	X / X
Time Plot Ch D Vrms*	X / X	X / X	X / X	X / X
Time Plot Ch A Vtrans	X / X	X / X		
Time Plot Ch B Vtrans		X / X		
Time Plot Ch D Vtrans*	X / X	X / X	X / X	X / X
Time Plot Ch A Vthd	X / X	X	X	X
Time Plot Ch B Vthd		X	X	X
Time Plot Ch A Irms	X	X	X	X
Time Plot Ch B Irms		X	X	X
Time Plot Ch C Irms			X	X
Time Plot V Unbalance			X	X
Worst Case Events	X / X	X / X	X / X	X / X

Key

V: Only voltage monitoring is turned on.

V+I: Voltage and current monitoring is turned on.

*If neutral to ground monitoring is turned on.

3 Easy Start Setup

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Circuit Types & Predefined Setups 4

This chapter shows the various circuit type connections of voltage and current probes that are required when power measurements are to be made. It features the threshold and waveform capture settings for the ten setups on the PQPlus TASKCard that correspond to each circuit configuration.

Circuit Connection Diagrams, Phasor Diagrams, and the Predefined Setups Corresponding to Each Circuit Type

Circuit Types

The Dranetz-BMI PP1-PQPlus can monitor any of the following power configurations:

- Single phase, 2 wire
- Split phase, 3 wire
- 3 phase, 3 wire (delta)
- 3 phase, 4 wire (wye)

While monitoring any of the above configurations, the Power Platform can also be wired to monitor neutral to ground voltage and neutral current.

Phasor Diagrams

Each circuit type is followed by a diagram describing the voltage and current phasors (for resistive loads) for standard type of power connections. Phasor diagrams are graphic representations that show the magnitude and angular relationship of each phase of a monitored connection.

Predefined Setups

A setup is a list of parameter thresholds that controls the events that the PP1-PQPlus records. The PP1-PQPlus has 10 setups. Setups 1 through 9 are predefined but can be modified. Setup 10 is used for Easy Start and can not be modified, but can be copied and then modified.

In the next pages, circuit connection diagrams are displayed, followed by the voltage and current phasors, then the default settings of the predefined setups using a particular power connection type.

If you are making power measurements, follow these diagrams so that your ABC totals are calculated correctly. Follow all Warning advisory and Safety Precautions listed next page.

4 Circuit Types & Predefined Setups

WARNING!

To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. **DO NOT** fuse any ground connection. Fuses must be located as close to the load as possible to maximize protection.

WARNING!

For continued protection against risk of fire or shock hazard replace only with the same type and rating of recommended fuse. Use only fast blow type fuse which is rated 600 V. Recommended fuse type is Littelfuse, part number KLKDO.25 rated 600 V AC/DC, 0.25 A fast blow.

WARNING!

Do not replace fuse again if failure is repeated. Repeated failure indicates a defective condition that will not clear with replacement of the fuse. Refer condition to a qualified technician.

Safety Precautions

- Connect the green safety (earth) ground first, before making any other connections.
- When connecting to electric circuits or pulse initiating equipment, open their related breakers. **DO NOT** install any connection of the instrument on live power lines.
- Connections must be made to the instrument first, then connect to the circuit to be monitored.
- Wear proper Personal Protective Equipment, including safety glasses and insulated gloves when making connections to power circuits.
- Hands, shoes and floor must be dry when making any connection to a power line.
- Make sure the unit is turned OFF before connecting probes to the rear panel.
- Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

Legend for each Predefined Setup

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
Parameter Name	xxx	xxx	xxx	xxx	On/Off	On/Off

Ch A, B, C, D: The numeric value or Off

Wave: On means that waveform data will be captured for the triggered channel only.

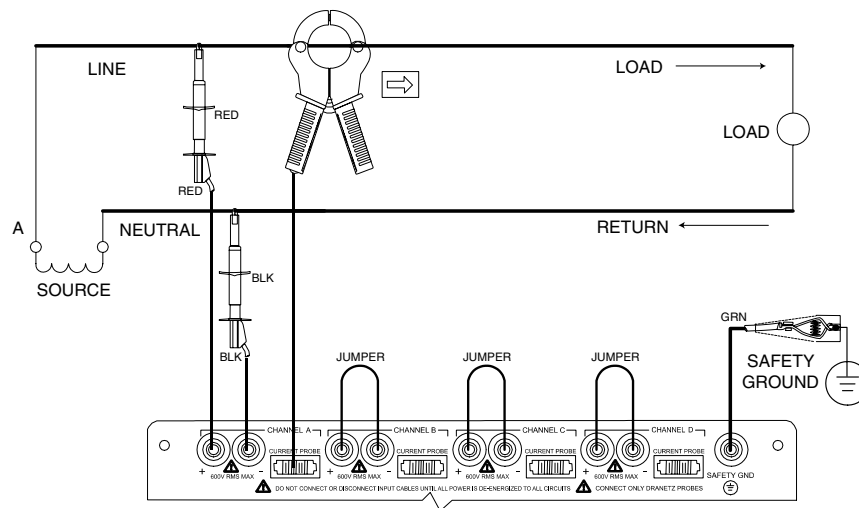
All Ch: On means that waveform data will be recorded for all channels.

Circuit Types & Predefined Setups 4

Single Phase

When making voltage connections to a single phase circuit use channel A differential inputs as shown below. Connect both terminals of channels B, C, and D together to prevent erroneous data. Channel D should be turned off if not used.

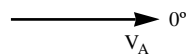
NOTE: Be sure to connect the current probe with the arrow on the handle pointing towards the load or an erroneous power reading will result.



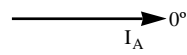
8600-6B

Single Phase

Voltage Phasor



Current Phasor



4 Circuit Types & Predefined Setups

Predefined Settings that correspond to the Single Phase configuration:

Setup #1: Single-Phase 120 Volt w/Neutral to Ground

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
V HIGH LIM	127.0	Off	Off	5.0	Off	Off
V LOW LIM	105.0	Off	Off	Off	Off	Off
V TRANSIENT	100.0	Off	Off	25.0	On	On
V THD%	5.0	Off	Off	Off	On	On
V FRQ HZ	5.0	Off	Off	Off	Off	Off
I HIGH RMS	Off	Off	Off	Off	Off	Off
I LOW RMS	Off	Off	Off	Off	Off	Off
I PEAK	Off	Off	Off	Off	Off	Off
I THD %	Off	Off	Off	Off	Off	Off
I TRANSIENT	Off	Off	Off	Off	Off	Off
WATTS HIGH LIM	Off	Off	Off	Off	Off	Off
VA HIGH LIM	Off	Off	Off	Off	Off	Off
VAR HIGH LIM	Off	Off	Off	Off	Off	Off
PF LOW LIM	Off	Off	Off	Off	Off	Off
V SENS OUT LIM	3.0	Off	Off	2.0	On	On
V SENS IN LIM	5.0	Off	Off	Off	Off	Off
I SENS OUT LIM	Off	Off	Off	Off	Off	Off
I SENS IN LIM	Off	Off	Off	Off	Off	Off
V TRANS % SENS	150.0	Off	Off	150.0	Off	Off
I TRANS % SENS	Off	Off	Off	Off	Off	Off
#3 V HARM %	5.0	Off	Off	Off	On	Off
#3 I HARM %	10.0	Off	Off	Off	On	Off

Setup #2: Single-Phase 208 Volt

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
V HIGH LIM	221.0	Off	Off	Off	Off	Off
V LOW LIM	181.0	Off	Off	Off	Off	Off
V TRANSIENT	150.0	Off	Off	Off	On	On
V THD%	5.0	Off	Off	Off	On	On
V FRQ HZ	0.5	Off	Off	Off	Off	Off
I HIGH RMS	Off	Off	Off	Off	Off	Off
I LOW RMS	Off	Off	Off	Off	Off	Off
I PEAK	Off	Off	Off	Off	Off	Off
I THD %	Off	Off	Off	Off	Off	Off
I TRANSIENT	Off	Off	Off	Off	Off	Off
WATTS HIGH LIM	Off	Off	Off	Off	Off	Off

(Continue next page)

Circuit Types & Predefined Setups 4

(Cont. - Setup #2: Single Phase 208 Volt)

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
VA HIGH LIM	Off	Off	Off	Off	Off	Off
VAR HIGH LIM	Off	Off	Off	Off	Off	Off
PF LOW LIM	Off	Off	Off	Off	Off	Off
V SENS OUT LIM	5.0	Off	Off	Off	Off	Off
V SENS IN LIM	5.0	Off	Off	Off	Off	Off
I SENS OUT LIM	Off	Off	Off	Off	Off	Off
I SENS IN LIM	Off	Off	Off	Off	Off	Off
V TRANS % SENS	150.0	Off	Off	Off	Off	Off
I TRANS % SENS	150.0	Off	Off	Off	Off	Off
#3 V HARM %	5.0	Off	Off	Off	On	Off
#3 I HARM %	10.0	Off	Off	Off	On	Off

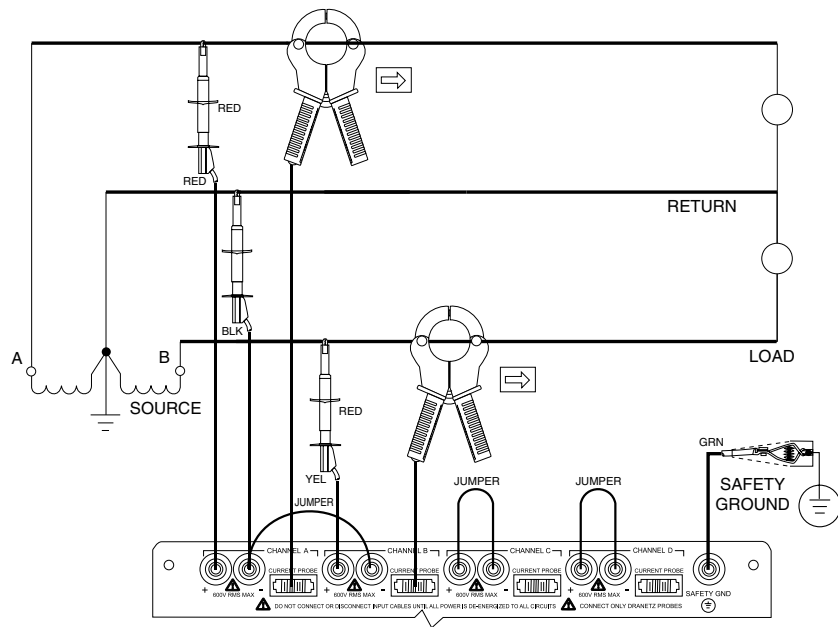
Setup #3: Single-Phase 220 Volt

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
V HIGH LIM	233.0	Off	Off	Off	Off	Off
V LOW LIM	192.0	Off	Off	Off	Off	Off
V TRANSIENT	200.0	Off	Off	Off	On	Off
V THD%	5.0	Off	Off	Off	On	Off
V FRQ HZ	0.5	Off	Off	Off	Off	Off
I HIGH RMS	Off	Off	Off	Off	Off	Off
I LOW RMS	Off	Off	Off	Off	Off	Off
I PEAK	Off	Off	Off	Off	Off	Off
I THD %	Off	Off	Off	Off	Off	Off
I TRANSIENT	Off	Off	Off	Off	Off	Off
WATTS HIGH LIM	Off	Off	Off	Off	Off	Off
VA HIGH LIM	Off	Off	Off	Off	Off	Off
VAR HIGH LIM	Off	Off	Off	Off	Off	Off
PF LOW LIM	Off	Off	Off	Off	Off	Off
V SENS OUT LIM	5.0	Off	Off	Off	Off	Off
V SENS IN LIM	5.0	Off	Off	Off	Off	Off
I SENS OUT LIM	Off	Off	Off	Off	Off	Off
I SENS IN LIM	Off	Off	Off	Off	Off	Off
V TRANS % SENS	150.0	Off	Off	Off	Off	Off
I TRANS % SENS	150.0	Off	Off	Off	Off	Off
#3 V HARM %	5.0	Off	Off	Off	On	Off
#3 I HARM %	10.0	Off	Off	Off	On	Off

4 Circuit Types & Predefined Setups

Split Phase

When making split phase measurements use both channels A and B for voltage and current connections. Connect both terminals of Channels C and D together to prevent erroneous data. The neutral is chosen as the reference for measurement purposes.

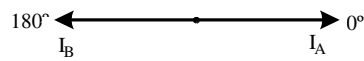
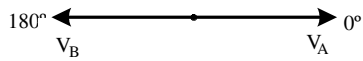


8600-7

Split Phase

Voltage Phasor

Current Phasor



Circuit Types & Predefined Setups 4

Predefined setting that correspond to the Split Phase configuration:

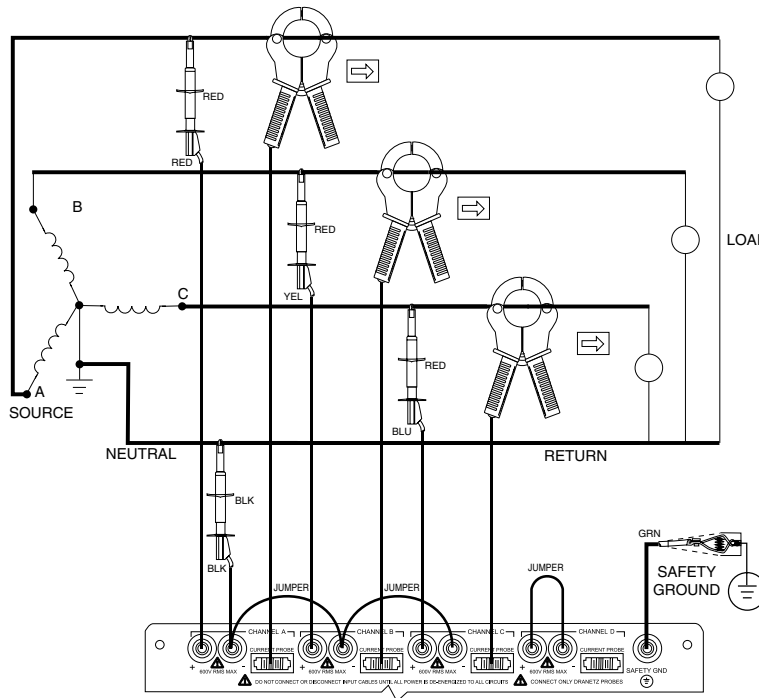
Setup #4: Split-Phase 120/240 Volt

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
V HIGH LIM	127.0	127	Off	Off	Off	Off
V LOW LIM	105.0	105	Off	Off	Off	Off
V TRANSIENT	100.0	100	Off	Off	On	Off
V THD%	5.0	005	Off	Off	On	Off
V FRQ HZ	0.5	00.5	Off	Off	Off	Off
I HIGH RMS	Off	Off	Off	Off	Off	Off
I LOW RMS	Off	Off	Off	Off	Off	Off
I PEAK	Off	Off	Off	Off	Off	Off
I THD %	Off	Off	Off	Off	Off	Off
I TRANSIENT	Off	Off	Off	Off	Off	Off
WATTS HIGH LIM	Off	Off	Off	Off	Off	Off
VA HIGH LIM	Off	Off	Off	Off	Off	Off
VAR HIGH LIM	Off	Off	Off	Off	Off	Off
PF LOW LIM	Off	Off	Off	Off	Off	Off
V SENS OUT LIM	3.0	3.0	Off	Off	Off	Off
V SENS IN LIM	5.0	5.0	Off	Off	Off	Off
I SENS OUT LIM	Off	Off	Off	Off	Off	Off
I SENS IN LIM	Off	Off	Off	Off	Off	Off
V TRANS % SENS	150.0	150.0	Off	Off	Off	Off
I TRANS % SENS	150.0	150.0	Off	Off	Off	Off
#3 V HARM %	5.0	5.0	Off	Off	On	Off
#3 I HARM %	10.0	10.0	Off	Off	On	Off

4 Circuit Types & Predefined Setups

Four Wire Wye

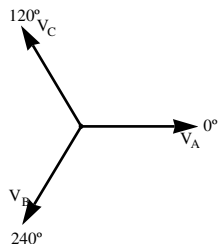
Channels A, B, and C are connected to voltage and current probes. The neutral is connected to common and is the reference for the three channels. Connect both terminals of Channel D together to prevent erroneous data.



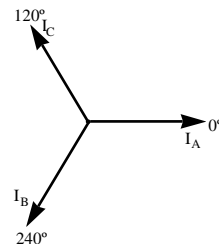
8600-12

Four Wire Wye

Voltage Phasor



Current Phasor



Circuit Types & Predefined Setups 4

Predefined settings that correspond to the Four Wire Wye configuration:

Setup #5: 3-Phase Wye 120 Volt

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
V HIGH LIM	127.0	127.0	127.0	5.0	Off	Off
V LOW LIM	105.0	105.0	105.0	0.0	Off	Off
V TRANSIENT	100.0	100.0	100.0	25.0	On	On
V THD%	5.0	5.0	5.0	Off	On	On
V FRQ HZ	0.5	0.5	0.5	Off	Off	Off
I HIGH RMS	Off	Off	Off	Off	Off	Off
I LOW RMS	Off	Off	Off	Off	Off	Off
I PEAK	Off	Off	Off	Off	Off	Off
I THD %	010	010	010	Off	On	Off
I TRANSIENT	Off	Off	Off	Off	Off	Off
WATTS HIGH LIM	Off	Off	Off	Off	Off	Off
VA HIGH LIM	Off	Off	Off	Off	Off	Off
VAR HIGH LIM	Off	Off	Off	Off	Off	Off
PF LOW LIM	0.8	0.8	0.80	Off	Off	Off
V SENS OUT LIM	5.0	5.0	5.0	2.0	Off	Off
V SENS IN LIM	5.0	5.0	5.0	Off	Off	Off
I SENS OUT LIM	Off	Off	Off	Off	Off	Off
I SENS IN LIM	Off	Off	Off	Off	Off	Off
V TRANS % SENS	150.0	150.0	150.0	150.0	Off	Off
I TRANS % SENS	150.0	150.0	150.0	150.0	Off	Off
#3 V HARM %	5.0	5.0	5.0	Off	On	On
#3 I HARM %	10.0	10.0	10.0	Off	On	Off

Setup #6: 3-Phase Wye 120 Volt w/CT-10

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
V HIGH LIM	127.0	127.0.0	127	5.0	Off	Off
V LOW LIM	105.0	105.0	105.0	0.0	Off	Off
V TRANSIENT	100.0.0	100	100.0	25.0	On	On
V THD%	5.0	5.0	5.0	Off	On	On
V FRQ HZ	0.5	0.5	0.5	Off	Off	Off
I HIGH RMS	5.0	5.0	5.0	5.0	Off	Off
I LOW RMS	0.0	0.0	0.0	0.0	Off	Off
I PEAK	7.0	7.0	7.0	7.0	On	Off
I THD %	10.0	10.0	10.0	Off	On	Off
I TRANSIENT	10.0	10.0	10.0	10.0	On	Off
WATTS HIGH LIM	Off	Off	Off	Off	Off	Off

(Continue next page)

4 Circuit Types & Predefined Setups

(Cont. - Setup #6: 3-Phase Wye 120 Volt w/CT-10)

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
VA HIGH LIM	Off	Off	Off	Off	Off	Off
VAR HIGH LIM	Off	Off	Off	Off	Off	Off
PF LOW LIM	0.8	0.8	0.8	Off	Off	Off
V SENS OUT LIM	5.0	5.0	5.0	2.0	Off	Off
V SENS IN LIM	5.0	5.0	5.0	Off	Off	Off
I SENS OUT LIM	0.5	0.5	0.5	0.5	Off	Off
I SENS IN LIM	1.0	1.0	1.0	1.0	Off	Off
V TRANS % SENS	150.0	150.0	150.0	150.0	Off	Off
I TRANS % SENS	150.0	150.0	150.0	150.0	Off	Off
#3 V HARM %	5.0	5.0	5.0	Off	On	On
#3 I HARM %	10.0	10.0	10.0	Off	On	Off

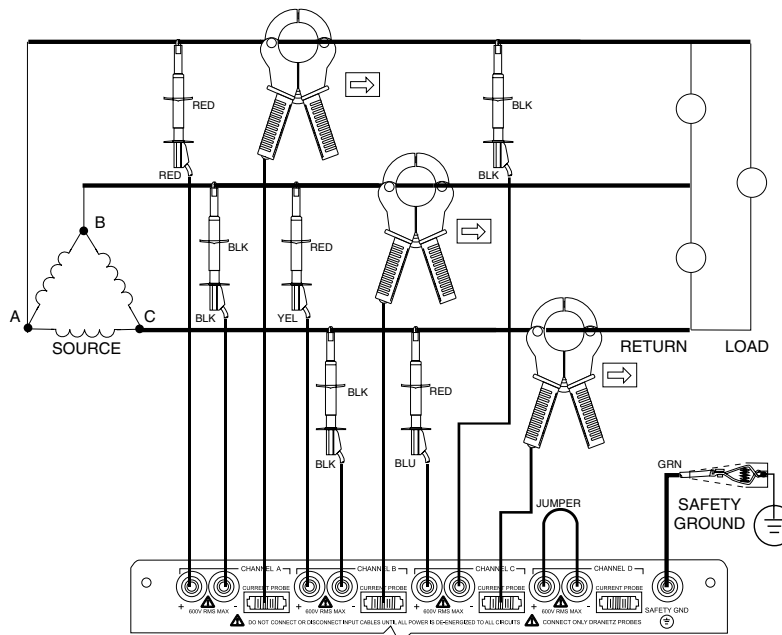
Setup #7: 3-Phase Wye 277 Volt

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
V HIGH LIM	304.0	304.0	304.0	5.0	Off	Off
V LOW LIM	250.0	250.0	250.0	0.0	Off	Off
V TRANSIENT	250.0	250.0	250.0	25.0	On	On
V THD%	5.0	5.0	5.0	Off	On	On
V FRQ HZ	0.5	0.5	0.5	Off	Off	Off
I HIGH RMS	Off	Off	Off	Off	Off	Off
I LOW RMS	Off	Off	Off	Off	Off	Off
I PEAK	Off	Off	Off	Off	Off	Off
I THD %	10.0	10.0	10.0	Off	On	Off
I TRANSIENT	Off	Off	Off	Off	Off	Off
WATTS HIGH LIM	Off	Off	Off	Off	Off	Off
VA HIGH LIM	Off	Off	Off	Off	Off	Off
VAR HIGH LIM	Off	Off	Off	Off	Off	Off
PF LOW LIM	0.8	0.8	0.8	Off	Off	Off
V SENS OUT LIM	5.0	5.0	5.0	2.0	Off	Off
V SENS IN LIM	5.0	5.0	5.0	Off	Off	Off
I SENS OUT LIM	Off	Off	Off	Off	Off	Off
I SENS IN LIM	Off	Off	Off	Off	Off	Off
V TRANS % SENS	150.0	150.0	150.0	150.0	Off	Off
I TRANS % SENS	150.0	150.0	150.0	150.0	Off	Off
#3 V HARM %	5.0	5.0	5.0	Off	On	On
#3 I HARM %	10.0	10.0	10.0	Off	On	Off

Circuit Types & Predefined Setups 4

Floating Delta

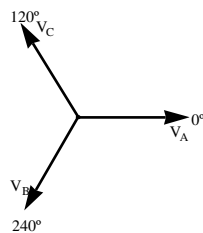
In this power connection, the PP1-PQPlus uses voltage channels A, B, and C as differential inputs with channel A using source voltage A-B, channel B using B-C, and channel C using C-A as the reference. Current probes are connected to channels A, B, and C. Connect both terminals of Channel D together to prevent erroneous data.



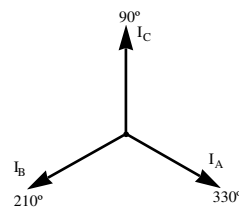
8600-9

Floating Delta

Voltage Phasor



Current Phasor



4 Circuit Types & Predefined Setups

Predefined settings that correspond to the Floating Delta configuration:

Setup #8: 3-Phase Delta 240 Volt

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
V HIGH LIM	264.0	264.0	264.0	Off	Off	Off
V LOW LIM	216.0	216.0	216.0	Off	Off	Off
V TRANSIENT	200.0	200.0	200.0	Off	On	On
V THD%	5.0	5.0	5.0	Off	On	On
V FRQ HZ	0.5	0.5	0.5	Off	Off	Off
I HIGH RMS	Off	Off	Off	Off	Off	Off
I LOW RMS	Off	Off	Off	Off	Off	Off
I PEAK	Off	Off	Off	Off	Off	Off
I THD %	010	010	010	Off	On	Off
I TRANSIENT	Off	Off	Off	Off	Off	Off
WATTS HIGH LIM	Off	Off	Off	Off	Off	Off
VA HIGH LIM	Off	Off	Off	Off	Off	Off
VAR HIGH LIM	Off	Off	Off	Off	Off	Off
PF LOW LIM	Off	0.80	0.80	Off	Off	Off
V SENS OUT LIM	5.0	5.0	5.0	Off	Off	Off
V SENS IN LIM	10.0	10.0	10.0	Off	Off	Off
I SENS OUT LIM	Off	Off	Off	Off	Off	Off
I SENS IN LIM	Off	Off	Off	Off	Off	Off
V TRANS % SENS	150.0	150.0	150.0	Off	Off	Off
I TRANS % SENS	150.0	150.0	150.0	Off	Off	Off
#3 V HARM %	5.0	5.0	5.00	Off	On	On
#3 I HARM %	10.0	10.0	10.0	Off	On	Off

Setup #9: 3-Phase Delta 480 Volt

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
V HIGH LIM	528.0	528.0	528.0	Off	Off	Off
V LOW LIM	432.0	432.0	432.0	Off	Off	Off
V TRANSIENT	400.0	400.0	400.0	Off	On	On
V THD%	5.0	5.0	5.0	Off	On	On
V FRQ HZ	0.5	0.5	0.5	Off	Off	Off
I HIGH RMS	Off	Off	Off	Off	Off	Off
I LOW RMS	Off	Off	Off	Off	Off	Off
I PEAK	Off	Off	Off	Off	Off	Off
I THD %	10.0	0.0	10.0	Off	On	Off
I TRANSIENT	Off	Off	Off	Off	Off	Off
WATTS HIGH LIM	Off	Off	Off	Off	Off	Off

(Continue next page)

Circuit Types & Predefined Setups 4

(Cont. - Setup #9: 3-Phase Delta 480 Volt)

Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
VA HIGH LIM	Off	Off	Off	Off	Off	Off
VAR HIGH LIM	Off	Off	Off	Off	Off	Off
PF LOW LIM	Off	0.8	0.8	Off	Off	Off
V SENS OUT LIM	10.0	10.0	10.0	Off	Off	Off
V SENS IN LIM	20.0	20.0	20.0	Off	Off	Off
I SENS OUT LIM	Off	Off	Off	Off	Off	Off
I SENS IN LIM	Off	Off	Off	Off	Off	Off
V TRANS % SENS	150.0	150.0	150.0	Off	Off	Off
I TRANS % SENS	150.0	150.0	150.0	Off	Off	Off
#3 V HARM %	5.0	5.0	5.0	Off	On	On
#3 I HARM %	10.0	10.0	10.0	Off	On	Off

Default Parameter Settings for Easy Start

Setup #10: Easy Start

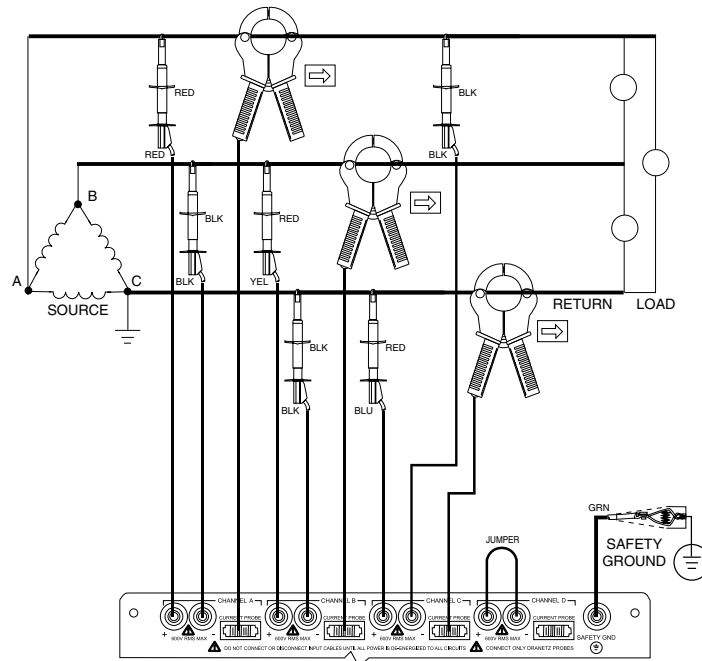
Parameter	Ch A	Ch B	Ch C	Ch D	Wave	All Ch
V HIGH LIM	132.0	132.0	132.0	Off	Off	Off
V LOW LIM	108.0	108.0	108.0	Off	On	On
V TRANSIENT	180.0	180.0	180.0	Off	On	On
V THD%	10.0	10.0	10.0	Off	On	Off
V FRQ HZ	2.0	2.0	2.0	Off	Off	Off
I HIGH RMS	33.0	33.0	33.0	Off	Off	Off
I LOW RMS	Off	Off	Off	Off	Off	Off
I PEAK	Off	Off	Off	Off	Off	Off
I THD %	Off	Off	Off	Off	Off	Off
I TRANSIENT	Off	Off	Off	Off	Off	Off
WATTS HIGH LIM	Off	Off	Off	Off	Off	Off
VA HIGH LIM	Off	Off	Off	Off	Off	Off
VAR HIGH LIM	Off	Off	Off	Off	Off	Off
PF LOW LIM	Off	Off	Off	Off	Off	Off
V SENS OUT LIM	Off	Off	Off	Off	Off	Off
V SENS IN LIM	Off	Off	Off	Off	Off	Off
I SENS OUT LIM	Off	Off	Off	Off	Off	Off
I SENS IN LIM	Off	Off	Off	Off	Off	Off
V TRANS % SENS	150.0	150.0	150.0	Off	Off	Off
I TRANS % SENS	150.0	150.0	150.0	Off	Off	Off
#3 V HARM %	Off	Off	Off	Off	On	Off
#3 I HARM %	Off	Off	Off	Off	On	Off

Default settings are set at $\pm 10\%$ of 120 Vac and $+10\%$ of 30 Arms.

4 Circuit Types & Predefined Setups

Delta, One Leg Grounded

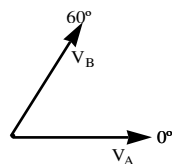
In this power connection, the PP1-PQPlus uses voltage channels A, B, and C as differential inputs with channel A using source voltage A-B, channel B using B-C, and channel C using C-A as the reference. Current probes are connected to channels A, B, and C. Connect both terminals of Channel D together to prevent erroneous data.



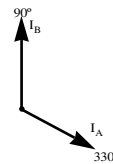
8600-8

Delta, One Leg Grounded

Voltage Phasor



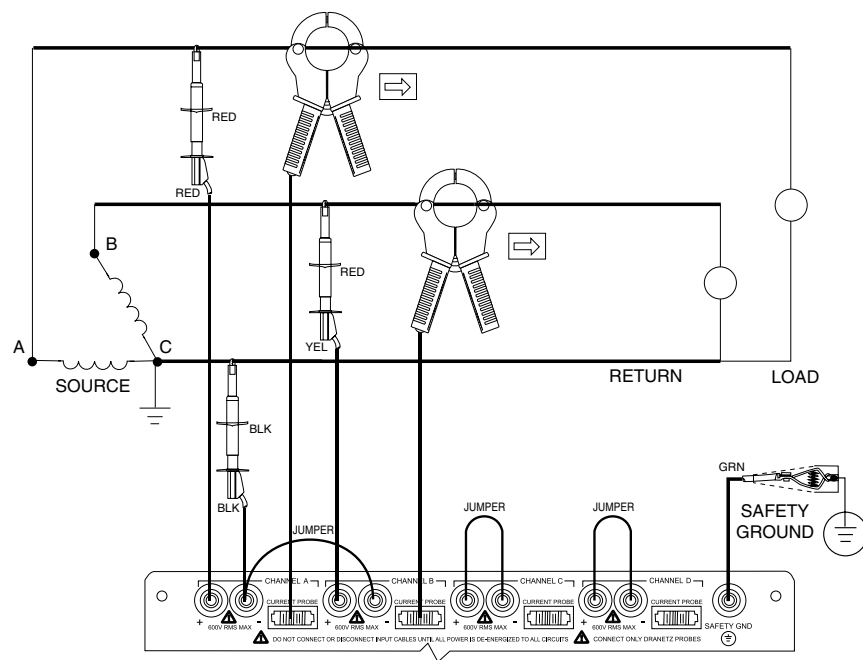
Current Phasor



Circuit Types & Predefined Setups 4

Open Leg Delta

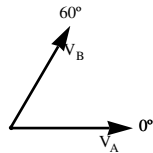
The figure below shows the open leg delta with phase A-C connected to channel A and phase B-C connected to channel B. A jumper connects the A- and B- terminal. Current probes are connected to channels A and B.



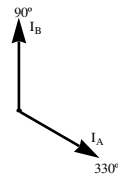
8600-10

Open Leg Delta

Voltage Phasor



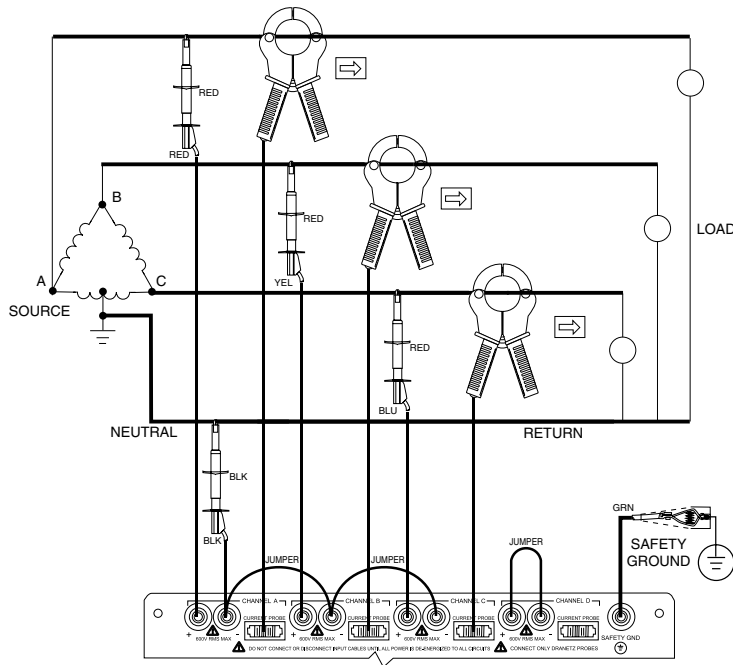
Current Phasor



4 Circuit Types & Predefined Setups

High-Leg Delta

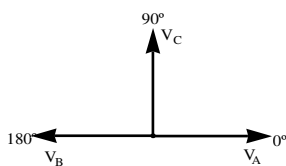
The 4-wire delta connected 120/240V source shown in the figure on the next page is connected with one phase connected to ground at mid-point. This phase provides 120V at phases A and C to ground. Phase B is designated the high-leg connection and is measured at 208V ($120V \times 1.73 = 208V$) to ground. The National Electrical Code (NEC 215-8) identifies the high-leg phase as the Orange colored line.



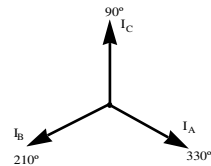
8600-11

High-Leg Delta

Voltage Phasor



Current Phasor



Circuit Types & Predefined Setups 4

Selecting a Circuit Type

You must select a circuit type when you are collecting data for power parameters such as watts, VAs, and VARs. If you do not select the proper circuit type, the ABC totals will not be calculated correctly.

How to display the Wiring Configuration screen to select your circuit type

1. Select item #3, Setup Menu, from the Main Menu.
2. Select item #1, Set Thresholds/Channel Config., from the Setup Menu. The Input Channel Configuration screen is displayed.
3. Press the ABC TOTALS key.

The following screen will appear

```
Jan-27-94  MONITORING OFF  09:51:48
WIRING CONFIGURATION & SCALE FACTORS
CONFIG. FOR ABC TOTALS: SINGLE PHASE
SCALE FACTOR: CHN  VOLTS  AMPS
                A   1.0000  1.0000
                B   1.0000  1.0000
                C   1.0000  1.0000
                LOW D  1.0000  1.0000
FREQ SYNC (Press 1 to change): EXTERNAL

ABC  NEXT  ENTER
CONF  CHAN  SCALE  PRINT  EXIT
```

4. Determine the circuit type that the Power Platform is connected to according to the diagrams in this chapter.
5. Press the ABC CONFIG key until the correct ABC configuration is displayed according to the following table:

<i>IF the Power Platform is connected to this circuit type...</i>	<i>THEN select this ABC config...</i>
Single Phase	Single Phase
Split Phase	Split Phase
Four Wire Wye	3 Phase Wye
Floating Delta	3 Phase Delta
Delta, One Leg Grounded	3 Phase Delta
Open Leg Delta	Split Phase
High-Leg Delta	3 Phase Wye

6. Press the EXIT key.

4 Circuit Types & Predefined Setups

Verifying Voltage and Current Connections

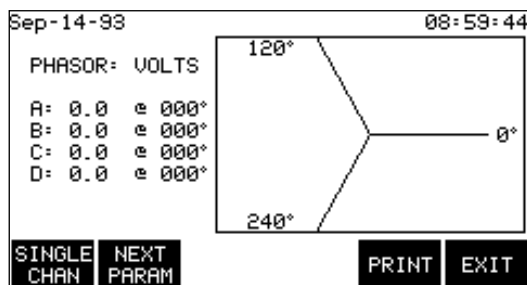
Correct voltage and current connection of single phase, split phase, or polyphase connections can be verified using phasor diagrams. Phasor diagrams are graphic representations that show the magnitude and angular relationship of each phase of a monitored connection.

Follow these steps to display the Voltage and Current Phasor screen.

1. From Main Menu, select item 2, Scope Mode.
2. From Scope Mode, press METER MODE.
3. From Meter Mode Menu, select item 4, Voltage and Current Phasors.

NOTE: The following screen will appear if no voltage inputs are connected.

See next page for actual inputs.



Single phase

A single phase voltage or current phasor is displayed as a single line showing a channel reference at 0 degrees and a magnitude relative to its measured value. An arrowhead on the line indicates direction.

Split phase

Split phase vectors are displayed as dual lines showing channel references and magnitudes and opposite (180 degrees) directions.

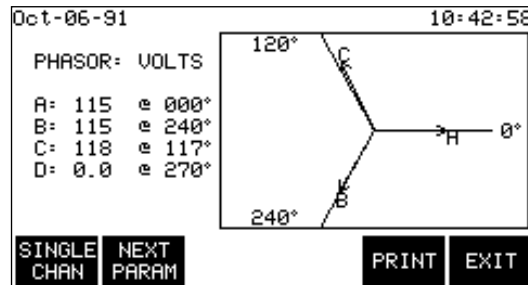
Three phase

Three phase vectors are displayed as three lines, 120 degrees apart in a resistive load (unity power factor). Phase displacement will occur in a reactive load.

Circuit Types & Predefined Setups 4

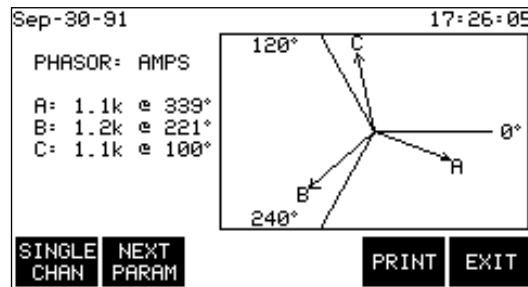
Correct 3-phase voltage phasor connections

The voltage phasor display shown below is for a three phase, 4 wire wye connection.



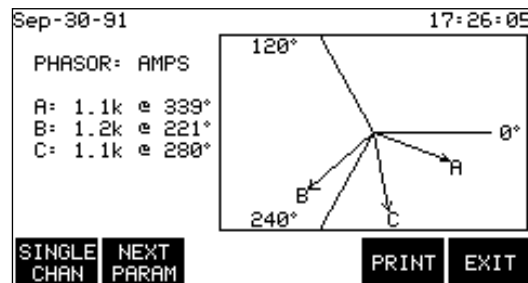
Correct 3-phase current phasor connections

The current phasor display shown below is for a three phase, 4 wire wye connection.



Incorrect 3-phase current phasor connections

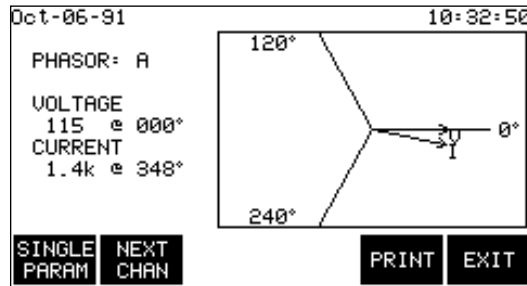
The following phasor display shows an incorrect current probe connection. The phasor for channel C is 180° out of phase. This can be corrected by connecting the probe so that the arrow on the probe handle points toward the load.



4 Circuit Types & Predefined Setups

Single channel phasor diagram

The following display shows the voltage and current phasors for channel A.



Selecting and Activating a Setup

The following procedure is for selecting and activating a setup only. A setup can be selected from one of nine predefined setups. Setup number 10, Easy Start, can be viewed only. Screens show data related to the default setups.

How to display the Setup screen

1. Select item 3, Setup Menu, from the Main Menu.
2. Select item 1, Set Thresholds/Channel Config., from the Setup Menu.

Result: The following screen appears.

Sep-14-93 09:16:12

INPUT CHANNEL CONFIGURATION

CHAN	VOLTS	AMPS
A	ON	ON
B	ON	ON
C	ON	ON
D	LOW	ON

NEXT VOLTS AMPS SCALE ABC NEXT
CHAN ON/OFF ON/OFF FACTOR TOTALS SCREEN

3. Set Volts and Amps to ON for all channels. For channel D set Volts to Low.

(Continue next page)

Circuit Types & Predefined Setups 4

(Cont. - How to display the Setup screen)

4. Press the NEXT SCREEN key.

Result: The following default sample screen will appear. If a setup screen other than setup #1 is displayed, then it is the last setup activated.

Mar-21-95					11:56:46
SETUP # 1: SINGLE-PHASE 120 VOLT W/N-G					
THRESHOLD	CH. A	CH. B	CH. C	CH. D	
V HI LIM	127.0	XXX	XXX	5.0	
V LO LIM	105.0	XXX	XXX	XXX	
V TRANS	100.0	XXX	XXX	25.0	
V THD %	5.0	XXX	XXX	XXX	
V FREQ HZ	0.5	XXX	XXX	XXX	
NEXT SETUP	NEXT GROUP	PREV GROUP	EDIT SETUP	PRINT SETUP	ACTI- VATE

How to display and activate a Setup

1. Press NEXT SETUP to display the next numbered setup (1 to 9).
2. Press NEXT GROUP to display the next group of parameters in the setup presently displayed.
3. Repeat steps 1 and 2 until the desired setup is displayed.
4. Press ACTIVATE to activate the setup presently displayed.

Result: Messages at the top of the screen will be displayed in the following sequence:

Monitoring off
Sync Acquired, Ch A
Monitoring on.

Then the screen will return to the Setup Menu.

Activated screen reference

To determine which setup is active at any time, select the View Status screen from the Main Menu.

4 Circuit Types & Predefined Setups

Editing Parameter Thresholds

If one of the predefined setups is similar to what you want, you should view that setup and edit only the threshold settings for the parameters that you want to change. You can then edit some or all of the threshold settings.

Parameter thresholds can be edited in two ways: three phase or individual channel. Both screens are identical except that the three phase screen allows you to enter the same value for channels A, B, and C only once.

Threshold list

The table next page lists the threshold parameters, their symbolic units, allowable range for each, the message that appears when an event occurs, and the description when an event occurs.

Triggerable Parameters for Power Platform Series

PARAMETER	UNITS	RANGE	EVENT MESSAGE	DESCRIPTION (Event Occurs When:)
Voltage Hi Limit	Volts rms	1 to 9,999,000	V HI LIM	Measured rms value crosses this limit
Voltage Low Limit	Volts rms	0.1 to 9,999,000	V LO LIM	Measured rms value crosses this limit
Voltage Transient	Volts Peak	5 to 9,999,000	V TRANS	Measured rms value crosses this limit (+ or - high frequency)
Voltage THD	%	0.5 to 1000	V THD LIMIT	Calculated voltage THD crosses this limit
Frequency Sensitivity	Hz	0.1 to 450	V FREQ SENS	Avg over 20 cycles-the measured frequency changes by this amount (+ or -)
Current Hi Limit	Amps rms	0.1 to 9,999,000	I HI LIM	Measured rms value crosses this limit
Current Low Limit	Amps rms	0.1 to 9,999,000	I LO LIM	Measured rms value crosses this limit
Current Peak	Amps peak	0.1 to 9,999,000	I PEAK	Largest most low frequency sample crosses this limit (+ or -)
Current THD	%	0.5 to 1000	I THD LIMIT	Calculated current THD crosses this limit
Current Transient	Amps peak	0.1 to 9,999,000	I TRANS	Measured peak value crosses this limit (+ or - high frequency)
Watts Hi Limit	Watts	0.1 to 9,999,000	WATTS LIM	Calculated value crosses this limit
VA Hi Limit	Volt-Amps	0.1 to 9,999,000	VA LIM	Calculated value crosses this limit
VAR Hi Limit	Volt-Amps Reactive	0.1 to 9,999,000	VAR LIM	Calculated value crosses this limit
Power Factor Low Limit	None	0.1 to 1.0	PF LO LIM	Calculated value crosses this limit
Volt Sensitivity Out Of Limits	Volts rms	0.5 to 9,999,000	V SENS OUT	Measured value changes by this amount while outside the hi and lo limits
Volt Sensitivity In Limits	Volts rms	0.5 to 9,999,000	V SENS IN	Measured value changes by this amount while inside the hi and lo limits
Current Sensitivity Out Of Limits	Amps rms	0.1 to 9,999,000	I SENS OUT	Measured value changes by this amount while outside the hi and lo limits
Current Sensitivity In Limits	Amps rms	0.1 to 9,999,000	I SENS IN	Measured value changes by this amount while inside the hi and lo limits
Voltage Transient Smart Threshold	%	1 to 9,999,000	V TRANS%	Voltage transient threshold was crossed 10 consecutive cycles. Threshold is adjusted up by this % and will adjust back down when signal clears up
Current Transient Smart Threshold	%	1 to 9,999,000	I TRANS%	Current transient threshold was crossed 10 consecutive cycles. Threshold is adjusted up by this % and will adjust back down when signal clears up
nTH Voltage Harmonic	%	0.1 to 1000	nTH V HARM%	User selected voltage harmonic crosses this limit
nTH Current Harmonic	%	0.1 to 1000	nTH I HARM%	User selected voltage harmonic crosses this limit

4 Circuit Types & Predefined Setups

How to modify either three phase or individual channel thresholds

1. Display your desired setup (see page 55).
2. Press EDIT SETUP.

Result: The following screen will appear.

```
Jan-21-94 15:07:51
EDIT SETUPS MENU
SETUP # 1: SINGLE-PHASE 120 VOLT W/N-G
1. SET IDENTICAL 3-PHASE THRESHOLDS
2. SET INDIVIDUAL CHANNELS THRESHOLDS
3. SELECT WAVEFORM CAPTURE
4. COPY EASY START THRESHOLDS TO #9
EXIT
```

3. Select item 1 or 2.

To set identical three phase thresholds screen -

Select item 1, and the following screen will appear.

```
Sep-24-93 17:43:34
SETUP # 1: SINGLE-PHASE 120 VOLT W/N-G
THRESHOLD CH.A CH.B CH.C CH.D
V HI LIM 128.0 128.0 128.0 128.0
V LO LIM 108.0 108.0 108.0 108.0
V TRANS 2.0K 2.0K 2.0K 2.0K
V THD % 100.0 100.0 100.0 100.0
V FREQ HZ 0.5 0.5 0.5 0.5
NEXT NEXT ON/OFF ENTER EDIT
LIMIT GROUP PARAM. VALUE NAME EXIT
```

To set individual channel thresholds screen -

Select item 2, and the following screen will appear.

```
Sep-29-93 17:06:44
SETUP # 1: SINGLE-PHASE 120 VOLT W/N-G
THRESHOLD CH.A CH.B CH.C CH.D
V HI LIM 128.0 128.0 128.0 128.0
V LO LIM 108.0 108.0 108.0 108.0
V TRANS 2.0K 2.0K 2.0K 2.0K
V THD % 100.0 100.0 100.0 100.0
V FREQ HZ 0.5 0.5 0.5 0.5
NEXT NEXT ON/OFF ENTER EDIT
LIMIT GROUP PARAM. VALUE NAME EXIT
```


Circuit Types & Predefined Setups 4

How to change a threshold setting

1. Press the NEXT LIMIT key to move the highlight bar to the desired parameter and channel.
2. Press ENTER VALUE.

The menu bar will change to the following.



3. Enter the number from the keypad. The number for the highlighted parameter must be within the range shown on page 57.
4. Press ENTER.

NOTE: Hi Lim must be set to a value that is greater than Lo Lim.

How to disable a parameter

1. Press the NEXT LIMIT key to move the highlight bar to the desired parameter and channel.
2. Press ON/OFF PARAM to toggle parameter on or off. Off indicated by xxx.
Result: The string XXX will be displayed for that parameter.

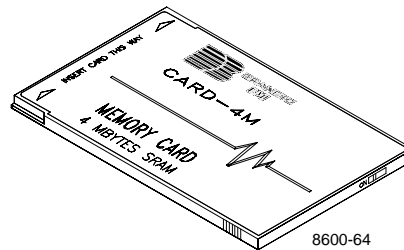
4 Circuit Types & Predefined Setups

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Memory Card Operations 5

A memory (data) card is used with the Power Platform to provide a removable, rugged, compact, solid state mass storage device. A memory card, shown below, uses low power, has an internal battery for data retention, and is available as an optional accessory in sizes from 512 Kbytes to 4 Mbytes.

The PP1-PQPlus treats the memory card like a floppy disk storing files in a DOS format. In the PP1-PQPlus, the memory cards are used to store events and setups.



Entering a Site/File Name

This function allows you to enter a site name of up to 20 characters. The site name appears on printouts. The site name is also used for file names on the memory card.

NOTE: NEVER change the site name after enabling auto-transfer. You will not collect data.

How to Enter a Site/File Name

1. Select item #3, Setup Menu, from the Main Menu.
2. Select item #2, Set Analyzer Parameters, from the Setup Menu.
3. Select item #1, Set Site/File Name, from the Set Analyzer Parameters Menu.

Result: The following screen will appear.

```
Jan-20-94 13:29:23
ENTER SITE/FILE NAME
PRESENT SITE/FILE NAME:
POWER PLATFORM
NOTE: THE FIRST 8 CHARACTERS OF THIS
NAME WILL BE USED TO NAME FILES
STORED ON THE MEMORY CARD.
[ENTER NAME] [EXIT]
```

(Continue next page)

5 Memory Card Operations

(Cont. - Enter Site/File Name screen)

4. Press the ENTER NAME key.

Result: The following screen will appear.



5. Highlight a desired letter or symbol using the arrow keys, then press ENTER.

6. Numbers are entered directly from keypad.

7. Repeat steps 5 and 6 until the entire name has been entered. Characters limited to 20.

8. Use the Backspace command to delete characters. Enter numbers from the keypad.

Setting Memory Storage Mode

The memory storage mode affects how events are saved to internal memory. There are two settings: 'Fill and Stop' and 'Overwrite'.

Fill and Stop mode

When in Fill and Stop mode, the PP1-PQPlus saves events until memory is full, then stops saving new events. All events in memory will be preserved.

Overwrite mode

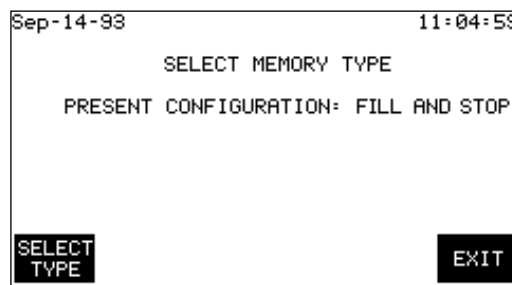
When in Overwrite mode, the PP1-PQPlus will save events normally until memory is full. After that, the PP1-PQPlus will replace the oldest events in memory with new events. This mode sacrifices old data in order to continuously save the most recent events.

Memory Card Operations 5

How to Change the Memory Storage Mode setting

1. From the Main Menu, select item #3, Setup Menu.
2. From the Setup Menu, select item #7, Memory Functions.
3. From the Memory Functions menu, select item #4, Set Memory Storage Mode.

Result: The following screen will appear.



4. Press NEXT MODE to change present configuration to Overwrite.
5. Press EXIT to enable Overwrite configuration and return to Memory Function screen.

Setting Auto-transfer to Memory Card

The auto-transfer function allows you to set the PP1 to automatically copy events from internal memory to a file on a memory (data) card. This allows you to take advantage of the larger storage capacity of a memory card (for 1 Mbyte or larger cards).

Settings: There are two auto-transfer settings: 'Update Continuously' (enabled) and 'Do Not Auto-transfer' (disabled).

NOTE: To fully take advantage of the auto-transfer function, the memory storage mode should be set to Overwrite. See previous page about this setting.

Update Continuously

When the auto-transfer mode is set to Update Continuously, the PP1-PQPlus will continuously store new event data to the memory card as well as to internal memory.

Do Not Auto-transfer

When the auto-transfer mode is set to Do Not Auto-transfer, events will be saved to internal memory only.

5 Memory Card Operations

Auto-transfer file

Size: The file will be as large as the available free space on the memory card.

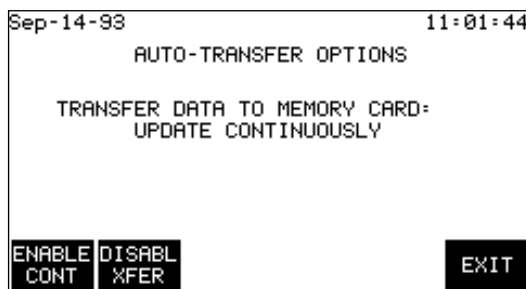
Filename: The filename for the auto-transfer file is filename.mdb. Where filename is the first eight characters of the Site/File Name. See pages 61-62.

Overwrite mode: When the memory storage mode is set to Overwrite, the auto-transfer file will also Overwrite, independently of internal memory.

How to Change the Auto-transfer setting

1. From the Main Menu, select item #3, Setup Menu.
2. From the Setup Menu, select item #7, Memory Functions.
3. From the Memory Functions menu, select item #2, Auto-transfer Options.

Result: The following screen will appear.



4. Press ENABLE CONT or DISABLE XFER to change the auto-transfer mode.
5. Press EXIT to enable auto-transfer.

NOTE 1: NEVER change the site name after enabling auto-transfer. You will not collect data.

NOTE 2: When auto-transfer is enabled, events in memory will immediately be transferred to the memory card and the message "Auto-Transfer in Progress. Please Wait." will be displayed. The DATA CARD indicator will light when data is being transferred to the memory (data) card.

List of Accessories

Standard Accessories

The following table lists the Power Platform's Standard Accessories

<u>Part Number</u>	<u>Description</u>
OM-PP1-TASK-PQPLUS	Operator's Manual
TASKCard PQPLUS-E*	PQPlus TASKCard, English Only
TASKCard PQPLUS-F*	PQPlus TASKCard, French and English
TASKCard PQPLUS-S*	PQPlus TASKCard, Spanish and English
115815-G1*	Measurement Cable Set (Domestic)
115815-G2*	Measurement Cable Set (Euro)
115815-G3*	Measurement Cable Set (UK)
115323-G1	Thermal Paper (4 rolls)
113218-G3	Terminal Block, 6 pin
113218-G4	Terminal Block, 8 pin
107506	Connector Plug, Battery
115520-G1	Wire Marker Kit
115240-G1	Shipping Carton
115818-G1	TASKCard Cover
107539-G13	TASKCard Cover Screw, Philips Head, 4-40 x 1/4" long. Two used.

* User specified, one standard only.

Optional Accessories

The following table lists the Power Platform's Optional Accessories.

<u>Part Number</u>	<u>Description</u>
TASKCard PQPLUS-E	PQPlus TASKCard, English Only
TASKCard PQPLUS-F	PQPlus TASKCard, French and English
TASKCard PQPLUS-S	PQPlus TASKCard, Spanish and English
TASKCard-8000	8000, TASKCard
TASKCard-Inrush	Inrush, TASKCard
PCPP1	Communications and Analysis Software
HB114415	Field Handbook for Electrical Energy Management
SM-PP1	Service Manual

(Continue next page)

List of Accessories

(Cont. - Optional Accessories)

<u>Part Number</u>	<u>Description</u>
CT-10	Clamp-on Current Probe, 1 to 10 A
CT-150	Clamp-on Current Probe, 15 to 150 A
CT-300	Clamp-on Current Probe, 30 to 300 A
CT-1000	Clamp-on Current Probe, 100 to 1000 A
CT-3000	Clamp-on Current Probe, 300 to 3000 A
ISO-1A	Isolated Current Transformer Box, 1A
ISO-5	Isolated Current Transformer Box, 5A
MCR-R, 115389-G1	Memory Card Reader, Serial Port
	Memory Card Reader, Serial Port, 230 V
MCR-P, 115390-G1	Memory Card Reader, Parallel Port
	Memory Card Reader, Parallel Port, 230 V
MCR-B, 115752-G1	Memory Card Reader, Data Bus Plug-in
Card-2M	Memory Card, 2M
Card-4M	Memory Card, 4M
CTP-16	Box of Thermal Paper (16 rolls)
XBF-12	External DC Battery Filter
	External Battery Charger
XMC-8	External Modem Interface Cable
RSCOM	RS-232 Cables, 25-pin M to 25-pin F, and a 25-pin M to 9-pin F adapter cable
SCC-8	Soft Carrying Case
RSC-8	Reusable Shipping Case
FBP-8	Battery Pack, Field Replaceable
115552-G1	Adapter Cable, 658 Probe to PP1