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PowerLogic™ Power Meter PM5350

User Guide

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HAZARD CATEGORIES AND SPECIAL SYMBOLS

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

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

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

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

CAUTION

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

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

PLEASE NOTE

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

CLASS A FCC STATEMENT

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

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Chapter 1—Introduction

Power Meter Hardware

Figure 1– 1 below shows the parts of the power meter. Table 1– 1 describes the parts.

Figure 1– 1 Parts of the power meter (rear view)

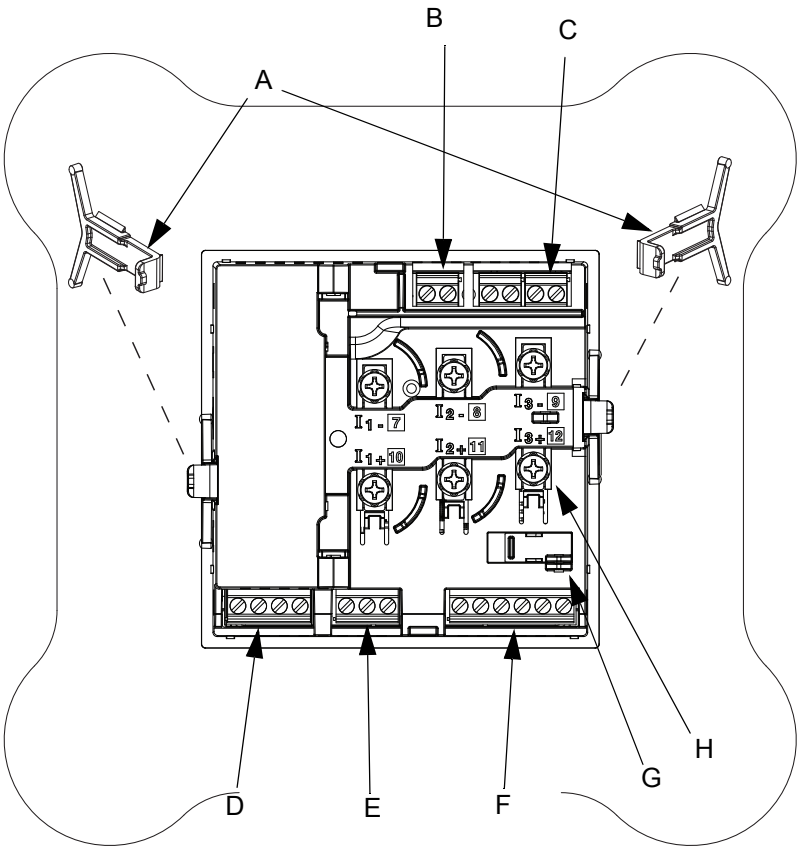

Table 1– 1 Parts of the Power Meter

Number	Part	Description
A	Retainer clips	Used to secure the power meter in place
B	Control power supply connector	Connection for control power to the power meter
C	Voltage inputs	Voltage metering connections
D	Digital outputs	Digital outputs (DO1 and DO2) connections
E	RS485 port (COM1)	Used for communications with a monitoring and control system, can be daisy-chained to multiple devices
F	Digital inputs	Digital inputs (DI1-DI4) connections, whetting voltage supplied by power meter
G	Optical revenue switch	Used to activate or deactivate revenue security
H	Current inputs	Current metering connections

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Power Meter Parts and Accessories

Table 1– 2 Power Meter Parts and Accessories

Description	Model Number
Power Meter with Integrated Display	PowerLogic™ Power Meter PM5350 (METSEPM5350)

Box Contents

- One (1) power meter
- Two (2) retainer clips
- One (1) installation sheet
- One (1) RS485 Terminator (MCT2W)
- One (1) gasket

Firmware

This instruction bulletin is written to be used with firmware version 1.0.0.0 and later. See “Identifying the Firmware Version, Model, and Serial Number” on page 61 for instructions on determining the firmware version.

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Chapter 2—Safety Precautions

Before You Begin

This section contains important safety precautions that must be followed before attempting to install, service, or maintain electrical equipment. Carefully read and follow the safety precautions outlined below.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. In the USA, see NFPA 70E.
- Only qualified electrical workers should install this equipment. Such work should be performed only after reading this entire set of instructions.
- NEVER work alone.
- If the equipment is not used in a manner specified by the manufacturer, the protection provided by the equipment may be impaired.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Turn off all power supplying the power meter and the equipment in which it is installed before working on it.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Before closing all covers and doors, carefully inspect the work area for tools and objects that may have been left inside the equipment.
- Use caution while removing or installing panels so that they do not extend into the energized bus; avoid handling the panels, which could cause personal injury.
- The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.
- NEVER bypass external fusing.
- NEVER short the secondary of a PT or VT.
- NEVER open circuit a CT; use the shorting block to short circuit the leads of the CT before removing the connection from the power meter.
- Before performing Dielectric (Hi-Pot) or Megger testing on any equipment in which the power meter is installed, disconnect all input and output wires to the power meter. High voltage testing may damage electronic components contained in the power meter.
- The power meter should be installed in a suitable electrical enclosure.

Failure to follow this instruction will result in death or serious injury

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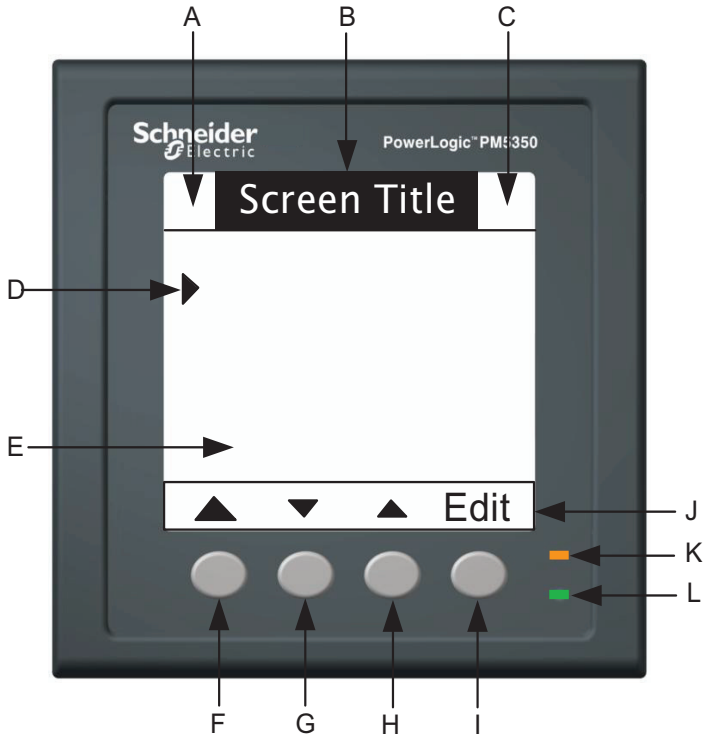
Chapter 3—Operation

Operating the Display

The power meter is equipped with a large, back-lit LCD display. It is designed to display up to six lines of information plus a row of menu options. Figure 3–1 shows the different parts of the power meter display.

Figure 3–1: Power Meter Display



A. Icon 1—MT (Meter Test Mode), Wrench Icon (Maintenance), or Heartbeat Icon
B. Screen Title
C. Icon 2—Alarm Icon
D. Cursor
E. Data Area
F. Button 1
G. Button 2
H. Button 3
I. Button 4
J. Menu Area
K. Energy/Alarm LED (orange)
L. Heartbeat/Comms LED (green)

LEDs

There are two LEDs on the power meter display, the energy/alarm LED and the heartbeat/comms LED. The two types of LED are described in the following sections.

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Energy/Alarm LED

Configure the energy/alarm LED in the following three ways:

- **Energy Indicator—**Flashes at a rate proportional to the amount of energy consumed, allows the accuracy of the power meter to be verified.
- **Alarm—**Flashes as long as there are any active alarms.
- **Off—**Default

NOTE: See “Setting Up the Energy/Alarm LED” on page 60 for more information.

Heartbeat/Comms LED

The heartbeat/comms LED flashes at a steady rate during normal operation and at a variable rate when communications is active.

NOTE: See “Heartbeat/Comms LED” on page 63 for more information.

How the Buttons Work

The buttons select menu items, display more menu items in a menu list, and return to previous menus. A menu item appears over one of the four buttons. Pressing a button selects the menu item and displays the menu item’s screen. To return to the previous menu level, press the button below ▲. To cycle through the menu items in a menu list, press the button below ▶. Table 3–1 describes the button symbols.

Table 3–1: Button Symbols

Navigation	
▲	Return to the previous screen. For setup screens: • If setup changes are made, a confirmation screen is displayed. • If editing a value, exits edit mode and restores previous value.
▼	Move cursor down.
▲	Move cursor up.
◀	Move the cursor one character to the left.
▶	Move cursor one character to the right.
✓	Indicates the item is selected.
+	Increment active character; toggle list selection On.
-	Decrement active character; toggle list selection Off.
Edit	Select parameter or item to edit.
Select	Select/deselect item for association.
OK	Enter change to a parameter.
Yes	Accept.
No	Reject.
Ack	Acknowledge alarms.
Reset	Reset selected item.

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- To differentiate between menu items and parameters, menu items are placed in brackets. For example, “[Phase]” denotes a phase menu item, and “Phase” denotes a phase parameter.
- Each time you read “press” in this manual, press and release the appropriate button beneath a menu item. For example, if you are asked to “Press [Phase],” you would press and release the button below the phase menu item.

Changing Values

In this document, “item” refers to a feature such as an alarm, and “parameter” refers to an attribute of an item such as a pickup setpoint.

When you enter a setup screen, the cursor points to the first setup item or parameter on the screen. Press ▲ and ▼ to move to the item or parameter you wish to edit. Press [Edit] to select a parameter. The value to be edited is displayed in the edit field, with the active digit of the setup value shown in reverse video.

To change a text value:

- Press ▶ to enter the selected value for the active digit and move to the next digit to the right. At the maximum number of digits, the ▶ takes you back to the first digit.
- Press + to increment and - to decrement the active digit through the numerals 0-9, the letters A-Z, the “.” or any other possible selections.

To change a numerical value:

- Press ◀ to enter the selected value for the active digit and move to the next digit to the left. At the maximum number of digits, the ◀ takes you back to the first digit.
- Press + to increment the active digit through the numerals 0-9, and ".", "+", and "-".

To select a value from a list:

- Press + to scroll up and - to scroll down through the list of available selections.
- Press [OK] to enter the selected value.

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When you complete setup for the selected feature, press ▲ to return to the previous screen. If any setup changes are made, a confirmation screen appears with the choice to save the changes or cancel. Select [Yes], to save changes and return to the previous screen. Select [No], to cancel the changes and return to the previous screen.

Figure 3–2: Confirmation screen

If any setup parameters are invalid, the “Invalid Parameter(s)” screen displays (see Figure 3–3). Press [OK] to return to the previous setup screen. The invalid parameter(s) is highlighted.

Figure 3–3: Invalid Parameter(s) screen

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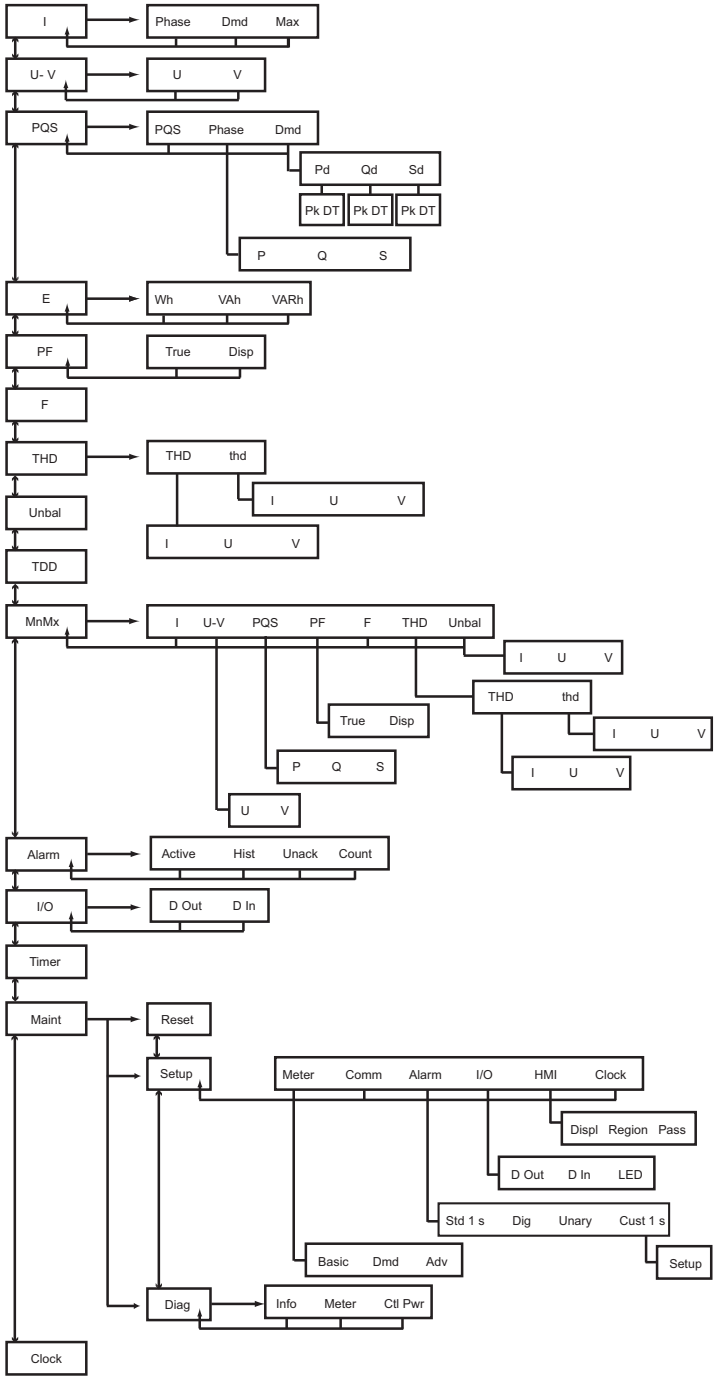
Menu Overview

Menu items are displayed below the horizontal line at the bottom of the screen. Figure 3–4 below shows the menu items of the power meter menu hierarchy. Selecting a Level 1 menu item takes you to the next screen level containing the Level 2 menu items. Some Level 2 items have Level 3 items. The navigation buttons work consistently across all menu levels. Press ▶ to scroll through all menu items on a level.

Figure 3–4: Menu Tree



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Setting Up the Power Meter

The power meter ships with many default values already set up. To change values, navigate to the appropriate screen and enter new values. Use the instructions in the following sections to change values. New values are automatically saved when you exit the screen and accept the confirmation request.

Power Meter Basic Setup

To begin power meter basic setup:

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Setup].
4. Enter your setup password.

   NOTE: The default password is 0000. See “Setting Up Passwords” on page 27 for information on changing passwords.
5. Press [Meter].
6. Press [Basic]. The Basic Setup screen appears.

Use the directions in the following sections to set up basic power meter values.

NOTE: If you make changes to the basic power meter setup, all alarms disable to prevent undesired alarm operation. Confirm alarm configuration and enable the required alarms.

Setting Up the Power System

There are several supported power systems available for selection.

To set up the power systerm:

1. Press [Edit] to select Power System.
2. Press + and - to scroll through a list of supported power system configurations.

   NOTE: See “Supported Power System Types” on page 11 for more information.
3. Press [OK] to select the power system configuration to be metered.

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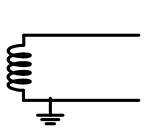
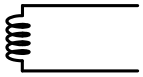
Supported Power System Types

The power meter supports several power system types. See Figure 3–5 and Figure 3–6, and Table 3–2, Table 3–3, and Table 3–4 for details.

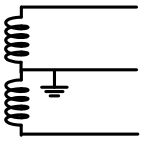
Figure 3–5: Single-Phase Power System Configurations



1PH2W LN



1PH2W LL



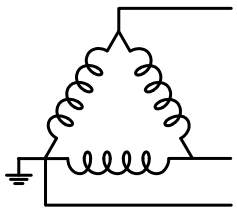
1PH3W LL with N

Table 3–2: Single-Phase

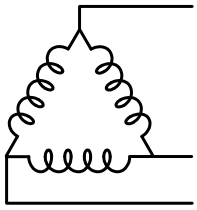
Power System Configuration	Number of Wires	CTs		Voltage Connections		
		Qty.	Meter Terminal	Qty.	Meter Terminal	Type
Single-Phase Wiring						
1PH2W LN	2	1[1]	I1	2	V1, Vn	L-N
1PH2W LL	2	1[1]	I1	2	V1, V2	L-L
1PH3W LL with N	3	2	I1, I2	3	V1, V2, Vn	L-L with N

[1] For 1 CT systems, you must configure the power meter for the phase on which the CT is installed.

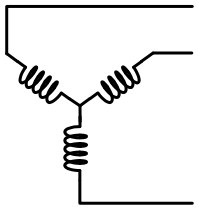
Figure 3–6: Three-Phase Power System Configurations



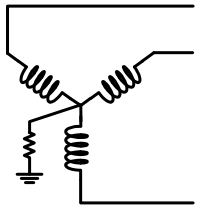
3PH3W Delta Corner Grounded
(3PH3W Dlt Crnr Gnd)



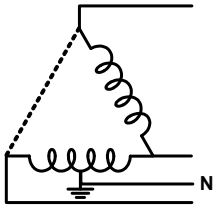
3PH3W Delta Ungrounded
(3PH3W Dlt Ungnd)



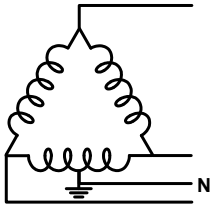
3PH3W Wye Ungrounded
(3PH3W Wye Ungnd)



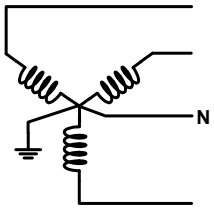
3PH3W Wye Resistance Grounded
(3PH3W Wye Res Gnd)



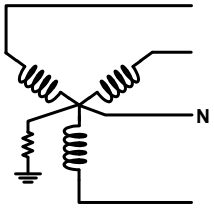
3PH4W Open Delta Center-Tapped
(3PH4W Opn Dlt Ctr Tp)



3PH4W Delta Center-Tapped
(3PH4W Dlt Ctr Tp)



3PH4W Wye Grounded
(3PH4W Wye Gnd)



3PH4W Wye Resistance Grounded
(3PH4W Wye Res Gnd)

Table 3–3: Three-Phase Direct Connect

Power System Configuration	Number of Wires	CTs		Voltage Connections		
		Qty.	Meter Terminal	Qty.	Meter Terminal	Type
Three-Phase Wiring						
3PH3W Dlt Crnr Gnd 3PH3WDlt Ungnd 3PH3W Wye Ungnd 3PH3W Wye Res Gnd	3	2	I1, I3	3	V1, V2, V3	Delta
		3	I1, I2, I3	3	V1, V2, V3	Delta
3PH3W Dlt Crnr Gnd 3PH3WDlt Ungnd 3PH3W Wye Ungnd 3PH3W Wye Res Gnd	3	1[1]	I1	3	V1, V2, V3	Delta (Balanced)

[1] For 1 CT systems, you must configure the power meter for the phase on which the CT is installed.

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Table 3–3: Three-Phase Direct Connect

Power System Configuration	Number of Wires	CTs		Voltage Connections		
		Qty.	Meter Terminal	Qty.	Meter Terminal	Type
Three-Phase Wiring						
3PH4W Opn Dlt Ctr Tp 3PH4W Dlt Ctr Tp 3PH4W Wye Gnd 3PH4W Wye Res Gnd	4	3	I1, I2, I3	4	V1, V2, V3, Vn	Delta
3PH4W Opn Dlt Ctr Tp 3PH4W Dlt Ctr Tp 3PH4W Wye Gnd 3PH4W Wye Res Gnd	4	3	I1, I2, I3	4	V1, V2, V3, Vn	Wye
3PH4W Opn Dlt Ctr Tp 3PH4W Dlt Ctr Tp 3PH4W Wye Gnd 3PH4W Wye Res Gnd	4	1[1]	I1	4	V1, V2, V3, Vn	Wye (Balanced)

[1] For 1 CT systems, you must configure the power meter for the phase on which the CT is installed.

Table 3–4: Three-Phase (with VTs)

Power System Configuration	Number of Wires	CTs		Voltage Connections		
		Qty.	Meter Terminal	Qty.	Meter Terminal	Type
Three-Phase Wiring						
3PH3W Dlt Crnr Gnd 3PH3WDlt Ungnd 3PH3W Wye Ungnd 3PH3W Wye Res Gnd	3	2	I1, I3	2	V1, V3 (V2 to Ground)	Delta
		3	I1, I2, I3	2	V1, V3 (V2 to Ground)	Delta
3PH3W Dlt Crnr Gnd 3PH3WDlt Ungnd 3PH3W Wye Ungnd 3PH3W Wye Res Gnd	3	1[1]	I1	2	V1, V3 (V2 to Ground)	Delta (Balanced)
3PH4W Opn Dlt Ctr Tp 3PH4W Dlt Ctr Tp 3PH4W Wye Gnd 3PH4W Wye Res Gnd	4	3	I1, I2, I3	3	V1, V2, V3 (Vn to Ground)	Wye
		3	I1, I2, I3	2	V1, V3 (Vn to Ground)	Wye
		2	I1, I2, I3	3	V1, V2, V3 (Vn to Ground)	Wye
3PH4W Opn Dlt Ctr Tp 3PH4W Dlt Ctr Tp 3PH4W Wye Gnd 3PH4W Wye Res Gnd	4	1[1]	I1	3	V1, V2, V3 (Vn to Ground)	Wye (Balanced)

[1] For 1 CT systems, you must configure the power meter for the phase on which the CT is installed.

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Setting Up CTs

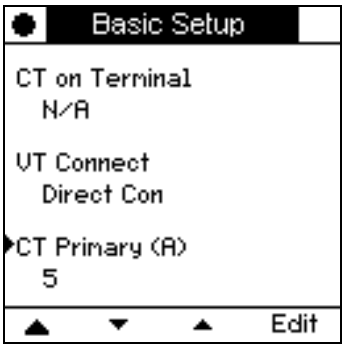
The number of CTs that can be selected is based on the power system selected in “Setting Up the Power System” on page 10.

To set up CTs:

1. Press ▲ and ▼ to scroll through the parameters in the Basic Setup screen.
2. Press [Edit] to select Number CTs.
3. Press + to increment the numerical value of the selected option.
4. Press [OK] to enter the number of CTs.

   NOTE: If you select “1” or “2,” go to Step 5. If you select “3,” skip to Step 8.
5. Press ▼ to select CT on Terminal, then press [Edit].
6. Press + and - to scroll through the terminal options.
7. Press [OK] to enter the terminal the CT is on.
8. Press ▼ to select CT Primary, then press [Edit].
9. Press + to increment the active digit through the numerals 0-9.
10. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
11. Continue until all values are selected.
12. Press [OK] to enter the CT Primary.
13. Press ▼ to select CT Secondary, then press [Edit].
14. Press + and - to scroll through a list of CT Secondary options.

    NOTE: CT Secondary options are 5A or 1A. See “” on page 65 for accuracy level.
15. Press [OK] to enter the CT Secondary.



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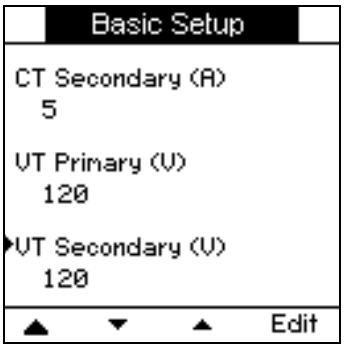
Setting Up VTs

The VT Connect options that can be selected are based on the power system selected in “Setting Up the Power System” on page 10.

To set up VTs:

1. Press ▲ and ▼ to scroll through the parameters in the Basic Setup screen.
2. Press [Edit] to select VT Connect.
3. Press + and - to scroll through a list of VT Connect options.
4. Press [OK] to enter the VT Connection.
5. Press ▼ to select VT Primary, then press [Edit].
6. Press + to increment the active digit through the numerals 0-9.
7. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
8. Continue until all values are selected.
9. Press [OK] to enter the VT Primary.
10. Press ▼ to select VT Secondary, then press [Edit].
11. Press + and - to scroll through a list of VT Secondary options.

    NOTE: VT Secondary is fixed at 100, 110, 115 or 120.
12. Press [OK] to enter the VT Secondary.



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Setting Up Nominal Values

The following nominal values are used for metering configuration and diagnostics.

Setting Up the Nominal Voltage

The nominal voltage is limited to 2x VT Primary, 690 V for direct connect.

To set up the nominal voltage:

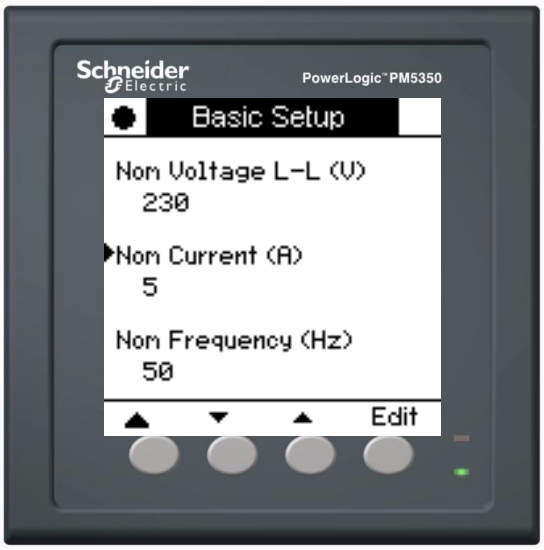
1. Press ▲ and ▼ to scroll through the options in the Basic Setup screen.
2. Press [Edit] to select Nominal Voltage.
3. Press + to increment the active digit through the numerals 0-9.
4. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
5. Continue until all values are selected.
6. Press [OK] to enter the value for the nominal voltage.

Setting Up the Nominal Current

The nominal current is limited to 4x CT Primary.

To set up the nominal current:

1. Press ▲ and ▼ to scroll through the options in the Basic Setup screen.
2. Press [Edit] to select Nominal Current.
3. Press + to increment the active digit through the numerals 0-9.
4. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
5. Continue until all values are selected.
6. Press [OK] to enter the value for the nominal current.



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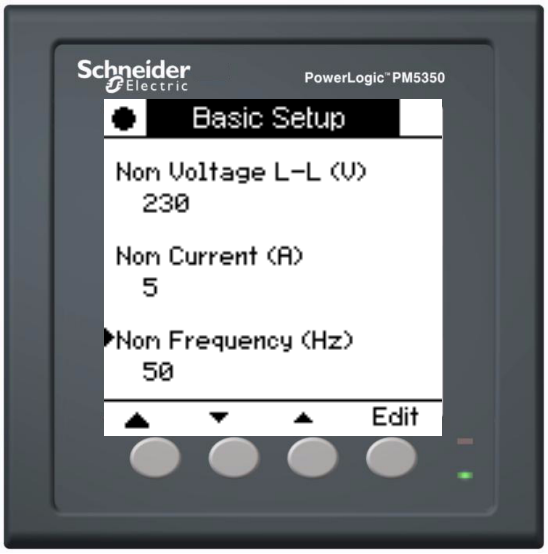
Setting Up the Nominal Frequency

The frequency options are limited to 50 Hz or 60 Hz.

To set up the nominal frequency:

1. Press ▲ and ▼ to scroll through the options in the Basic Setup screen.
2. Press [Edit] to select Nominal Frequency.
3. Press + and - to scroll through a list of available frequencies.
4. Press [OK] to enter the value for the nominal frequency.



Setting Up the Nominal Power Factor

The nominal power factor is entered based on the expected power factor of the load being monitored.

To set up the nominal power factor:

1. Press ▲ and ▼ to scroll through the options in the Basic Setup screen.
2. Press [Edit] to select Nominal PF.
3. Press + and - to scroll through a list of nominal power factors.
4. Press [OK] to enter the nominal power factor.

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Setting Up the Nominal Power Factor Lead/Lag

The nominal power factor can be configured to lead or lag.

To set up the nominal power factor lead/lag:

1. Press ▲ and ▼ to scroll through the options in the Basic Setup screen.
2. Press [Edit] to select Nominal Power Factor Lead/Lag.
3. Press + and - to scroll through lead or lag options.
4. Press [OK] to enter the selected option for the nominal power factor lead/lag.

Setting Up the Nominal Phase Rotation

The phase rotation is limited to ABC or CBA.

To set up the nominal phase rotation:

1. Press ▲ and ▼ to scroll through the options in the Basic Setup screen.
2. Press [Edit] to select Phase Rotation.
3. Press + and - to scroll through the available options for phase rotation.
4. Press [OK] to enter the phase rotation.

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Power Meter Advanced Setup

To begin power meter advanced setup:

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Setup].
4. Enter your setup password.

   NOTE: The default password is 0000. See “Setting Up Passwords” on page 27 for information on changing passwords.
5. Press [Meter].
6. Press [Adv].

Use the directions in the following sections to set up power meter advanced values.

Setting Up the Load Timer Setpoint

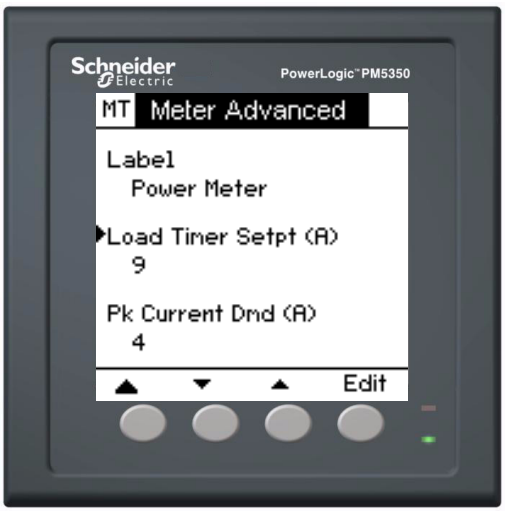
There are two typical uses for the load timer setpoint:

- Select a relatively low setpoint. The timer increments when the load being metered is running. This could be useful in recording machine run time for a preventive maintenance program.
- Select a setpoint that is equal to the rating of the power system conductors. The timer increments and record how long the conductors were overloaded. This could be used to help determine if a circuit has the capacity to add additional load or if loads should be moved to another circuit.

NOTE: The load timer setpoint is in amperes.

To set up the load timer setpoint:

1. Press ▲ and ▼ to scroll through the options in the Meter Advanced screen.
2. Press [Edit] to select Load Timer Setpoint.
3. Press + to increment the active digit through the numerals 0-9.
4. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
5. Continue until all values are selected.
6. Press [OK] to enter the load timer setpoint.



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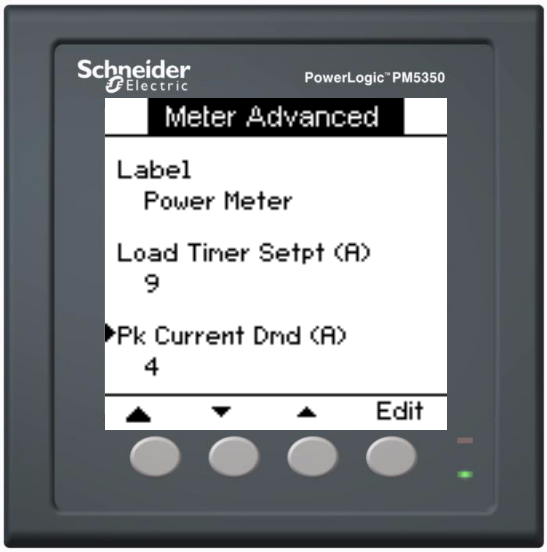
Setting Up the Peak Current Demand Over Last Year

The peak current demand over last year calculates Total Demand Distortion (TDD) in amperes. Enter 0 if you want the power meter to use metered current peak demand for this calculation.

To set up the peak current demand over last year:

1. Press ▲ and ▼ to scroll through the options in the Meter Advanced screen.
2. Press [Edit] to select Pk Current Dmd.
3. Press + to increment the active digit through the numerals 0-9.
4. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
5. Continue until all values are selected.
6. Press [OK] to enter the Peak Current Demand Over Last Year.



Power Meter Demand Setup

To begin power meter demand setup:

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Setup].
4. Enter your setup password.

   NOTE: The default password is 0000. See “Setting Up Passwords” on page 27 for information on changing passwords.
5. Press [Meter].
6. Press [Dmd].

Use the directions in the following sections to set up power meter demand values.

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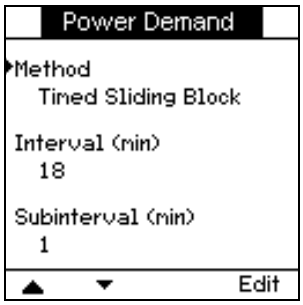
Setting Up Power, Current, and Input Demand

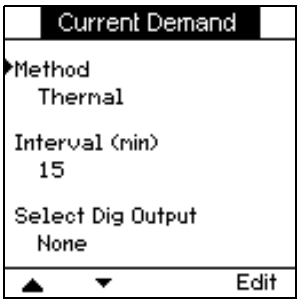
To set up the power, current, or input demand:

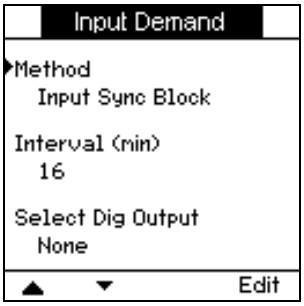
1. Press ▲ and ▼ to scroll though Power, Current, and Input Demand.
2. Press [Edit] to select a demand.
3. Press [Edit] to select Method.
4. Press + and - to scroll through a list of supported demand methods.
5. Press [OK] to select the demand method.

   NOTE: If you select Input Sync Block or Input Sync Rolling Block, see “Select the Digital Input” on page 22.
6. Press ▼ to select Interval, then press [Edit].
7. Press + to increment the active digit through the numerals 0-9.
8. Press ◀ to enter the selected number for the active digit and move to the next digit to the left.
9. Continue until all values are selected.
10. Press [OK] to enter the interval.
11. If the selected demand method uses subintervals, press ▼ to select Subinterval, then press [Edit].

    NOTE: The subinterval duration must be evenly divisible into the demand interval duration.
12. Press + to increment the active digit through the numerals 0-9.
13. Continue until all values are selected.
14. Press [OK] to enter the subinterval.
15. If you selected Input Sync Block or Input Sync Rolling Block as the demand method, proceed to “Select the Digital Input” on page 22.







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Select the Digital Output

To select the digital output:

1. Press [Edit] to select Select Dig Output.
2. Press + and - to scroll through a list of digital outputs in the Select digital output menu.
3. Press [Select] to select the digital output to be associated with the demand system.
4. Press ▲ to return to the previous screen.

   NOTE: If there are existing associations that will be lost by making the new selection, a confirmation screen appears.

   — Press [Yes] to accept the changes and return to the previous screen.

   — Press [No] to keep the existing configuration and return to the previous screen.

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Select the Digital Input

If you select Input Sync Block or Input Sync Rolling Block as the demand method, you can now select the digital input to be associated with the demand system.

To select the digital input:

1. Press [Edit] to select Select Dig Input.
2. Press + and - to scroll through a list of digital inputs in the Select digital input menu.
3. Press [OK] to select the digital input to be associated with the demand system.
4. Press ▲ to return to the previous screen.

   NOTE: If there are existing associations that will be lost by making the new selection, a confirmation screen appears.

   — Press [Yes] to accept the changes and return to the previous screen.

   — Press [No] to keep the existing configuration and return to the previous screen.

Power Meter Comms Setup

To begin power meter comms setup:

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Setup].
4. Enter your setup password.

   NOTE: The default password is 0000. See “Setting Up Passwords” on page 27 for information on changing passwords.
5. Press [Comm]. The Comms Setup screen appears.

Use the directions in the following sections to set up power meter communications values.

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Setting Up Communications

To set up communications:

1. Press ▲ and ▼ to scroll through the items in the Comms Setup screen.
2. Press [Edit] to select Protocol.
3. Press + and - to scroll through the protocol options.
4. Press [OK] to set the protocol.
5. Press ▼ to select Address, then press [Edit].
6. Press + to increment the active digit through the numerals 0-9.
7. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
8. Continue until all values are selected.
9. Press [OK] to set the address.
10. Press ▼ to select Baud Rate, then press [Edit].
11. Press + and - to scroll through the Baud rate options.
12. Press [OK] to set the Baud rate.
13. Press ▼ to select Parity, then press [Edit].
14. Press + and - to scroll through the parity options.
15. Press [OK] to set the parity.

Setting Up Alarms

See “Alarms” on page 39 for information on setting up alarms.

Setting Up I/O

See “” on page 51 for information on setting up I/O.

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Power Meter HMI Setup

To begin power meter HMI setup:

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Setup].
4. Enter your setup password.

   NOTE: The default password is 0000. See “Setting Up Passwords” on page 27 for information on changing passwords.
5. Press [HMI]. The HMI Setup screen appears.

Use the directions in the following sections to set up power meter HMI values.

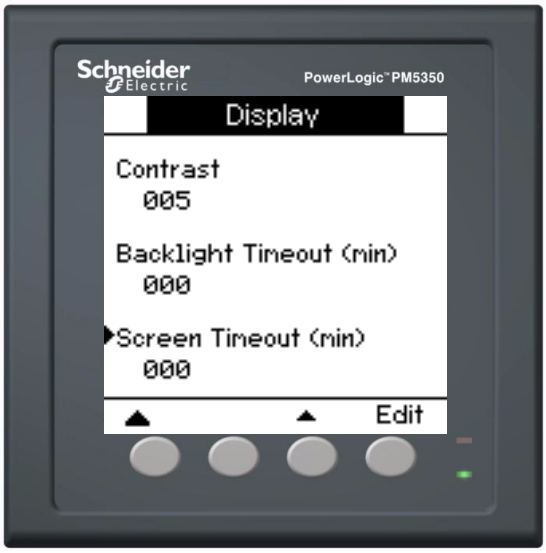
Setting Up the Display

To set up the display:

1. Press [Disp]. The Display screen appears.
2. Press [Edit] to select Contrast.
3. Press + to increment the active digit through the numerals 0-9.

   NOTE: The contrast values range between 1 and 9.
4. Press [OK] to set the contrast.
5. Press ▼ to select Backlight Timeout (min), then press [Edit].
6. Press + to increment the active digit through the numerals 0-9.
7. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
8. Continue until all values are selected.

   NOTE: The backlight timeout values range between 0 and 60 minutes. 0 disables the timeout.
9. Press [OK] to set the backlight timeout.



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Setting Up the Display (continued)

10. Press ▼ to select Screen Timeout (min), then press [Edit].
11. Press + to increment the active digit through the numerals 0-9.
12. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
13. Continue until all values are selected.

    NOTE: The screen timeout values range between 0 and 60 minutes. 0 disables the timeout.
14. Press [OK] to set the screen timeout.
15. Press ▲ to return to the previous screen.

    NOTE: If there are existing associations that will be lost by making the new selection, a confirmation screen appears.

    — Press [Yes] to accept the changes and return to the previous screen.

    — Press [No] to keep the existing configuration and return to the previous screen.

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Setting Up Regional Settings

To set up regional settings:

1. Press [Region]. The Regional Settings screen appears.
2. Press [Edit] to select Language.
3. Press + and - to scroll through the language options.
4. Press [OK] to set the language.

   NOTE: Models with communications support the download of language files with additional languages to the power meter. All languages available on the power meter are listed. See “Downloading Firmware” on page 62 for more information.
5. Press ▼ to select Date Format, then press [Edit].
6. Press + and - to scroll through the date format options.
7. Press [OK] to set the date format.
8. Press ▼ to select Time Format, then press [Edit].
9. Press + and - to scroll through the time format options.
10. Press [OK] to set the time format.
11. Press ▼ to select HMI Mode, then press [Edit].
12. Press + and - to scroll through the HMI mode options.
13. Press [OK] to set the HMI mode.
14. Press ▲ to return to the previous screen.

    NOTE: If there are existing associations that will be lost by making the new selection, a confirmation screen appears.

    — Press [Yes] to accept the changes and return to the previous screen.

    — Press [No] to keep the existing configuration and return to the previous screen.

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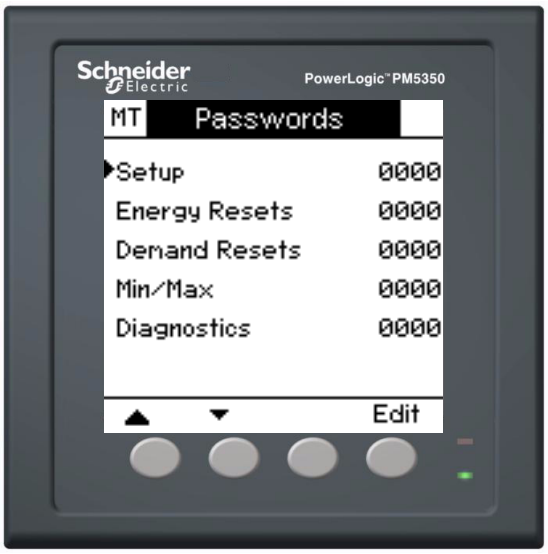
Setting Up Passwords

The passwords for HMI access to setup and resets are configurable. Passwords must use four numeric characters. The characters are from the US ASCII character set and are not translated or affected by language selection.

To set up a password:

1. Press ▲ and ▼ to scroll through the passwords options in the Passwords screen.
2. Press [Edit] to select Setup.
3. Press + to increment the active digit through the numerals 0-9.
4. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
5. Continue until all values are selected.
6. Press [OK] to set the setup password.
7. Press ▼ and follow Steps 2 to 6 to set the Energy Resets, Demand Resets, Min/Max, and Diagnostics passwords.



Power Meter Clock Setup

To begin power meter clock setup:

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Setup].
4. Enter your setup password.

   NOTE: The default password is 0000. See “Setting Up Passwords” on page 27 for information on changing passwords.
5. Press [Clock]. The Clock setup screen appears.

Use the directions in the following sections to set up power meter clock values.

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Setting Up the Clock

The power meter stores all date and time stamps in GMT. If “Local” meter time is selected, the GMT offset converts the GMT values to local date and time values for display on the HMI. There is also an option to display the GMT values on the HMI.

To set up the clock:

1. Press ▲ and ▼ to scroll through the items in the Clock setup screen.
2. Press [Edit] to select Date.
3. Press + to increment the active digit for the first character of the date.
4. Press ◀ to enter the selected character and move to the character to the left.
5. Continue until all values are selected.
6. Press [OK] to set the date
7. Press ▼ and follow Steps 2 to 6 to set the Time and GMT Offset (h).
8. Press ▼ to select Meter Time, then press [Edit].
9. Press + and - to scroll through the meter time options.
10. Press [OK] to set the meter time.

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Reset the Power Meter

To begin power meter reset setup:

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Reset]. The Resets screen appears.

Meter values can be re-initialized using the reset function. Resets are grouped into global resets and single resets. Use the directions in the following sections to set up power meter reset values.

Global Reset

Global resets include power meter initialization and selections to reset:

- All Energies
- All Demands
- All Min/Max Values
- All Alarm Logs and Counters
- All I/O Counters and Timers

To re-initialize the power meter:

1. Press [Select] to select Global Resets.
2. Press ▲ and ▼ to scroll to the item you want to reset.
3. Press [Reset].

   NOTE: If you selected energies, demands, or min/max, a password is required. Enter the reset password for the item selected.
4. Press [OK].
5. A confirmation screen appears. Press [Yes].

   NOTE: A message screen appears if revenue security is active.

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Single Reset

Single resets allow you to reset specific items individually. Use the single reset option to reset he following values:

- Energy
- Demand
- Alarms
- Digital Inputs
- Digital Outputs
- Load Operation Timer

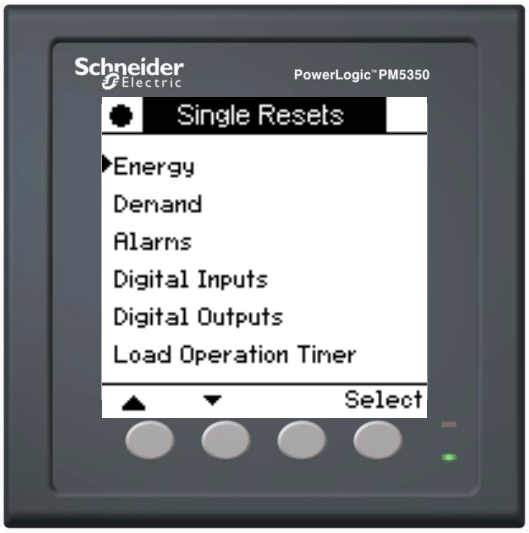
To re-initialize the power meter:

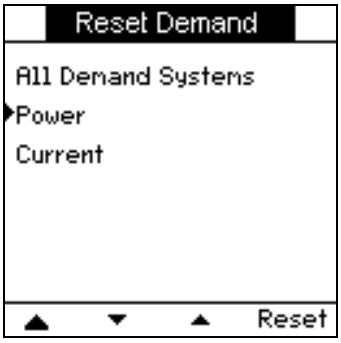
1. Press ▼ to select Single Resets, then press [Select].
2. Press ▲ and ▼ to scroll to the item you want to reset.
3. Press [Select].

   NOTE: If you selected energy or demand, a password is required. Enter the reset password for the item selected.
4. In the item Reset screen, press ▲ and ▼ to select the specific value you wish to reset.

   NOTE: The example displays a demand reset with Demand selected for reset.
5. A confirmation screen appears. Press [Yes].

   NOTE: A message screen appears if revenue security is active.





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Chapter 4—Metering

Power Meter Characteristics

The power meter measures currents and voltages and reports in real time the rms values for all three phases and neutral. In addition, the power meter calculates power factor, real power, reactive power, and more.

The PM5350 is not for use on Direct Current (DC) circuits. The power meter will incorrectly read 0 volts.

Table 4–5 lists metering characteristics of the power meter.

Table 4–5: Power Meter Characteristics

Instantaneous rms Values	
Current	Per phase, neutral or ground, average of 3 phases
Voltage	Average of 3 phases, L-L and L-N
Frequency	45 to 70 Hz
Active power	Total and per phase (signed)
Reactive power	Total and per phase (signed)
Apparent power	Total and per phase
True Power Factor	Total and per phase 0.000 to 1 (signed)
Displacement Power Factor	Total and per phase 0.000 to 1 (signed)
Energy Values	
Active energy	0 to 9.2 x 10^{18} Wh
Reactive energy	0 to 9.2 x 10^{18} VARh
Apparent energy	0 to 9.2 x 10^{18} VAh
Demand Values	
Current	Average
Active, reactive, apparent power	Total
Maximum Demand Values	
Maximum current	Average
Maximum active power	Total
Maximum reactive power	Total
Maximum apparent power	Total
Power-Quality Values	
Total harmonic distortion (THD and thd)	Current and voltage (L-L and L-N)
Total demand distortion (TDD)	
Reset	
Maximum demand current and power (password protected)	
Energy values (password protected)	
Minimum and maximum values (password protected)	
Load operation timer	
I/O Counters and timers	
Visualization Modes	
IEC and IEEE	All calculations are the same under both visualization modes.
Minimum and Maximum Values	
Real power per phase[1] total	
Apparent power per phase[1] and total	
Reactive power per phase[1] and total	
PF (power factor) true and displacement, per phase[1] and total	
Current per phase[1] and average	
Voltage (L-L and L-N) per phase[1] and average	

[1] Available over comms.
[2] See Appendix A “” on page 65 for accuracy information.

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Table 4–5: Power Meter Characteristics *(continued)*

THD and thd current per phase[1]	
THD and thd voltage (L-L and L-N)	
Local or Remote Setup	
Distribution system Type	3-phase 3- or 4-wire with 1, 2, or 3 CTs, single-phase 2- or 3-wire with 1 or 2 CTs
Current transformers rating	Primary 5 to 32,767 A Secondary 5 A, 1 A[2]
Voltage transformers rating	Primary 1,000,000 V max Secondary 100, 110, 115, 120
Demand currents calculation method	1 to 60 minutes
Demand power calculation method	1 to 60 minutes

[1] Available over comms.
[2] See Appendix A “” on page 65 for accuracy information.

MODBUS RS485

Functions	
RS485 link	2-wire
Communication protocol	MODBUS RTU, MODBUS ASCII, JBUS
Settings	
Communication address	1 to 247 (255 for JBUS)
Baud rate (communication speed)	9600, 19200, 38400 baud
Parity	none, even, odd

Digital Outputs

Digital Outputs	
: External Control, Alarm	2 Electromechanical relays

Digital Inputs

Digital Inputs	
Two Modes: Normal, Demand Sync	4 digital inputs

Min/Max Values for Real-Time Readings

When any one-second real-time reading reaches its highest or lowest value, the power meter saves the values in its nonvolatile memory. These values are called the minimum and maximum (min/max) values.

From the power meter display you can:

- View all min/max values since the last reset and the reset date and time. See Table 4–5 for a list of the minimum and maximum values stored in the power meter.
- Reset min/max values. See “Reset the Power Meter” on page 29.

All running min/max values are arithmetic minimum and maximum values. For example, the minimum phase A–B voltage is the lowest value in the range 0 to 1200 kV that has occurred since the min/max values were last reset.

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Power Factor Min/Max Conventions

The range of power factor (PF) values falls between the minimum and maximum values on a continuous scale for all real-time readings: -2 < PF ≤ 2. The minimum value represents the measurement closest to -2 and the maximum value is the measurement closest to 2 on the scale.

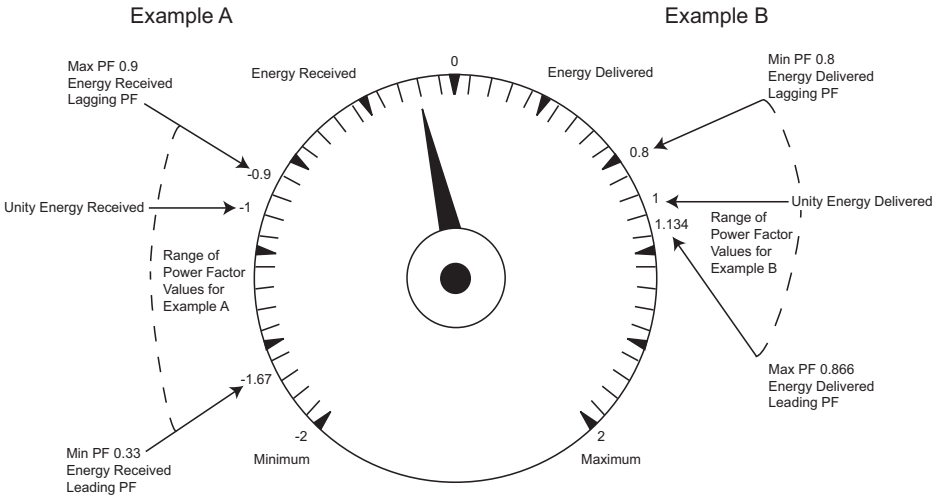
NOTE: See Appendix E “” on page 105 for information on using register values to determine power factor values,.

Figure 4–7 below shows two examples of min/max values. Note that the minimum power factor need not be leading, and the maximum power factor need not be lagging.

In Example A, the customer is metering a substation that provides power to the utility (Energy Received). The minimum register value is -1.67 and the maximum is -0.9 with power factor values ranging from 0.33 (leading) to 0.9 (lagging).

In Example B, the customer is being supplied power by the utility (Energy Delivered). The minimum register value is 0.8 and the maximum is 1.134 with power factor values ranging from 0.8 (lagging) to 0.866 (leading).

Figure 4–7: Min/Max Examples



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Demand Readings

The power meter provides a variety of demand readings. Table 4–6 lists the available demand readings and their reportable ranges.

Table 4–6: Demand Readings

Demand Readings
Demand Current, Average
Last Complete Interval
Present Incomplete Interval
Predicted
Peak
Demand Real Power, 3Ø Total
Last Complete Interval
Present Incomplete Interval
Predicted
Peak
Demand Reactive Power, 3Ø Total
Last Complete Interval
Present Incomplete Interval
Predicted
Peak
Demand Apparent Power, 3Ø Total
Last Complete Interval
Present Incomplete Interval
Predicted
Peak

Demand Calculation Methods

Demand power is the energy accumulated during a specified period divided by the length of that period. How the power meter performs this calculation depends on the method you select. To be compatible with electric utility billing practices, the power meter provides the following types of demand power calculations:

- Block Interval Demand
- Synchronized Demand
- Thermal Demand

The default demand calculation is set to a fixed block with a 15 minute interval.

Block Interval Demand

In the block interval demand method, you select a “block” of time that the power meter uses for the demand calculation. You choose how the power meter handles that block of time (interval). Three different modes are possible:

- **Sliding Block**. Select an interval from 1 to 60 minutes (in 1-minute increments). For demand intervals less than 15 minutes, the value is updated every 15 seconds. For demand intervals 15 minutes and greater, the demand value is updated every 60 seconds. The power meter displays the demand value for the last completed interval.
- **Fixed Block**. Select an interval from 1 to 60 minutes (in 1-minute increments). The power meter calculates and updates the demand at the end of each interval.

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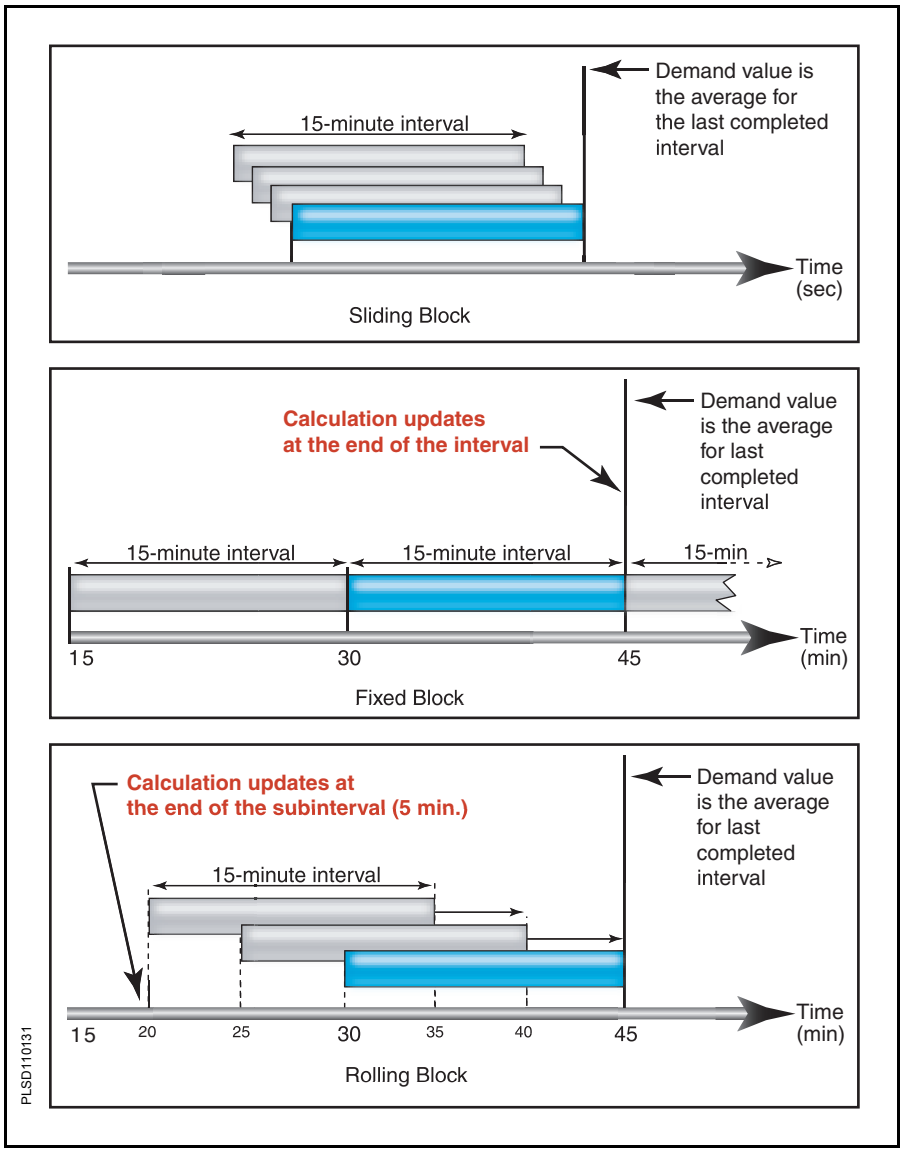
- **Rolling Block**. Select an interval and a subinterval. The subinterval must divide evenly into the interval. For example, you might set three 5-minute subintervals for a 15-minute interval. Demand for each completed interval is updated at each subinterval. The power meter displays the demand value for the last completed interval.

Figure 4–8 illustrates the three ways to calculate demand power using the block method. For illustration purposes, the interval is set to 15 minutes.

Figure 4–8: Block Interval Demand Examples



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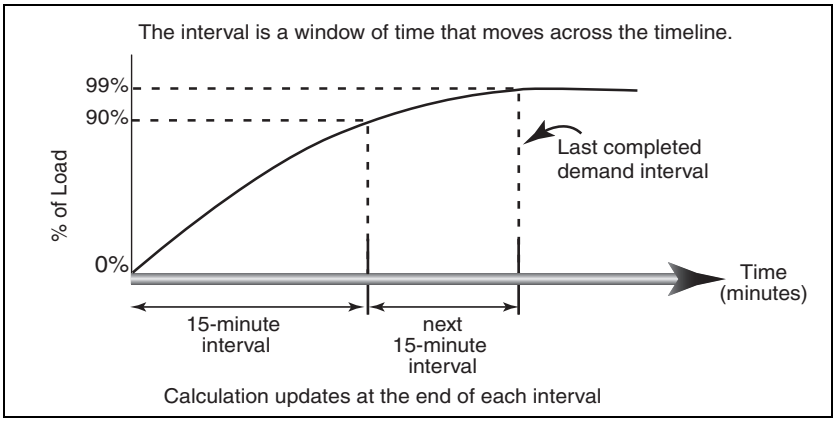
Thermal Demand

The thermal demand method calculates the demand based on a thermal response, which mimics thermal demand meters. The demand calculation updates at the end of each interval. You select the demand interval from 1 to 60 minutes (in 1-minute increments). In Figure 4–9 the interval is set to 15 minutes for illustration purposes.

Figure 4–9: Thermal Demand Example



Peak Demand

In nonvolatile memory, the power meter maintains a running maximum for demand values, called “peak demand.” The peak is the highest value for each of these readings since the last reset. Table 4–6 on page 34 lists the available peak demand readings from the power meter.

You can reset peak demand values from the power meter display. See “Reset the Power Meter” on page 29 for more information.

You should reset peak demand after changes to basic power meter setup, such as CT ratio or power system configuration.

Energy Readings

The power meter calculates and stores accumulated energy values for real, reactive, and apparent energy.

You can view accumulated energy from the display. The resolution of the energy value automatically changes from kWh to MWh (kVAh to MVARh).

Energy values can be reported over communications as 64-bit signed integers. The units are always Wh, VARh, or VAh.

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Power Analysis Values

The power analysis values use the following abbreviations:

HC (Harmonic Content) = $\sqrt{H_2^2 + H_3^2 + H_4^2 + \bullet\bullet\bullet\bullet}$

H_1 = Fundamental Content

I_L = Maximum Demand Load

The power meter provides the following power analysis values:

- **THD**. Total Harmonic Distortion (THD) is a quick measure of the total distortion present in a waveform and is the ratio of harmonic content to the fundamental. It provides a general indication of the “quality” of a waveform. THD is calculated for both voltage and current. The power meter uses the following equation to calculate THD:

$$THD = \frac{HC}{H_1} \times 100\%$$

- **thd**. An alternate method for calculating Total Harmonic Distortion. It considers the total harmonic current and the total rms content rather than fundamental content in the calculation. The power meter calculates thd for both voltage and current. The power meter uses the following equation to calculate thd:

$$thd = \frac{HC}{\sqrt{H_1^2 + HC^2}} \times 100\%$$

- **TDD**. Total Demand Distortion (TDD) evaluates the harmonic currents between an end user and a power source. The harmonic values are based on a point of common coupling (PCC), which is a common point where each user receives power from the power source. The power meter uses the following equation to calculate TDD:

$$TDD = \frac{\sqrt{HC_{IA}^2 + HC_{IB}^2 + HC_{IC}^2}}{I_L} \times 100\%$$

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Chapter 5—Alarms

About Alarms

The power meter maintains a counter for each alarm to keep track of the total number of occurrences (see Figure 5–10).

If you make changes to the basic power meter setup, all alarms are disabled to prevent undesired alarm operation. Confirm alarm configuration and enable required alarms.

Figure 5–10: Alarm Counters

There are three types of alarms available with this power meter: standard over/under, digital, and unary.

Standard Over/Under Alarms

The power meter has 29 standard over/under alarms. See Table 5–7 for a complete list. Use the display to configure standard over/under alarms with the following values:

- Enable—disable (default) or enable.
- Pickup Magnitude
- Pickup Time Delay (in seconds)
- Dropout Magnitude
- Dropout Time Delay (in seconds)

Many of the standard over/under alarms are three-phase alarms. Alarm setpoints are evaluated for each of the three phases individually, but the alarm is reported as a single alarm. The alarm pickup occurs when the first phase exceeds the alarm pickup magnitude for the pickup time delay. The alarm is active as long as any phase remains in an alarm state. The alarm dropout occurs when the last phase drops below the dropout magnitude for the dropout time delay.

NOTE: Only alarms that apply to the selected power system configuration can be enabled.

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Digital

The power meter has four digital alarms for alarming on digital input status. By default, the digital alarms are active when the associated digital input is on. The pickup and dropout time delays are configured in seconds.

Unary

The power meter has four unary alarms. These alarms alert you when the meter powers up after a control power failure, when the meter resets for any reason, when the meter self-diagnostic feature detects a problem, or when the meter detects a phase rotation different than expected.

The ⚠ icon appears in the upper-left corner of the meter display when an alarm is active.

If the LED has been configured for alarms, the energy/alarm LED flashes when an alarm is active. See “Setting Up the Energy/Alarm LED” on page 60 for more information.

Setpoint-Driven Alarms

Many of the alarm conditions require you to define setpoints. This includes all alarms for over, under, and phase unbalance alarm conditions. Other alarm conditions, such as digital input transitions and phase reversals, do not require setpoints. For those alarm conditions that require setpoints, you must define:

- Pickup Setpoint
- Pickup Delay
- Dropout Setpoint
- Dropout Delay

Alarms with both pickup and dropout setpoints set to zero are invalid.

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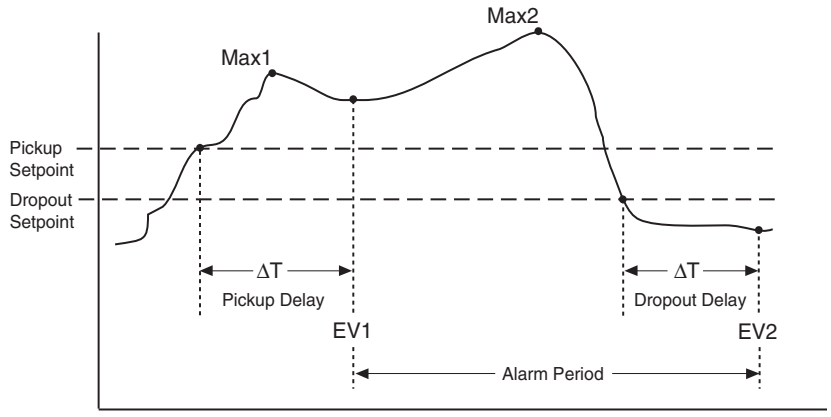
To understand how the power meter handles setpoint-driven alarms, see Figure 5–11 below.

Figure 5–11: How the power meter handles setpoint-driven alarms



EV1—The power meter records the date and time that the pickup setpoint and time delay were satisfied, and the maximum value reached (Max1) during the pickup delay period (ΔT). Also, the power meter performs any tasks assigned to the event such as operation of a digital output.

EV2—The power meter records the date and time that the dropout setpoint and time delay were satisfied, and the maximum value reached (Max2) during the alarm period.

Priorities

Each alarm has a priority level. Use priorities to distinguish between events that require immediate action and those that do not require action. See “Setting Up the Energy/Alarm LED” on page 60 for information on configuring the alarm LED for alarm mode.

- **High priority**—if a high priority alarm occurs, the display informs you in two ways: the alarm LED on the display flashes until you acknowledge the alarm, and the alarm icon blinks while the alarm is active. An alarm message is displayed while the alarm is active.
- **Medium priority**—if a medium priority alarm occurs, the alarm LED and the alarm icon blink only while the alarm is active. An alarm message is displayed while the alarm is active.
- **Low priority**—if a low priority alarm occurs, the alarm LED and the alarm icon blink only while the alarm is active. No alarm message is displayed.
- **No priority**—if an alarm is set up with no priority, no visible representation appears on the display. Alarms with no priority are not entered in the alarm Log.

If multiple alarms with different priorities are active at the same time, the display shows the alarms in the order they occurred. See “Setting Up Alarms” on page 23 for instructions on setting up alarms from the power meter display.

When a pickup event occurs, the active alarm list appears. Press “Detail” to see more event information. See “Viewing Alarm Activity and History” on page 42 for more information.

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Viewing Alarm Activity and History

There are two types of alarm entries: primary and secondary. The primary entry identifies the alarm. The secondary entries provide pickup and dropout information.

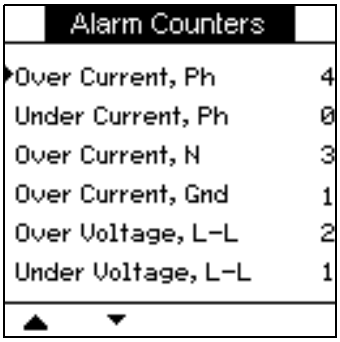
The active alarm list holds 40 entries at a time. The list works as a circular buffer, replacing old entries as new entries over 40 are entered into the alarm event queue. The information in the alarm event queue is volatile and reinitializes when the power meter resets.

The alarm history log holds 40 entries. The log also works as a circular buffer, replacing old entries with new entries. This information is nonvolatile.

Viewing Active Alarms and Alarm Counters

To view active alarms or alarm counters:

1. Scroll through the menu list at the bottom of the screen until you see [Alarm].
2. Press [Alarm].
3. Press the button beneath [Active] or [Count].
4. Press ▲ and ▼ to scroll through the alarm list.
5. Press ▲ to return to the previous screen.



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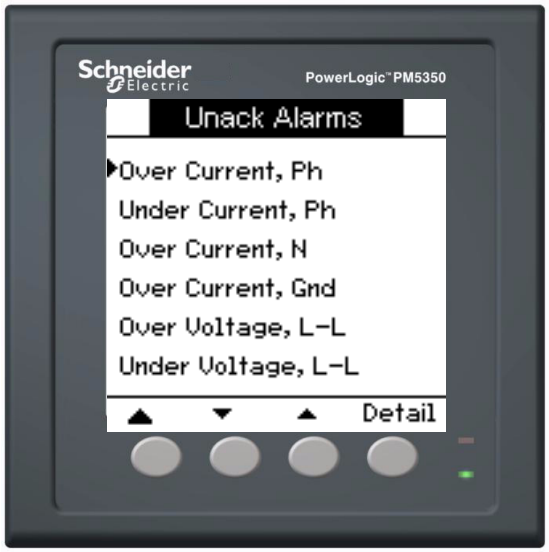
Viewing Unacknowledged Alarms and the Alarm History Log

To view the unacknowledged alarms or the alarm history log:

1. Scroll through the menu list at the bottom of the screen until you see [Alarm].
2. Press [Alarm].
3. Press the button beneath [Unack] or [Hist].
4. Press ▲ and ▼ to scroll through the list of primary alarm events.
5. Press [Detail] to view pickup and dropout event details.
6. Press ▲ and ▼ to scroll through the pickup and dropout event details.
7. For unacknowledged alarms, press [Ack] to acknowledge the alarm.
8. Press ▲ to return to the alarm list on the previous screen.
9. For unacknowledged alarms, follow Steps 4 to 7 until all alarms are acknowledged.



Using an Alarm to Control a Relay Output

Relays can be configured as external, demand sync, and alarm. See the “Setting Up Alarms” sections in this chapter or “Setting Up the Digital Output” on page 56 and “” on page 51 for more information.

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Standard Over/Under Alarms

Table 5–7: List of Standard Over/Under Alarms

Alarm Number	Alarm Label
01	Over Current, Phase
02	Under Current, Phase
03	Over Current, Neutral
04	Over Current, Ground
05	Over Voltage, L-L
06	Under Voltage, L-L
07	Over Voltage, L-N
08	Under Voltage L-N
09	Over kW
10	Over kVAR
11	Over kVA
12	Lead PF, True
13	Lag PF, True
14	Lead PF, Disp
15	Lag PF, Disp
16	Over kW Dmd, Pres
17	Over kW Dmd, Last
18	Over kW Dmd, Pred
19	Over kVAR Dmd, Pres
20	Over kVAR Dmd, Last
21	Over kVAR Dmd, Pred
22	Over kVA Dmd, Pres
23	Over kVA Dmd, Last
24	Over kVA Dmd, Pred
25	Over Frequency
26	Under Frequency
27	Over Voltage Unbal
28	Over Voltage THD
29	Phase Loss

Alarm Setup

Evaluation of all alarms is temporarily suspended while alarm setup screens are displayed. Evaluation resumes immediately upon exit from alarm setup screens.

To set up standard alarms:

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Setup].
4. Enter your setup password.

   NOTE: The default password is 0000. See “Setting Up Passwords” on page 27 for information on changing passwords.
5. Press [Alarm].

Use the directions in the following sections to set up alarms.

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Setting Up Standard Over/Under Alarms

To set up a standard alarm:

1. Press [1-Sec]. The 1-second alarm Select screen appears.
2. Press ▲ and ▼ to scroll through the list of standard 1–second alarms.
3. Press [Edit] to select an alarm to be configured.
4. Press [Edit] to select Pickup Setpoint.
5. Press + to increment the active digit through the numerals 0-9.
6. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
7. Continue until all values are selected.
8. Press [OK] to enter the selected number for the pickup setpoint.
9. Follow Steps 4 to 7 for Pickup Time Delay, Dropout Setpoint, and Dropout Time Delay.
10. Press ▼ to select Enable, then press [Edit].
11. Press + and - to scroll between Yes and No.
12. Press [OK] to enable or disable the alarm.

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Setting Up Standard Over/Under Alarms (continued)

13. Press ▼ to select Priority, then press [Edit].
14. Press + and - to scroll through priority options None, High, Medium, or Low.

    NOTE: See “Priorities” on page 41 for more information.
15. Press [OK] to set the priority.
16. Press ▼ to select Select Digital Output, then press [Edit].
17. Press + and - to scroll through the list of digital outputs to associate with the alarm.
18. Press [OK] to select a digital output to be associated with the selected alarm.
19. If the selected digital output already has an association that will be lost by making the new selection, a confirmation screen appears.
    - — Press [Yes] to accept the changes and return to the previous screen.
    - — Press [No] to keep the existing configuration in use and return to the previous screen
20. Press ▲ to save all alarm selections and return to the previous screen.
21. Press ▲ to save all 1-second alarm selections.

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Setting Up Unary Alarms

To set up unary alarms:

1. Press [Unary]. The unary alarm Select screen appears.
2. Press ▲ and ▼ to scroll through the list of unary alarms.
3. Press [Edit] to select an alarm to be configured.
4. Press [Edit] to select Enable.
5. Press + and - to scroll between Yes and No.
6. Press [OK] to enable or disable the alarm.
7. Press ▼ to select Priority.
8. Press + and - to scroll through priority options Low, None, High, or Medium.

   NOTE: See “Priorities” on page 41 for more information.
9. Press [OK] to set the priority.
10. Press ▼ to select Select Digital Output, then press [Edit].
11. Press + and - to scroll through the list of digital outputs to associate with the alarm.
12. Press [OK] to select a digital output to be associated with the selected alarm.
13. If the selected digital output already has an association that will be lost by making the new selection, a confirmation screen appears.
    - — Press [Yes] to accept the changes and return to the previous screen.
    - — Press [No] to keep the existing configuration in use and return to the previous screen
14. Press ▲ to save all alarms selections and return to the previous screen.
15. Press ▲ to save all unary alarm selections.

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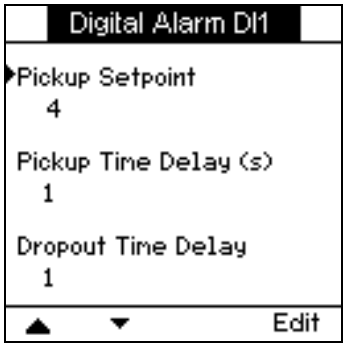
Setting Up Digital Alarms

To set up digital alarms:

1. Press [Dig]. The digital alarm Select screen appears.
2. Press ▲ and ▼ to scroll through the list of digital alarms.
3. Press [Edit] to select an alarm to be configured.
4. Press [Edit] to select Pickup Setpoint, then press [Edit].
5. Press + and - to scroll between On and Off.
6. Press [OK] to enter the pickup setpoint.
7. Press ▼ to select Pickup Time Delay, then press [Edit].

   NOTE: If the selected digital input mode is Demand Sync or Input Metering, a confirmation screen appears warning that if an alarm is enabled for this digital input, the existing association will be broken.
8. Press + to increment the active digit through the numerals 0-9.

   NOTE: Units for time delays are set in seconds.
9. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
10. Continue until all values are selected.
11. Press [OK] to enter the pickup time delay.
12. Press ▼ to select Dropout Time Delay, then press [Edit].
13. Follow Steps 8 to 11 for the dropout time delay.



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Setting Up Digital Alarms (continued)

14. Press ▼ to select Enable, then press [Edit].
15. Press + and - to scroll between Yes and No.
16. Press [OK] to enable or disable the alarm.
17. Press ▼ to select Priority, then press [Edit].
18. Press + and - to scroll through priority options None, High, Medium, or Low.

    NOTE: See “Priorities” on page 41 for more information.
19. Press [OK] to set the priority.
20. Press ▼ to select Select Digital Output, then press [Edit].
21. Press + and - to scroll through the list of digital outputs to associate with the alarm.
22. Press [OK] to select a digital output to be associated with the selected alarm.
23. If the selected digital output already has an association that will be lost by making the new selection, a confirmation screen appears.
    - — Press [Yes] to accept the changes and return to the previous screen.
    - — Press [No] to keep the existing configuration in use and return to the previous screen
24. Press ▲ to save all alarm selections and return to the previous screen.
25. Press ▲ to save all digital alarm selections.

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Chapter 6—Input/Output Capabilities

Digital Inputs

The power meter can accept four digital inputs designated DI1, DI2, DI3, and DI4. A digital input detects digital signals. For example, the digital input can be used to determine circuit breaker status, count pulses, or count motor starts.

The power meter counts Off-to-On transitions for each input. The count can be reset using the command interface (see Appendix C “Command Interface” on page 71) or by performing a reset (see “Reset the Power Meter” on page 29).

The digital input has two operating modes:

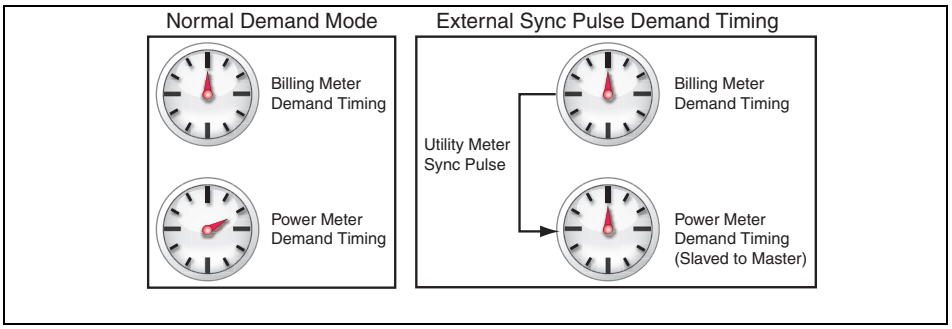
- **Normal**—Use for simple On/Off digital inputs. The digital inputs can be configured to activate an alarm when changing status, for example, from Off to On. See “Alarms” on page 39.
- **Demand Interval Sync Pulse**—Use to configure a digital input to accept a demand sync pulse from a utility demand meter.

Demand Sync Pulse Input

The power meter can be configured to accept a demand sync pulse from an external source such as another demand meter. By accepting demand sync pulses through a digital input, the power meter can make its power demand interval “window” match the other meter’s demand interval “window.” The power meter does this by “watching” the digital input for a pulse from the other demand meter. When it sees a pulse (an off-to-on transition of the digital input), it starts a new demand interval and calculates the demand for the preceding interval. The power meter then uses the same time interval as the other meter for each demand calculation. Figure 6–12 illustrates this point.

When in demand sync pulse operating mode, the power meter will not end a demand interval without a pulse. The pulse must be received within +/- 5 seconds of when expected. If the pulse is not received in that time frame, the demand system is reinitialized.

Figure 6–12: Demand sync pulse timing



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Setting Up the Digital Inputs

To begin digital input setup:

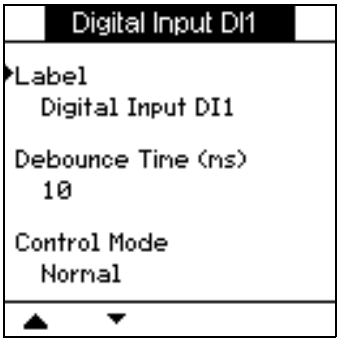
1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Setup].
4. Enter your setup password.

   NOTE: The default password is 0000. See “Setting Up Passwords” on page 27 for information on changing passwords.
5. Press [I/O].
6. Press [D In].

To set up the digital inputs:

1. Press ▲ and ▼ to scroll through the list of digital inputs.
2. Press [Edit] to select a digital input.
3. Press ▼ to select Debounce Time, then press [Edit].
4. Press + to increment the active digit through the numerals 0-9.

   NOTE: Units for debounce time are set in milliseconds.
5. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
6. Continue until all values are selected.
7. Press [OK] to enter the selected number for Debounce Time.



The following sections describe the steps for setting up the input in each control mode.

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Setting Up the Digital Inputs in Normal Mode

1. Press ▼ to select Control Mode, then press [Edit].
2. Press + and - to scroll through the list of control mode options.
3. Press [OK] to select Normal.
4. Press ▲ to save all selections

   NOTE: If the selected digital input already has a demand system association, changing the mode displays a confirmation screen indicating that the previous associations will be lost. Press [Yes] to proceed, or [No] to go back to the previous screen.

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Setting Up the Digital Inputs in Demand Sync Mode

1. Press ▼ to select Control Mode, then press [Edit].
2. Press + and - to scroll through the list of control mode options.
3. Press [OK] to select Select Dmd System.
4. Press ▼ to select Select Dmd System, then press [Edit].
5. Press + and - to scroll through a list of available demand systems.
6. Press [OK] to select a demand system.
7. Press ▲ to save all input selections and return to the previous screen.

   NOTE: A confirmation screen appears. Press [Yes] to proceed, or [No] to go back to the previous screen.
8. Press ▲ to save all digital input selections.

When using a digital input for demand sync, the selected demand method must be “Input Synchronized Block,” or “Input Synchronized Rolling Block,” and the demand interval duration and demand subinterval duration configurations must be the expected durations. The demand sync pulse from the external meter must occur within +/- 5 seconds of the expected duration to be considered a valid sync pulse.

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Digital Outputs

The power meter has two relay outputs, DO1 and DO2. The relay outputs have three control modes:

- **External—**The default setting. The output is controlled by a command sent over the communications link.
- **Alarm—**The output is controlled by the power meter in response to an alarm condition. Multiple alarms can be associated with the same output simultaneously.
- **Demand Sync—**The output signals the end of a demand interval.

The relay outputs have a limited number of operations that depend on the load being switched. Review the relay specifications (“Power Meter Specifications” on page 65) to verify they are suitable for your application.

Depending on the selected control mode, the following behavior modes are available for the relay outputs:

- **Normal**
  - **External[1]:** The output turns on when the “energize” command is received and turns off when the “de-energize” command is received.
  - **Alarm:** The output turns on when an alarm is activated and turns off when it is deactivated.
- **Timed**
  - **External[1]:** The output turns on when the “energize” command is received and turns off after a user-configurable time.
  - **Alarm:** The output turns on when an alarm is activated and turns off after a user-configurable time. The alarm may still be active after the output has turned off.
  - **Demand Sync:** The output turns on at the end of the associated demand interval and stays on for a user-configurable time.
- **Coil Hold**
  - **External[1]:** The output turns on when the “energize” command is received and turns off when the “coil hold release” command is received. In the event of a control power failure, the output remembers and returns to the state it was in when the control power fail occurred.
  - **Alarm:** The output turns on when an alarm is activated and turns off when the alarm is deactivated and acknowledged.

The following sections describe the steps for setting up the output in each of the control modes and associated behavior modes.

[1] See Appendix C “Command Interface” on page 71 for information on commands and using the command interface.

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Setting Up the Digital Output

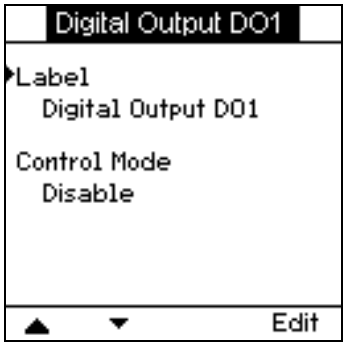
To begin digital output setup:

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Setup].
4. Enter your setup password.

   NOTE: The default password is 0000. See “Setting Up Passwords” on page 27 for information on changing passwords.
5. Press [I/O].
6. Press [D Out].

To set up the digital outputs:

1. Press ▲ and ▼ to scroll through the list of digital outputs.
2. Press [Edit] to select a digital output.
3. Proceed to the following sections to configure the output in External, Alarm, or Demand Sync mode.



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Setting Up the Digital Output in External Mode

1. Press ▼ to select Control Mode, then press [Edit].
2. Press + and - to scroll through the list of control mode options.
3. Press [OK] to select External.

   NOTE: If the selected digital output is in Demand Sync or Alarm mode and has a demand system or alarm association, a confirmation screen appears warning that previous associations will be lost. Press [Yes] to proceed, or [No] to go back to the previous screen.
4. Press ▼ to select Behavior Mode, then press [Edit].
5. Press + and - to select a behavior mode.
6. Press [OK] to select the behavior mode.
7. Press ▼ to select On Time (s), then press [Edit].
8. Press + to increment the active digit through the numerals 0-9.
9. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
10. Continue until all values are selected.
11. Press [OK] to enter the selected number for On Time (s).
12. Press ▲ to save all external mode output selections.

    NOTE: A confirmation screen appears. Press [Yes] to proceed, or [No] to go back to the previous screen.
13. Press ▲ to save all digital output selections.

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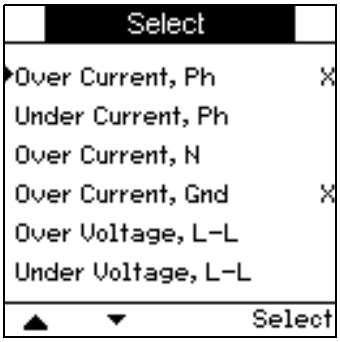
Setting Up the Digital Output in Alarm Mode

1. Press ▼ to select Control Mode, then press [Edit].
2. Press + and - to scroll through the list of control mode options.
3. Press [OK] to select Alarm.

   NOTE: If the selected digital output is in Demand Sync mode and has a demand system association, a confirmation screen appears warning that previous associations will be lost. Press [Yes] to proceed, or [No] to go back to the previous screen.
4. Press ▼ to select Behavior Mode, then press [Edit].
5. Press + and - to select a behavior mode.
6. Press [OK] to select a behavior mode.
7. Press ▼ to select On Time (s), then press [Edit]
8. Press + to increment the active digit through the numerals 0-9.
9. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
10. Continue until all values are selected.
11. Press [OK] to enter the selected number for On Time (s).
12. Press ▼ to select Select Alarms, then press [Edit].
13. Press ▲ and ▼ to scroll through a list of available alarms.
14. Press [Select] to select an alarm.

    NOTE: Any number of alarms can be associated with a digital output. An X appears next to the selected item(s).
15. Press ▲ to save all alarm mode output selections and return to the previous screen.

    NOTE: A confirmation screen appears. Press [Yes] to proceed, or [No] to go back to the previous screen.
16. Press ▲ to save all digital output selections.



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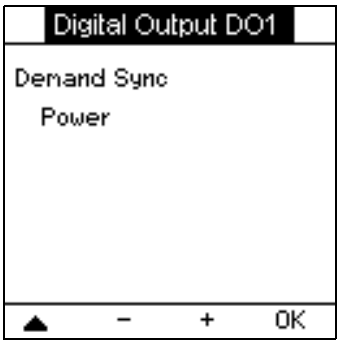
Setting Up the Digital Output in Demand Sync Mode

1. Press ▼ to select Control Mode, then press [Edit].
2. Press + and - to scroll through the list of control mode options.
3. Press [OK] to select Demand Sync.

   NOTE: If the selected digital output is in Alarm mode and has an alarm association, a confirmation screen appears warning that previous associations will be lost. Press [Yes] to proceed, or [No] to go back to the previous screen.
4. Press ▼ to select Behavior Mode, then press [Edit].
5. Press + and - to select a behavior mode.
6. Press [OK] to select a behavior mode.
7. Press ▼ to select On Time (s) then press [Edit].
8. Press + to increment the active digit through the numerals 0-9.
9. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
10. Continue until all values are selected.
11. Press [OK] to enter the selected number for On Time (s).
12. Press ▼ to select Select Dmd System then press [Edit].
13. Press + and - to scroll through a list of available demand systems.
14. Press [OK] to select a demand system.
15. Press ▲ to save all demand sync mode output selections and return to the previous screen.

    NOTE: A confirmation screen appears. Press [Yes] to proceed, or [No] to go back to the previous screen.
16. Press ▲ to save all digital output selections.



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Energy/Alarm LED

The energy/alarm LED has three modes: Off, Alarm, and Energy.

- **Off—** Turns off the LED.
- **Alarm—** The LED flashes when there is an active alarm.
- **Energy—** The LED flashes

Setting Up the Energy/Alarm LED

To begin energy/alarm LED setup:

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Setup].
4. Enter your setup password.

   NOTE: The default password is 0000. See “Setting Up Passwords” on page 27 for information on changing passwords.
5. Press [I/O].
6. Press [LED].

To set up the energy/alarm LED:

1. Press [Edit] to select the Mode.
2. Press + and - to scroll through a list of modes.
3. Press [OK] to select the mode.
   - — Off, continue to Step 12.
   - — Alarm, continue to Step 12.
   - — Energy, continue to Step 4.
4. Press ▼ to select Pulse Weight, then press [Edit].
5. Press + to increment the active digit through the numerals 0-9.
6. Press ◀ to enter the selected value for the active digit and move to the next digit to the left.
7. Continue until all values are selected.
8. Press [OK] to enter the pulse weight.
9. Press ▼ to select Channel, then press [Edit].
10. Press + and - to scroll through a list of energy channels.
11. Press [OK] to enter the energy channel.
12. Press ▲ to save all selections.

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Chapter 7—Maintenance and Troubleshooting

Password Recovery

If you lose your password, contact technical support for password recovery assistance:

- Global-PMC-Tech-support@schneider-electric.com
- (00) + 1 (250) 544-3010.

Technical support will provide you with a new password based on your power meter's serial number.

NOTE: Be sure to include your power meter's serial number in your e-mail or have it readily available when calling technical support.

Power Meter Memory

The power meter uses its nonvolatile memory to retain all data and metering configuration values. Under the operating temperature range specified for the power meter, this nonvolatile memory has an expected life of at least 45 years.

NOTE: Life expectancy is a function of operating conditions and does not constitute any expressed or implied warranty.

Identifying the Firmware Version, Model, and Serial Number

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Diag].
4. Press [Info].
5. View the model, firmware (OS) version, serial number, and other power meter information.
6. Press ▲ to return to the maintenance screen.

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Additional Meter Status Information

Meter

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Diag].
4. Press [Meter].
5. View the power meter diagnostic information.
6. Press ▲ to return to the Maintenance screen.

Control Power

1. Scroll to [Maint] in the menu list.
2. Press [Maint].
3. Press [Diag].
4. Press [Ctl Pwr].
5. View control power information.
6. Press ▲ to return to the maintenance screen.

Downloading Firmware

The power meter supports the downloading of new firmware and language files over the communications link. This requires the free DLF3000 software, which is available at www.powerlogic.com. The DLF3000 offers an extensive Help file with informations on operating the software. The most recent firmware and language files are also available on the website.

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Troubleshooting

The information in Table 7–1 on page 64 describes potential problems and their possible causes. It also describes checks you can perform or possible solutions for each. After referring to this table, if you cannot resolve the problem, contact your local Schneider Electric sales representative for assistance.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical practices. For example, in the United States, see NFPA 70E.
- This equipment must be installed and serviced only by qualified personnel.
- Turn off all power supplying this equipment before working on or inside.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Carefully inspect the work area for tools and objects that may have been left inside the equipment.
- Use caution while removing or installing panels so that they do not extend into the energized bus; avoid handling the panels, which could cause personal injury.

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

Heartbeat/Comms LED

The heartbeat/comms LED helps to troubleshoot the power meter. The heartbeat/comms LED works as follows:

- **Normal operation** — the LED flashes at a steady rate during normal operation.
- **Communications** — the LED flash rate changes as the communications port transmits and receives data. If the LED flash rate does not change when data is sent from the host computer, the power meter is not receiving requests from the host computer.
- **Hardware** — if the heartbeat LED remains lit and does not flash On and Off, there is a hardware problem. Perform a hard reset of the power meter (turn Off power to the power meter, then restore power to the power meter). If the heartbeat LED remains lit, contact your local sales representative.
- **Control power and display** — if the heartbeat LED flashes, but the display is blank, the display may not be functioning properly or may have timed out (see “Setting Up the Display (continued)” on page 25). If the display is blank and the LED is not lit, verify that control power is connected to the power meter.

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Table 7–1: Troubleshooting

Potential Problem	Possible Cause	Possible Solution
The maintenance (wrench) icon is illuminated on the power meter display.	When the maintenance (wrench) icon is illuminated, it indicates a potential hardware or firmware problem in the power meter.	Go to [Maint] > [Diag]. Error messages display to indicate the reason the icon is illuminated. Note these error messages and call Technical Support or contact your local sales representative for assistance.
The display is blank after applying control power to the power meter.	The power meter may not be receiving the necessary power. The display may have timed out.	Verify that the power meter line and terminals are receiving the necessary power. Verify that the heartbeat LED is blinking. Press a button to see if the display timed out.
The data being displayed is inaccurate or not what you expect.	Incorrect setup values.	Check that the correct values have been entered for power meter setup parameters (CT and VT ratings, Nominal Frequency, and so on). See “Setting Up the Power Meter” on page 10 for setup instructions.
	Incorrect voltage inputs.	Check power meter voltage input terminals L (8, 9, 10, 11) to verify that adequate voltage is present.
	Power meter is wired improperly.	Check that all CTs and VTs are connected correctly (proper polarity is observed) and that they are energized. Check shorting terminals. See the recommended torque in the Wiring section of the installation manual.
Cannot communicate with power meter from a remote personal computer.	Power meter address is incorrect.	Check to see that the power meter is correctly addressed. See “Setting Up Communications” on page 23 for instructions.
	Power meter baud rate is incorrect.	Verify that the baud rate of the power meter matches the baud rate of all other devices on its communications link. See “Setting Up Communications” on page 23 for instructions.
	Communications lines are improperly connected.	Verify the power meter communications connections. Refer to the Communications section in the installation manual for instructions.
	Communications lines are improperly terminated.	Check to see that a multipoint communications terminator is properly installed. See the Communications section in the installation manual for instructions.
	Incorrect route statement to power meter.	Check the route statement. Refer to the SMS online help for instructions on defining route statements.
Energy/Alarm LED not working	May have been disabled by user.	See “LEDs” on page 5

The power meter does not contain any user-serviceable parts. If the power meter requires service, contact your local sales representative. Do not open the power meter. Opening the power meter voids the warranty.

Getting Technical Support

Please refer to the *Technical Support Contacts* provided in the power meter shipping carton for a list of support phone numbers by country, or go to www.powerlogic.com, select your country > Support, then navigate to support for contact information by country.

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Appendix A—Specifications

Power Meter Specifications

Table A –1: Specifications

Electrical Characteristics			
Type of Measurement			RMS including harmonics on three-phase AC system (3P, 3P + N) 32 samples per cycle, zero blind
Measurement Accuracy	Current, Phase		±0.24% from 0.5 to 9.0 A
	Voltage, L-N		±0.30% from 65 to 347 Vac
	Power Factor		±0.50% from 0.5 to 9.0 A at 120 V, -60 to 60 degrees
	Power, 3 Phase		±0.36% from 0.5 to 9.0 A at 120 V, -60 to 60 degrees
	Frequency		±0.03% from 45 to 70 Hz
	Real Energy		IEC 62053-22 Class 0.5S, IEC 61557-12 Class 0.5 for 5A nominal CT (1A nominal CT when I > 150 mA)
	Reactive Energy		IEC 62053-22 Class 2, IEC 61557-12 Class 2 for 5A nominal CT (1A nominal CT when I > 150 mA)
Data Update Rate			1 s
Input-Voltage	VT primary		1.0 MVac max, the starting voltage depends on the VT ratio.
	U_{nom}		277 V L-N
	Measured Voltage with overrange and Crest Factor		20 to 690 Vac L-L 20 to 400 Vac L-N
	Permanent Overload		710 Vac L-L 410 Vac L-N
	Impedance		10 MΩ
	Frequency Range		45 to 70 Hz
Input-Current	CT Ratings	Primary	Adjustable from 5A to 32767 A
		Secondary	5 A Nominal (1A nominal CT when I > 150 mA)
	Measured Current with overrange and Crest Factor		5 mA to 9 A
	Withstand		Continuous 20A 10 sec/hr 50A 1 sec/hr 500A
	Impedance		< 0.3 mΩ
	Frequency Range		45 to 70 Hz
	Burden		< 0.024 VA at 9 A
AC Control Power	Operating Range		85 to 265 Vac
	Burden		4.1 VA / 1.5 W typical, 6.7 VA / 2.7 W maximum at 120 Vac 6.3 VA / 2.0 W typical, 8.6 VA / 2.9 W maximum at 230 Vac 9.6 VA / 3.5 W maximum at 265 Vac
	Frequency		45 to 65 Hz
	Ride-Through Time		100 mS typical at 120 Vac and maximum burden 400 mS typical at 230 Vac and maximum burden
DC Control Power	Operating Range		100 to 300 Vdc
	Burden		1.4 W typical, 2.6 W maximum at 125 Vdc 1.8 W typical, 2.7 W maximum at 250 Vdc 3.2 W maximum at 300 Vdc
	Ride-Through Time		50 mS typical at 125 Vdc and maximum burden
Real Time Clock	Ride-Through Time		30 seconds

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Table A –1: Specifications *(continued)*

Digital Output	Number/Type	2 - Mechanical Relays
	Output Frequency	0.5 Hz maximum (1 second ON / 1 second OFF - minimum times)
	Switching Current	250 Vac at 2.0 Amps, 200k cycles, resistive 250 Vac at 8.0 Amps, 25k cycles, resistive 250 Vac at 2.0 Amps, 100k cycles, COSΦ=0.4 250 Vac at 6.0 Amps, 25k cycles, COSΦ=0.4 30 Vdc at 2.0 Amps, 75k cycles, resistive 30 Vdc at 5.0 Amps, 12.5k cycles, resistive
	Isolation	2.5 kVrms
Status Digital Inputs	Voltage Ratings	ON 18.5 to 36 Vdc OFF 0 to 4 Vdc
	Input Resistance	110k Ω
	Maximum Frequency	25 Hz
	Response Time	10 milliseconds
	Isolation	2.5 kVrms
Whetting Output	Nominal Voltage	24 Vdc
	Allowable Load	4 mA
	Isolation	2.5 kVrms
Mechanical Characteristics		
Weight		250 g
IP Degree of Protection (IEC 60529)		Designed to IP51 front display, IP30 meter body
Dimensions (W x H x D)		96 x 96 x 44 mm (depth of meter from housing mounting flange 96 x 96 x 13 mm (protrusion of meter from housing mounting flange)
Mounting Position		Vertical
Panel Thickness		6.35 mm maximum
Environmental Characteristics		
Operating Temperature	Meter	-25 to +70 °C
	Display	-20 to +70 °C (Display functions to -25 C with reduced performance)
Storage Temperature	Meter + Display	-40 °C to +85 °C
Humidity Rating		5 to 95% RH at 50 °C (non-condensing)
Pollution Degree		2
Altitude		3000 m
Electromagnetic Compatibility		
Electrostatic Discharge		Level III (IEC 61000-4-2)
Immunity to Radiated Fields		Level III (IEC 61000-4-3)
Immunity to Fast Transients		Level III (IEC 61000-4-4)
Immunity to Impulse Waves		Level III (IEC 61000-4-5)
Conducted Immunity		Level III (IEC 61000-4-6)
Immunity to Magnetic Fields		Level III (IEC 61000-4-8)
Immunity to Voltage Dips		Level III (IEC 61000-4-11)
Radiated Emissions		FCC Part 15 Class A, EN55011 Class A
Conducted Emissions		FCC Part 15 Class A, EN55011 Class A
Harmonics		IEC 61000-3-2
Flicker Emissions		IEC 61000-3-3
Safety		
Europe		CE, as per IEC 61010-1, IEC 61557-12
U.S. and Canada		cULus as per UL 61010-1, IEC 61010-1 (addition to)
Measurement Category (Voltage Inputs)		CAT III, for MAINS supply up to 300 V L-N / 520 V L-L[1] nominal CAT II, for MAINS supply up to 400 V L-N / 690 V L-L[1] nominal [1](V L-L is limited to 710 Vac by creepage distance)
Measurement Category (Current Inputs)		CAT III

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Table A –1: Specifications *(continued)*

Overvoltage Category (Control Power)		CAT III
Dielectric Withstand		As per IEC 61010-1 Double insulated front panel display
Protective Class		II
Communications		
RS485 Port		2-wire, 9600, 19200, or 38400 baud; Parity— Even, Odd, None; 1 stop bit if parity Odd or Even, 2 stop bits if None; Modbus RTU, Modbus ASCII, JBUS
Firmware and Language File Update		Update via the communication port using DLF3000 software
Isolation		2.5 kVrms, double insulated
Human Machine Interface		
Display	Type	Monochrome Graphics
	Resolution	128 x 128
	Backlight	White LED
	Viewable Area (w x h)	67 x 62.5 mm
Keypad	Type	4 button
Indicator	Heartbeat/Comm Activity	Green LED
Energy Pulse Output		
Type		Optical, amber LED
Wavelength		590 to 635 nM
Maximum Pulse Rate		2.5 kHz

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Appendix B—Communications Wiring

Communications Capabilities

Table B–1: RS485 Communications Distances

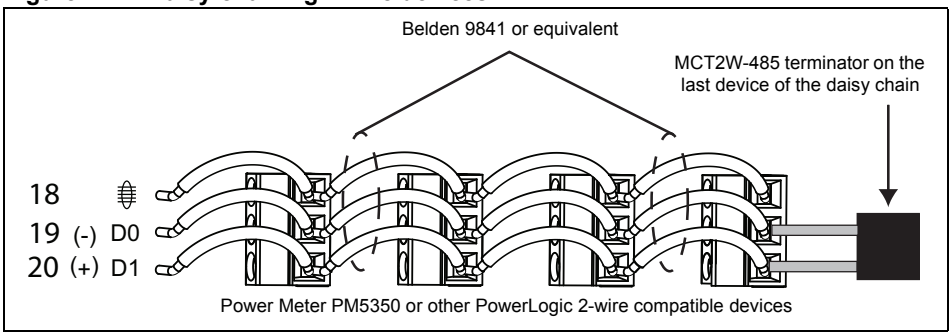
Baud Rate	Maximum Communication Distances 1 to 32 Devices	
	Feet	Meters
9600	8,000	2,438
19200	6,000	1,829
38400	2,500	762

NOTE: Distances listed should be used as a guide only and cannot be guaranteed for non-PowerLogic devices. Refer to the master device's documentation for any additional distance limitations.

Daisy-Chaining Devices to the Power Meter

The RS485 slave port allows the power meter to be connected in a daisy chain with up to 31, 2-wire devices. In this document, communications link refers to a chain of devices that are connected by a communications cable.

Figure B–1: Daisy-chaining 2-wire devices



- If the power meter is the last device on the daisy chain, terminate it with the terminator provided.
- See Table B–1 for the maximum daisy-chain communications distances for 2-wire devices.

The terminal's voltage and current ratings are compliant with the requirements of the EIA RS485 communications standard.

⚠ WARNING

HAZARD OF ELECTRIC SHOCK

- Shield conductors may be energized if not properly connected.
- Shield wire should be installed per the device's installation instructions and grounded at one end only.

Failure to follow these instructions can result in death or serious injury.

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Appendix C—Command Interface

Command Interface

The command interface allows you to configure the power meter by sending specific commands using Modbus protocol.

Table C–1: Command Interface

		Protected Command Interface	Unprotected Command Interface
	Command Block	**Register #**	**Register #**
A	Command	5000	5250
B	Semaphore	5001	5251 (Ignored)
C	Parameters	5002 - 5124	5252 - 5374
	Meter Results	**Register #**	**Register #**
D	Status	5125	5375
E	Result	5126	5376
F	Data	5127 - 5249	5377- 5499

A. In the **Command** register, enter a meter command (see “Command List” on page 73).

B. In the **Semaphore** register, when using the protected command interface, enter the semaphore you are given (see “Using the Protected Command Interface” on page 72). The semaphore register is not used with the unprotected command interface (see “Using the Unprotected Command Interface” on page 73).

C. In the **Parameters** register, enter all parameters (see “Command List” on page 73) for a meter command.

D. The **Status** register displays 0 when the power meter receives a command. Once the command is completed, the status register displays the same value as the command register.

E. The **Result** register indicates if the command was successful, and if not, what error may have occurred (see Appendix D “Command Interface” on page 84).

F. The **Data** register displays the executed parameters of a successful command and the invalid parameters based on data type of an unsuccessful command (see Appendix D “Data Types” on page 102).

There are two command interfaces, protected and unprotected, described in the following sections.

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Using the Protected Command Interface

To issue a meter command using the protected command interface, you must have a command semaphore.

To get a semaphore, read the semaphore Modbus register. The power meter will return a 0 or a nonzero number.

- If 0 is returned, someone else owns the semaphore. You must wait for the semaphore to be available before sending a command.
- If a nonzero number is returned, you now own the semaphore. The semaphore is provided once until it is released or has been inactive for approximately 4 minutes. Once you have the semaphore, subsequent reads of the semaphore register will return 0 until you release the semaphore or it times out.

To send a meter command using the protected command interface:

1. Read the semaphore register and record the meter response. This is your semaphore.
2. Build the packet to be written to the command block.
3. Write the packet as a Modbus block write (enter the command number, semaphore, and parameters at the same time).

Table C–2: Protected Command Block Example

Command Block	Register #
Command	2039
Semaphore	5
Parameters	1

4. Monitor the meter response registers for validity and completion.

Table C–3: Protected Meter Response Example

Meter Response	Register #
Status	2039
Result	0
Data	1

5. Write the semaphore back to the semaphore register to release it for future use.

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Using the Unprotected Command Interface

The unprotected command interface allows you to issue a broadcast command to multiple meters at once. The unprotected command interface ignores the semaphore register.

Although some applications require the unprotected command interface, it is recommended that you use the protected command interface whenever possible.

To send a meter command using the unprotected command interface:

1. Build the packet to be written to the command block.
2. Write the packet as a Modbus block write (enter the command number, any number as the semaphore, and the parameters at the same time).

Table C–4: Unprotected Command Block Example

Command Block	Register #
Command	2039
Semaphore	___
Parameters	1

3. Monitor the meter response registers for validity and completion.

Table C–5: Unprotected Meter Response Example

Meter Response	Register #
Status	2039
Result	0
Data	1

Command List

Table C–6: Command List

Command Name	Command #	Parameters	User Notes
REGISTER_ACCESS (0 - 999)			
Reset Subsystem(s) to Default	1	(1) Command Semaphore (2) 1 or -1 (For All Subsystems) (3) Subsystem ID or -1 (For All Subsystems)	Subsystem IDs 0 = Register Access 1 = System 2 = Metering 3 = Commands 4 = HMI 5 = Communications 6 = IO 7 = Alarms 8 = Files 9 = Diagnostics 10 = Security
SYSTEM (1000 - 1999)			
Warm Start Reset	1000	(1) Command Semaphore	This command does not provide a command status or result.
Reset Power Fail Counter	1002	(1) Command Semaphore	

[1] Allowed for Unprotected Command Interface.

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Table C–6: Command List

Command Name	Command #	Parameters	User Notes
Set Date/Time[1]	1003	(1) Command Semaphore (2) Year (2000-2127) (3) Month (4) Day of Month (5) Hour (6) Minute (7) Second (8) Millisecond	
Disable Revenue Security Switch	1004	(1) Command Semaphore	
Enable Revenue Security Switch	1005	(1) Command Semaphore	
Meter Name Setup	1008	(1) Command Semaphore (2-21) Meter Name	
METERING (2000 - 2999)			
Demand System Setup	2002	(1) Command Semaphore (2) Demand System ID (3) Demand Method (4) Demand Interval Duration (5) Demand Subinterval Duration	Demand System ID 1 = Power 2 = Current 3 = Input Metering
Energy Pulse Output Setup	2003	(1) Command Semaphore (2) Energy Channel (3) Digital Output ID (4-5) Pulse Weight (6) Energy Channel (7) Digital Output ID (8-9) Pulse Weight (10) Energy Channel (11) Digital Output ID (12-13) Pulse Weight	Digital Output ID 1 = Digital Output S01 2 = Digital Output S02 99 = Energy LED
Reset Cycle Count[1]	2007	(1) Command Semaphore	
Reset All Min/Max[1]	2009	(1) Command Semaphore	
Reset Active Load Timer[1]	2010	(1) Command Semaphore	
Reset All Demands[1]	2011	(1) Command Semaphore (2-5) Demand Reset Password	The Demand Reset Password is verified if Revenue Security is active.
Reset Current Demand[1]	2012	(1) Command Semaphore	
Reset Power Demand[1]	2013	(1) Command Semaphore (2-5) Demand Reset Password	The Demand Reset Password is verified if Revenue Security is active.
Reset All Peak Demands[1]	2015	(1) Command Semaphore (2-5) Demand Reset Password	The Demand Reset Password is verified if Revenue Security is active.
Reset Current Peak Demands[1]	2016	(1) Command Semaphore	
Reset Power Peak Demands[1]	2017	(1) Command Semaphore (2-5) Demand Reset Password	The Demand Reset Password is verified if Revenue Security is active.
Start New Demand Interval[1]	2019	(1) Command Semaphore (2) Bitmap of Demand Systems	
Reset All Energies[1]	2020	(1) Command Semaphore	
Reset All Accumulated Energies[1]	2021	(1) Command Semaphore	
Reset All Energy Pulse Output Channels[1]	2024	(1) Command Semaphore	

[1] Allowed for Unprotected Command Interface.

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Table C–6: Command List

Command Name	Command #	Parameters	User Notes
Meter Initialization	2037	(1) Command Semaphore	Resets Energy Demand Demand peaks Min/Max Alarm counters Alarm logs Alarm event queue IO Counters IO Timers Active Load Timer Comm diagnostics Power fail counter Cycle counter
Energy/Alarm LED Enable	2039	(1) Command Semaphore (2) 0 = Disable / 1 = Energy / 2 = Alarm	
TDD Setup	2043	(1) Command Semaphore (2-3) Peak Current Demand Over Last Year	
Active Load Timer Setup	2044	(1) Command Semaphore (2-3) Active Load Timer Setpoint	
COMMANDS (3000 - 3999)			
HMI (4000 - 4999)			
HMI Setup	4000	(1) Command Semaphore (2) HMI Contrast Setting (3) HMI Backlight On/Off (4) HMI Language (5) HMI IEC/IEEE Mode (6) HMI Date Format (7) HMI Time Format (8) HMI Backlight Timeout (9) HMI Screen Timeout (10) HMI Energy Resolution (11) HMI Current Resolution (12) HMI Voltage Resolution (13) HMI Power Resolution	

[1] Allowed for Unprotected Command Interface.

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Table C–6: Command List

Command Name	Command #	Parameters	User Notes
COMMUNICATIONS (5000 - 5999)			
Communications Setup[1]	5000	(1) Command Semaphore (2) Communications Port ID (3) RS-485 Comm Port (M/S) Protocol (4) RS-485 Comm Port (M/S) Address (5) RS-485 Comm Port (M/S) Baud Rate (6) RS-485 Comm Port (M/S) Parity (7) RS-485 Comm Port (M/S) Modbus ASCII Default Timeout	Communications Port ID 1 = Standard RS-485
Reset Comm Port Counters[1]	5001	(1) Command Semaphore (2) Communications Port ID	Communications Port ID 1 = Standard RS-485
I/O (6000 - 6999)			
Digital Output Setup	6000	(1) Command Semaphore (2) Digital Output ID (3-22) Label (23) Behavioral Mode (24) On Time For Timed Mode	Digital Output ID 1 = Digital Output S01 2 = Digital Output S02
Digital Input Setup	6001	(1) Command Semaphore (2) Digital Input ID (3-22) Label (23) Debounce Time	Digital Input ID 1 = Digital Input S01 2 = Digital Input S02 3 = Digital Input S03 4 = Digital Input S04
De-energize Digital Output[1]	6002	(1) Command Semaphore (2) Digital Output ID	Digital Output ID 1 = Digital Output S01 2 = Digital Output S02
Energize Digital Output[1]	6003	(1) Command Semaphore (2) Digital Output ID	Digital Output ID 1 = Digital Output S01 2 = Digital Output S02
Release Digital Output From Coil Hold[1]	6004	(1) Command Semaphore (2) 1 or -1 (For All Digital Outputs) (3) Digital Output ID or -1 (For All Digital Outputs)	Digital Output ID 1 = Digital Output S01 2 = Digital Output S02
Release Digital Output From Override Control	6005	(1) Command Semaphore (2) 1 or -1 (For All Digital Outputs) (3) Digital Output ID or -1 (For All Digital Outputs)	Digital Output ID 1 = Digital Output S01 2 = Digital Output S02
Place Digital Output In Override Control	6006	(1) Command Semaphore (2) 1 or -1 (For All Digital Outputs) (3) Digital Output ID or -1 (For All Digital Outputs)	Digital Output ID 1 = Digital Output S01 2 = Digital Output S02
Reset Operation Counter For Digital Output[1]	6007	(1) Command Semaphore (2) 1 or -1 (For All Digital Outputs) (3) Digital Output ID or -1 (For All Digital Outputs)	Digital Output ID 1 = Digital Output S01 2 = Digital Output S02
Reset On-Time For Digital Output[1]	6008	(1) Command Semaphore (2) 1 or -1 (For All Digital Outputs) (3) Digital Output ID or -1 (For All Digital Outputs)	Digital Output ID 1 = Digital Output S01 2 = Digital Output S02
Reset Operation Counter For Digital Input[1]	6009	(1) Command Semaphore (2) 1 or -1 (For All Digital Inputs) (3) Digital Input ID or -1 (For All Digital Inputs)	Digital Input ID 1 = Digital Input S01 2 = Digital Input S02 3 = Digital Input S03 4 = Digital Input S04

[1] Allowed for Unprotected Command Interface.

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Table C–6: Command List

Command Name	Command #	Parameters	User Notes
Reset On-Time For Digital Input[1]	6010	(1) Command Semaphore (2) 1 or -1 (For All Digital Inputs) (3) Digital Input ID or -1 (For All Digital Inputs)	Digital Input ID 1 = Digital Input S01 2 = Digital Input S02 3 = Digital Input S03 4 = Digital Input S04
Setup Digital Input To Demand Associations	6011	(1) Command Semaphore (2) Digital Input ID for Demand System 1 (3) Digital Input ID for Demand System 2 (4) Digital Input ID for Demand System 3 (5) Digital Input ID for Demand System 4 (6) Digital Input ID for Demand System 5 (7) Digital Input ID for Demand System 6	
Setup Digital Output To Demand Associations	6012	(1) Command Semaphore (2) Digital Output ID for Demand System 1 (3) Digital Output ID for Demand System 2 (4) Digital Output ID for Demand System 3 (5) Digital Output ID for Demand System 4 (6) Digital Output ID for Demand System 5 (7) Digital Output ID for Demand System 6	
De-energize Digital Output While In Override	6015	(1) Command Semaphore (2) Digital Output ID	
Energize Digital Output While In Override	6016	(1) Command Semaphore (2) Digital Output ID	
ALARMS (7000 - 7999)			
Over/Under Alarm Setup	7000	(1) Command Semaphore (2) Alarm ID (3) Priority (0=None, 1=High, 2=Medium, 3=Low) (4) Setpoints (0 = Fixed, 1 = Variable) (5) Learning (0 = Not Learning, 1 = Learning) (6) Enable (0 = Disabled, 1 = Enabled) (7-8) Pickup Setpoint (9-10) Pickup Time Delay (11-12) Dropout Setpoint (13-14) Dropout Time Delay (15) Digital Outputs to Associate - Standard	See “List of Standard Over/Under Alarms” on page 44 for Alarm IDs 1-29. Alarm ID 41 = Custom Alarm 1 42 = Custom Alarm 2 43 = Custom Alarm 3 44 = Custom Alarm 4 45 = Custom Alarm 5 46 = Custom Alarm 6 47 = Custom Alarm 7 48 = Custom Alarm 8 49 = Custom Alarm 9 50 = Custom Alarm 10
Reset Alarm Counters	7002	(1) Command Semaphore (2) 1 or -1 (For All Alarms) (3) Alarm ID or -1 (For All Alarms)	
Acknowledge Alarms[1]	7003	(1) Command Semaphore (2) 1 or -1 (For All Alarms) (3) Alarm ID or -1 (For All Alarms)	
Disable Alarms	7004	(1) Command Semaphore (2) 1 or -1 (For All Alarms) (3) Alarm ID or -1 (For All Alarms)	
Reset Aggregated Alarm History[1]	7005	(1) Command Semaphore	
Reset Event Queue[1]	7006	(1) Command Semaphore	

[1] Allowed for Unprotected Command Interface.

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Table C–6: Command List

Command Name	Command #	Parameters	User Notes
Digital Alarm Setup	7007	(1) Command Semaphore (2) Alarm ID (3) Priority (0=None, 1=High, 2=Medium, 3=Low) (4) Enable (0 = Disabled, 1 = Enabled) (5) Subtype (0 = Off, 1 = On) (6-7) Pickup Time Delay (8-9) Dropout Time Delay (10) Digital Outputs to Associate - Standard	Alarm ID 111 = Digital Input S01 112 = Digital Input S02 113 = Digital Input S03 114 = Digital Input S04
Unary Alarm Setup	7008	(1) Command Semaphore (2) Alarm ID (3) Priority (0=None, 1=High, 2=Medium, 3=Low) (4) Enable (0 = Disabled, 1 = Enabled) (5) Digital Outputs to Associate - Standard	Alarm ID 101 = Meter Power Up (Control Power Loss) 102 = Meter Reset 103 = Meter Diagnostics 104 = Phase Reversal
FILES (8000 - 8999)			
DIAGNOSTICS (9000 - 9999)			
Reset Diagnostic Log[1]	9000	(1) Command Semaphore	
SECURITY (10000 - 10999)			

[1] Allowed for Unprotected Command Interface.

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Appendix D—Register List

Register List

See Table D–2 on page 102 for data type information. See Appendix C “Command Interface” on page 71 for the command list and command interface information.

Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
System Setup & Status							
Product & Features							
30	Meter Name	20	UTF8	RWC	Y	---	
50	Meter Model	20	UTF8	RWC	Y	---	
70	Manufacturer	20	UTF8	RWC	Y	---	
90	Product ID Number	1	INT16U	RWC	Y	---	PM5350 = 15234
Manufacturing Data							
Meter							
130	Serial Number	2	INT32U	R	Y	---	
132	Date of Manufacture	4	DATETIME	R	Y	---	
136	Hardware Revision	5	UTF8	R	Y	---	
Firmware Versions							
Operating System							
1637	Present Firmware Version (DLF Format) X.Y.T	1	INT16U	R	Y	---	
1642	Previous Firmware Version (DLF Format) X.Y.T	1	INT16U	R	Y	---	
1647	Date/Time of Last Firmware Download	4	DATETIME	R	Y	---	
Reset							
1669	Present Firmware Version (DLF Format) X.Y.T	1	INT16U	R	Y	---	
Language							
1701	Present Firmware Version (DLF Format) X.Y.T	1	INT16U	R	Y	---	
Meter Resets							
1824	Last Unit Restart DateTime	4	DATETIME	R	Y	---	
1828	Number of Metering System Restarts	1	INT16U	R	Y	---	
1829	Number of Control Power Failures	1	INT16U	R	Y	---	
1830	Date/Time of Last Control Power Failure	4	DATETIME	R	Y	---	
1834	Duration of Last Control Power Failure	2	INT32U	R	Y	seconds	
1836	Cause of Last Meter Reset	1	INT16U	R	Y	---	0 = Unknown 1 = Reset command 2 = Power failure
Timekeeping							
Present Date & Time (7 register format)							
1837	Year	1	INT16U	R	N	year	
1838	Month	1	INT16U	R	N	month	
1839	Day	1	INT16U	R	N	days	
1840	Hour	1	INT16U	R	N	hours	
1841	Minute	1	INT16U	R	N	minutes	
1842	Second	1	INT16U	R	N	seconds	
1843	Millisecond	1	INT16U	R	N	msec	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Present Date & Time (4 register format)							
1845	Year	1	INT16U	R	N	---	
1846	Month & Day	1	INT16U	R	N	---	
1847	Hour & Minute	1	INT16U	R	N	---	
1848	Milliseconds	1	INT16U	R	N	---	
Time Management Setup							
1850	Time Zone Offset From GMT	1	INT16U	RWC	Y	---	
1851	GMT or Local Date/Time Selection	1	INT16U	RWC	Y	---	0 = GMT 1 = Local Date/Time
Security							
Revenue Security							
1920	Revenue Security Switch Status	1	INT16U	R	Y	---	0 = disabled 1 = enabled
1921	Revenue Security Status	1	INT16U	R	Y	---	0 = inactive 1= active
1922	Date/Time of Last Revenue Security State Change	4	DATETIME	R	Y	---	
Meter Setup & Status							
Miscellaneous Control & Status							
2002	Active Load Timer	2	INT32U	R	Y	seconds	Increments when average current exceeds the Active Load Timer Setpoint.
2004	Meter Operation Timer	2	INT32U	R	Y	seconds	
Metering Setup							
Power System							
2014	Number of Phases	1	INT16U	RWC	Y	---	
2015	Number of Wires	1	INT16U	RWC	Y	---	
2016	Power System Configuration	1	INT16U	RWC	Y	---	0 = 1ph, 2w, LN 1 = 1ph, 2w, LL 2 = 1ph, 3w, LL with N 3 = 3ph, 3w, Delta, Ungrounded 4 = 3ph, 3w, Delta, Corner Grounded 5 = 3ph, 3w, Wye, Ungrounded 6 = 3ph, 3w, Wye Grounded 7 = 3ph, 3w, Wye, Resistance Grounded 8 = 3ph, 4w, Open Delta, Center-Tapped 9 = 3ph, 4w, Delta, Center-Tapped 10 = 3ph, 4w, Wye, Ungrounded 11 = 3ph, 4w, Wye Grounded 12 = 3ph, 4w, Wye, Resistance Grounded 13 = Multiple 1ph, 2w, LN
2017	Nominal Frequency	1	INT16U	RWC	Y	Hz	
2018	Nominal Voltage	2	FLOAT32	RWC	Y	V	
2020	Nominal Current	2	FLOAT32	RWC	Y	A	
2022	Nominal Power Factor	2	PF32	RWC	Y	---	
2024	Normal Phase Rotation	1	INT16U	RWC	Y	---	
Instrument Transformers							
2025	Number VTs	1	INT16U	RWC	Y	---	
2026	VT Primary	2	FLOAT32	RWC	Y	V	
2028	VT Secondary	1	INT16U	RWC	Y	V	
2029	Number CTs	1	INT16U	RWC	Y	---	
2030	CT Primary	1	INT16U	RWC	Y	A	
2031	CT Secondary	1	INT16U	RWC	Y	A	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
2034	CT Location for 1 CT Metering	1	INT16U	RWC	Y	---	1 = Phase A, 2 = Phase B 3 = Phase C
2035	VT Location for 1 VT Metering	1	INT16U	RWC	Y	---	1 = Phase A 2 = Phase B 3 = Phase C
2036	VT Connection Type	1	INT16U	RWC	Y	---	0 = Direct Connect 1 = Delta (2 VT) 2 = Wye (3 VT) 3 = L-N (1 VT) 4 = L-L (1 VT) 5 = L-L W/N (2 VT)
Operating Modes							
2048	Peak Current Demand Over Last Year	2	FLOAT32	RWC	Y	A	Entered by the user for use in calculation of Total Demand Distortion. 0 = Calculation performed using peak demand of 3-phase average current.
2050	Active Load Timer Setpoint	2	FLOAT32	RWC	Y	A	
Energy Pulse Output Setup							
Alarm / Energy LED Mode							
2126	Alarm / Energy LED Mode	1	INT16U	RWC	Y	---	0 = Disable 1 = Active Alarm (default) 2 = Energy
Energy Pulse Output Channel 01							
2130	Energy Channel	1	INT16U	RWC	Y	---	0 = Not Used 1 = Active Energy Delivered (Into Load) 2 = Active Energy Received (Out of Load) 3 = Active Energy Delivered + Received 4 = Reactive Energy Delivered 5 = Reactive Energy Received 6 = Reactive Energy Delivered + Received 7 = Apparent Energy Delivered 8 = Apparent Energy Received 9 = Apparent Energy Delivered + Received
2131	Digital Output Association	1	INT16U	RWC	Y	---	0 = No association 1 - 2 = Digital Output 99 = LED
2132	Pulse Weight	2	FLOAT32	RWC	Y	kWh, kVAh, kVAh	
Meter Data (Basic)							
1s Metering (50/60 Cycles)							
Current							
3000	Current A	2	FLOAT32	R	N	A	
3002	Current B	2	FLOAT32	R	N	A	
3004	Current C	2	FLOAT32	R	N	A	
3006	Current N	2	FLOAT32	R	N	A	
3008	Current G	2	FLOAT32	R	N	A	
3010	Current Avg	2	FLOAT32	R	N	A	
Current Unbalance							
3012	Current Unbalance A	2	FLOAT32	R	N	%	
3014	Current Unbalance B	2	FLOAT32	R	N	%	
3016	Current Unbalance C	2	FLOAT32	R	N	%	
3018	Current Unbalance Worst	2	FLOAT32	R	N	%	
Voltage							
3020	Voltage A-B	2	FLOAT32	R	N	V	
3022	Voltage B-C	2	FLOAT32	R	N	V	
3024	Voltage C-A	2	FLOAT32	R	N	V	
3026	Voltage L-L Avg	2	FLOAT32	R	N	V	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
3028	Voltage A-N	2	FLOAT32	R	N	V	
3030	Voltage B-N	2	FLOAT32	R	N	V	
3032	Voltage C-N	2	FLOAT32	R	N	V	
3036	Voltage L-N Avg	2	FLOAT32	R	N	V	
Voltage Unbalance							
3038	Voltage Unbalance A-B	2	FLOAT32	R	N	%	
3040	Voltage Unbalance B-C	2	FLOAT32	R	N	%	
3042	Voltage Unbalance C-A	2	FLOAT32	R	N	%	
3044	Voltage Unbalance L-L Worst	2	FLOAT32	R	N	%	
3046	Voltage Unbalance A-N	2	FLOAT32	R	N	%	
3048	Voltage Unbalance B-N	2	FLOAT32	R	N	%	
3050	Voltage Unbalance C-N	2	FLOAT32	R	N	%	
3052	Voltage Unbalance L-N Worst	2	FLOAT32	R	N	%	
Power							
3054	Active Power A	2	FLOAT32	R	N	kW	
3056	Active Power B	2	FLOAT32	R	N	kW	
3058	Active Power C	2	FLOAT32	R	N	kW	
3060	Active Power Total	2	FLOAT32	R	N	kW	
3062	Reactive Power A	2	FLOAT32	R	N	kVAR	
3064	Reactive Power B	2	FLOAT32	R	N	kVAR	
3066	Reactive Power C	2	FLOAT32	R	N	kVAR	
3068	Reactive Power Total	2	FLOAT32	R	N	kVAR	
3070	Apparent Power A	2	FLOAT32	R	N	kVA	
3072	Apparent Power B	2	FLOAT32	R	N	kVA	
3074	Apparent Power C	2	FLOAT32	R	N	kVA	
3076	Apparent Power Total	2	FLOAT32	R	N	kVA	
Power Factor							
3078	Power Factor A	2	PF32	R	N	---	
3080	Power Factor B	2	PF32	R	N	---	
3082	Power Factor C	2	PF32	R	N	---	
3084	Power Factor Total	2	PF32	R	N	---	
3086	Displacement Power Factor A	2	PF32	R	N	---	
3088	Displacement Power Factor B	2	PF32	R	N	---	
3090	Displacement Power Factor C	2	PF32	R	N	---	
3092	Displacement Power Factor Total	2	PF32	R	N	---	
Frequency							
3110	Frequency	2	FLOAT32	R	N	Hz	
Miscellaneous							
3134	Phase Rotation	1	INT16U	R	N	---	0 = ABC, 1 = CBA
Energy							
Accumulated Energy							
3200	Accumulated Energy Reset Date/Time	4	DATETIME	R	Y	---	
3204	Active Energy Delivered (Into Load)	4	INT64	R	Y	Wh	
3208	Active Energy Received (Out of Load)	4	INT64	R	Y	Wh	
3212	Active Energy Delivered + Received	4	INT64	R	Y	Wh	
3216	Active Energy Delivered – Received	4	INT64	R	Y	Wh	
3220	Reactive Energy Delivered	4	INT64	R	Y	VARh	
3224	Reactive Energy Received	4	INT64	R	Y	VARh	
3228	Reactive Energy Delivered + Received	4	INT64	R	Y	VARh	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
3232	Reactive Energy Delivered – Received	4	INT64	R	Y	VARh	
3236	Apparent Energy Delivered	4	INT64	R	Y	VAh	
3240	Apparent Energy Received	4	INT64	R	Y	VAh	
3244	Apparent Energy Delivered + Received	4	INT64	R	Y	VAh	
3248	Apparent Energy Delivered – Received	4	INT64	R	Y	VAh	
Demand							
Demand System 1 (Power)							
3701	Power Demand Method	1	INT16U	RWC	Y	---	0 = Thermal Demand 1 = Timed Interval Sliding Block 2 = Timed Interval Block 3 = Timed Interval Rolling Block 4 = Input Synchronized Block 5 = Input Synchronized Rolling Block 6 = Command Synchronized Block 7 = Command Synchronized Rolling Block
3702	Power Demand Interval Duration	1	INT16U	RWC	Y	minutes	
3703	Power Demand Subinterval Duration	1	INT16U	RWC	Y	minutes	For Thermal and Block demand methods, must be same as Interval Duration. Must be evenly divisible into Interval Duration.
3704	Power Demand Elapsed Time in Interval	1	INT16U	R	N	seconds	
3705	Power Demand Elapsed Time in Subinterval	1	INT16U	R	N	seconds	
3706	Power Demand Peak Reset Date/Time	4	DATETIME	R	Y	---	
Demand System 2 (Current)							
3711	Current Demand Method	1	INT16U	RWC	Y	---	"0 = Thermal Demand 1 = Timed Interval Sliding Block 2 = Timed Interval Block 3 = Timed Interval Rolling Block 4 = Input Synchronized Block 5 = Input Synchronized Rolling Block 6 = Command Synchronized Block 7 = Command Synchronized Rolling Block"
3712	Current Demand Interval Duration	1	INT16U	RWC	Y	minutes	
3713	Current Demand Subinterval Duration	1	INT16U	RWC	Y	minutes	"For Thermal and Block demand methods, must be same as Interval Duration.”
3714	Current Demand Elapsed Time in Interval	1	INT16U	R	N	seconds	
3715	Current Demand Elapsed Time in Subinterval	1	INT16U	R	N	seconds	
3716	Current Demand Peak Reset Date/Time	4	DATETIME	R	Y	---	
Demand Channel 1 (Active Power)							
3761	Demand System Assignment – Active Power	1	INT16U	R	Y	---	Power Demand
3762	Register Number of Metered Quantity – Active Power	1	INT16U	R	Y	---	Active Power Total
3763	Units Code – Active Power	1	INT16U	R	Y	---	
3764	Last Demand – Active Power	2	FLOAT32	R	Y	kW	
3766	Present Demand – Active Power	2	FLOAT32	R	N	kW	
3768	Predicted Demand – Active Power	2	FLOAT32	R	N	kW	
3770	Peak Demand – Active Power	2	FLOAT32	R	Y	kW	
3772	Peak Demand DateTime – Active Power	4	DATETIME	R	Y	---	
Demand Channel 2 (Reactive Power)							
3777	Demand System Assignment – Reactive Power	1	INT16U	R	Y	---	Power Demand
3778	Register Number of Metered Quantity – Reactive Power	1	INT16U	R	Y	---	Reactive Power Total
3779	Units Code – Reactive Power	1	INT16U	R	Y	---	
3780	Last Demand – Reactive Power	2	FLOAT32	R	Y	kVAR	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
3782	Present Demand – Reactive Power	2	FLOAT32	R	N	kVAR	
3784	Predicted Demand – Reactive Power	2	FLOAT32	R	N	kVAR	
3786	Peak Demand – Reactive Power	2	FLOAT32	R	Y	kVAR	
3788	Peak Demand DateTime – Reactive Power	4	DATETIME	R	Y	---	
Demand Channel 3 (Apparent Power)							
3793	Demand System Assignment – Apparent Power	1	INT16U	R	Y	---	Power Demand
3794	Register Number of Metered Quantity – Apparent Power	1	INT16U	R	Y	---	Apparent Power Total
3795	Units Code – Apparent Power	1	INT16U	R	Y	---	
3796	Last Demand – Apparent Power	2	FLOAT32	R	Y	kVA	
3798	Present Demand – Apparent Power	2	FLOAT32	R	N	kVA	
3800	Predicted Demand – Apparent Power	2	FLOAT32	R	N	kVA	
3802	Peak Demand – Apparent Power	2	FLOAT32	R	Y	kVA	
3804	Peak Demand DateTime – Apparent Power	4	DATETIME	R	Y	---	
Demand Channel 8 (Current Avg)							
3873	Demand System Assignment – Current Avg	1	INT16U	R	Y	---	Current Demand
3874	Register Number of Metered Quantity – Current Avg	1	INT16U	R	Y	---	Current, Average
3875	Units Code – Current Avg	1	INT16U	R	Y	---	
3876	Last Demand – Current Avg	2	FLOAT32	R	Y	A	
3878	Present Demand – Current Avg	2	FLOAT32	R	N	A	
3880	Predicted Demand – Current Avg	2	FLOAT32	R	N	A	
3882	Peak Demand – Current Avg	2	FLOAT32	R	Y	A	
3884	Peak Demand DateTime – Current Avg	4	DATETIME	R	Y	---	
Command Interface							
Commands (see Appendix C “Command Interface” on page 71)							
Protected Command Interface							
5000	Requested Command	1	INT16U	RW	N	---	
5001	Command Semaphore	1	INT16U	RW	N	---	
5002	Command Parameter 001	1	INT16U	RW	N	---	
5124	Command Parameter 123	1	INT16U	RW	N	---	
5125	Command Status	1	INT16U	R	N	---	
5126	Command Result	1	INT16U	R	N	---	"0 = Valid Operation 3000 = Invalid Command 3001 = Invalid Parameter 3002 = Invalid Number of Parameters 3003 = Invalid Password 3004 = Command Failed Security Check 3005 = Invalid Command Interface 3006 = Revenue Security Active 3007 = Operation Not Performed 3008 = Invalid ID 3010 = Invalid Semaphore 3009 = Feature Not Supported 6000 = Invalid Control Mode 6001 = Digital Output Disabled’
5127	Command Data 001	1	INT16U	R	N	---	
5249	Command Data 123	1	INT16U	R	N	---	
Unprotected Command Interface							
5250	Requested Command	1	INT16U	RW	N	---	
5252	Command Parameter 001	1	INT16U	RW	N	---	
5374	Command Parameter 123	1	INT16U	RW	N	---	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
5375	Command Status	1	INT16U	R	N	---	
5376	Command Result	1	INT16U	R	N	---	
5377	Command Data 001	1	INT16U	R	N	---	
5499	Command Data 123	1	INT16U	R	N	---	
Mailbox Registers							
5580	Mailbox Register 001	1	INT16U	RW	Y	---	
5679	Mailbox Register 100	1	INT16U	RW	Y	---	
Command Semaphore							
5680		1	INT16U	RW	N	---	
Command Session Active							
5681		1	INT16U	R	N	---	
HMI							
Setup							
Basic HMI Setup							
6001	HMI Contrast Setting	1	INT16U	RWC	Y	---	1 = Brightest…9 = Dimmest
6003	HMI Language	1	INT16U	RWC	Y	---	"0 = EnglishUS 9 = Chinese"
6004	HMI Date Format	1	INT16U	RWC	Y	---	"0 = MM/DD/YYYY 1 = YYYY/MM/DD 2 = DD/MM/YYYY"
6005	HMI Time Format	1	INT16U	RWC	Y	---	"0 = 2400hr
6006	HMI IEC/IEEE Mode	1	INT16U	RWC	Y	---	"0 = IEC 1 = IEEE"
6007	HMI Screen Timeout	1	INT16U	RWC	Y	minutes	0 = disabled
6008	HMI Backlight Timeout	1	INT16U	RWC	Y	minutes	0 = disabled
Communications							
RS-485							
RS-485 Base Unit							
6500	RS-485 Comm Port (M/S) Protocol	1	INT16U	RWC	Y	---	"0 = Modbus 1 = Jbus 2 = Modbus ASCII 8-Bit 3 = Modbus ASCII 7-Bit"
6501	RS-485 Comm Port (M/S) Address	1	INT16U	RWC	Y	---	"Valid Addresses: Modbus: 1 – 247 Jbus: 1 – 255"
6502	RS-485 Comm Port (M/S) Baud Rate	1	INT16U	RWC	Y	---	"0 = 9600 1 = 19200 2 = 38400"
6503	RS-485 Comm Port (M/S) Parity	1	INT16U	RWC	Y	---	"0 = Even 1 = Odd 2 = None"
6504	RS-485 Comm Port (M/S) Modbus ASCII Default Timeout	1	INT16U	RWC	Y	msec	Timeout for end of ASCII packet when no control delimitation is detected.
6508	RS-485 Comm Port (M/S) Packets To This Unit	1	INT16U	R	Y	---	Number of valid messages addressed to this unit
6509	RS-485 Comm Port (S) Packets To Other Units	1	INT16U	R	Y	---	Number of valid messages addressed to other units
6510	RS-485 Comm Port (M/S) Packets With Bad CRC	1	INT16U	R	Y	---	Number of messages received with bad CRC
6511	RS-485 Comm Port (M/S) Packets With Error	1	INT16U	R	Y	---	Number of messages received with errors
6512	RS-485 Comm Port (M/S) Packets With Illegal Opcode	1	INT16U	R	Y	---	Number of messages received with an illegal opcode
6513	RS-485 Comm Port (M/S) Number Of Exceptions	1	INT16U	R	Y	---	Number of exception replies

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Inputs & Outputs							
Demand Sync Setup							
Digital Input Associations With Demand Systems							
7020	Demand System 1 (Power)	1	INT16U	RWC	Y	---	
7021	Demand System 2 (Current)	1	INT16U	RWC	Y	---	
Digital Output Associations With Demand Systems							
7026	Demand System 1 (Power)	1	INT16U	RWC	Y	---	
7027	Demand System 2 (Current)	1	INT16U	RWC	Y	---	
Digital Inputs Setup							
Base Unit - Digital Input DI1							
7273	Type	1	INT16U	R	N	---	
7274	Control Mode	1	INT16U	R	N	---	"0 = Normal (Alarm) 1 = Demand Interval Sync Pulse 2 = Multi-tariff Control 3 = Input Metering 4 = Conditional Energy Control 5 = Incremental Energy Reset"
7275	Label	20	UTF8	RWC	Y	---	
7295	Debounce Time	1	INT16U	RWC	Y	msec	Must be entered in increments of 10ms.
Base Unit - Digital Input DI2							
7297	Type	1	INT16U	R	N	---	
7298	Control Mode	1	INT16U	R	N	---	
7299	Label	20	UTF8	RWC	Y	---	
7319	Debounce Time	1	INT16U	RWC	Y	msec	Must be entered in increments of 10ms.
Base Unit - Digital Input DI3							
7321	Type	1	INT16U	R	N	---	
7322	Control Mode	1	INT16U	R	N	---	
7323	Label	20	UTF8	RWC	Y	---	
7343	Debounce Time	1	INT16U	RWC	Y	msec	Must be entered in increments of 10ms.
Base Unit - Digital Input DI4							
7345	Type	1	INT16U	R	N	---	
7346	Control Mode	1	INT16U	R	N	---	
7347	Label	20	UTF8	RWC	Y	---	
7367	Debounce Time	1	INT16U	RWC	Y	msec	Must be entered in increments of 10ms.
Digital Inputs Status							
On/Off Status							
8905	Digital Input Status – Base Unit	2	BITMAP	R	N	---	
Base Unit - Digital Input DI1							
8915	Count	2	INT32U	R	Y	---	
8917	On Time	2	INT32U	R	Y	seconds	
Base Unit - Digital Input DI2							
8919	Count	2	INT32U	R	Y	---	
8921	On Time	2	INT32U	R	Y	seconds	
Base Unit - Digital Input DI3							
8923	Count	2	INT32U	R	Y	---	
8925	On Time	2	INT32U	R	Y	seconds	
Base Unit - Digital Input DI4							
8927	Count	2	INT32U	R	Y	---	
8929	On Time	2	INT32U	R	Y	seconds	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Digital Outputs Setup							
Base Unit - Digital Output DO1							
9187	Type	1	INT16U	R	N	---	
9188	Label	20	UTF8	RWC	Y	---	
9209	Behavioral Mode	1	INT16U	RWC	Y	---	"0 = Normal 1 = Timed 2 = Coil Hold"
9210	On Time For Timed Mode	1	INT16U	RWC	Y	seconds	The time for the output to remain energized when the output is energized in timed mode.
Base Unit - Digital Output DO2							
9211	Type	1	INT16U	R	N	---	
9212	Label	20	UTF8	RWC	Y	---	
9233	Behavioral Mode	1	INT16U	RWC	Y	---	"0 = Normal 1 = Timed 2 = Coil Hold"
9234	On Time For Timed Mode	1	INT16U	RWC	Y	seconds	The time for the output to remain energized when the output is energized in timed mode.
Digital Outputs Status							
On/Off Status							
9667	Digital Output Status – Base Unit	1	BITMAP	R	Y	---	
Base Unit - Digital Output DO1							
9672	Operating Mode Status	1	INT16U	R	N	---	0 = Normal, 1 = Override
9673	Control Mode Status	1	INT16U	R	N	---	"0 = External 1 = Alarm 2 = Demand Sync 3 = Energy"
9674	Behavioral Mode Status	1	INT16U	R	Y	---	"0 = Normal 1 = Timed 2 = Coil Hold"
9675	Count	2	INT32U	R	Y	---	
9677	On Time	2	INT32U	R	Y	seconds	
Base Unit - Digital Output DO2							
9680	Operating Mode Status	1	INT16U	R	N	---	
9681	Control Mode Status	1	INT16U	R	N	---	
9682	Behavioral Mode Status	1	INT16U	R	Y	---	
9683	Count	2	INT32U	R	Y	---	
9685	On Time	2	INT32U	R	Y	seconds	
Alarms							
Alarm Status							
Detected Priority Status							
11010	Detected Priority Status Bitmap	1	BITMAP	R	N	---	"Bit 01 = 1 if any priority 1-3 alarm is active Bit 02 = 1 if a “High” (1) priority alarm is active Bit 03 = 1 if a “Medium” (2) priority alarm is active Bit 04 = 1 if a “Low” (3) priority alarm is active Bit 05 = 1 if a ""None"" (0) priority alarm is active"
Enabled Alarm Bitmaps							
11040	Standard – 1 second 1	1	BITMAP	R	N	---	0 = Disabled; 1 = Enabled
11041	Standard – 1 second 2	1	BITMAP	R	N	---	
11042	Standard – 1 second 3	1	BITMAP	R	N	---	
11050	Unary	1	BITMAP	R	N	---	
11051	Digital 1	1	BITMAP	R	N	---	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Detected Alarm Bitmaps							
11059	Standard – 1 second 1	1	BITMAP	R	N	---	0 = Not Detected; 1 = Detected
11060	Standard – 1 second 2	1	BITMAP	R	N	---	
11061	Standard – 1 second 3	1	BITMAP	R	N	---	
11069	Unary	1	BITMAP	R	N	---	
11070	Digital 1	1	BITMAP	R	N	---	
Unacknowledged High Priority Alarm Bitmaps							
11078	Standard – 1 second 1	1	BITMAP	R	N	---	0 = Acknowledged; 1 = Unacknowledged
11079	Standard – 1 second 2	1	BITMAP	R	N	---	
11080	Standard – 1 second 3	1	BITMAP	R	N	---	
11088	Unary	1	BITMAP	R	N	---	
11089	Digital 1	1	BITMAP	R	N	---	
Alarm Event Queue							
11111	Version of Event Queue	1	INT16U	R	N	---	
11113	Size of Event Queue	1	INT16U	R	N		
11114	Number of Entries in Event Queue	1	INT16U	R	Y	---	
11115	Entry Number of Most Recent Event	1	INT16U	R	Y	---	Rolls over from 65535 to 0.
Entry 001							
11116	Entry Number	1	INT16U	R	N	---	
11117	Date/Time	4	DATETIME	R	N	---	
11121	Record Type	1	INT16U	R	N	---	"Indicates datatype of Value. 0x0000 Boolean 0x0010 INT16U 0x0011 INT16 0x0020 INT32U 0x0021 INT32 0x0030 INT64U 0x0031 INT64 0x0040 FLOAT32 0x0041 FLOAT64"
11122	Register Number or Event Code	1	INT16U	R	N	---	
11123	Value	4	INT16U	R	N	---	
11127	Sequence Number	1	INT16U	R	N	---	
Entry 40							
11584	Entry Number	1	INT16U	R	N	---	
11585	Date/Time	4	DATETIME	R	N	---	
11589	Record Type	1	INT16U	R	N	---	
11590	Register Number or Event Code	1	INT16U	R	N	---	
11591	Value	4	INT16U	R	N	---	
11595	Sequence Number	1	INT16U	R	N	---	
Alarm History Log							
12316	Size of History Log	1	INT16U	R	N	---	
12317	Number of Entries in History Log	1	INT16U	R	Y	---	
12318	Entry Number of Most Recent Event	1	INT16U	R	Y	---	
Entry 001							
12319	Entry Number	1	INT16U	R	Y	---	
12320	Date/Time	4	DATETIME	R	Y	---	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
12324	Record Type	1	INT16U	R	Y	---	"Indicates datatype of Value. 0x0000 Boolean 0x0010 INT16U 0x0011 INT16 0x0020 INT32U 0x0021 INT32 0x0030 INT64U 0x0031 INT64 0x0040 FLOAT32 0x0041 FLOAT64"
12325	Register Number or Event Code	1	INT16U	R	Y	---	
12326	Value	4	INT16U	R	Y	---	
12330	Sequence Number	1	INT16U	R	Y	---	
Entry 040							
12787	Entry Number	1	INT16U	R	Y	---	
12788	Date/Time	4	DATETIME	R	Y	---	
12792	Record Type	1	INT16U	R	Y	---	
12793	Register Number or Event Code	1	INT16U	R	Y	---	
12794	Value	4	INT16U	R	Y	---	
12798	Sequence Number	1	INT16U	R	Y	---	
Alarm Counters							
Summary							
13519	Total Counter	1	INT16U	R	Y	---	
13520	Low Priority Counter	1	INT16U	R	Y	---	
13521	Medium Priority Counter	1	INT16U	R	Y	---	
13522	High Priority Counter	1	INT16U	R	Y	---	
1-Second Alarms - Standard							
13523	Over Current, Phase	1	INT16U	R	Y	---	
13524	Under Current, Phase	1	INT16U	R	Y	---	
13525	Over Current, Neutral	1	INT16U	R	Y	---	
13526	Over Current, Ground	1	INT16U	R	Y	---	
13527	Over Voltage, L-L	1	INT16U	R	Y	---	
13528	Under Voltage, L-L	1	INT16U	R	Y	---	
13529	Over Voltage, L-N	1	INT16U	R	Y	---	
13530	Under Voltage, L-N	1	INT16U	R	Y	---	
13531	Over Power, Active	1	INT16U	R	Y	---	
13532	Over Power, Reactive	1	INT16U	R	Y	---	
13533	Over Power, Apparent	1	INT16U	R	Y	---	
13534	Lead Power Factor, True	1	INT16U	R	Y	---	
13535	Lag Power Factor, True	1	INT16U	R	Y	---	
13536	Lead Power Factor, Displacement	1	INT16U	R	Y	---	
13537	Lag Power Factor, Displacement	1	INT16U	R	Y	---	
13538	Over Demand, Active Power, Present	1	INT16U	R	Y	---	
13539	Over Demand, Active Power, Last	1	INT16U	R	Y	---	
13540	Over Demand, Active Power, Predicted	1	INT16U	R	Y	---	
13541	Over Demand, Reactive Power, Present	1	INT16U	R	Y	---	
13542	Over Demand, Reactive Power, Last	1	INT16U	R	Y	---	
13543	Over Demand, Reactive Power, Predicted	1	INT16U	R	Y	---	
13544	Over Demand, Apparent Power, Present	1	INT16U	R	Y	---	
13545	Over Demand, Apparent Power, Last	1	INT16U	R	Y	---	
13546	Over Demand, Apparent Power, Predicted	1	INT16U	R	Y	---	
13547	Over Frequency	1	INT16U	R	Y	---	
13548	Under Frequency	1	INT16U	R	Y	---	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
13549	Over Voltage Unbalance	1	INT16U	R	Y	---	
13550	Over Voltage Total Harmonic Distortion	1	INT16U	R	Y	---	
13551	Phase Loss	1	INT16U	R	Y	---	
Unary Alarms							
13623	Phase Reversal	1	INT16U	R	Y	---	
13624	Meter Powerup (Control Power Loss)	1	INT16U	R	Y	---	
13625	Meter Reset	1	INT16U	R	Y	---	
13626	Meter Diagnostic	1	INT16U	R	Y	---	
Digital Alarms							
13633	Digital Alarm DI1	1	INT16U	R	Y	---	
13634	Digital Alarm DI2	1	INT16U	R	Y	---	
13635	Digital Alarm DI3	1	INT16U	R	Y	---	
13636	Digital Alarm DI4	1	INT16U	R	Y	---	
1-Second Alarms - Standard							
Over Current, Phase							
14000	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14002	Source Register A	1	INT16U	R	N	---	
14003	Source Register B	1	INT16U	R	N	---	
14004	Source Register C	1	INT16U	R	N	---	
14005	Pickup Setpoint	2	FLOAT32	RWC	Y	A	The maximum pickup setpoint allowed is the maximum current that can be reported under the present configuration of CT ratio.
14007	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14009	Dropout Setpoint	2	FLOAT32	RWC	Y	A	Must be <= Pickup Setpoint.
14011	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14013	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Under Current, Phase							
14020	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14022	Source Register A	1	INT16U	R	N	---	
14023	Source Register B	1	INT16U	R	N	---	
14024	Source Register C	1	INT16U	R	N	---	
14025	Pickup Setpoint	2	FLOAT32	RWC	Y	A	Must be <= Dropout Setpoint.
14027	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14029	Dropout Setpoint	2	FLOAT32	RWC	Y	A	"The maximum pickup setpoint allowed is the maximum current that can be reported under the present configuration of CT ratio."
14031	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14033	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	"Bitmap of digital outputs to associate with this alarm."
Over Current, Neutral							
14040	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14042	Source Register A	1	INT16U	R	N	---	
14043	Source Register B	1	INT16U	R	N	---	
14044	Source Register C	1	INT16U	R	N	---	
14045	Pickup Setpoint	2	FLOAT32	RWC	Y	A	"The maximum pickup setpoint allowed is the maximum current that can be reported under the present configuration of CT ratio."
14047	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14049	Dropout Setpoint	2	FLOAT32	RWC	Y	A	Must be <= Pickup Setpoint.
14051	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14053	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	"Bitmap of digital outputs to associate with this alarm."

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Over Current, Ground							
14060	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14062	Source Register A	1	INT16U	R	N	---	
14063	Source Register B	1	INT16U	R	N	---	
14064	Source Register C	1	INT16U	R	N	---	
14065	Pickup Setpoint	2	FLOAT32	RWC	Y	A	The maximum pickup setpoint allowed is the maximum current that can be reported under the present configuration of CT ratio.
14067	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14069	Dropout Setpoint	2	FLOAT32	RWC	Y	A	Must be <= Pickup Setpoint.
14071	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14073	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Voltage, L-L							
14080	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14082	Source Register A	1	INT16U	R	N	---	
14083	Source Register B	1	INT16U	R	N	---	
14084	Source Register C	1	INT16U	R	N	---	
14085	Pickup Setpoint	2	FLOAT32	RWC	Y	V	The maximum pickup setpoint allowed is the maximum voltage that can be reported under the present configuration of VT ratio.
14087	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14089	Dropout Setpoint	2	FLOAT32	RWC	Y	V	Must be <= Pickup Setpoint.
14091	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14093	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Under Voltage, L-L							
14100	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14102	Source Register A	1	INT16U	R	N	---	
14103	Source Register B	1	INT16U	R	N	---	
14104	Source Register C	1	INT16U	R	N	---	
14105	Pickup Setpoint	2	FLOAT32	RWC	Y	V	Must be <= Dropout Setpoint.
14107	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14109	Dropout Setpoint	2	FLOAT32	RWC	Y	V	The maximum dropout setpoint allowed is the maximum voltage that can be reported under the present configuration of VT ratio.
14111	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14113	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Voltage, L-N							
14120	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14122	Source Register A	1	INT16U	R	N	---	
14123	Source Register B	1	INT16U	R	N	---	
14124	Source Register C	1	INT16U	R	N	---	
14125	Pickup Setpoint	2	FLOAT32	RWC	Y	V	The maximum pickup setpoint allowed is the maximum voltage that can be reported under the present configuration of VT ratio.
14127	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14129	Dropout Setpoint	2	FLOAT32	RWC	Y	V	Must be <= Pickup Setpoint.
14131	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14133	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Under Voltage, L-N							
14140	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14142	Source Register A	1	INT16U	R	N	---	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
14143	Source Register B	1	INT16U	R	N	---	
14144	Source Register C	1	INT16U	R	N	---	
14145	Pickup Setpoint	2	FLOAT32	RWC	Y	V	Must be <= Dropout Setpoint.
14147	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14149	Dropout Setpoint	2	FLOAT32	RWC	Y	V	The maximum dropout setpoint allowed is the maximum voltage that can be reported under the present configuration of VT ratio.
14151	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14153	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Power, Active							
14160	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14162	Source Register A	1	INT16U	R	N	---	
14163	Source Register B	1	INT16U	R	N	---	
14164	Source Register C	1	INT16U	R	N	---	
14165	Pickup Setpoint	2	FLOAT32	RWC	Y	kW	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14167	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14169	Dropout Setpoint	2	FLOAT32	RWC	Y	kW	Must be <= Pickup Setpoint.
14171	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14173	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Power, Reactive							
14180	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14182	Source Register A	1	INT16U	R	N	---	
14183	Source Register B	1	INT16U	R	N	---	
14184	Source Register C	1	INT16U	R	N	---	
14185	Pickup Setpoint	2	FLOAT32	RWC	Y	kVAR	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14187	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14189	Dropout Setpoint	2	FLOAT32	RWC	Y	kVAR	Must be <= Pickup Setpoint.
14191	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14193	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Power, Apparent							
14200	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14202	Source Register A	1	INT16U	R	N	---	
14203	Source Register B	1	INT16U	R	N	---	
14204	Source Register C	1	INT16U	R	N	---	
14205	Pickup Setpoint	2	FLOAT32	RWC	Y	kVA	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14207	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14209	Dropout Setpoint	2	FLOAT32	RWC	Y	kVA	Must be <= Pickup Setpoint.
14211	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14213	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Leading Power Factor, True							
14220	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14222	Source Register A	1	INT16U	R	N	---	
14223	Source Register B	1	INT16U	R	N	---	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
14224	Source Register C	1	INT16U	R	N	---	
14225	Pickup Setpoint	2	FLOAT32	RWC	Y	---	
14227	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14229	Dropout Setpoint	2	FLOAT32	RWC	Y	---	
14231	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14233	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Lagging Power Factor, True							
14240	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14242	Source Register A	1	INT16U	R	N	---	
14243	Source Register B	1	INT16U	R	N	---	
14244	Source Register C	1	INT16U	R	N	---	
14245	Pickup Setpoint	2	FLOAT32	RWC	Y	---	
14247	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14249	Dropout Setpoint	2	FLOAT32	RWC	Y	---	
14251	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14253	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Leading Power Factor, Displacement							
14260	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14262	Source Register A	1	INT16U	R	N	---	
14263	Source Register B	1	INT16U	R	N	---	
14264	Source Register C	1	INT16U	R	N	---	
14265	Pickup Setpoint	2	FLOAT32	RWC	Y	---	
14267	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14269	Dropout Setpoint	2	FLOAT32	RWC	Y	---	
14271	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14273	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Lagging Power Factor, Displacement							
14280	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14282	Source Register A	1	INT16U	R	N	---	
14283	Source Register B	1	INT16U	R	N	---	
14284	Source Register C	1	INT16U	R	N	---	
14285	Pickup Setpoint	2	FLOAT32	RWC	Y	---	
14287	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14289	Dropout Setpoint	2	FLOAT32	RWC	Y	---	
14291	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14293	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Demand, Active Power, Present							
14300	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14302	Source Register A	1	INT16U	R	N	---	
14303	Source Register B	1	INT16U	R	N	---	
14304	Source Register C	1	INT16U	R	N	---	
14305	Pickup Setpoint	2	FLOAT32	RWC	Y	kW	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14307	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14309	Dropout Setpoint	2	FLOAT32	RWC	Y	kW	Must be <= Pickup Setpoint.
14311	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14313	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Over Demand, Active Power, Last							
14320	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14322	Source Register A	1	INT16U	R	N	---	
14323	Source Register B	1	INT16U	R	N	---	
14324	Source Register C	1	INT16U	R	N	---	
14325	Pickup Setpoint	2	FLOAT32	RWC	Y	kW	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14327	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14329	Dropout Setpoint	2	FLOAT32	RWC	Y	kW	Must be <= Pickup Setpoint.
14331	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14333	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Demand, Active Power, Predicted							
14340	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14342	Source Register A	1	INT16U	R	N	---	
14343	Source Register B	1	INT16U	R	N	---	
14344	Source Register C	1	INT16U	R	N	---	
14345	Pickup Setpoint	2	FLOAT32	RWC	Y	kW	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14347	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14349	Dropout Setpoint	2	FLOAT32	RWC	Y	kW	Must be <= Pickup Setpoint.
14351	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14353	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Demand, Reactive Power, Present							
14360	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14362	Source Register A	1	INT16U	R	N	---	
14363	Source Register B	1	INT16U	R	N	---	
14364	Source Register C	1	INT16U	R	N	---	
14365	Pickup Setpoint	2	FLOAT32	RWC	Y	kVAR	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14367	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14369	Dropout Setpoint	2	FLOAT32	RWC	Y	kVAR	Must be <= Pickup Setpoint.
14371	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14373	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Demand, Reactive Power, Last							
14380	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14382	Source Register A	1	INT16U	R	N	---	
14383	Source Register B	1	INT16U	R	N	---	
14384	Source Register C	1	INT16U	R	N	---	
14385	Pickup Setpoint	2	FLOAT32	RWC	Y	kVAR	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14387	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14389	Dropout Setpoint	2	FLOAT32	RWC	Y	kVAR	Must be <= Pickup Setpoint.
14391	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14393	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Over Demand, Reactive Power, Predicted							
14400	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14402	Source Register A	1	INT16U	R	N	---	
14403	Source Register B	1	INT16U	R	N	---	
14404	Source Register C	1	INT16U	R	N	---	
14405	Pickup Setpoint	2	FLOAT32	RWC	Y	kVAR	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14407	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14409	Dropout Setpoint	2	FLOAT32	RWC	Y	kVAR	Must be <= Pickup Setpoint.
14411	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14413	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Demand, Apparent Power, Present							
14420	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14422	Source Register A	1	INT16U	R	N	---	
14423	Source Register B	1	INT16U	R	N	---	
14424	Source Register C	1	INT16U	R	N	---	
14425	Pickup Setpoint	2	FLOAT32	RWC	Y	kVA	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14427	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14429	Dropout Setpoint	2	FLOAT32	RWC	Y	kVA	Must be <= Pickup Setpoint.
14431	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14433	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Demand, Apparent Power, Last							
14440	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14442	Source Register A	1	INT16U	R	N	---	
14443	Source Register B	1	INT16U	R	N	---	
14444	Source Register C	1	INT16U	R	N	---	
14445	Pickup Setpoint	2	FLOAT32	RWC	Y	kVA	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14447	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14449	Dropout Setpoint	2	FLOAT32	RWC	Y	kVA	Must be <= Pickup Setpoint.
14451	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14453	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Demand, Apparent Power, Predicted							
14460	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14462	Source Register A	1	INT16U	R	N	---	
14463	Source Register B	1	INT16U	R	N	---	
14464	Source Register C	1	INT16U	R	N	---	
14465	Pickup Setpoint	2	FLOAT32	RWC	Y	kVA	The maximum pickup setpoint allowed is the maximum power that can be reported under the present configuration of CT and VT ratio.
14467	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14469	Dropout Setpoint	2	FLOAT32	RWC	Y	kVA	Must be <= Pickup Setpoint.
14471	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14473	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Frequency							
14480	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14482	Source Register A	1	INT16U	R	N	---	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
14483	Source Register B	1	INT16U	R	N	---	
14484	Source Register C	1	INT16U	R	N	---	
14485	Pickup Setpoint	2	FLOAT32	RWC	Y	Hz	
14487	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14489	Dropout Setpoint	2	FLOAT32	RWC	Y	Hz	Must be <= Pickup Setpoint.
14491	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14493	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Under Frequency							
14500	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14502	Source Register A	1	INT16U	R	N	---	
14503	Source Register B	1	INT16U	R	N	---	
14504	Source Register C	1	INT16U	R	N	---	
14505	Pickup Setpoint	2	FLOAT32	RWC	Y	Hz	Must be <= Dropout Setpoint.
14507	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14509	Dropout Setpoint	2	FLOAT32	RWC	Y	Hz	
14511	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14513	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Voltage Unbalance							
14520	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14522	Source Register A	1	INT16U	R	N	---	
14523	Source Register B	1	INT16U	R	N	---	
14524	Source Register C	1	INT16U	R	N	---	
14525	Pickup Setpoint	2	FLOAT32	RWC	Y	%	
14527	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14529	Dropout Setpoint	2	FLOAT32	RWC	Y	%	Must be <= Pickup Setpoint.
14531	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14533	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Over Voltage Total Harmonic Distortion							
14540	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14542	Source Register A	1	INT16U	R	N	---	
14543	Source Register B	1	INT16U	R	N	---	
14544	Source Register C	1	INT16U	R	N	---	
14545	Pickup Setpoint	2	FLOAT32	RWC	Y	%	
14547	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14549	Dropout Setpoint	2	FLOAT32	RWC	Y	%	Must be <= Pickup Setpoint.
14551	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14553	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Phase Loss							
14560	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
14562	Source Register A	1	INT16U	R	N	---	
14563	Source Register B	1	INT16U	R	N	---	
14564	Source Register C	1	INT16U	R	N	---	
14565	Pickup Setpoint	2	FLOAT32	RWC	Y	V	
14567	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
14569	Dropout Setpoint	2	FLOAT32	RWC	Y	V	Must be <= Pickup Setpoint.
14571	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
14573	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Unary Alarms							
Meter Power Up (Control Power Loss)							
16200	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
16202	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Meter Reset							
16210	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
16212	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Meter Diagnostic							
16220	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
16222	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Phase Reversal							
16230	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
16232	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Digital Alarms							
Digital Alarm DI1							
16300	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
16302	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
16304	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
16306	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Digital Alarm DI2							
16314	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
16316	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
16318	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
16320	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Digital Alarm DI3							
16328	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
16330	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
16332	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
16334	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Digital Alarm DI4							
16342	Attributes	2	INT32U	RWC	Y	---	See Alarm Attributes for details.
16344	Pickup Time Delay	2	INT32U	RWC	Y	seconds	
16346	Dropout Time Delay	2	INT32U	RWC	Y	seconds	
16348	Digital Outputs to Associate – Standard	1	BITMAP	RWC	Y	---	Bitmap of digital outputs to associate with this alarm.
Diagnostics							
Self-Test Results							
Miscellaneous Self-Test							
20003	Meter Self-Test	5	BITMAP	R	N	---	"0 = OK, 1 = Error Detected Bit 01 = Summary (on if any other bit is on - Maintenance Icon shown on HMI) Bit 02 = RAM Failure Bit 03 = NVRAM Failure Bit 04 = RTC Failure Bit 05 = Calibration Failure Bit 06 = Clipping Detected Bit 07 = Over-Running Energy Pulse Output Bit 08-16 Not Used"

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Meter Data (Advanced)							
Frequency							
21016	Frequency 1 Cycle	2	FLOAT32	R	N	Hz	
Power Quality							
Total Harmonic Distortion, Current							
21300	THD Current A	2	FLOAT32	R	N	%	THD = (RMS of harmonics / RMS of fundamental) * 100
21302	THD Current B	2	FLOAT32	R	N	%	
21304	THD Current C	2	FLOAT32	R	N	%	
21306	THD Current N	2	FLOAT32	R	N	%	
21308	THD Current G	2	FLOAT32	R	N	%	
21310	thd Current A	2	FLOAT32	R	N	%	thd = (RMS of harmonics / total RMS) * 100
21312	thd Current B	2	FLOAT32	R	N	%	
21314	thd Current C	2	FLOAT32	R	N	%	
21316	thd Current N	2	FLOAT32	R	N	%	
21318	thd Current G	2	FLOAT32	R	N	%	
Total Demand Distortion							
21320	Total Demand Distortion	2	FLOAT32	R	N	%	
Total Harmonic Distortion, Voltage							
21322	THD Voltage A-B	2	FLOAT32	R	N	%	
21324	THD Voltage B-C	2	FLOAT32	R	N	%	
21326	THD Voltage C-A	2	FLOAT32	R	N	%	
21328	THD Voltage L-L	2	FLOAT32	R	N	%	
21330	THD Voltage A-N	2	FLOAT32	R	N	%	
21332	THD Voltage B-N	2	FLOAT32	R	N	%	
21334	THD Voltage C-N	2	FLOAT32	R	N	%	
21338	THD Voltage L-N	2	FLOAT32	R	N	%	
21340	thd Voltage A-B	2	FLOAT32	R	N	%	
21342	thd Voltage B-C	2	FLOAT32	R	N	%	
21344	thd Voltage C-A	2	FLOAT32	R	N	%	
21346	thd Voltage L-L	2	FLOAT32	R	N	%	
21348	thd Voltage A-N	2	FLOAT32	R	N	%	
21350	thd Voltage B-N	2	FLOAT32	R	N	%	
21352	thd Voltage C-N	2	FLOAT32	R	N	%	
21356	thd Voltage L-N	2	FLOAT32	R	N	%	
Minimum Values							
27214	Min/Max Reset Datetime	4	DATETIME	R	Y	---	
Current							
27218	Min Current A	2	FLOAT32	R	Y	A	
27220	Min Current B	2	FLOAT32	R	Y	A	
27222	Min Current C	2	FLOAT32	R	Y	A	
27224	Min Current N	2	FLOAT32	R	Y	A	
27226	Min Current G	2	FLOAT32	R	Y	A	
27228	Min Current Avg	2	FLOAT32	R	Y	A	
Current Unbalance							
27230	Min Current Unbalance A	2	FLOAT32	R	Y	%	
27232	Min Current Unbalance B	2	FLOAT32	R	Y	%	
27234	Min Current Unbalance C	2	FLOAT32	R	Y	%	
27236	Min Current Unbalance Worst	2	FLOAT32	R	Y	%	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Voltage							
27238	Min Voltage A-B	2	FLOAT32	R	Y	V	
27240	Min Voltage B-C	2	FLOAT32	R	Y	V	
27242	Min Voltage C-A	2	FLOAT32	R	Y	V	
27244	Min Voltage L-L Avg	2	FLOAT32	R	Y	V	
27246	Min Voltage A-N	2	FLOAT32	R	Y	V	
27248	Min Voltage B-N	2	FLOAT32	R	Y	V	
27250	Min Voltage C-N	2	FLOAT32	R	Y	V	
27254	Min Voltage L-N Avg	2	FLOAT32	R	Y	V	
Voltage Unbalance							
27256	Min Voltage Unbalance A-B	2	FLOAT32	R	Y	%	
27258	Min Voltage Unbalance B-C	2	FLOAT32	R	Y	%	
27260	Min Voltage Unbalance C-A	2	FLOAT32	R	Y	%	
27262	Min Voltage Unbalance L-L Worst	2	FLOAT32	R	Y	%	
27264	Min Voltage Unbalance A-N	2	FLOAT32	R	Y	%	
27266	Min Voltage Unbalance B-N	2	FLOAT32	R	Y	%	
27268	Min Voltage Unbalance C-N	2	FLOAT32	R	Y	%	
27270	Min Voltage Unbalance L-N Worst	2	FLOAT32	R	Y	%	
Power							
27272	Min Active Power A	2	FLOAT32	R	Y	kW	
27274	Min Active Power B	2	FLOAT32	R	Y	kW	
27276	Min Active Power C	2	FLOAT32	R	Y	kW	
27278	Min Active Power Total	2	FLOAT32	R	Y	kW	
27280	Min Reactive Power A	2	FLOAT32	R	Y	kVAR	
27282	Min Reactive Power B	2	FLOAT32	R	Y	kVAR	
27284	Min Reactive Power C	2	FLOAT32	R	Y	kVAR	
27286	Min Reactive Power Total	2	FLOAT32	R	Y	kVAR	
27288	Min Apparent Power A	2	FLOAT32	R	Y	kVA	
27290	Min Apparent Power B	2	FLOAT32	R	Y	kVA	
27292	Min Apparent Power C	2	FLOAT32	R	Y	kVA	
27294	Min Apparent Power Total	2	FLOAT32	R	Y	kVA	
Power Factor							
27306	Min Power Factor A	2	PF32	R	Y	---	
27308	Min Power Factor B	2	PF32	R	Y	---	
27310	Min Power Factor C	2	PF32	R	Y	---	
27312	Min Power Factor Total	2	PF32	R	Y	---	
27314	Min Displacement Power Factor A	2	PF32	R	Y	---	
27316	Min Displacement Power Factor B	2	PF32	R	Y	---	
27318	Min Displacement Power Factor C	2	PF32	R	Y	---	
27320	Min Displacement PF Total	2	PF32	R	Y	---	
Total Harmonic Distortion, Current							
27338	Min THD Current A	2	FLOAT32	R	Y	%	THD = (RMS of harmonics / RMS of fundamental) * 100
27340	Min THD Current B	2	FLOAT32	R	Y	%	
27342	Min THD Current C	2	FLOAT32	R	Y	%	
27344	Min THD Current N	2	FLOAT32	R	Y	%	
27346	Min THD Current G	2	FLOAT32	R	Y	%	
27348	Min thd Current A	2	FLOAT32	R	Y	%	thd = (RMS of harmonics / total RMS) * 100
27350	Min thd Current B	2	FLOAT32	R	Y	%	
27352	Min thd Current C	2	FLOAT32	R	Y	%	
27354	Min thd Current N	2	FLOAT32	R	Y	%	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
Total Demand Distortion							
27358	Min Total Demand Distortion	2	FLOAT32	R	Y	%	
Total Harmonic Distortion, Voltage							
27360	Min THD Voltage A-B	2	FLOAT32	R	Y	%	
27362	Min THD Voltage B-C	2	FLOAT32	R	Y	%	
27364	Min THD Voltage C-A	2	FLOAT32	R	Y	%	
27366	Min THD Voltage L-L	2	FLOAT32	R	Y	%	
27368	Min THD Voltage A-N	2	FLOAT32	R	Y	%	
27370	Min THD Voltage B-N	2	FLOAT32	R	Y	%	
27372	Min THD Voltage C-N	2	FLOAT32	R	Y	%	
27376	Min THD Voltage L-N	2	FLOAT32	R	Y	%	
27378	Min thd Voltage A-B	2	FLOAT32	R	Y	%	
27380	Min thd Voltage B-C	2	FLOAT32	R	Y	%	
27382	Min thd Voltage C-A	2	FLOAT32	R	Y	%	
27384	Min thd Voltage L-L	2	FLOAT32	R	Y	%	
27386	Min thd Voltage A-N	2	FLOAT32	R	Y	%	
27388	Min thd Voltage B-N	2	FLOAT32	R	Y	%	
27390	Min thd Voltage C-N	2	FLOAT32	R	Y	%	
27394	Min thd Voltage L-N	2	FLOAT32	R	Y	%	
Frequency							
27616	Min Frequency	2	FLOAT32	R	Y	Hz	
Maximum Values							
Current							
27694	Max Current A	2	FLOAT32	R	Y	A	
27696	Max Current B	2	FLOAT32	R	Y	A	
27698	Max Current C	2	FLOAT32	R	Y	A	
27700	Max Current N	2	FLOAT32	R	Y	A	
27702	Max Current G	2	FLOAT32	R	Y	A	
27704	Max Current Avg	2	FLOAT32	R	Y	A	
Current Unbalance							
27706	Max Current Unbalance A	2	FLOAT32	R	Y	%	
27708	Max Current Unbalance B	2	FLOAT32	R	Y	%	
27710	Max Current Unbalance C	2	FLOAT32	R	Y	%	
27712	Max Current Unbalance Worst	2	FLOAT32	R	Y	%	
Voltage							
27714	Max Voltage A-B	2	FLOAT32	R	Y	V	
27716	Max Voltage B-C	2	FLOAT32	R	Y	V	
27718	Max Voltage C-A	2	FLOAT32	R	Y	V	
27720	Max Voltage L-L Avg	2	FLOAT32	R	Y	V	
27722	Max Voltage A-N	2	FLOAT32	R	Y	V	
27724	Max Voltage B-N	2	FLOAT32	R	Y	V	
27726	Max Voltage C-N	2	FLOAT32	R	Y	V	
27730	Max Voltage L-N Avg	2	FLOAT32	R	Y	V	
Voltage Unbalance							
27732	Max Voltage Unbalance A-B	2	FLOAT32	R	Y	%	
27734	Max Voltage Unbalance B-C	2	FLOAT32	R	Y	%	
27736	Max Voltage Unbalance C-A	2	FLOAT32	R	Y	%	
27738	Max Voltage Unbalance L-L Worst	2	FLOAT32	R	Y	%	
27740	Max Voltage Unbalance A-N	2	FLOAT32	R	Y	%	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
27742	Max Voltage Unbalance B-N	2	FLOAT32	R	Y	%	
27744	Max Voltage Unbalance C-N	2	FLOAT32	R	Y	%	
27746	Max Voltage Unbalance L-N Worst	2	FLOAT32	R	Y	%	
Power							
27748	Max Active Power A	2	FLOAT32	R	Y	kW	
27750	Max Active Power B	2	FLOAT32	R	Y	kW	
27752	Max Active Power C	2	FLOAT32	R	Y	kW	
27754	Max Active Power Total	2	FLOAT32	R	Y	kW	
27756	Max Reactive Power A	2	FLOAT32	R	Y	kVAR	
27758	Max Reactive Power B	2	FLOAT32	R	Y	kVAR	
27760	Max Reactive Power C	2	FLOAT32	R	Y	kVAR	
27762	Max Reactive Power Total	2	FLOAT32	R	Y	kVAR	
27764	Max Apparent Power A	2	FLOAT32	R	Y	kVA	
27766	Max Apparent Power B	2	FLOAT32	R	Y	kVA	
27768	Max Apparent Power C	2	FLOAT32	R	Y	kVA	
27770	Max Apparent Power Total	2	FLOAT32	R	Y	kVA	
Power Factor							
27782	Max Power Factor A	2	PF32	R	Y	---	
27784	Max Power Factor B	2	PF32	R	Y	---	
27786	Max Power Factor C	2	PF32	R	Y	---	
27788	Max Power Factor Total	2	PF32	R	Y	---	
27790	Max Displacement Power Factor A	2	PF32	R	Y	---	
27792	Max Displacement Power Factor B	2	PF32	R	Y	---	
27794	Max Displacement Power Factor C	2	PF32	R	Y	---	
27796	Max Displacement PF Total	2	PF32	R	Y	---	
Total Harmonic Distortion, Current							
27814	Max THD Current A	2	FLOAT32	R	Y	%	THD = (RMS of harmonics / RMS of fundamental) * 100
27816	Max THD Current B	2	FLOAT32	R	Y	%	
27818	Max THD Current C	2	FLOAT32	R	Y	%	
27820	Max THD Current N	2	FLOAT32	R	Y	%	
27822	Max THD Current G	2	FLOAT32	R	Y	%	
27824	Max thd Current A	2	FLOAT32	R	Y	%	thd = (RMS of harmonics / total RMS) * 100
27826	Max thd Current B	2	FLOAT32	R	Y	%	
27828	Max thd Current C	2	FLOAT32	R	Y	%	
27830	Max thd Current N	2	FLOAT32	R	Y	%	
Total Demand Distortion							
27834	Max Total Demand Distortion	2	FLOAT32	R	Y	%	
Total Harmonic Distortion, Voltage							
27836	Max THD Voltage A-B	2	FLOAT32	R	Y	%	
27838	Max THD Voltage B-C	2	FLOAT32	R	Y	%	
27840	Max THD Voltage C-A	2	FLOAT32	R	Y	%	
27842	Max THD Voltage L-L	2	FLOAT32	R	Y	%	
27844	Max THD Voltage A-N	2	FLOAT32	R	Y	%	
27846	Max THD Voltage B-N	2	FLOAT32	R	Y	%	
27848	Max THD Voltage C-N	2	FLOAT32	R	Y	%	
27852	Max THD Voltage L-N	2	FLOAT32	R	Y	%	
27854	Max thd Voltage A-B	2	FLOAT32	R	Y	%	
27856	Max thd Voltage B-C	2	FLOAT32	R	Y	%	
27858	Max thd Voltage C-A	2	FLOAT32	R	Y	%	
27860	Max thd Voltage L-L	2	FLOAT32	R	Y	%	

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Table D–1:Register List

Reg	Name	Size	Data Type	Access	NV	Units	Notes
27862	Max thd Voltage A-N	2	FLOAT32	R	Y	%	
27864	Max thd Voltage B-N	2	FLOAT32	R	Y	%	
27866	Max thd Voltage C-N	2	FLOAT32	R	Y	%	
27870	Max thd Voltage L-N	2	FLOAT32	R	Y	%	
Frequency							
28092	Max Frequency	2	FLOAT32	R	Y	Hz	

Data Types

Table D–2: Data Types

Data Type	Description	Native Range	N/A Value	Notes
UTF8	Alphanumeric	0 - 3 bytes	0x00	
INT16	Signed Integer, 16 bits	-32,768 - 32,767	0x8000	
INT16U	Unsigned Integer, 16 bits	0 - 64,535	0xFFFF	
INT32	Signed Integer, 32 bits	-2,147,483,648 - 2,147,483,647	0x80000000	
INT32U	Unsigned Integer, 32 bits	0 - 4,2,94,967,295	0xFFFFFFFF	
INT64	Signed Integer, 64 bits		0x8000000000000000	
FLOAT32	Floating Point, 32 bits	+/- 1*10^38	0xFFC00000	
FLOAT64	Floating Point, 64 bits	+/- 1*10^380	0xFFF8000000000000	
BITMAP			0x8000 Example for a status bitmap 1 register long.	For status bitmaps that are multiple registers long, the most significant bit will be set to indicate the entire bitmap is N/A.This does not apply to configuration bitmaps. So, in setup commands that include a bitmap as a parameter, the user must always include the desired value for these bitmaps.
DATETIME	DateTime	1/1/2000 - 12/31/2127	0xFFFFFFFFFFFFFFFF	DateTime coding format using 4 words as per IEC 870-5-4 Word 1 b0-b6: Year (0 - 127) b7-b15: Reserved Word 2 b0-b4: Day (1-31) b5-b7: Weekday (1-7, 0 if not used) b8-b11: Month (1-12) b12-b15: Reserved Word 3 b0-b5: Minutes (0-59) b6: Reserved b7: Time synchronization quality, 1 = non valid or non synchronization b8-b12: Hour (0-23) b13-b14: Reserved b15: 0 = Standard time, 1 = Daylight Savings Time Word 4 b0-b15: Millisecond (0 - 59999)

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Table D–2: Data Types

Data Type	Description	Native Range	N/A Value	Notes
DATE	Date		0xFFFFFFFF	Word 1 b0-b7: Year (0 - 99) b8-b15: Reserved Word 2 b0-b4: Day (1-31) b5-b7: Weekday (1-7, 0 if not used) b8-b11: Month (1-12) b12-b15: Reserved
TIME	Time		0xFFFFFFFF	Word 1 b0-b5: Minutes (0-59) b6: Reserved b7: Time synchronization quality, 1 = non valid or non synchronization b8-b12: Hour (0-23) b13-b14: Reserved b15: 0 = Standard time, 1 = Daylight Savings Time Word 2 b0-b15: Millisecond (0 - 59999)
PF32	Power Factor	-2 - 2	0xFFC00000	See “” on page 105.

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Appendix E—Power Factor Register Format

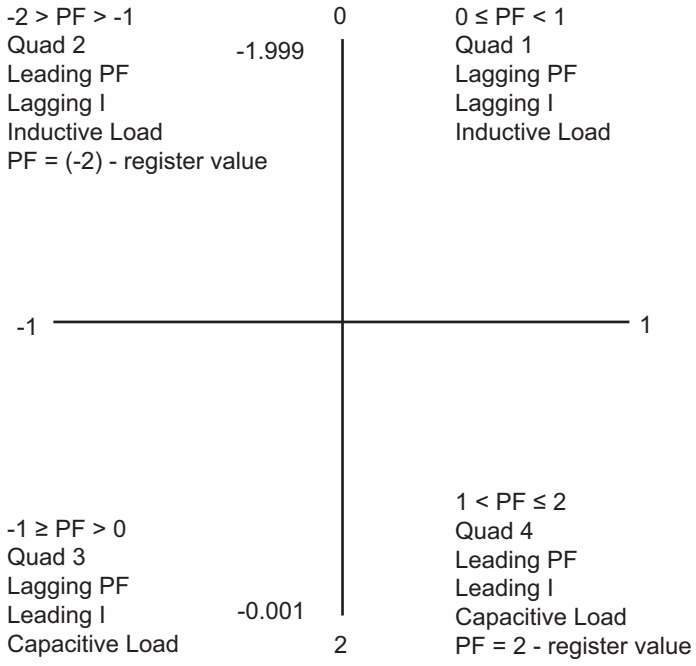
Power Factor Register Format

Each power factor (PF) value occupies one register. The power meter display and ION software interpret the register format in all reporting or data entry fields according to the PQS Coordinate System Chart (Figure E–1). The PQS Coordinate System Chart uses the power factor register value to provide information on leading or lagging power factor and current, as well as energy delivered or received.

- Power Factor (PF): The difference between the total power and the portion of total power that does the useful work. The ratio of Active (P) power to Apparent (S) power (kW/kVA).
- True Power Factor: Includes harmonic content.
- Displacement Power Factor: Excludes harmonic content. The cosine of the angle between the fundamental values of current to voltage.
- Leading PF: Active (P) and Reactive (Q) power flowing in opposite directions.
- Lagging PF: Active and Reactive power flowing in the same directions.
- Leading Current (I): Current is leading voltage up to 180°.
- Lagging Current (I): Current is lagging voltage up to 180°.

The PQS Coordinate System chart quadrants are based on Active and Reactive power from the point of view of a utility. Whether or not a connected facility or substation is consuming or providing energy, it is assumed that the utility considers it the load.

Figure E–1: PQS Coordinate System Chart



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To determine power factor:

1. Get the register value.
2. Use the register value to determine in which quadrant the system is operating.

   NOTE: The Quadrant determines lead/lag for power factor and current.
3. Use the register value to determine the flow of Active power:
   a. a positive value indicates Energy Delivered.
   b. a negative value indicates Energy Received.
4. Use the register value to determine power factor:
   a. if the register value is within -1 to + 1, the register value is the power factor value.
   b. if the register value is not within -1 to +1, the power factor value is derived differently for Energy Delivered and Energy Received systems:
      — for Energy Delivered: PF = 2 - the register value.
      — for Energy Received: PF = (-2) - the register value.

For example:

- Register value = 0.999: Apparent power is in Quadrant 1, current (I) is lagging, and energy is delivered by the utility to the customer with a lagging power factor of 0.999.
- Register value = -1.1: Apparent power is in Quadrant 2, current (I) is lagging, and energy is received by the utility from the customer with a leading power factor of -0.9 (PF = (-2) - (-1.1)).
- Register value = -0.986: Apparent power is in Quadrant 3, current (I) is leading, and energy is received by the utility from the customer with a lagging power factor of 0.986.
- Register value = 1.14: Apparent power is Quadrant 4, current (I) is leading, and energy is delivered by the utility to the customer with a leading power factor of 0.86 (PF = 2 - 1.14).

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Glossary

Terms

accumulated energy—energy accumulates as either delivered to the customer or received from the customer.

active alarm—an alarm that has been set up to trigger the execution of a task or notification when certain conditions are met. An icon in the upper-left corner of the power meter indicates that an alarm is active (!).

ASCII—American Standard Code for Information Interchange

baud rate—specifies how fast data is transmitted across a network port.

block interval demand—demand calculation method for a block of time; includes sliding block, fixed block, or rolling block method.

communications link—a chain of devices connected by a communications cable to a communications port.

current transformer (CT)—current transformer for current inputs.

demand—average value of a quantity, such as power, over a specified interval of time.

device address—used to identify a device on the Modbus communications link; defines where the power meter resides in the power monitoring system.

energy delivered—the utility delivers energy to the facility; energy in.

energy received—the utility receives energy from the facility; the customer provides power to the utility; energy out.

event—the occurrence of an alarm condition, such as *Undervoltage Phase A*, configured in the power meter.

firmware—operating system within the power meter

fixed block—a demand calculation method using an interval selected from 1 to 60 minutes (in 1-minute increments). The power meter calculates and updates the demand at the end of each interval.

frequency—number of cycles in one second.

GMT—Greenwich Mean Time

lagging current (I)—current is lagging voltage up to 180°.

leading current (I)—current is leading voltage up to 180°.

lagging power factor (PF) —active and reactive power flowing in the same directions.

leading power factor (PF) —active and reactive power flowing in opposite directions.

line-to-line voltages—measurement of the rms line-to-line voltages of the circuit.

line-to-neutral voltages—measurement of the rms line-to-neutral voltages of the circuit.

maximum value—highest value recorded of the instantaneous quantity such as Phase A Current, Phase A Voltage, etc., since the last reset of the minimums and maximums.

minimum value—lowest value recorded of the instantaneous quantity such as Phase A Current, Phase A Voltage, etc., since the last reset of the minimums and maximums.

nominal—typical or average.

parity—refers to binary numbers sent over the communications link. An extra bit is added so that the number of ones in the binary number is either even or odd, depending on your configuration. Used to detect errors in the transmission of data.

partial interval demand—equal to energy accumulated thus far in the interval divided by the length of the complete interval.

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peak demand current—highest demand current measured in amperes since the last reset of demand.

peak demand real power—highest demand real power measured since the last reset of demand.

peak demand—highest demand measured since the last reset of demand.

phase currents (rms)—measurement in amperes of the rms current for each of the three phases of the circuit.

phase rotation—refers to the order in which the instantaneous values of the voltages or currents of the system reach their maximum positive values. Two phase rotations are possible: A-B-C or A-C-B.

potential transformer (PT)—also known as a voltage transformer (VT).

power factor (PF)—power factor is the degree to which voltage and current to a load are out of phase. Total power factor is the difference between the total power your utility delivers and the portion of total power that does useful work. True power factor is the ratio of real power to apparent power using the complete harmonic content of real and apparent power. Calculated by dividing watts by volt amperes. Displacement power factor is the cosine of the angle between the fundamental components of current and voltage, which represents the time lag between fundamental voltage and current.

real power—calculation of the real power (3-phase total and per-phase real power calculated) to obtain kilowatts.

rms—root mean square. Power meters are true rms sensing devices.

rolling block—a selected interval and subinterval that the power meter uses for demand calculation. The subinterval must divide evenly into the interval. Demand is updated at each subinterval, and the power meter displays the demand value for the last completed interval.

sliding block—an interval selected from 1 to 60 minutes (in 1-minute increments). If the interval is between 1 and 15 minutes, the demand calculation updates every 15 seconds. If the interval is between 16 and 60 minutes, the demand calculation updates every 60 seconds. The power meter displays the demand value for the last completed interval.

thermal demand—demand calculation based on thermal response.

Total Demand Distortion (TDD)—indicates the harmonic currents between an end user and a power source.

Total Harmonic Distortion (THD or thd)—indicates the degree to which the voltage or current signal is distorted in a circuit.

total power factor—*see power factor*.

true power factor—see *power factor*.

voltage transformer (VT)—also known as a potential transformer (PT).

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Abbreviations

A—Ampere
Amps—Amperes
Comms—Communications
CPT—Control Power Transformer
CT—Current Transformer
D In—Digital Input
D Out—Digital Output
DMD—Demand
DO—Drop Out
F—Frequency
Hz—Hertz
I—Current
I/O—Input/Output
Imax—Current maximum demand
kVA—Kilovolt-Ampere
kVAD—Kilovolt-Ampere demand
kVAR—Kilovolt-Ampere reactive
kVARD—Kilovolt-Ampere reactive demand
kVARH—Kilovolt-Ampere reactive hour
kW—Kilowatt
kWD—Kilowatt demand
kWH—Kilowatthours
kWH/P—Kilowatthours per pulse
kWmax—Kilowatt maximum demand
Mag—Magnitude
Maint—Maintenance
Min—Minimum
MnMx—Minimum and maximum values
MSec—Milliseconds
MVAh—Megavolt ampere hour
MVARh—Megavolt ampere reactive hour
MWh—Megawatt hour
OS—Operating System (firmware version)
P—Real power
Pd—Real power demand
PF—Power factor
PM—Power meter
PQS—Real, reactive, apparent power
PQSd—Real, reactive, apparent power demand
Prim—Primary
PT—Potential Transformer (also known as VT–Voltage Transformer)
PU—Pick Up
Pulse—Pulse output mode
Pwr—Power

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Q—Reactive power
Qd—Reactive power demand
RS—Firmware reset system version
S—Apparent power
SN—Power meter serial number
Sd—Apparent power demand
Sec—Secondary
Sub-I—Subinterval
TDD—Total Demand Distortion
THD—Total Harmonic Distortion
U—Voltage line to line
V—Volts
VT—Voltage Transformer (also known as PT–Potential Transformer)
VAR—volt ampere reactive.
Vmax—Maximum voltage
Vmin—Minimum voltage

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PowerLogic™ Power Meter PM5350
User Guide

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