94-1100-00002861 D0
OPERATING MANUAL

PowerView
Circuit Monitoring System

The PowerView monitoring system offers factory integrated branch circuit and sub-feed management for your Cyberex® RPP and PDU which can communicate valuable information to your central management system or to a local or remote display.

For a comprehensive overview of publications available for the PowerView monitoring product line, refer to the Web link and/or QR code referenced on the inside cover of this publication.

The Company

We are an established world force in the design and manufacture of power electronics and power protection equipment.

As a part of ABB, a world leader in electrical technology, we offer customers application expertise, service and support worldwide. We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance ABB’s products result from over 100 years of experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

Quality control

To ensure that we meet our responsibilities and obligations to our customers, our people, our partners, our suppliers and to our shareholders, we are committed to deliver on-time and on-quality products, systems and services that meet or exceed our customers’ expectations.

For more information

Further publications for the PowerView monitoring System and accessories are available for free download from http://new.abb.com/ups/power-distribution or by scanning the QR code below.

Contacting ABB for support

To contact ABB for information or repair service in the United States, call 1 800 292 3739. ABB offers a complete range of start-up services, repair services, preventive maintenance plans and service contracts.

For repair or maintenance service outside the 48 contiguous United States, contact ABB, if available in your area.

Please provide the following information for customer service when you contact the ABB service center:

Equipment
Part number
Serial number
Voltage rating
Current rating
Purchase date
Installation date
Location

To get important information on all equipment warranties, please contact the ABB service center or request service follow-up or by scanning the QR code below.

Safety notices

PowerView monitoring systems are typically installed in a high-energy distribution product such as a Power Distribution Unit (PDU) or Remote Power Panel (RPP). Refer to your distribution product manual for further safety information.

The following safety instructions must be observed when working with the device. Refer to the nameplate of the distribution product for the specific model designation and operating parameters. External input over-current protection is to be supplied by the user in accordance with nameplate ratings for applications where the distribution product has no main breaker.

These symbols may appear on your distribution product or on labels inside the distribution product. Most international safety agents accept them. Everyone in your organization who works with your system should understand the meaning of these symbols:

Safety notice	
	**CAUTION – Refer to manual** Stop and refer to the operator manual for more information.
	**WARNING – Risk of electric shock** There is a risk of electric shock present, and you should observe associated warnings. The Distribution Product contains high voltages.

Safety precautions

The distribution products where PowerView is typically installed contain hazardous voltages which are present regardless of the mode of operation. Before making any connection(s) to the distribution product, ensure that any/all power sources are de-energized and locked out.

As lethal voltages are present within the distribution product during all modes of operation, maintenance shall only be performed by authorized service personnel.

Refer to your distribution product manual for further safety precautions.

ABB neither recommends nor knowingly sells this product for use with life support applications or other FDA designed critical applications.

All wiring should be performed by qualified electricians and in the accordance with local and national electrical safety codes. Before placing the unit into service, a thorough inspection and supervised start-up should be performed by a qualified service technician.

Safety considerations

PowerView monitoring systems are typically installed in power protection equipment such as a Power Distribution Unit (PDU) or Remote Power Panel (RPP). Refer to your power protection product user's manual for further safety considerations.

The PowerView monitoring system is designed for commercial market applications, and typically is installed within complex power systems that should be handled with appropriate care, following these guidelines:

- Keep surroundings clean and free from excess moisture.
- Do not operate the PowerView monitoring system close to gas or electric heat sources.
- The system is not intended for outdoor use.
- The operating environment should be maintained within the parameters stated in the manual.
- Keep the cabinet doors closed and locked to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.

Safety consideration
 **CAUTION** Only authorized service personnel should perform maintenance on or service the PowerView system.

If service or routine maintenance is required:

- Ensure all power is disconnected before performing maintenance.
- Ensure the area around the PowerView monitoring system is clean and uncluttered.
- Observe all DANGER, CAUTION and WARNING notices affixed to the inside and outside of the PowerView monitoring systems and the distribution product in which it is typically installed.

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1 General

1.1 Using this manual

This manual is provided to aid the user in the installation, operation, and maintenance of the PowerView monitoring system, manufactured by ABB. Read and understand the procedures described to ensure trouble-free installation and operation.

Read through each procedure before beginning the procedure. Perform only those procedures that apply to the PowerView monitoring system being installed or operated.

1.1.1 List of symbols

Symbols	
	**DANGER – Risk of electric shock** This symbol in conjunction with the signal word "DANGER" indicates an imminent electrical hazard. Observe the warning associated with the risk of electric shock symbol.
	**WARNING – Bodily injury** This symbol in conjunction with the signal word "WARNING" indicates a potentially dangerous situation. Failure to observe the related safety note may cause personnel injury or death or equipment damages.
	**CAUTION – Refer to manual** This symbol in conjunction with the signal word "CAUTION" indicates that before proceeding, the user should refer to the appropriate section of this manual.
	**IMPORTANT – NOTE** This symbol indicates operator tips, particularly useful or important information for the use of the product. This symbol and wording does not indicate a dangerous situation.
	The universal symbol for Recycle.
	This symbol indicates that you should not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.

1.2 Electrical safety precautions

The PowerView monitoring system is typically installed in, or is connected to, power protection equipment such as a Power Distribution Unit (PDU) or Remote Power Panel (RPP), which can be connected to one (1) or more single (1) or three (3) phase power sources. Refer to the monitored equipment's nameplate for the specific model designation, operating voltage, and input power configuration, and to its operating manual for additional safety precautions.

Warning

WARNING

As lethal voltages exist within all operating modes of the distribution product, maintenance can only be performed by qualified and authorized trained service personnel.

ABB neither recommends nor knowingly sells this product for use with life support applications or other FDA designated critical applications.

All wiring should be performed by qualified electricians and in accordance with local and national electrical safety codes. Before placing the unit into service, a thorough inspection and supervised start-up should be performed by a qualified technician.

Warning

WARNING

To provide sufficient isolation protection when working upstream of the distribution product, open the respective source feeder breakers contained within the distribution product. Prescribing to this maintenance method reduces the risk of electric shock due to backfeed.

Danger

DANGER – Risk of electric shock

Current transformers (CT's) with an open secondary can generate a significantly high voltage across its terminals, which poses a shock hazard to personnel and can damage equipment.

Prior to servicing the PowerView, ensure all CT's secondary circuits have been shorted, primary circuits have been disconnected and LOTO, or that functioning open circuit protection is installed.

1.3 Cybersecurity

1.3.1 Disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is the Customer's sole responsibility to provide and continuously ensure a secure connection between the product and Customer network or any other network (as the case may be). The customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

We recommend connecting the system in private network, if not the case additional hardware that provide increased security controls/measures such as firewalls should be implemented

1.3.2 Ports used by this product

Table 1-1: TCP/UDP service ports used by this product

Port	Service	Purpose
22/tcp	SSH	Valid for SSH
502/tcp	Modbus/TCP	Valid for Modbus TCP
25/tcp	Email	Valid of Email
110/tcp	Email	Valid of Email
143/tcp	Email	Valid of Email
465/tcp	Email	Valid of Email
587/tcp	Email	Valid of Email
993/tcp	Email	Valid of Email
995/tcp	Email	Valid of Email
69/udp	TFTP	Valid for Software Upgrade
123/udp	NTP	Valid for Network Time Products

1.4 Equipment description overview

1.4.1 Application overview

PowerView monitoring system can be used for communicating valuable information to your central management system, or to a local or remote display. We recommend connecting the system in private network, if not the case additional hardware that provide increased security controls/measures such as firewalls should be implemented. PowerView actively monitors the load current of each of your power distribution circuits and reports this information to you for cost allocation or load protection management.

PowerView can be configured to monitor the following, depending on the system being monitored:

1.4.1.1 Branch Circuit Management (BCM)

PowerView can be configured to monitor up to 252 branch circuits on up to 6 power distribution panelboards which are powered by 1 to 6 sources of three-phase voltages. The source voltages for panelboards are user configurable, i.e., the user can configure any source to any panelboard. PowerView monitors the RMS branch currents and voltages. Based on the above parameters, it calculates the power quality parameters like power, energy, load, power factor, MD (Maximum Demand), etc. It also monitors panel level currents, voltages and other power quality parameters. PowerView generates warnings/alarms for different power quality parameters based on the thresholds and delays configured by the user.

1.4.1.2 Sub-feed Circuit Management (SFCM)

PowerView can be configured to monitor sub-feeds and/or main feeds in a Power Distribution System, up to 67 (each 3 phase) without neutrals or 60 with neutral, which are powered by 1 to 6 sources of three-phase voltages. PowerView monitors the sub-feed or main feed RMS phase currents and voltages. Based on the above parameters, it calculates the power quality parameters such as power, energy, load, power factor, and MD (Maximum Power Demand). PowerView generates warnings/alarms for different power quality parameters based on the thresholds and delays configured by the user.

1.4.1.3 Transformer monitoring

PowerView monitors voltage and current on all three phases of a power distribution transformer. Warnings and alarms notify operators when monitored current, voltage or power approaches user set limits. PowerView generates warnings/alarms for different power quality parameters based on the thresholds and delays configured by the user.

1.4.1.4 Discrete Input monitoring

PowerView can be configured to monitor input sensors placed in the unit. Circuit breakers are the most commonly monitored input. PowerView can monitor up to 150 discrete input sensors, depending on cards configured.

1.4.1.5 Thermocouple monitoring

PowerView can be configured to monitor thermocouple placed in the unit. PowerView will support Type J, Type E, Type K or Type T thermocouples. PowerView can monitor up to 90 thermal sensors, depending on cards configured. Thresholds can be set to provide alerts and warnings as sensed temperatures pass these thresholds.

2 Installation

2.1 Installation site

2.1.1 Operating environment

The PowerView is designed for indoor applications only and must be protected from excessive moisture or corrosive environments. The PowerView is not intended for use in the presence of explosive gases.

This unit complies with the limits for a Class A digital device in accordance with Part 15, Subpart J of the FCC rules; therefore, it is suitable for use in a commercial environment. If not used in accordance with its design intent, and in accordance with the instructions contained within this manual, PDU may cause interference with radio frequency communications.

Required operating environment conditions can be found in Section 8.4.

2.1.2 Positioning

PowerView is typically located inside the cabinet of a distribution product such as a PDU or RPP. It is either factory installed or installed in the field by an ABB certified technician.

Refer to the distribution product manuals, and associated outline drawings for the exact location of PowerView inside your unit's cabinet.

Caution	
	– Make sure all cabinet ventilation openings are clear of obstructions.

2.2 Checking the supplied parts

2.2.1 Inspection

2.2.1.1 Shipping and delivery

Every ABB Power Protection product is fully tested and has passed our thorough quality control inspection prior to delivery. Once the product is tested and quality control inspected, the unit is then carefully packaged for delivery.

PowerView is typically located inside the cabinet of a distribution product. Refer to the distribution product manuals, and associated outline drawings for the exact location of PowerView inside your unit's cabinet, and for inspection instructions before and after unpacking the unit.

2.2.2 Meter overview

PowerView consists of three main components:

- A sheet metal enclosure surrounding a Backplane Distribution Board (BDB) with either 2 or 6 slots
- A Main Control Board (MCB), with USB and RJ-45 connectors for communicating with other modules inside the distribution product and with service tools.
- Daughter cards with various metering and monitoring functions which can be mixed according to the needs of the unit to be monitored. Daughter cards can be added to an existing PowerView for new capabilities. Installation and configuration must be completed by ABB Service personnel.
    - Analog Conditioning Boards (ACB) for monitoring branches and sub-feeds. Each board has two sets of connectors:
        - Four connectors with 22 positions for connecting to branch or sub-feed current transformers (CT).
        - One connector with 8 positions for connecting to panel main or sub-feed CT's.
        - Four 2 pin connectors for connecting to voltage phases and neutral.
    - Primary-Secondary Board (PSB) for monitoring the PDU transformer. Each board has two sets of connectors:
        - Two connectors with 22 positions for connecting to current transformers (CT).
        - Eight 2 pin connectors for connecting to voltage phases and neutral.
    - Discrete Input Board (DIB) for monitoring input status of components like breakers or doors. Each board has seven Phoenix-style connectors with screw clamps for connecting to input sensor wires.
    - Thermocouple Input Board (TIB) for monitoring thermocouples placed throughout the unit. Each board has four Phoenix-style connectors with screw clamps for connecting to thermocouple sensor wires.
    - Blind cover, for open slots

A sample PowerView Assembly is shown in Figure 2-1 and Figure 2-2.

Figure 2-1: PowerView assembly front view

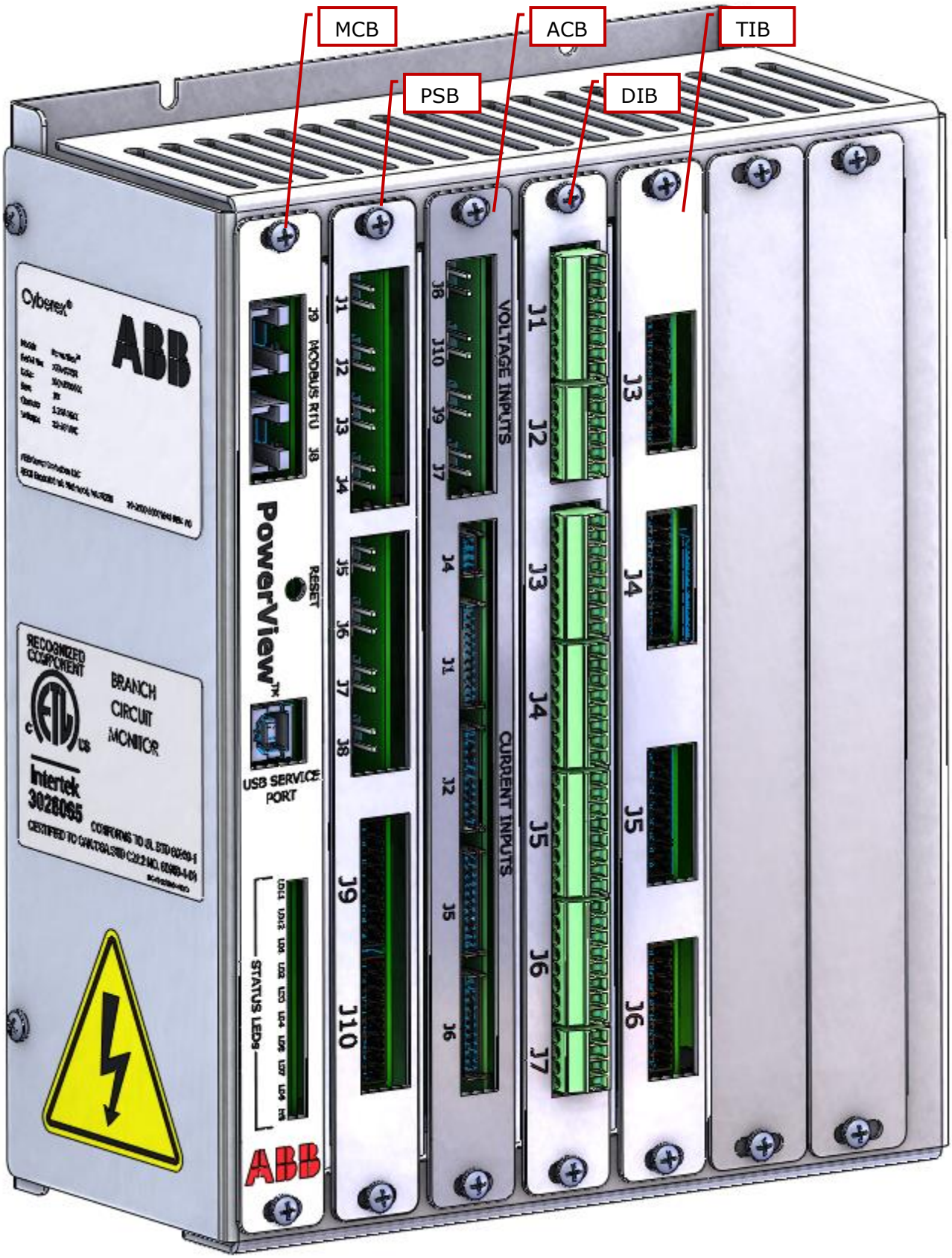
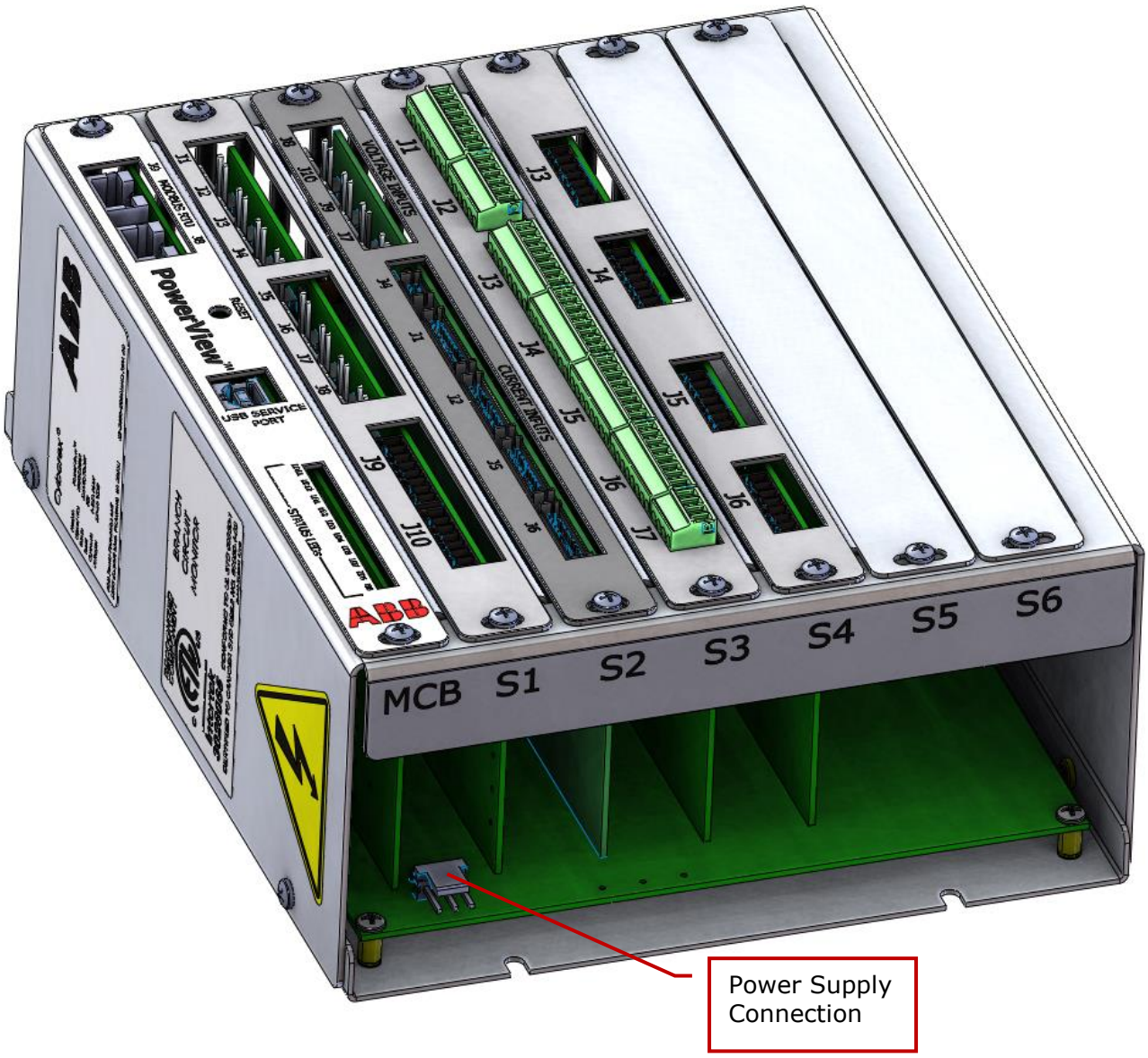


Figure 2-2: PowerView assembly bottom view



3 Startup

3.1 Power up

PowerView will typically power up with the distribution product. LED's LD11 and LD12 on the MCB will indicate that the system is powering up by being continuously lighted. Refer to the distribution product manuals for power up procedures for the unit. Follow all safety warnings and procedures.

LED's LD1 and LD2 indicate communication and will blink when communications are functionating normally.

3.1.1 Power supply requirements

Power supplies for PowerView need to meet the following requirements:

- 12-28 VDC output voltage
- 4A output current
- 0°C to 40°C operating temperature
- UL 60950 listed, SELV or Class 2

The PowerView power supply connection is located as shown in Figure 2-2, and is TE Connectivity part number 640389-3 or equivalent.

4 Metering and monitoring

All referenced voltages and currents are based on the standard 480 -208/120V units. See as built documents and/or unit nameplate for unit specific voltages.

4.1 Overview

The PowerView monitoring system will be used to monitor various voltages & currents in a power distribution panel or remote power panel. It will also compute various other parameters such as power, energy, demand, frequency, power factor, etc. Specific parameters for transformers, branches and sub-feeds are shown in Section 4.2.1.

4.2 Product description

The Metering module will acquire the voltage & current signals from current transformers through an Analog Conditioning board or Primary/Secondary Board. It will calculate energy and power quality parameters. These parameters are passed to the display board/PC for display and data logging. It will also receive control/command/system parameter data from display board or a third-party display module. Meters can be configured in groups to improve monitoring efficiency. PowerView has capacity for up to 50 custom groups.

4.2.1 Monitored Parameters

4.2.1.1 PowerView Branch Circuit Monitoring Parameters

PowerView BCM shall provide the capability of measuring individual currents for up to 252 branch circuits residing in up to six 42 position panel boards or three 84 position panel boards. Parameters include:

- Real time current, peak current (resettable), minimum current (resettable) for each branch circuit
- Panel board phase current
- Voltage, power, energy, power factor and THD (current) for each branch circuit
- Voltage, power, energy, power factor and THD (current) at the panel board level
- User configurable warning and alarm thresholds for each circuit
- User configurable warning and alarm statuses for each circuit
- PC-based set up software capable of global or individual circuit setup

4.2.1.2 PowerView Sub-feed Circuit Management Parameters

PowerView SFCM shall provide the capability of providing phase current, metering at the sub-feed circuit level. Parameters include:

- Real time current, peak current (resettable), minimum current (resettable) for each sub-feed circuit
- Voltage, power, energy, power factor and THD (current)
- User configurable warning and alarm thresholds for each sub-feed circuit
- User configurable warning and alarm statuses for each sub-feed circuit

4.2.1.3 PowerView Main-feed Circuit Monitoring Parameters

PowerView MFCM shall provide the capability of providing phase current, metering at the panel board main or source level with the following functionality:

- Real time current, peak current (resettable), minimum current (resettable) for each main feed circuit
- Voltage, power, energy, power factor and THD (current) for panel board main or source
- User configurable warning and alarm thresholds for each main feed circuit
- User configurable warning and alarm statuses for each main feed circuit

4.2.2 Current measurement

For accurate current measurements in the mission critical power chain, the PowerView uses precisely specified Current Transformers (CT's), which are installed at each monitored location.

The CT's used with the PowerView have a protective resistor installed across the secondary terminals. This resistor will limit the voltage across the CT's terminals to less than 50Vrms, in the event of an open secondary, under otherwise normal operating conditions and currents.

4.2.2.1 Branch circuit CT requirements

For the measurement of branch circuits rated 60A or less installed in standard lighting panelboards, ABB Power Protection can provide compact CT strip assemblies. These CT strips are designed to provide an efficient means of measuring current in each branch circuit, without taking up significant wire gutter space or complicating the branch circuit wire installation.

Each CT strip is supplied with the appropriate # of fully encapsulated, solid-core CT's, a steel mounting bracket, and a complete wiring harness, with field accessible terminations (See Figure 4-1 for a typical CT strip). The CT strip assemblies are then mounted near the monitored panelboard, with the CT's openings aligned with the terminals of each branch circuit breaker (See Figure 4-2 for a typical installation).

Figure 4-1: Typical CT strip

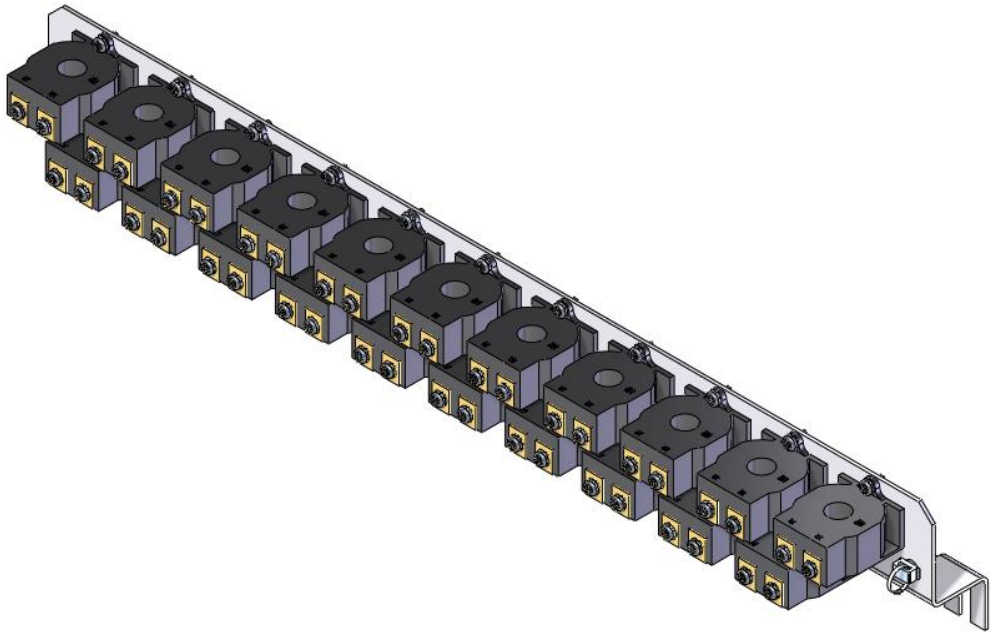
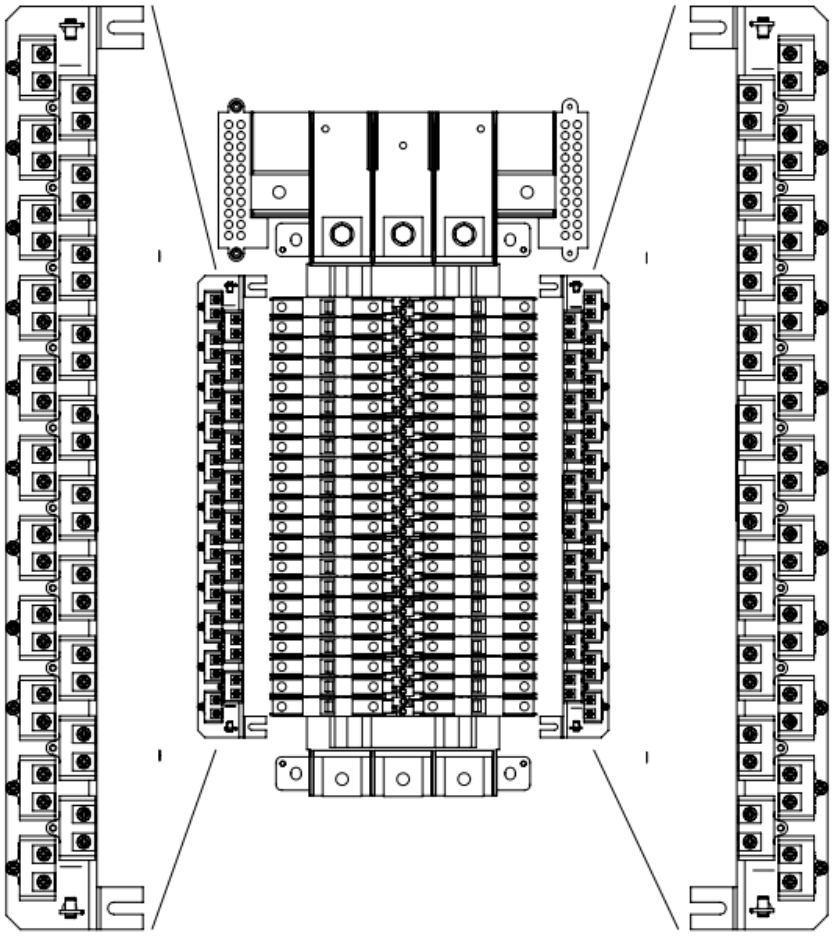


Figure 4-2: Typical CT strip installation



To accommodate the wide variety of lighting panelboards and branch circuit breaker styles available today, ABB Power Protection has the availability to offer CT strips with the following features:

Table 4-1: CT strip features

Number of circuits per strip	21, 42	
Branch circuit pitch	0.71”	ABB Proline, SmissLine
	0.75”	Schneider NQ
	1.00”	ABB-EPIS (GE) AQ/AE panels, Schneider NF, Bussman Quick Spec, Eaton/Cutler Hammer
Mounting orientation	Right-handed, Left-handed	
CT rating	60A:0.1A	
Maximum wire O.D.	0.275”	

In addition to the options shown above, ABB Power Protection can provide 100A rated branch circuit CT's for larger circuits and wire O.D.'s, and wire-mounted split-core CT's for retrofit applications. Please contact ABB Power Protection for further information.

The PowerView software supports the following two panelboard configurations:

- The standard panelboard
- The column-width panelboard

The PowerView is configured for either of these configurations by the value set in the Modbus configuration. See Section 4.2.3 for detailed information on Modbus configuration.

4.2.2.2 Sub-feed or PDU CT requirements

CT rating depends on whether the circuit is monitored with a PSB or an ACB. See Table 4-2 for required current rating.

Table 4-2: Current Transformer Rating

	PSB	ACB
Current Transformer Rating	5A secondary	0.1 A secondary

4.2.3 Thermal measurement

PowerView will acquire the signals from thermocouples placed throughout a PDU or RPP when a Thermocouple Input Board (TIB) is installed. Multiple TIB's can be installed in PowerView. Each TIB can accept up to 15 thermocouple inputs.

4.2.3.1 Thermocouple requirements

Thermocouples Type J, Type E, Type K or Type T are compatible for use with PowerView.

5 Modbus connectivity

The PowerView acts as a Modbus slave, and can be accessed by the Modbus master using either Modbus RTU (via RS-485) or Modbus TCP through customer connection on the User Interface Modbus port. See your system manual for the exact location of this interface. The default PowerView slave ID=1 for identification by the master. The default Modbus RTU settings are as follows.

Baud rate: 19200

Parity: None

Stop bits: 1

5.1 Modbus map overview

The Modbus map contains four different maps, which are assigned register ranges

- MCB System map, Modbus registers from 1 - 1000
- System map, Modbus registers from 1000 - 2000
- Single-phase map, Modbus registers from 2001-39800
- Three-phase map, Modbus registers from 40001-63450
- Input Map, Modbus registers from 63451-65535

Each map is described in a following section, and register definitions are provided in each section.

Access types are either R = Read Only, or RW = Read/Write.

5.2 MCB System map

The MCB system configuration map will contain the information related to the PowerView system configuration, including information on how many meters are present, type of each meter and meter status. Modbus IDs from 1 to 1000 are allocated for the MCB system map.

Table 5-1: MCB System map values

Reg. No.	Description	Format	Scale	Min	Max	Default	Access Type	Note
1	Device ID	int16	1	1	20	1	R	
2	Uart Baud Rate Options	int16	1	1	5	5	R	
3	Major_Minor Version	int16	1	N/A	N/A	N/A	R	
4	Patch Version	int16	1	N/A	N/A	N/A	R	
5	Total no of meters	int16	1	N/A	N/A	N/A	R	
6	System Alarm	int16	1	N/A	N/A	N/A	R	
7	System Slot status	int16	1	1	511	7	RW	
11	System Command	int16	1	0	65535	0	RW	See Table 5-2
17	System Slot12 information	int16	1	N/A	N/A	N/A	R	
18	System Slot34 information	int16	1	N/A	N/A	N/A	R	
19	System Slot56 information	int16	1	N/A	N/A	N/A	R	
20	System Slot1 SW Version	int16	1	N/A	N/A	N/A	R	
21	System Slot2 SW Version	int16	1	N/A	N/A	N/A	R	
22	System Slot3 SW Version	int16	1	N/A	N/A	N/A	R	
23	System Slot4 SW Version	int16	1	N/A	N/A	N/A	R	
24	System Slot5 SW Version	int16	1	N/A	N/A	N/A	R	
25	System Slot6 SW Version	int16	1	N/A	N/A	N/A	R	
51	Global panel no	int16	1	1	6	1	RW	
52	Global Over Current Alarm Set Limit	int16	1	60	150	80	RW	
53	Global Over Current Alarm Hysteresis Limit	int16	1	1	20	5	RW	
54	Global Over Current Alarm Set Delay	int16	100	0.1	100	10	RW	
55	Global Over Current Alarm Reset Delay	int16	100	0.1	100	10	RW	
56	Global Over Current Warning Set Limit	int16	1	50	145	70	RW	
57	Global Over Current Warning Hysteresis Limit	int16	1	1	20	5	RW	
58	Global Over Current Warning Set Delay	int16	100	0.1	100	10	RW	
59	Global Over Current Warning Reset Delay	int16	100	0.1	100	10	RW	
60	Global Under Current Alarm Set Limit	int16	1	0	99	1	RW	
61	Global Under Current Alarm Hysteresis Limit	int16	1	1	20	1	RW	
62	Global Under Current Alarm Set Delay	int16	100	0.1	100	10	RW	
63	Global Under Current Alarm Reset Delay	int16	100	0.1	100	10	RW	

Table 5-2: System Command register

Bits	Description
0	Writing back default user configurations
1	Resetting the alarm and warnings
2	Resetting the min max values
6	Command to backup calibration data

5.3 General Settings map

The General Settings map updates overall system status and transformer temperature status, UIB data and date and time. Modbus IDs in the range from 1000 to 2000 are allocated for the General Settings map.

5.3.1 Date and Time registers

The 'Date and Time' Modbus registers are shown below in Table 5-3. These registers are accessed using Function Codes 03 (Read Holding Registers) and 16 (Preset Multiple Registers).

Table 5-3: Modbus registers - Date and time

Reg. No.	Description	Format	Scale	Min	Max	Default	Type
1411	Month (1-12)	int16	1	1	12	N/A	RW
1412	Day (1-31)	int16	1	1	31	N/A	RW
1413	Year (1970-2030)	int16	1	1970	2030	N/A	RW
1414	Hours (0-23)	int16	1	0	23	N/A	RW
1415	Minutes (0-59)	int16	1	0	59	N/A	RW
1416	Seconds (0-59)	int16	1	0	59	N/A	RW
1417	Milliseconds (0-999)	int16	1	0	999	N/A	RW

5.3.2 System Status registers

The 'System Status' Modbus registers are shown below in Table 5-4. These registers are accessed using Function Code 03 (Read Holding Registers).

Table 5-4: Modbus registers - System status

Reg. No.	Description	Format	Scale	Min	Max	Default	Type
1001	System Status Bit 0: (Set = Summary Alarm) Bit 2: (Set = Unacknowledged Events)	int16	1	N/A	N/A	N/A	R
1002	Outputs on UIB Port Bit 0: (Set = Summary Alarm) Bit 1: (Set = Unacknowledged Events)	int16	1	N/A	N/A	N/A	R
1003	Inputs on UIB Port Bit 0: (Set = PDU Transformer Excess Temperature) Bit 1: (Set = PDU Transformer Over Temperature) Bit 2: (Set = TVSS Fault) Bit 3: (Set = EPO [Local or Remote]) Bit 4: (Set = Circuit Breaker No. 1: Open) Bit 5: (Set = Circuit Breaker No. 2: Open) * Bit 6: (Set = Circuit Breaker No. 3: Open) * Bit 7: (Set = Circuit Breaker No. 4: Open) *	Flag	1	N/A	N/A	N/A	R
1004	Display Board Temperature (°C)	int16	1	N/A	N/A	N/A	R
1005	PDU Transformer Excess Temperature (0 = Normal; 1 = Warning)	int16	1	N/A	N/A	N/A	R
1006	PDU Transformer Over Temperature (0 = Normal; 2 = Alarm)	int16	1	N/A	N/A	N/A	R

* Optional

5.4 Single-phase map

The Single-phase map contains the information of each single-phase meter. It contains user configuration, factory configuration, metering data and monitoring data for all single-phase meters.

PowerView has capacity for up to 252 single-phase meters. The Single-phase map starts from 2000. Modbus ID offset for each single-phase meter is 150, so that all registers assigned to the meter are assigned within that group of 150. Each meter will start at a register id 150 higher than the previous meter's starting register ID, as noted in Figure 5-1.

Table 5-5 includes customer accessible registers, only.

Figure 5-1: Single-phase map offsets

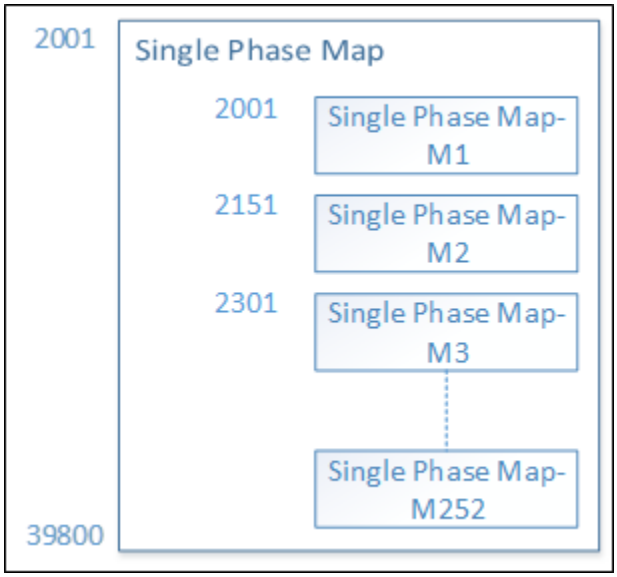


Table 5-5: Single-phase Modbus register (Meter Index = 1)

Reg No.	Description	Format	Scale	Min	Max	Default	Unit		Notes
2001	Meter rating	int16	1	10	4000	200	A	R	
2002	Voltage Rating	int16	1	120	600	120	V	R	
2003	Frequency Rating	int16	1	50	60	60	Hz	R	
2004	Meter Info ID	int16	1	0	65535	0	N/A	R	
2007	CT Primary Scale	int16	10	0.1	6500	2500	Turns	R	
2008	CT Secondary Scale	int16	10	0.1	6500	1	Turns	R	
2009	Burden Resistor Val	int16	1000	0	50	47.4	Ohms	R	
2011	Parent ID	int16	1	1	6	1	N/A	R	
2013	KW rating	int16	10	1.2	2400	24	KW	R	
2020	Group Number	int16	1	0	100	0	N/A	R	
2021	Meter Info Name1	int16	1	0	65535	0	N/A	R	
2023	Meter Info Name3	int16	1	0	65535	0	N/A	R	
2024	Meter Info Name4	int16	1	0	65535	0	N/A	R	
2025	Meter Info Name5	int16	1	0	65535	0	N/A	R	

2026	Meter Info On/Off	int16	1	0	1	1	N/A	RW	
2027	Max Demand Period Setting	int16	1	0	2	0	N/A	RW	See Table 5-9
2028	KW Fault set limit	int16	1	10	200	80	%	RW	
2029	KW Fault Reset Hysteresis	int16	1	1	20	10	%	RW	
2030	KW Fault Set delay	int16	100	0.1	100	10	Sec	RW	
2031	KW Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
2032	KVA Fault set limit	int16	1	10	200	80	%	RW	
2033	KVA Fault Reset Hysteresis	int16	1	1	20	10	%	RW	
2034	KVA Fault Set delay	int16	100	0.1	100	10	Sec	RW	
2035	KVA Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
2036	PF Fault set limit	int16	1	10	90	70	N/A	RW	
2037	PF Fault Reset Hysteresis	int16	1	1	20	5	N/A	RW	
2038	PF Fault Set delay	int16	100	0.1	100	10	Sec	RW	
2039	PF Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
2040	Voltage THD Fault set limit	int16	1	1	20	5	%	RW	
2041	Voltage THD Fault Reset Hysteresis	int16	1	1	20	1	%	RW	
2042	Voltage THD Fault Set delay	int16	100	0.1	100	30	Sec	RW	
2043	Voltage THD Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
2044	Current THD Fault set limit	int16	1	1	20	5	%	RW	
2045	Current THD Fault Reset Hysteresis	int16	1	1	20	1	%	RW	
2046	Current THD Fault Set delay	int16	100	0.1	100	30	Sec	RW	
2047	Current THD Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
2048	Frequency Fault set limit	int16	10	0.5	15	3	Hz	RW	
2049	Frequency Fault Reset Hysteresis	int16	10	0.5	15	0.5	Hz	RW	
2050	Frequency Fault Set delay	int16	100	0.1	100	10	Sec	RW	
2051	Frequency Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
2052	Over Current Alarm Set Limit	int16	1	60	150	80	%	RW	
2053	Over Current Alarm Reset Hysteresis	int16	1	1	20	5	%	RW	
2054	Over Current Alarm Set Delay	int16	100	0.1	100	10	Sec	RW	
2055	Over Current Alarm Reset Delay	int16	100	0.1	100	10	Sec	RW	
2056	Over Current Warning Set Limit	int16	1	50	145	70	%	RW	
2057	Over Current Warning Reset Hysteresis	int16	1	1	20	5	%	RW	
2058	Over Current Warning Set Delay	int16	100	0.1	100	10	Sec	RW	
2059	Over Current Warning Reset Delay	int16	100	0.1	100	10	Sec	RW	
2060	Under Current Alarm Set Limit	int16	1	0	99	1	%	RW	

2061	Under Current Alarm Reset Hysteresis	int16	1	1	20	1	%	RW
2062	Under Current Alarm Set Delay	int16	100	0.1	100	10	Sec	RW
2063	Under Current Alarm Reset Delay	int16	100	0.1	100	10	Sec	RW
2064	Over Voltage Alarm Set Limit	int16	1	115	125	120	%	RW
2065	Over Voltage Alarm Reset Hysteresis	int16	1	1	20	5	%	RW
2066	Over Voltage Alarm Set Delay	int16	100	0.1	100	10	Sec	RW
2067	Over Voltage Alarm Reset Delay	int16	100	0.1	100	10	Sec	RW
2068	Over Voltage Warning Set Limit	int16	1	105	115	110	%	RW
2069	Over Voltage Warning Reset Hysteresis		1	1	20	5	%	RW
2070	Over Voltage Warning Set Delay	int16	100	0.1	100	10	Sec	RW
2071	Over Voltage Warning Reset Delay	int16	100	0.1	100	10	Sec	RW
2072	Under Voltage Alarm Set Limit	int16	1	75	85	80	%	RW
2073	Under Voltage Alarm Reset Hysteresis	int16	1	1	20	5	%	RW
2074	Under Voltage Alarm Set Delay	int16	100	0.1	100	10	Sec	RW
2075	Under Voltage Alarm Reset Delay	int16	100	0.1	100	10	Sec	RW
2076	Under Voltage Warning Set Limit	int16	1	85	95	90	%	RW
2077	Under Voltage Warning Reset Hysteresis	int16	1	1	20	5	%	RW
2078	Under Voltage Warning Set Delay	int16	100	0.1	100	10	Sec	RW
2079	Under Voltage Warning Reset Delay	int16	100	0.1	100	10	Sec	RW
2080	Frequency Averaging Duration	int16	10	1	10	1	Sec	RW
2081	Voltage RMS Averaging Duration	int16	10	1	100	10	Sec	RW
2082	Current RMS Averaging Duration	int16	10	1	100	10	Sec	RW
2083	Alarm Delay	int16	100	0.1	100	10	Sec	RW
2084	Warning Delay	int16	100	0.1	100	10	Sec	RW
2091	KVAH Calib Gain	int16	1	1	5	1	N/A	RW
2092	KWH Calib Gain	int16	1	1	5	1	N/A	RW
2093	Energy kWH, Upper Part	int16	N/A	N/A	N/A	N/A	kWH	R
2094	Energy kWH, Lower Part	int16	N/A	N/A	N/A	N/A	kWH	R
2095	Energy kVAH, Lower Part	int16	N/A	N/A	N/A	N/A	kVAH	R
2096	Energy kVAH, Upper Part	int16	N/A	N/A	N/A	N/A	kVAH	R
2097	Power MD	int16	N/A	N/A	N/A	N/A	kW	R
2101	Voltage RMS	int16	1	N/A	N/A	N/A	V	R
2102	Max Voltage RMS	int16	1	N/A	N/A	N/A	V	R

2103	Min Voltage RMS	int16	1	N/A	N/A	N/A	V	R	
2104	Average Voltage RMS	int16	1	N/A	N/A	N/A	V	R	
2105	Peak Voltage RMS	int16	1	N/A	N/A	N/A	V	R	
2106	Current RMS	int16	1	N/A	N/A	N/A	A	R	
2107	Max Current RMS	int16	1	N/A	N/A	N/A	A	R	
2108	Min Current RMS	int16	1	N/A	N/A	N/A	A	R	
2109	Average Current RMS	int16	1	N/A	N/A	N/A	A	R	
2110	Peak Current RMS	int16	1	N/A	N/A	N/A	A	R	
2111	Current Crest Factor	int16	100	N/A	N/A	N/A	N/A	R	
2112	Frequency	int16	10	N/A	N/A	N/A	Hz	R	
2113	Min Frequency	int16	10	N/A	N/A	N/A	Hz	R	
2114	Max Frequency	int16	10	N/A	N/A	N/A	Hz	R	
2115	Average Frequency	int16	10	N/A	N/A	N/A	Hz	R	
2116	Load	int16	10	N/A	N/A	N/A	%	R	
2117	kW	int16	10	N/A	N/A	N/A	kW	R	
2118	kVA	int16	10	N/A	N/A	N/A	kVA	R	
2119	kVAR	int16	10	N/A	N/A	N/A	kVAR	R	
2120	PF	int16	100	N/A	N/A	N/A	N/A	R	
2121	Displacement PF	int16	100	N/A	N/A	N/A	N/A	R	
2126	THD, Voltage	int16	100	N/A	N/A	N/A	%	R	
2127	THD, Current	int16	100	N/A	N/A	N/A	%	R	
2128	Voltage Harmonics 1st	int16	100	N/A	N/A	N/A	%	R	
2129	Voltage Harmonics 3rd	int16	100	N/A	N/A	N/A	%	R	
2130	Voltage Harmonics 5th	int16	100	N/A	N/A	N/A	%	R	
2131	Voltage Harmonics 7th	int16	100	N/A	N/A	N/A	%	R	
2132	Voltage Harmonics 9th	int16	100	N/A	N/A	N/A	%	R	
2133	Voltage Harmonics 11th	int16	100	N/A	N/A	N/A	%	R	
2134	Voltage Harmonics 13th	int16	100	N/A	N/A	N/A	%	R	
2135	Current Harmonics 1st	int16	100	N/A	N/A	N/A	%	R	
2136	Current Harmonics 3rd	int16	100	N/A	N/A	N/A	%	R	
2137	Current Harmonics 5th	int16	100	N/A	N/A	N/A	%	R	
2138	Current Harmonics 7th	int16	100	N/A	N/A	N/A	%	R	
2139	Current Harmonics 9th	int16	100	N/A	N/A	N/A	%	R	
2140	Current Harmonics 11th	int16	100	N/A	N/A	N/A	%	R	
2141	Current Harmonics 13th	int16	100	N/A	N/A	N/A	%	R	
2145	Alarm Register 1	int16	1	N/A	N/A	N/A	Flags	R	See Table 5-6
2146	Warning Register 1	int16	1	N/A	N/A	N/A	Flags	R	See Table 5-7
2147	Command Register	int16	1	N/A	N/A	N/A	Flags	RW	See Table 5-8

Registers noted as “Not Implemented” have been defined and will be activated in future releases.

5.4.1 Single-phase register input tables

The alarm, warning and meter command registers each require an integer input to define their settings.

Table 5-6: Alarm register

Bits	Description
0	Over Voltage Alarm
2	Over Current Alarm
3	Under Current Alarm
4	Over KVA Alarm
5	Over KW Alarm
6	Low PF Alarm
7	Voltage Over THD Alarm
8	Current Over THD Alarm
9	High Frequency Alarm
10	Low frequency Alarm

Table 5-7: Warning register

Bits	Description
0	Over voltage warning
1	Under voltage warning
2	Over current warning

Table 5-8: Meter Command register

Bits	Description
0	Writing back default user configurations
1	Resetting the alarm and warnings
2	Resetting the min max values
3	Resetting the energy values

Table 5-9: Max Demand Period setting

Bits	Description
0	15 min
1	30 min
2	60 min

5.5 Three-phase map

The Three-phase map contains the information of each three-phase meter. It contains user configuration, factory configuration, metering data and monitoring data for all three-phase meters.

PowerView has capacity for up to 67 three-phase meters without neutral, or 60 three-phase meters with neutral. The Three-phase map starts from 40001. Modbus ID offset for each three-phase meter is 350, so that all registers assigned to the meter are assigned within that group of 350. Each meter will start at a register id 350 higher than the previous meter's starting register ID, as noted in Figure 5-2.

Table 5-10 includes customer accessible registers only.

Figure 5-2: Three-phase Modbus map offsets

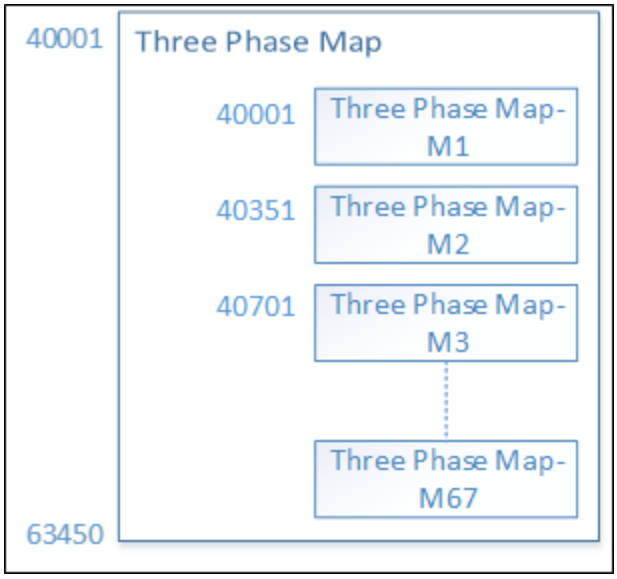


Table 5-10: Three-phase Modbus register (Meter Index = 1)

Reg No.	Description	Format	Scale	Min	Max	Default	Unit		Notes
40001	Meter Rating	int16	1	10	4000	200	I	R	
40002	Voltage Rating	int16	1	120	600	120	V	R	
40003	Frequency Rating	int16	1	50	60	60	Hz	R	
40004	Meter Info ID	int16	1	0	65535	0	N/A	R	
40005	Meter Wiring Type	int16	1	1	6	2	N/A	R	See Table 5-20
40006	CT Primary Scale Phase	int16	10	0.1	6500	2500	Turns	R	
40007	CT Secondary Scale Phase	int16	10	0.1	6500	1	Turns	R	
40008	CT Primary Scale Neutral	int16	10	0.1	6500	2500	Turns	R	
40009	CT Secondary Scale Neutral	int16	10	0.1	6500	1	Turns	R	
40010	Burden Resistor Val	int16	1000	0	50	47.4	Ohms	R	
40019	Zero Cutoff Current Setting	int16	1	0	10	2	A	R	
40020	Parent ID	int16	1	1	6	1	N/A	R	
40022	KW Rating	int16	10	1.2	2400	24	KW	R	
40023	LL/LN sensing	int16	1	0	1	1	N/A	R	

40031	Group No	int16	1	0	100	0	N/A	RW	
40032	Meter Info Name1	int16	1	0	65535	0	N/A	RW	
40034	Meter Info Name3	int16	1	0	65535	0	N/A	RW	
40035	Meter Info Name4	int16	1	0	65535	0	N/A	RW	
40036	Meter Info Name5	int16	1	0	65535	0	N/A	RW	
40037	Meter Info On/Off	int16	1	0	1	1	N/A	RW	0- OFF, 1-ON
40038	Max Demand Period Setting	int16	1	0	2	0	N/A	RW	See Table 5-19
40039	KW Fault set limit	int16	1	10	200	80	%	RW	
40040	KW Fault Reset Hysteresis	int16	1	1	20	10	%	RW	
40041	KW Fault Set delay	int16	100	0.1	100	10	Sec	RW	
40042	KW Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
40043	KVA Fault set limit	int16	1	10	200	80	%	RW	
40044	KVA Fault Reset Hysteresis	int16	1	1	20	10	%	RW	
40045	KVA Fault Set delay	int16	100	0.1	100	10	Sec	RW	
40046	KVA Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
40047	PF Fault set limit	int16	1	10	90	70	%	RW	
40048	PF Fault Reset Hysteresis	int16	1	1	20	5	%	RW	
40049	PF Fault Set delay	int16	100	0.1	100	10	Sec	RW	
40050	PF Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
40051	Voltage THD Fault set limit	int16	1	1	20	5	%	RW	
40052	Voltage THD Fault Reset Hysteresis	int16	1	1	20	1	%	RW	
40053	Voltage THD Fault Set delay	int16	100	0.1	100	30	Sec	RW	
40054	Voltage THD Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
40055	Current THD Fault set limit	int16	1	1	20	5	%	RW	
40056	Current THD Fault Reset Hysteresis	int16	1	1	20	1	%	RW	
40057	Current THD Fault Set delay	int16	100	0.1	100	30	Sec	RW	
40058	Current THD Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
40059	Frequency Fault set limit	int16	10	0.5	15	3	Hz	RW	
40060	Frequency Fault Reset Hysteresis	int16	10	0.5	15	0.5	Hz	RW	
40061	Frequency Fault Set delay	int16	100	0.1	100	10	Sec	RW	
40062	Frequency Fault Reset delay	int16	100	0.1	100	10	Sec	RW	
40063	Over Current Alarm Set Limit	int16	1	60	150	125	%	RW	
40064	Over Current Alarm Reset Hysteresis	int16	1	1	20	5	%	RW	
40065	Over Current Alarm Set Delay	int16	100	0.1	100	10	Sec	RW	

40066	Over Current Alarm Reset Delay	int16	100	0.1	100	10	Sec	RW
40067	Over Current Warning Set Limit		1	50	145	110	%	RW
40068	Over Current Warning Reset Hysteresis	int16	1	1	20	5	%	RW
40069	Over Current Warning Set Delay	int16	100	0.1	100	10	Sec	RW
40070	Over Current Warning Reset Delay	int16	100	0.1	100	10	Sec	RW
40071	Under Current Alarm Set Limit	int16	1	0	99	1	%	RW
40072	Under Current Alarm Reset Hysteresis	int16	1	1	20	1	%	RW
40073	Under Current Alarm Set Delay	int16	100	0.1	100	10	Sec	RW
40074	Under Current Alarm Reset Delay	int16	100	0.1	100	10	Sec	RW
40075	Over Voltage Alarm Set Limit	int16	1	115	125	120	%	RW
40076	Over Voltage Alarm Reset Hysteresis	int16	1	1	20	5	%	RW
40077	Over Voltage Alarm Set Delay	int16	100	0.1	100	10	Sec	RW
40078	Over Voltage Alarm Reset Delay	int16	100	0.1	100	10	Sec	RW
40079	Over Voltage Warning Set Limit	int16	1	105	115	110	%	RW
40080	Over Voltage Warning Reset Hysteresis		1	1	20	5	%	RW
40081	Over Voltage Warning Set Delay	int16	100	0.1	100	10	Sec	RW
40082	Over Voltage Warning Reset Delay	int16	100	0.1	100	10	Sec	RW
40083	Under Voltage Alarm Set Limit	int16	1	75	85	80	%	RW
40084	Under Voltage Alarm Reset Hysteresis	int16	1	1	20	5	%	RW
40085	Under Voltage Alarm Set Delay	int16	100	0.1	100	10	Sec	RW
40086	Under Voltage Alarm Reset Delay	int16	100	0.1	100	10	Sec	RW
40087	Under Voltage Warning Set Limit	int16	1	85	95	90	%	RW
40088	Under Voltage Warning Reset Hysteresis	int16	1	1	20	5	%	RW
40089	Under Voltage Warning Set Delay	int16	100	0.1	100	10	Sec	RW
40090	Under Voltage Warning Reset Delay	int16	100	0.1	100	10	Sec	RW
40091	Gnd Current Fault Alarm Set Limit	int16	1	1	25	20	A	RW
40092	Gnd Current Fault Alarm Reset Hysteresis	int16	1	1	20	1	A	RW
40093	Gnd Current Fault Alarm Set Delay	int16	100	0.1	100	10	Sec	RW
40094	Gnd Current Fault Alarm Reset Delay	int16	100	0.1	100	10	Sec	RW
40095	Gnd Current Fault Warning Set Limit	int16	1	1	20	10	%	RW
40096	Gnd Current Fault Warning Reset Hysteresis	int16	1	1	20	1	%	RW

40097	Gnd Current Fault Warning Set Delay	int16	100	0.1	100	10	Sec	RW	
40098	Gnd Current Fault Warning Reset Delay	int16	100	0.1	100	10	Sec	RW	
40099	Neutral Current Fault Alarm Set Limit	int16	1	115	150	125	%	RW	
40100	Neutral Current Fault Alarm Reset Hysteresis	int16	1	1	20	5	%	RW	
40101	Neutral Current Fault Alarm Set Delay	int16	100	0.1	100	10	Sec	RW	
40102	Neutral Current Fault Alarm Reset Delay	int16	100	0.1	100	10	Sec	RW	
40103	Neutral Current Fault Warning Set Limit	int16	1	105	140	110	%	RW	
40104	Neutral Current Fault Warning Reset Limit	int16	1	1	20	5	%	RW	
40105	Neutral Current Fault Warning Set Delay	int16	100	0.1	100	10	Sec	RW	
40106	Neutral Current Fault Warning Reset Delay	int16	100	0.1	100	10	Sec	RW	
40107	Frequency Averaging Duration	int16	10	1	10	1	Sec	RW	
40108	Voltage RMS Averaging Duration	int16	10	1	100	10	Sec	RW	
40109	Current RMS Averaging Duration	int16	10	1	100	10	Sec	RW	
40110	Alarm Delay	int16	100	0.1	100	10	Sec	RW	
40111	Warning Delay	int16	100	0.1	100	10	Sec	RW	
40112	Sag Voltage Lower Limit	int16	1	80	80	80	%	RW	Not Implemented
40113	Sag Voltage Upper Limit	int16	1	80	90	90	%	RW	Not Implemented
40114	Sag Voltage Duration Lower Limit	int16	100	0.1	60	0.1	Sec	RW	Not Implemented
40115	Sag Voltage Duration Upper Limit	int16	100	60	60	60	Sec	RW	Not Implemented
40116	Outage Voltage Lower Limit	int16	1	0	0	0	%	RW	Not Implemented
40117	Outage Voltage Upper Limit	int16	1	0	80	80	%	RW	Not Implemented
40118	Outage Voltage Duration Lower Limit	int16	1	60	1000	60	Sec	RW	Not Implemented
40119	Outage Voltage Duration Upper Limit	int16	1	1000	1000	1000	Sec	RW	Not Implemented
40120	Dropout Voltage Lower Limit	int16	1	0	0	0	%	RW	Not Implemented
40121	Dropout Voltage Upper Limit	int16	1	0	80	80	%	RW	Not Implemented
40122	Dropout Voltage Duration Lower Limit	int16	100	0.1	60	0.1	Sec	RW	Not Implemented
40123	Dropout Voltage Duration Upper Limit	int16	100	60	60	60	Sec	RW	Not Implemented
40124	Over Voltage Lower Limit	int16	1	110	200	110	%	RW	Not Implemented
40125	Over Voltage Upper Limit	int16	1	200	200	200	%	RW	Not Implemented
40126	Over Voltage Duration Lower Limit	int16	1	60	1000	60	Sec	RW	Not Implemented

40127	Over Voltage Duration Upper Limit	int16	1	1000	1000	1000	Sec	RW	Not Implemented
40128	Swell Voltage Lower Limit	int16	1	120	200	120	%	RW	Not Implemented
40129	Swell Voltage Upper Limit	int16	1	200	200	200	%	RW	Not Implemented
40130	Swell Voltage Duration Lower Limit	int16	100	0.1	60	0.1	Sec	RW	Not Implemented
40131	Swell Voltage Duration Upper Limit	int16	100	60	60	60	Sec	RW	Not Implemented
40132	Temp OV Voltage Lower Limit	int16	1	180	200	180	%	RW	Not Implemented
40133	Temp OV Voltage Upper Limit	int16	1	200	200	200	%	RW	Not Implemented
40134	Temp OV Voltage Duration Lower Limit	int16	1	0	0	0	Sec	RW	Not Implemented
40135	Temp OV Voltage Duration Upper Limit	int16	1	0	0	0	Sec	RW	Not Implemented

40145	KVAH Calib Gain A Phase	int16	1	1	5	1	N/A	R
40146	KVAH Calib Gain B Phase	int16	1	1	5	1	N/A	R
40147	KVAH Calib Gain C Phase	int16	1	1	5	1	N/A	R
40148	KWH Calib Gain A Phase	int16	1	1	5	1	N/A	R
40149	KWH Calib Gain B Phase	int16	1	1	5	1	N/A	R
40150	KWH Calib Gain C Phase	int16	1	1	5	1	N/A	R
40151	Total KVAH Calib Gain	int16	1	1	5	1	N/A	R
40152	Total KWH Calib Gain	int16	1	1	5	1	N/A	R
40153	Energy kWH, øA Phase Upper Part	int16	N/A	N/A	N/A	N/A	kWH	R
40154	Energy kWH, øA Phase Lower Part	int16	N/A	N/A	N/A	N/A	kWH	R
40155	Energy kWH, øB Phase Upper Part	int16	N/A	N/A	N/A	N/A	kWH	R
40156	Energy kWH, øB Phase Lower Part	int16	N/A	N/A	N/A	N/A	kWH	R
40157	Energy kWH, øC Phase Upper Part	int16	N/A	N/A	N/A	N/A	kWH	R
40158	Energy kWH, øC Phase Lower Part	int16	N/A	N/A	N/A	N/A	kWH	R
40159	Energy kWH, Total Upper Part	int16	N/A	N/A	N/A	N/A	kWH	R
40160	Energy kWH, Total Lower Part	int16	N/A	N/A	N/A	N/A	kWH	R
40161	Energy kVAH, øA Upper Part	int16	N/A	N/A	N/A	N/A	kVAH	R
40162	Energy kVAH, øA Phase Lower Part	int16	N/A	N/A	N/A	N/A	kVAH	R
40163	Energy kVAH, øB Phase Upper Part	int16	N/A	N/A	N/A	N/A	kVAH	R
40164	Energy kVAH, øB Phase Lower Part	int16	N/A	N/A	N/A	N/A	kVAH	R
40165	Energy kVAH, øC Phase Upper Part	int16	N/A	N/A	N/A	N/A	kVAH	R
40166	Energy kVAH, øC Phase Lower Part	int16	N/A	N/A	N/A	N/A	kVAH	R
40167	Energy kVAH, Total Upper Part	int16	N/A	N/A	N/A	N/A	kVAH	R
40168	Energy kVAH, Total Lower Part	int16	N/A	N/A	N/A	N/A	kVAH	R
40169	Power MD, øA	int16	N/A	N/A	N/A	N/A	kW	R

40170	Power MD, øB	int16	N/A	N/A	N/A	N/A	kW	R	
40171	Power MD, øC	int16	N/A	N/A	N/A	N/A	kW	R	
40172	Power MD, Total	int16	N/A	N/A	N/A	N/A	kW	R	
40175	Voltage RMS, øA-B	int16	1	N/A	N/A	N/A	V	R	
40176	Voltage RMS, øB-C	int16	1	N/A	N/A	N/A	V	R	
40177	Voltage RMS, øC-A	int16	1	N/A	N/A	N/A	V	R	
40178	Voltage RMS, øA-N	int16	1	N/A	N/A	N/A	V	R	
40179	Voltage RMS, øB-N	int16	1	N/A	N/A	N/A	V	R	
40180	Voltage RMS, øC-N	int16	1	N/A	N/A	N/A	V	R	
40181	Max Voltage RMS, øA-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Max Voltage RMS, øA-B
40182	Max Voltage RMS, øB-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Max Voltage RMS, øB-C
40183	Max Voltage RMS, øC-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Max Voltage RMS, øC-A
40184	Min Voltage RMS, øA-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Min Voltage RMS, øA-B
40185	Min Voltage RMS, øB-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Min Voltage RMS, øB-C
40186	Min Voltage RMS, øC-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Min Voltage RMS, øC-A
40187	Average Voltage RMS, øA-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Average Voltage RMS, øA-B
40188	Average Voltage RMS, øB-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Max Voltage RMS, øB-C
40189	Average Voltage RMS, øC-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Average Voltage RMS, øC-A
40190	Peak Voltage RMS, øA-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Average Voltage RMS, øA-B
40191	Peak Voltage RMS, øB-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Average Voltage RMS, øB-C
40192	Peak Voltage RMS, øC-N	int16	1	N/A	N/A	N/A	V	R	For PDU input, Average Voltage RMS, øC-A
40193	Current RMS, øA	int16	1	N/A	N/A	N/A	A	R	
40194	Current RMS, øB	int16	1	N/A	N/A	N/A	A	R	
40195	Current RMS, øC	int16	1	N/A	N/A	N/A	A	R	
40196	Current RMS, Neutral	int16	1	N/A	N/A	N/A	A	R	
40197	Current RMS, Ground	int16	1	N/A	N/A	N/A	A	R	
40198	Max Current RMS, øA	int16	1	N/A	N/A	N/A	A	R	
40199	Max Current RMS, øB	int16	1	N/A	N/A	N/A	A	R	
40200	Max Current RMS, øC	int16	1	N/A	N/A	N/A	A	R	
40201	Max Current RMS, Neutral	int16	1	N/A	N/A	N/A	A	R	

40202	Max Current RMS, Ground	int16	1	N/A	N/A	N/A	A	R
40203	Min Current RMS, øA	int16	1	N/A	N/A	N/A	A	R
40204	Min Current RMS, øB	int16	1	N/A	N/A	N/A	A	R
40205	Min Current RMS, øC	int16	1	N/A	N/A	N/A	A	R
40206	Min Current RMS, Neutral	int16	1	N/A	N/A	N/A	A	R
40207	Min Current RMS, Ground	int16	1	N/A	N/A	N/A	A	R
40208	Average Current RMS, øA	int16	1	N/A	N/A	N/A	A	R
40209	Average Current RMS, øB	int16	1	N/A	N/A	N/A	A	R
40210	Average Current RMS, øC	int16	1	N/A	N/A	N/A	A	R
40211	Average Current RMS, Neutral	int16	1	N/A	N/A	N/A	A	R
40212	Average Current RMS, Ground	int16	1	N/A	N/A	N/A	A	R
40213	Peak Current RMS, øA	int16	1	N/A	N/A	N/A	A	R
40214	Peak Current RMS, øB	int16	1	N/A	N/A	N/A	A	R
40215	Peak Current RMS, øC	int16	1	N/A	N/A	N/A	A	R
40216	Peak Current RMS, Neutral	int16	1	N/A	N/A	N/A	A	R
40217	Peak Current RMS, Ground	int16	1	N/A	N/A	N/A	A	R
40218	Current Crest Factor, øA	int16	100	N/A	N/A	N/A	N/A	R
40219	Current Crest Factor, øB	int16	100	N/A	N/A	N/A	N/A	R
40220	Current Crest Factor, øC	int16	100	N/A	N/A	N/A	N/A	R
40221	Frequency	int16	10	N/A	N/A	N/A	Hz	R
40222	Min Frequency	int16	10	N/A	N/A	N/A	Hz	R
40223	Max Frequency	int16	10	N/A	N/A	N/A	Hz	R
40224	Average Frequency	int16	10	N/A	N/A	N/A	Hz	R
40225	Load, øA	int16	10	N/A	N/A	N/A	%	R
40226	Load, øB	int16	10	N/A	N/A	N/A	%	R
40227	Load, øC	int16	10	N/A	N/A	N/A	%	R
40228	Load, Total	int16	10	N/A	N/A	N/A	%	R
40229	kW, øA	int16	10	N/A	N/A	N/A	kW	R
40230	kW, øB	int16	10	N/A	N/A	N/A	kW	R
40231	kW, øC	int16	10	N/A	N/A	N/A	kW	R
40232	kW, Total		10	N/A	N/A		kW	R
40233	kVA, øA	int16	10	N/A	N/A	N/A	kVA	R
40234	kVA, øB	int16	10	N/A	N/A	N/A	kVA	R
40235	kVA, øC	int16	10	N/A	N/A	N/A	kVA	R
40236	kVA, Total	int16	10	N/A	N/A	N/A	kVA	R
40237	kVAR, øA	int16	10	N/A	N/A	N/A	kVAR	R
40238	kVAR, øB	int16	10	N/A	N/A	N/A	kVAR	R
40239	kVAR, øC	int16	10	N/A	N/A	N/A	kVAR	R
40240	kVAR, Total	int16	10	N/A	N/A	N/A	kVAR	R

40241	PF, øA	int16	100	N/A	N/A	N/A	N/A	R	
40242	PF, øB	int16	100	N/A	N/A	N/A	N/A	R	
40243	PF, øC	int16	100	N/A	N/A	N/A	N/A	R	
40244	PF	int16	100	N/A	N/A	N/A	N/A	R	
40245	PF, Displacement factor, øA	int16	100	N/A	N/A	N/A	N/A	R	Not Implemented
40246	PF, Displacement factor, øB	int16	100	N/A	N/A	N/A	N/A	R	Not Implemented
40247	PF, Displacement factor, øC	int16	100	N/A	N/A	N/A	N/A	R	Not Implemented

40253	THD, Voltage, øA	int16	100	N/A	N/A	N/A	%	R	
40254	THD, Voltage, øB	int16	100	N/A	N/A	N/A	%	R	
40255	THD, Voltage, øC	int16	100	N/A	N/A	N/A	%	R	
40256	THD, Current øA	int16	100	N/A	N/A	N/A	%	R	
40257	THD, Current øB	int16	100	N/A	N/A	N/A	%	R	
40258	THD, Current øC	int16	100	N/A	N/A	N/A	%	R	
40259	Voltage Harmonics 1st, øA	int16	100	N/A	N/A	N/A	%	R	
40260	Voltage Harmonics 3rd, øA	int16	100	N/A	N/A	N/A	%	R	
40261	Voltage Harmonics 5th, øA	int16	100	N/A	N/A	N/A	%	R	
40262	Voltage Harmonics 7th, øA	int16	100	N/A	N/A	N/A	%	R	
40263	Voltage Harmonics 9th, øA	int16	100	N/A	N/A	N/A	%	R	
40264	Voltage Harmonics 11th, øA	int16	100	N/A	N/A	N/A	%	R	
40265	Voltage Harmonics 13th, øA	int16	100	N/A	N/A	N/A	%	R	
40266	Voltage Harmonics 1st, øB	int16	100	N/A	N/A	N/A	%	R	
40267	Voltage Harmonics 3rd, øB	int16	100	N/A	N/A	N/A	%	R	
40268	Voltage Harmonics 5th, øB	int16	100	N/A	N/A	N/A	%	R	
40269	Voltage Harmonics 7th, øB	int16	100	N/A	N/A	N/A	%	R	
40270	Voltage Harmonics 9th, øB	int16	100	N/A	N/A	N/A	%	R	
40271	Voltage Harmonics 11th, øB	int16	100	N/A	N/A	N/A	%	R	
40272	Voltage Harmonics 13th, øB	int16	100	N/A	N/A	N/A	%	R	
40273	Voltage Harmonics 1st, øC	int16	100	N/A	N/A	N/A	%	R	
40274	Voltage Harmonics 3rd, øC	int16	100	N/A	N/A	N/A	%	R	
40275	Voltage Harmonics 5th, øC	int16	100	N/A	N/A	N/A	%	R	
40276	Voltage Harmonics 7th, øC	int16	100	N/A	N/A	N/A	%	R	
40277	Voltage Harmonics 9th, øC	int16	100	N/A	N/A	N/A	%	R	
40278	Voltage Harmonics 11th, øC	int16	100	N/A	N/A	N/A	%	R	
40279	Voltage Harmonics 13th, øC	int16	100	N/A	N/A	N/A	%	R	

40280	Current Harmonics 1st, øA	int16	100	N/A	N/A	N/A	%	R
40281	Current Harmonics 3rd, øA	int16	100	N/A	N/A	N/A	%	R
40282	Current Harmonics 5th, øA	int16	100	N/A	N/A	N/A	%	R
40283	Current Harmonics 7th, øA	int16	100	N/A	N/A	N/A	%	R
40284	Current Harmonics 9th, øA	int16	100	N/A	N/A	N/A	%	R
40285	Current Harmonics 11th, øA	int16	100	N/A	N/A	N/A	%	R
40286	Current Harmonics 13th, øA	int16	100	N/A	N/A	N/A	%	R
40287	Current Harmonics 15th, øA	int16	100	N/A	N/A	N/A	%	R
40288	Current Harmonics 17th, øA	int16	100	N/A	N/A	N/A	%	R
40289	Current Harmonics 19th, øA	int16	100	N/A	N/A	N/A	%	R
40290	Current Harmonics 21st, øA	int16	100	N/A	N/A	N/A	%	R
40291	Current Harmonics 23rd, øA	int16	100	N/A	N/A	N/A	%	R
40292	Current Harmonics 25th, øA	int16	100	N/A	N/A	N/A	%	R
40293	Current Harmonics 27th, øA	int16	100	N/A	N/A	N/A	%	R
40294	Current Harmonics 29th, øA	int16	100	N/A	N/A	N/A	%	R
40295	Current Harmonics 31st, øA	int16	100	N/A	N/A	N/A	%	R
40296	Current Harmonics 33rd, øA	int16	100	N/A	N/A	N/A	%	R
40297	Current Harmonics 35th, øA	int16	100	N/A	N/A	N/A	%	R
40298	Current Harmonics 1st, øB	int16	100	N/A	N/A	N/A	%	R
40299	Current Harmonics 3rd, øB	int16	100	N/A	N/A	N/A	%	R
40300	Current Harmonics 5th, øB	int16	100	N/A	N/A	N/A	%	R
40301	Current Harmonics 7th, øB	int16	100	N/A	N/A	N/A	%	R
40302	Current Harmonics 9th, øB	int16	100	N/A	N/A	N/A	%	R
40303	Current Harmonics 11th, øB	int16	100	N/A	N/A	N/A	%	R
40304	Current Harmonics 13th, øB	int16	100	N/A	N/A	N/A	%	R
40305	Current Harmonics 15th, øB	int16	100	N/A	N/A	N/A	%	R
40306	Current Harmonics 17th, øB	int16	100	N/A	N/A	N/A	%	R
40307	Current Harmonics 19th, øB	int16	100	N/A	N/A	N/A	%	R
40308	Current Harmonics 21st, øB	int16	100	N/A	N/A	N/A	%	R
40309	Current Harmonics 23rd, øB	int16	100	N/A	N/A	N/A	%	R
40310	Current Harmonics 25th, øB	int16	100	N/A	N/A	N/A	%	R
40311	Current Harmonics 27th, øB	int16	100	N/A	N/A	N/A	%	R
40312	Current Harmonics 29th, øB	int16	100	N/A	N/A	N/A	%	R
40313	Current Harmonics 31st, øB	int16	100	N/A	N/A	N/A	%	R

40314	Current Harmonics 33rd, øB	int16	100	N/A	N/A	N/A	%	R	
40315	Current Harmonics 35th, øB	int16	100	N/A	N/A	N/A	%	R	
40316	Current Harmonics 1st, øC	int16	100	N/A	N/A	N/A	%	R	
40317	Current Harmonics 3rd, øC	int16	100	N/A	N/A	N/A	%	R	
40318	Current Harmonics 5th, øC	int16	100	N/A	N/A	N/A	%	R	
40319	Current Harmonics 7th, øC	int16	100	N/A	N/A	N/A	%	R	
40320	Current Harmonics 9th, øC	int16	100	N/A	N/A	N/A	%	R	
40321	Current Harmonics 11th, øC	int16	100	N/A	N/A	N/A	%	R	
40322	Current Harmonics 13th, øC	int16	100	N/A	N/A	N/A	%	R	
40323	Current Harmonics 15th, øC	int16	100	N/A	N/A	N/A	%	R	
40324	Current Harmonics 17th, øC	int16	100	N/A	N/A	N/A	%	R	
40325	Current Harmonics 19th, øC	int16	100	N/A	N/A	N/A	%	R	
40326	Current Harmonics 21st, øC	int16	100	N/A	N/A	N/A	%	R	
40327	Current Harmonics 23rd, øC	int16	100	N/A	N/A	N/A	%	R	
40328	Current Harmonics 25th, øC	int16	100	N/A	N/A	N/A	%	R	
40329	Current Harmonics 27th, øC	int16	100	N/A	N/A	N/A	%	R	
40330	Current Harmonics 29th, øC	int16	100	N/A	N/A	N/A	%	R	
40331	Current Harmonics 31st, øC	int16	100	N/A	N/A	N/A	%	R	
40332	Current Harmonics 33rd, øC	int16	100	N/A	N/A	N/A	%	R	
40333	Current Harmonics 35th, øC	int16	100	N/A	N/A	N/A	%	R	
40334	Positive Sequence	int16	1	N/A	N/A	N/A	V	R	Not Implemented
40335	Negative Sequence	int16	1	N/A	N/A	N/A	V	R	Not Implemented
40336	Zero Sequence	int16	1	N/A	N/A	N/A	V	R	Not Implemented
40337	Unbalance Factor	int16	10	N/A	N/A	N/A	N/A	R	
40339	Alarm Register 1	int16	N/A	N/A	N/A	N/A	Flags	R	See Table 5-11
40340	Alarm Register 2	int16	N/A	N/A	N/A	N/A	Flags	R	See Table 5-12
40341	Alarm Register 3	int16	N/A	N/A	N/A	N/A	Flags	R	See Table 5-13
40342	Warning Register 1	int16	N/A	N/A	N/A	N/A	Flags	R	See Table 5-14
40343	Warning Register 2	int16	N/A	N/A	N/A	N/A	Flags	R	See Table 5-15
40344	Warning Register 3	int16	N/A	N/A	N/A	N/A	Flags	R	See Table 5-16
40345	Alarm Register Common	int16	N/A	N/A	N/A	N/A	Flags	R	See Table 5-17
40346	Command Register	int16	N/A	N/A	N/A	N/A	Flags	RW	See Table 5-18

Registers noted as "Not Implemented" have been defined and will be activated in future releases.

5.5.1 Three-phase register input tables

The alarm, warning and meter command registers each require an integer input to define their settings.

Table 5-11: Alarm register 1

Bits	Description
0	Over Voltage Alarm, øA
1	Under Voltage Alarm, øA
2	Over Current Alarm, øA
3	Under Current Alarm, øA
4	Over KVA Alarm, øA
5	Over KW Alarm, øA
6	Low PF Alarm, øA
7	Voltage Over THD Alarm, øA
8	Current Over THD Alarm, øA
10	Low frequency Alarm
11	Neutral Current Fault
12	Ground Current fault

Table 5-12: Alarm register 2

Bits	Description
0	Over Voltage Alarm, øB
1	Under Voltage Alarm, øB
2	Over Current Alarm, øB
3	Under Current Alarm, øB
4	Over KVA Alarm, øB
5	Over KW Alarm, øB
6	Low PF Alarm, øB
7	Voltage Over THD Alarm, øB
8	Current Over THD Alarm, øB

Table 5-13: Alarm register 3

Bits	Description
0	Over Voltage Alarm, øC
1	Under Voltage Alarm, øC
2	Over Current Alarm, øC
3	Under Current Alarm, øC
4	Over KVA Alarm, øC
5	Over KW Alarm, øC
6	Low PF Alarm, øC
7	Voltage Over THD Alarm, øC
8	Current Over THD Alarm, øC

Table 5-14: Warning register 1

Bits	Description
0	Over voltage warning, øA
1	Under voltage warning, øA
2	Over current warning, øA
11	Neutral current warning
12	Ground current warning

Table 5-15: Warning register 2

Bits	Description
0	Over voltage warning, øB
1	Under voltage warning, øB
2	Over current warning, øB

Table 5-16: Warning register 3

Bits	Description
0	Over voltage warning, øC
1	Under voltage warning, øC
2	Over current warning, øC

Table 5-17: Alarm register common

Bits	Description
0	Phase sequence warning
1	Phase loss warning
2	Load unbalance
3	Voltage unbalance
4	Over kva alarm total
5	Over kw alarm total
6	Low pf alarm total

Table 5-18: Meter Command register

Bits	Description
0	Writing back default user configurations
1	Resetting the alarm and warnings
2	Resetting the min max values
3	Resetting the energy values

Table 5-19: Max Demand Period setting

Value	Description
0	15 min
1	30 min
2	60 min

Table 5-20: Meter Wiring Type

Value	Description
1	Meter Type 3L
2	Meter Type 3LN
3	Meter Type 3LNG
4	Meter Type 3L without Neutral
5	Meter Type 2L without Neutral
6	Meter Type 2L with one current sensing

5.6 Thermal and User Input maps

These maps contain thermal and user input data. Modbus IDs in the range from 63451 to 65535 are allocated for the Thermal and User input maps.

5.6.1 Input Card map

The Input map contains the status information of each input sensor, using one bit per sensor. Status can be either 0 or 1.

PowerView has capacity for up to 150 input sensors, 25 per card, up to 6 cards. Each card uses two 16-bit registers, with sensors 1 to 16 on the first register and 17 to 25 on the second register. The registers output strings of 0's and 1's, up to 16 digits if all sensors on that register are configured. The input configuration section starts from 63451.

Table 5-21: Input card Modbus register

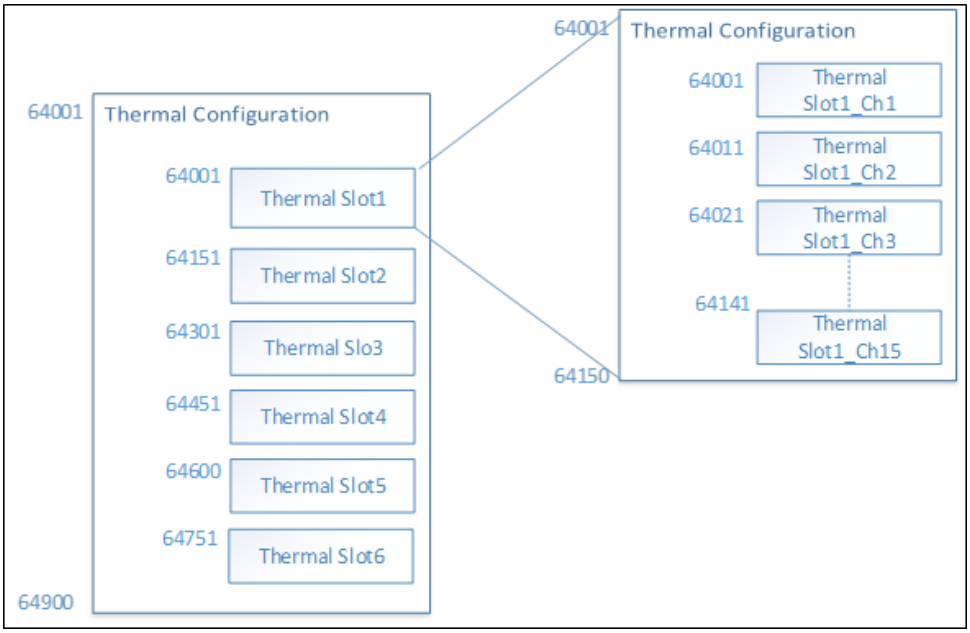
Reg. No.	Description	Format	Scale	Min	Max	Default	Access Type	Note
63451	Input Board1 Status1	int16	1	N/A	N/A	N/A	R	
63452	Input Board1 Status2	int16	1	N/A	N/A	N/A	R	
63453	Input Board2 Status1	int16	1	N/A	N/A	N/A	R	
63454	Input Board2 Status2	int16	1	N/A	N/A	N/A	R	
63455	Input Board3 Status1	int16	1	N/A	N/A	N/A	R	
63456	Input Board3 Status2	int16	1	N/A	N/A	N/A	R	
63457	Input Board4 Status1	int16	1	N/A	N/A	N/A	R	
63458	Input Board4 Status2	int16	1	N/A	N/A	N/A	R	
63459	Input Board5 Status1	int16	1	N/A	N/A	N/A	R	
63460	Input Board5 Status2	int16	1	N/A	N/A	N/A	R	
63461	Input Board6 Status1	int16	1	N/A	N/A	N/A	R	
63462	Input Board6 Status2	int16	1	N/A	N/A	N/A	R	
63471	Debounce Setting	int16	1	0	20000	2	RW	

5.6.2 Thermocouple Card map

The Thermocouple map contains the information of each thermal sensor. It contains configuration and metering data for all thermal sensors.

PowerView has capacity for up to 90 thermal sensors, 15 per card, up to 6 cards. The Thermocouple Card map consists of two sections. The thermal configuration section starts from 64001. Modbus ID offset for each thermal sensor configuration is 10, so that all registers assigned to the meter are assigned within that group of 10. Each sensor configuration will start at a register id 10 higher than the previous sensor's starting register ID, as noted in Figure 5-3.

Figure 5-3: Thermal configuration map offsets



The thermal metering section starts from 63501. Modbus ID offset for each thermal sensor configuration is 5, so that all registers assigned to the meter are assigned within that group of 5. Each sensor metering will start at a register id 5 higher than the previous sensor's starting register ID, as noted in Figure 5-4.

Figure 5-4: Thermal metering map offsets

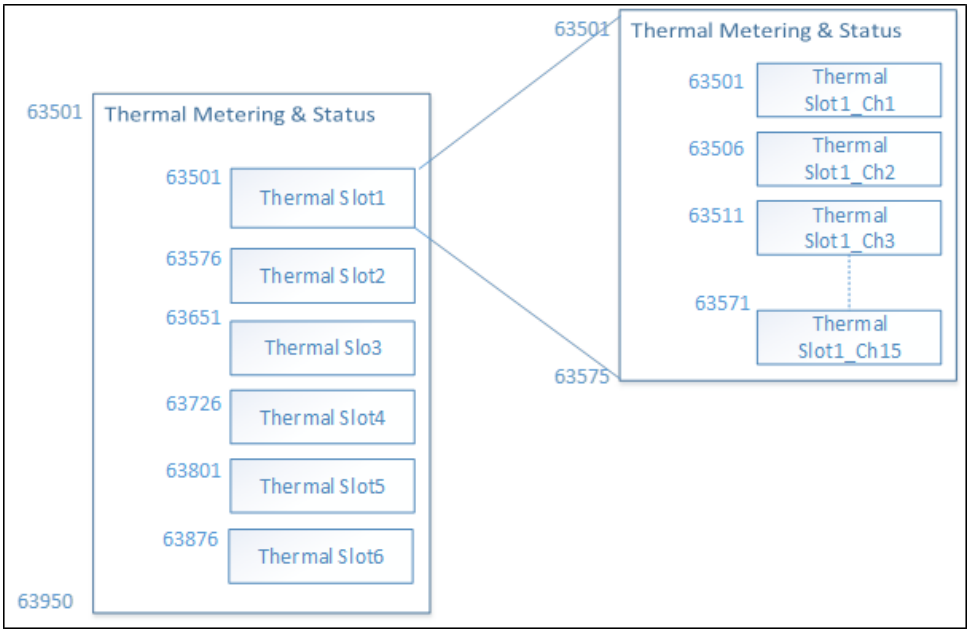


Table 5-22: Thermocouple Card register (index=1)

Thermal Configuration									
Reg No.	Description	Format	Scale	Min	Max	Default	Unit	Access Type	Notes
64001	THERMAL_PROBE_ID	int16	1	1	65535	1	N/A	RW	
64002	THERMAL_SENSOR_TYPE	int16	1	0	3	1	N/A	RW	See Table 5-23
64003	THERMAL_ALARM_LIM	int16	1	5	500	200	°C	RW	
64004	THERMAL_ALARM_DELAY	int16	1	1	60	10	Secs	RW	
64005	THERMAL_WARN_LIM	int16	1	5	400	150	°C	RW	
64006	THERMAL_WARN_DELAY	int16	1	1	60	10	Secs	RW	
64007	THERMAL_SENSOR_ONOFF	int16	1	0	65535	0	N/A	RW	
64008	THERMAL_RESERVED2	int16	1	0	1	0	N/A	RW	
64009	THERMAL_RESERVED3	int16	1	0	65535	0	N/A	RW	
64010	THERMAL_RESERVED4	int16	1	0	65535	0	N/A	RW	
Thermal Metering/Status									
63501	THERMAL_STATUS	int16	N/A	N/A	N/A	N/A	Flags	R	See Table 5-24
63502	THERMAL_VAL	int16	N/A	N/A	N/A	N/A	°C	R	
63503	THERMAL_MAX_VAL	int16	N/A	N/A	N/A	N/A	°C	R	
63504	THERMAL_MIN_VAL	int16	N/A	N/A	N/A	N/A	°C	R	
63505	Reserved	int16	N/A	N/A	N/A	N/A	Flags	R	

5.6.2.1 Thermal map register input tables

Table 5-23: Thermal Sensor Type

Value	Description
0	T Type
1	K Type
2	J Type
3	E Type

Table 5-24: Thermal Status

Bits	Description
0	HighTempAlarm
1	HighTemp Warning

5.6.3 Custom Group map

The custom group map contains the information of each group. PowerView has capacity for up to 50 custom groups. The Custom group map starts from 65001. Modbus ID offset for each group is 10, so that all registers assigned to the meter are assigned within that group of 10. Each group will start at a register id 10 higher than the previous group's starting register ID, as noted in Figure 5-1.

Table 5-25: Custom Group Modbus map offsets

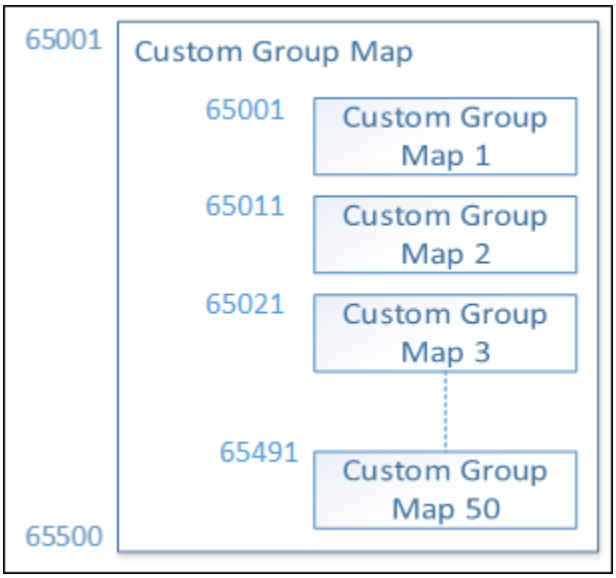


Table 5-26: Custom Group Modbus register (Meter Index = 1)

Reg No.	Description	Format	Scale	Min	Max	Default	Unit	Access Type	Notes
65001	kW	int16	10	N/A	N/A	N/A	kW	R	
65002	Energy kWH, Upper Part	int16	N/A	N/A	N/A	N/A	kWH	R	
65003	Energy kWH, Lower Part	int16	N/A	N/A	N/A	N/A	kWH	R	
65004	Group Status register	int16	N/A	N/A	N/A	N/A	N/A	R	
65005	Reserved	int16	N/A	N/A	N/A	N/A	N/A	R	
65006	Reserved	int16	N/A	N/A	N/A	N/A	N/A	R	
65007	Reserved	int16	N/A	N/A	N/A	N/A	N/A	R	
65008	Reserved	int16	N/A	N/A	N/A	N/A	N/A	R	
65009	Reserved	int16	N/A	N/A	N/A	N/A	N/A	R	
65010	Reserved	int16	N/A	N/A	N/A	N/A	N/A	R	

5.6.3.1 Custom Group register input table

Table 5-27: Group Status register

Value	Description
0	Normal
1	Alarm
2	Warning

6 Configuration tool

System configuration is typically completed by ABB Service personnel. Contact ABB service for changes that require Level 2 access.

6.1 Program Description

The PowerView Configuration Tool is a PC based program that can be used for configuring and monitoring the PowerView Monitoring System.

6.2 PC System Requirements

- IBM Pentium or higher (or compatible) PC with two free USB ports and one USB to RS-485 adapter, and a minimum screen resolution setting of 1366 by 768.
- Microsoft Windows 7 or higher.
- Microsoft Excel 2010 (or higher) is needed for certain functions regarding Captured Settings.

6.3 Setup

6.3.1 Installation

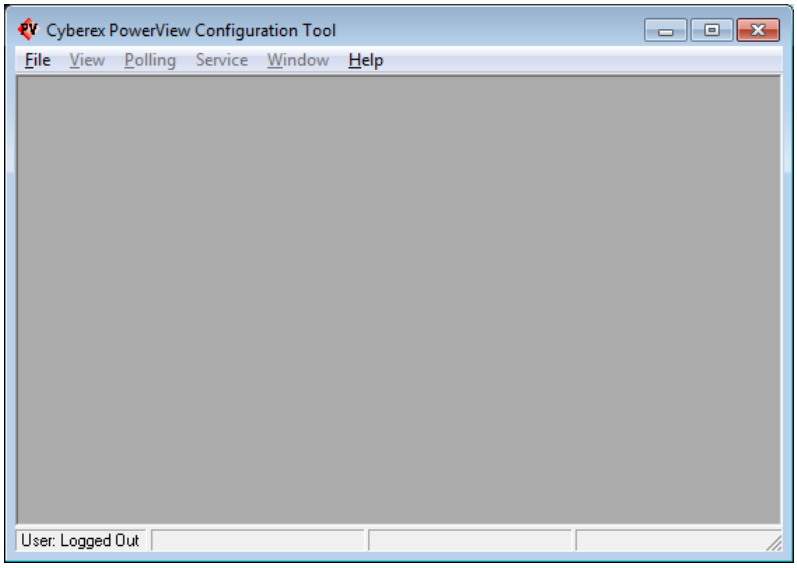
This program can be installed by double-clicking the "PowerViewConfigTool_Setup_vX_X_X_X.exe" file provided and following the on-screen instructions.

This setup program will put a shortcut on the Desktop and in the Windows Start>All Programs folder.

6.3.2 Initial Login

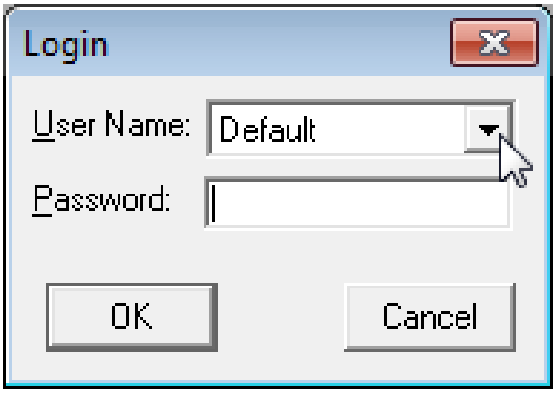
When the program is started, the main window will appear as shown in Figure 6-1 below.

Figure 6-1: Main Configuration Tool window



An initial login is required before using the program. Once you are logged in, you have the option of logging out between uses, or remaining logged in for future uses. To log in, click File>Login in the main menu bar. The Login dialog box will open as shown below.

Figure 6-2: Login window



There are three login levels as shown in Table 6-1 below.

Table 6-1: Login levels

Level	Login name	Default Password	Permissions
0	Default	Default	Permission to view meter readings and settings only.
1	Admin	Admin	In addition to those of Level 0 (above), permission to change the program's settings, modify PowerView setpoints, and change the program's passwords for Levels 0-1.
2	Supervisor	<reserved for service>	Reserved for ABB Service

When you are finished using the program, you have the option of logging out or remaining logged in for the next use. To log out, click File>Logout in the main menu bar.

6.3.3 PC Setup

The connection from PC to the unit will be made through the unit's Modbus user interface connection. See your unit's manual for the correct location.

To configure the ports on the PC, open the "PC Setup" window (shown below) by clicking "File > PC Setup" on the menu bar.

The default Modbus settings of this program and the module are 115200 baud and Slave ID 1 as shown in Figure 6-3 below. The USB Service Port also works at 115200 baud, and it is not configurable.

You will need to change the COM Ports settings in the "PC Setup" window to match those assigned on your PC. A "Device Mgr." button in this window is provided to open the Windows Device Manager, where you can see the COM Port assignments for these ports. After setting the COM Ports, click the "Save" button. If everything is connected and configured correctly, you should start seeing activity in the status bar at the bottom of the main window as shown in the screenshot down below in Figure 6-4. The Service port is reserved for service setup by qualified ABB service personnel.

Figure 6-3: PC Setup dialog box

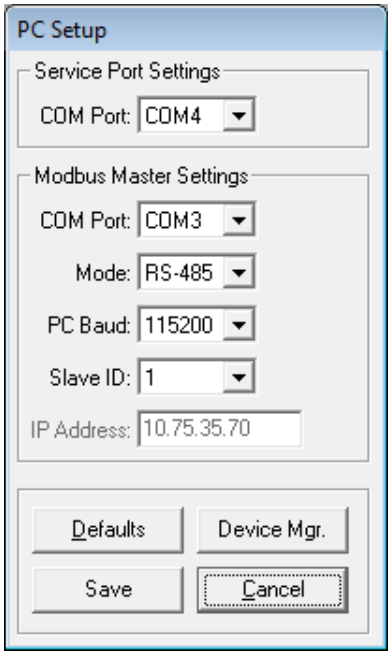
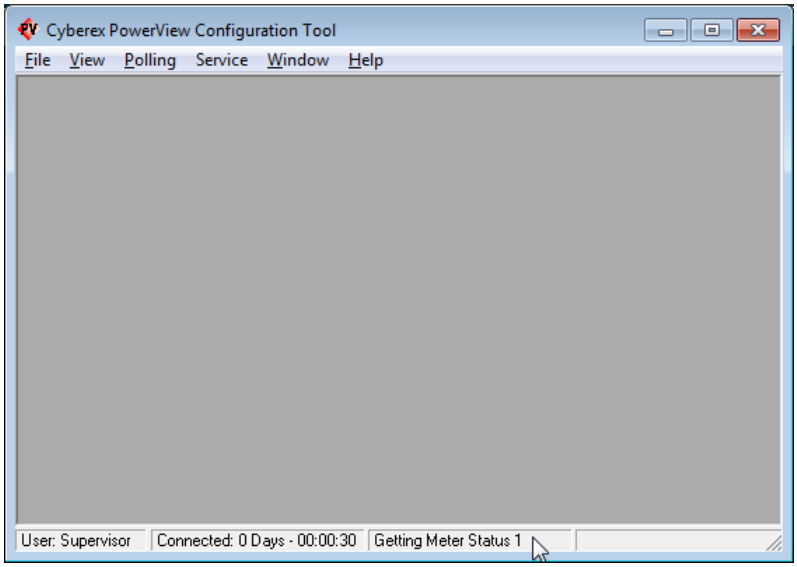


Figure 6-4: System Configuration window

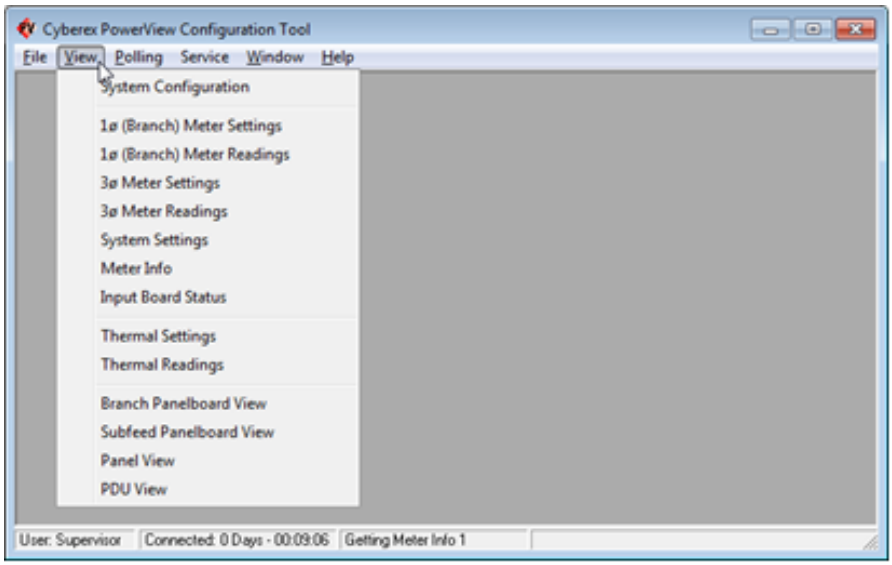


6.4 View Menu

The View menu is shown below in Figure 6-5.

Any combination of the items in the View menu can be selected to view. When an item is selected, its window will open, and a checkmark will appear next to the item in the menu. The item can be unselected by either re-clicking the selected item in the menu or by closing its window.

Figure 6-5: View menu

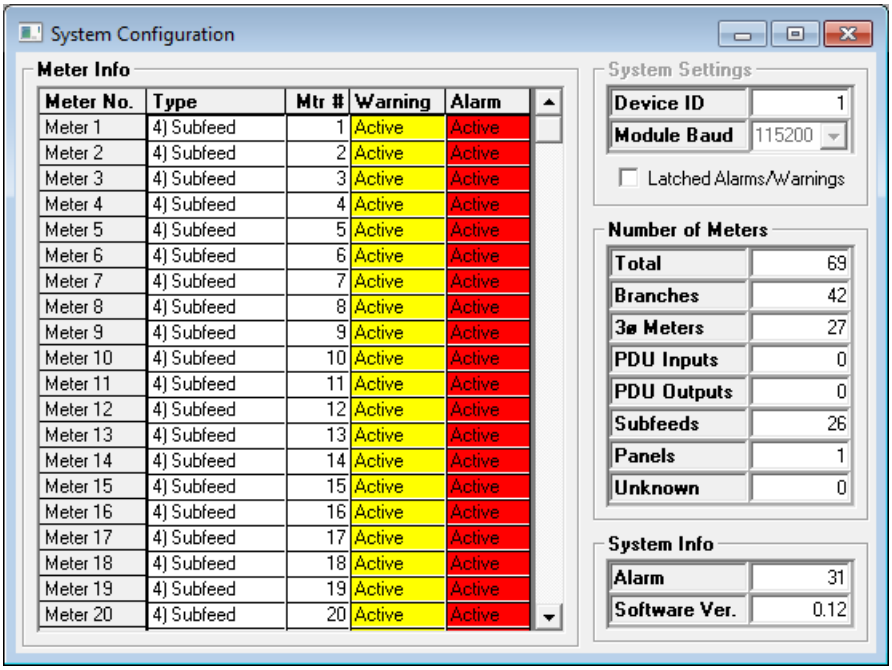


The program remembers the views selected when the program is closed and reopened later. It also remembers the positions of open windows.

6.4.1 System Configuration

The "System Configuration" window (shown below), shows the basic metering configuration of the PowerView module and the alarm/warning status for each meter.

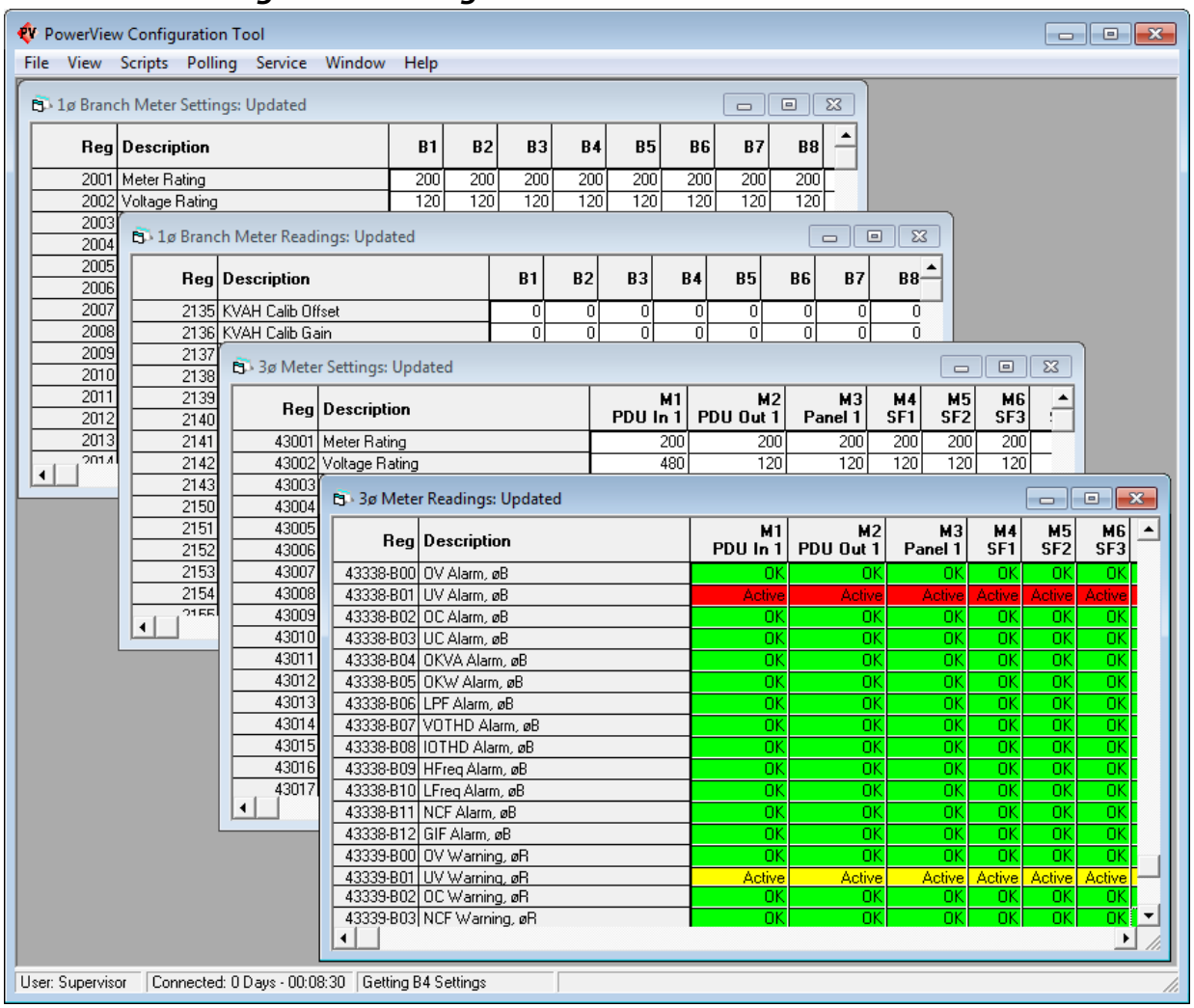
Figure 6-6: System Configuration window



6.4.2 Meter Settings/Readings windows

These windows show all the settings and readings for each meter in the PowerView module as shown below. The alarm/warning status for each meter is also included in the Readings windows.

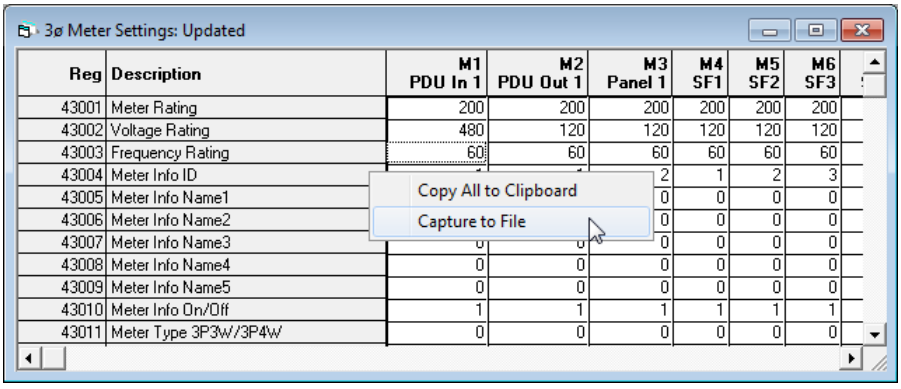
Figure 6-7: Meter Settings and Readings windows



6.4.2.1 Copying and Capturing Data

When logged in at Level 0 or 1, you can copy the data from each of these four windows by right-clicking on the table and selecting "Copy All to Clipboard" or "Capture to File" in the popup menu as shown below. The data will be in the tab-delimited format. When a window is first opened, you must wait for the table to be fully populated before this popup menu will appear. (The word, "Updated" will appear in the window's title bar when the table is fully populated.)

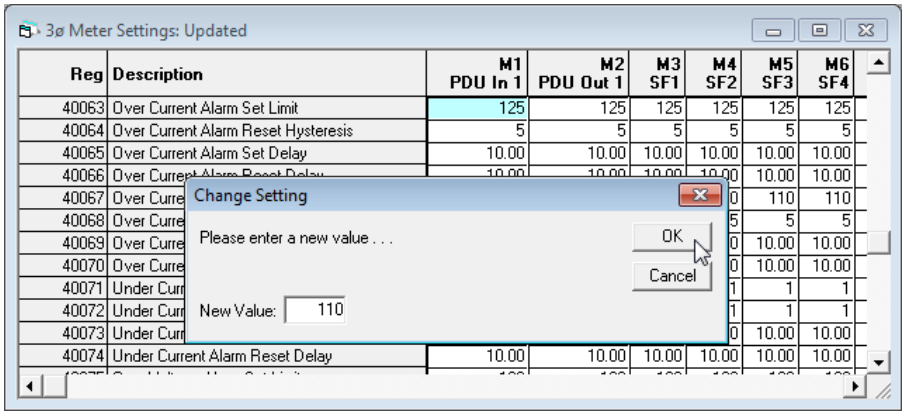
Figure 6-8: Copying Meter Data window



6.4.2.2 Modifying Meter Settings

When logged in at Level 1, you can change settings in the Settings windows by double-clicking on the parameter you want to change and entering the new setting in the popup dialog box that appears as shown below. Note that some parameters can only be changed with Level 2 access, as they are typically not changed after factory setup.

Figure 6-9: Meter Settings Update window



A "Global Settings feature is also available only for the Over/Under Current Alarm/Warning setpoints, which include the following Modbus register ranges and the equivalent registers for each existing meter.

Single-Phase Table: Reg. 2052 to 2063

Three-Phase Table: Reg. 40063 to 40074

To use this global feature, double-click the item in the "Description" column instead of on the setting value.

6.4.3 Branch and Sub-feed Panelboard windows

These windows show the current or voltage readings for each branch or sub-feed meter in the PowerView module as shown below. The alarm/warning status for each meter is also included indicated by the color of the cells in the first columns. The middle columns show the ADC mapping info: Slot#/Connector#/Pin# (Channel No.)

Figure 6-10: Standard Panelboard Branch Circuit view

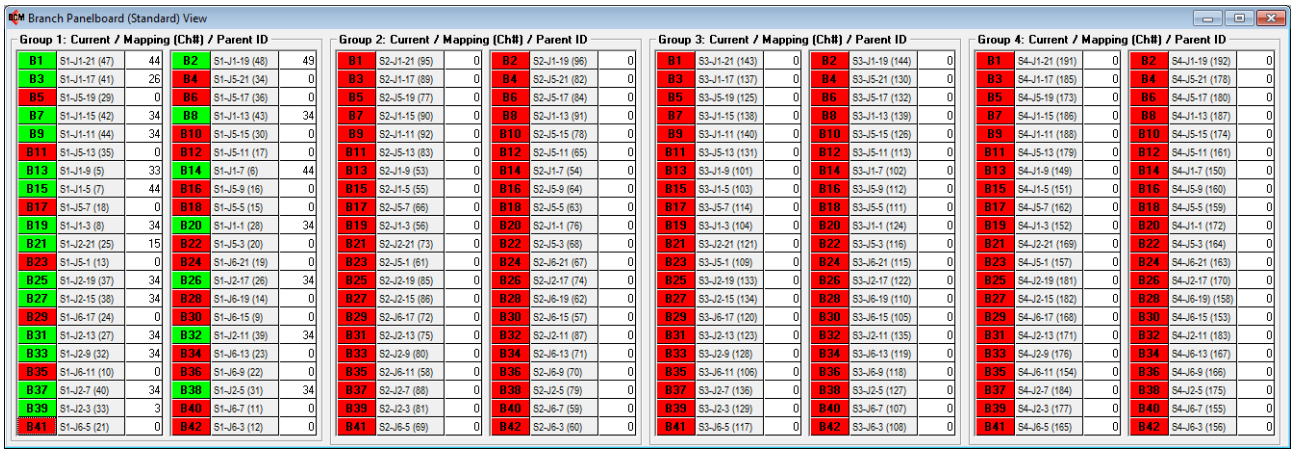


Figure 6-11: Column Width Panelboard Branch Circuit view

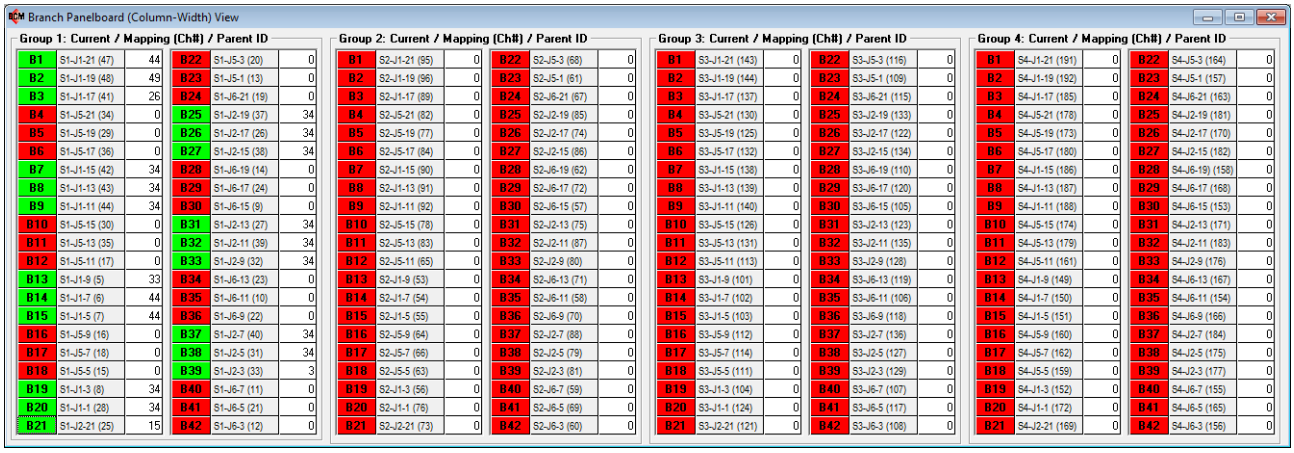


Figure 6-12: Sub-feed Circuits with neutrals view

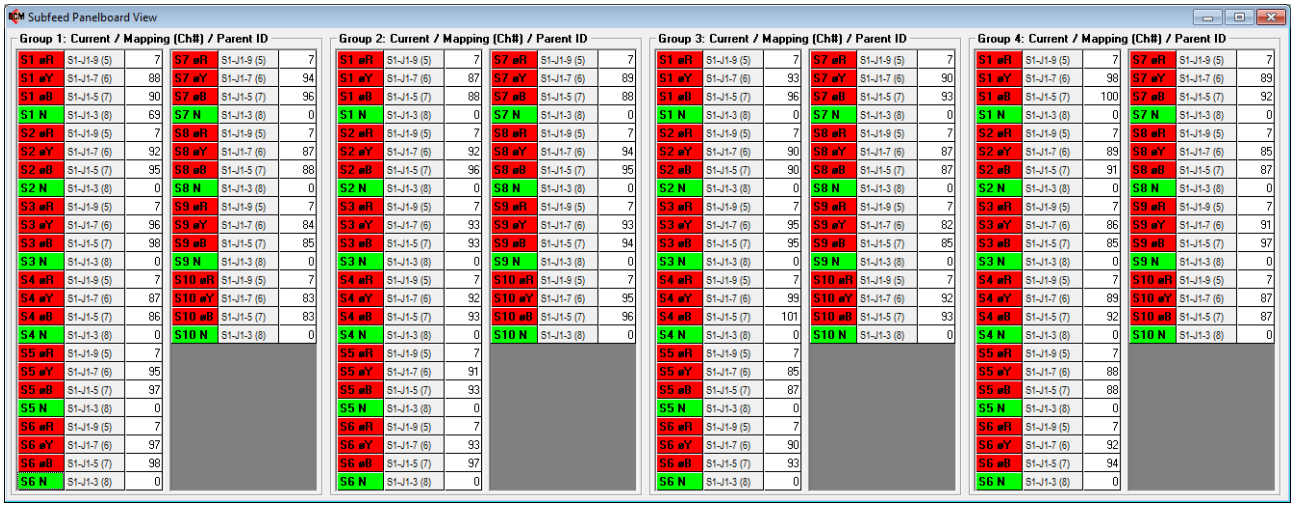
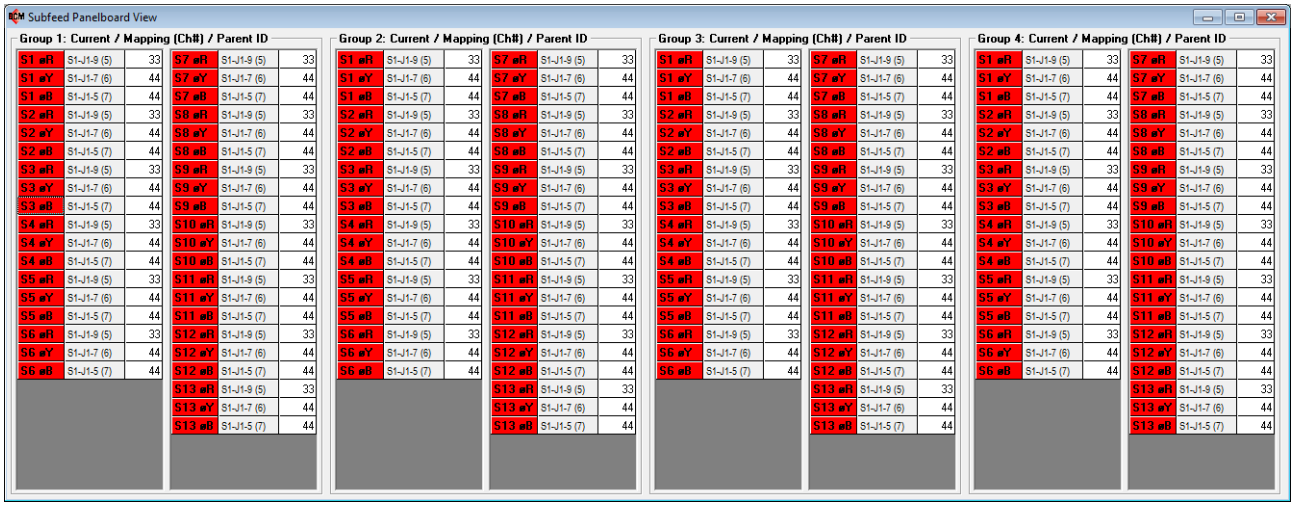


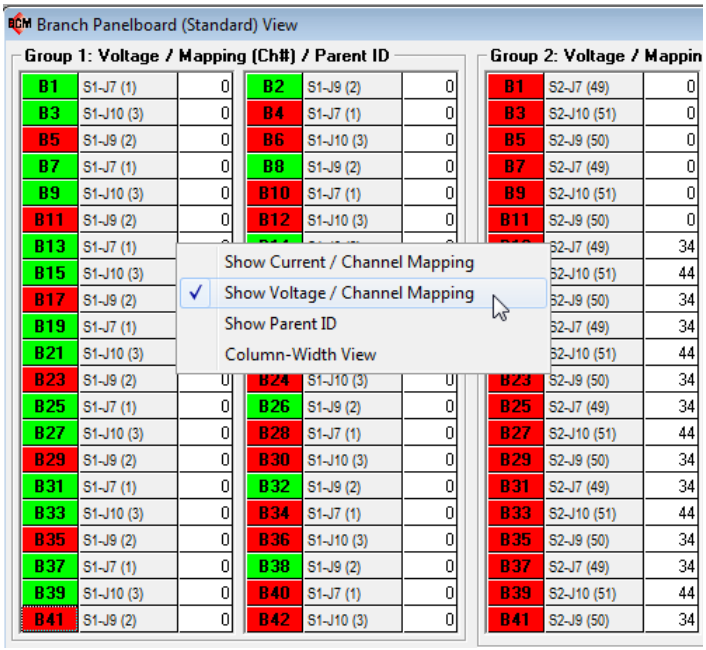
Figure 6-13: Sub-feed Circuits without neutrals view



6.4.3.1 Changing View Modes

To change to different views in each window, right-click on any of the tables to bring up the popup menu as shown below. This screenshot shows the window with "Show Voltage /Channel Mapping" view selected. The other selections are "Show Parent ID", where the middle columns show Parent IDs for each meter, and "Column-Width View", which is applicable only with the Branch windows.

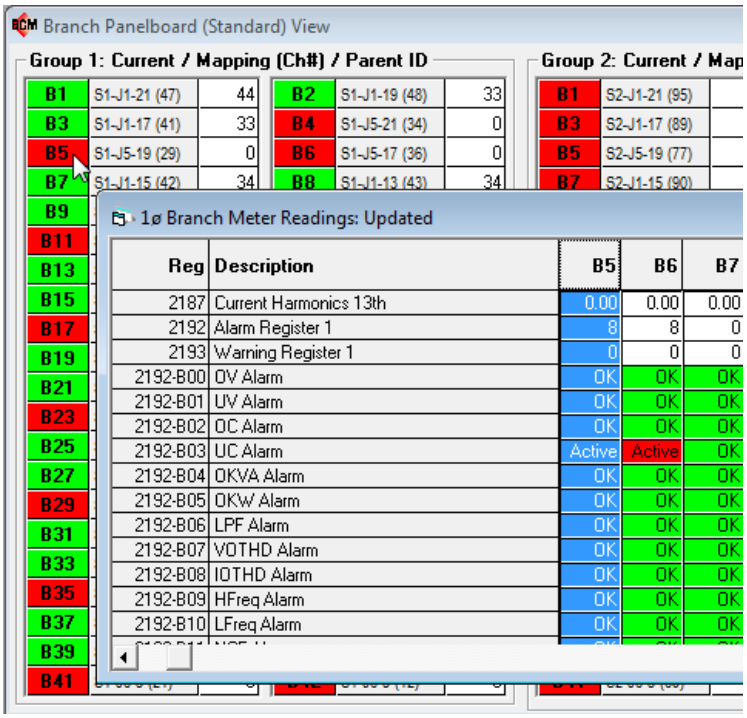
Figure 6-14: Branch Circuit Pop-up menu



6.4.3.2 Accessing Additional Metering Information

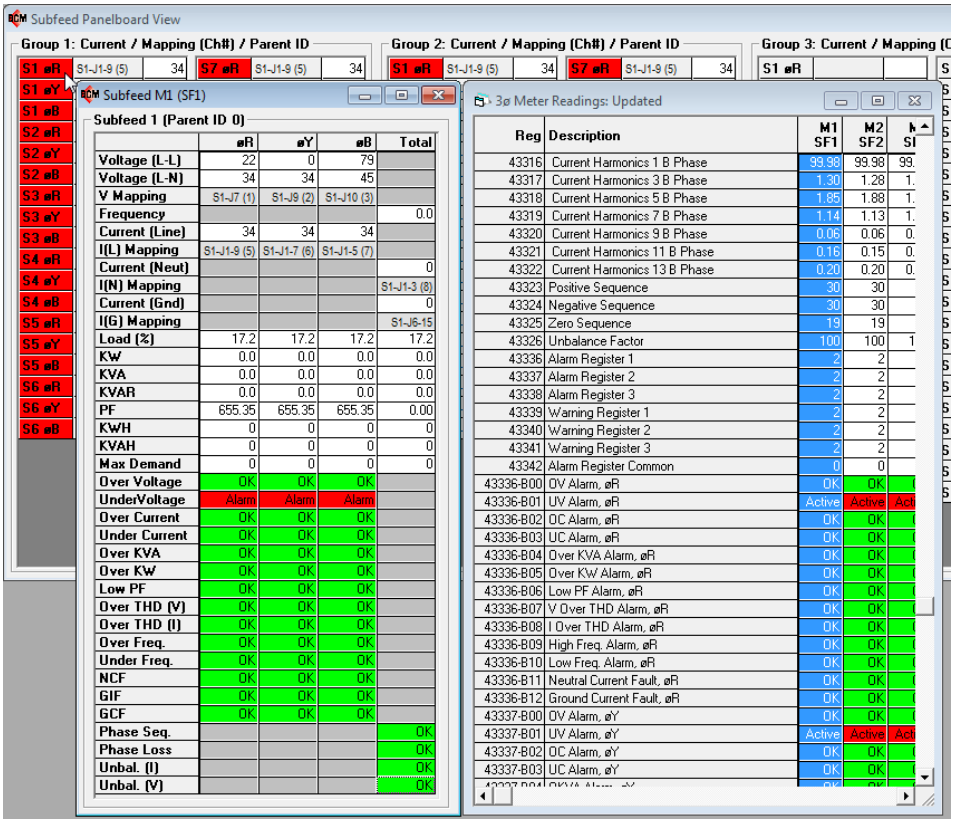
You can access additional info for each meter in the View windows shown above, by clicking on the meter row in the table. In the example screenshot below, the "B5" branch meter was clicked, which brought up the Readings window and selected the B5 meter column, where you can see all of readings and alarm/warning statuses for that meter.

Figure 6-15: Branch Meter window



In the example screenshot below, the "S1" sub-feed meter was clicked, which brought up the separate Sub-feed window for that meter along with the selected SF1 meter on the 3ø Meter Readings window.

Figure 6-16: Sub-feed and Three-phase Meter windows



6.4.4 Panel and PDU windows

These windows show the readings and alarm/warning status for the available panel and PDU meters. The ADC mapping info is also provided: Slot#/Connector#/Pin# (Channel No.).

Clicking on the tables in the Panel and PDU windows opens windows with details on the items clicked.

Figure 6-17: Panel window

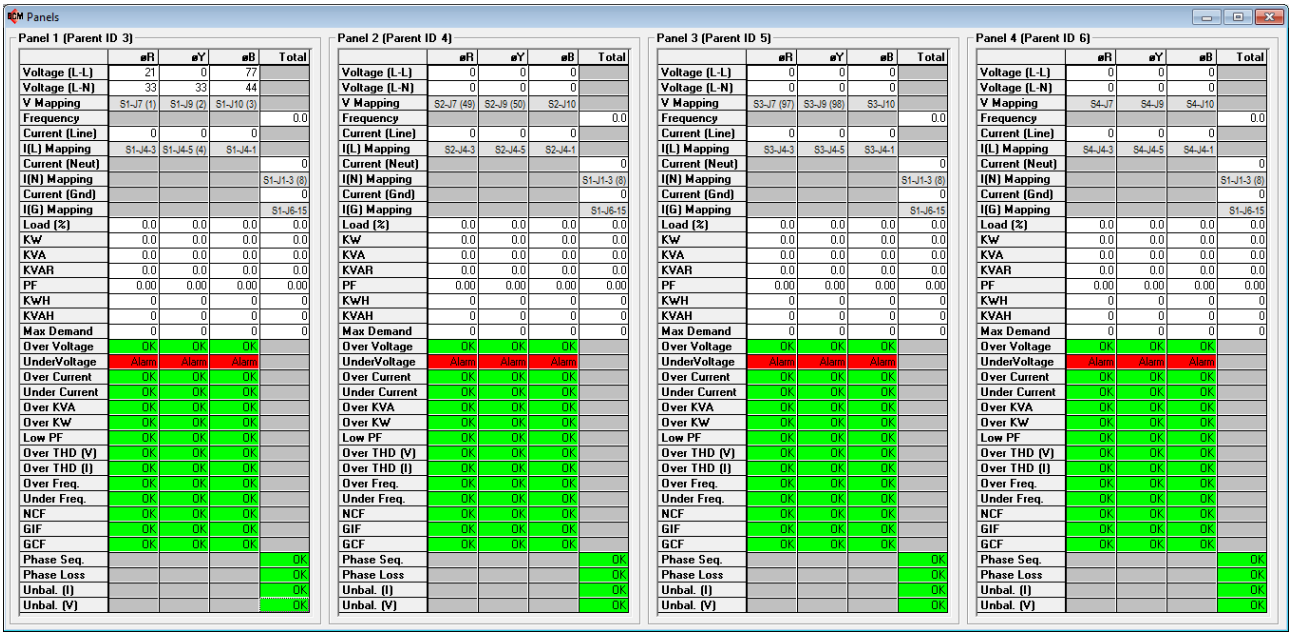
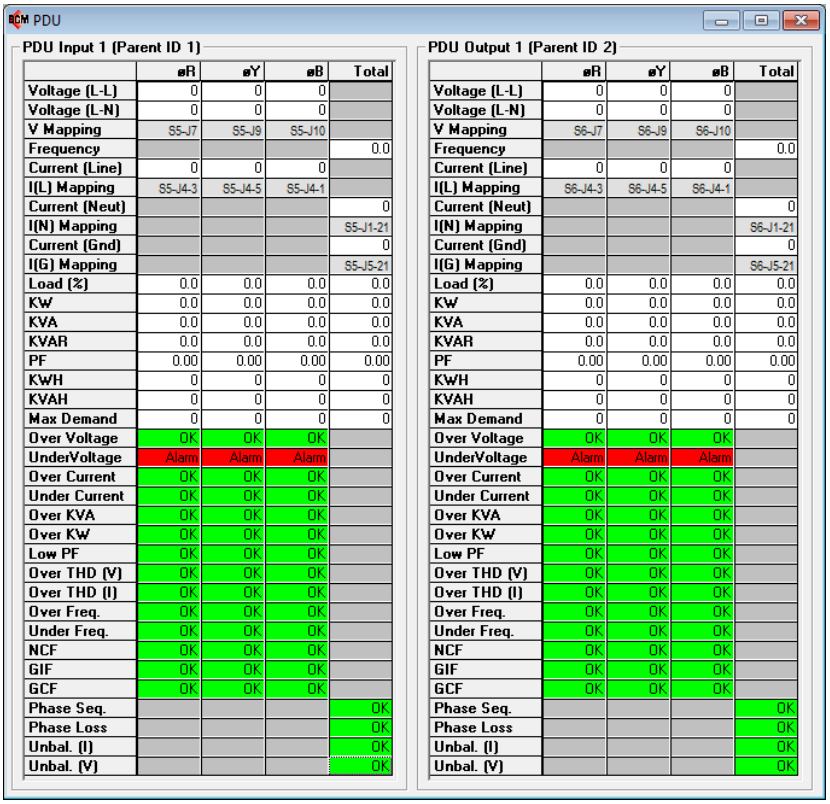


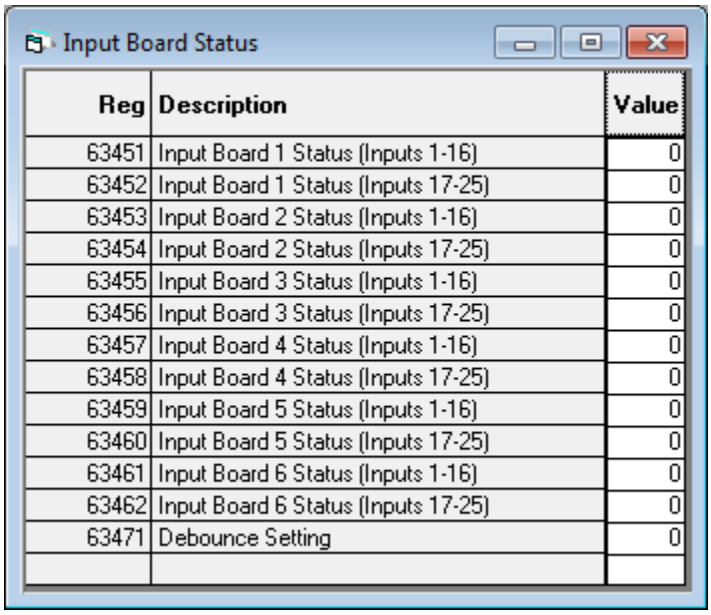
Figure 6-18: PDU window



6.4.5 Input Board window

The discrete input board status window shows the raw data from the Modbus registers.

Figure 6-19: Input Board status window

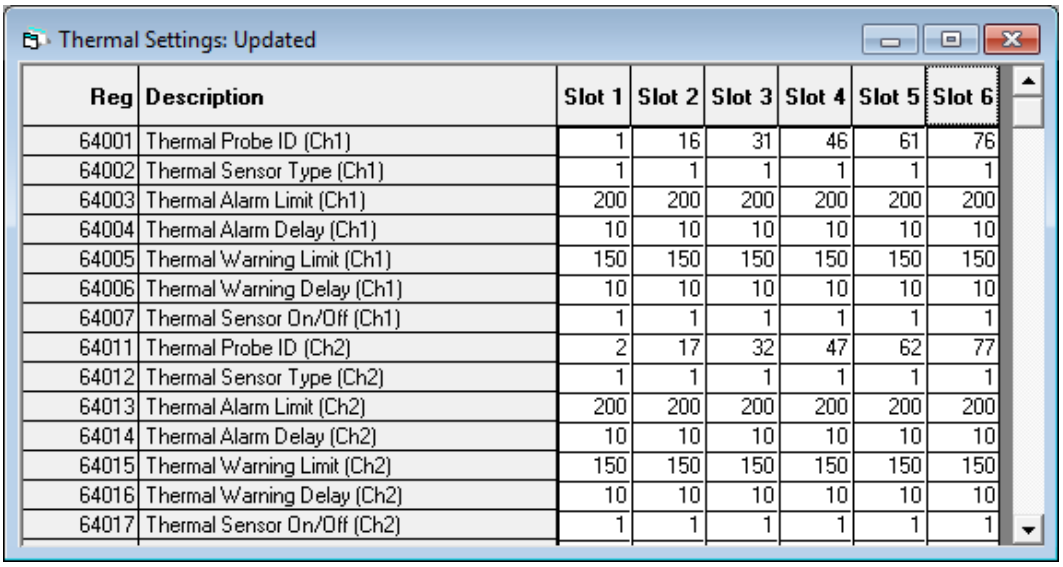


Reg	Description	Value
63451	Input Board 1 Status (Inputs 1-16)	0
63452	Input Board 1 Status (Inputs 17-25)	0
63453	Input Board 2 Status (Inputs 1-16)	0
63454	Input Board 2 Status (Inputs 17-25)	0
63455	Input Board 3 Status (Inputs 1-16)	0
63456	Input Board 3 Status (Inputs 17-25)	0
63457	Input Board 4 Status (Inputs 1-16)	0
63458	Input Board 4 Status (Inputs 17-25)	0
63459	Input Board 5 Status (Inputs 1-16)	0
63460	Input Board 5 Status (Inputs 17-25)	0
63461	Input Board 6 Status (Inputs 1-16)	0
63462	Input Board 6 Status (Inputs 17-25)	0
63471	Debounce Setting	0

6.4.6 Thermal windows

The thermal settings for each Modbus register are shown in the Thermal Settings Window. Settings include alarms, warnings and delay times. These are shown PowerView chassis slot that holds a Thermocouple Input Board.

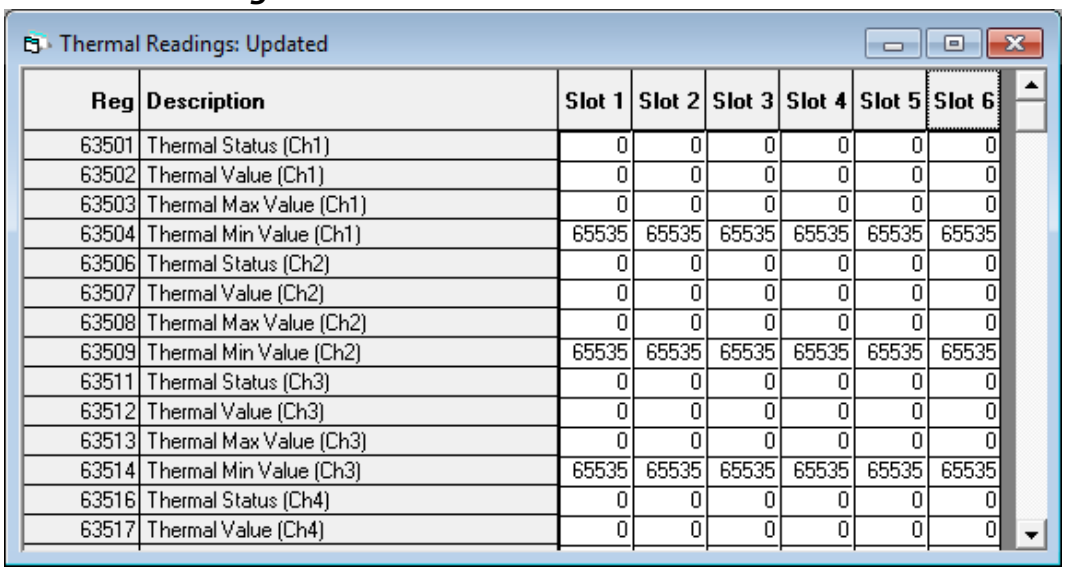
Figure 6-20: Thermal Settings window



Reg	Description	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6
64001	Thermal Probe ID (Ch1)	1	16	31	46	61	76
64002	Thermal Sensor Type (Ch1)	1	1	1	1	1	1
64003	Thermal Alarm Limit (Ch1)	200	200	200	200	200	200
64004	Thermal Alarm Delay (Ch1)	10	10	10	10	10	10
64005	Thermal Warning Limit (Ch1)	150	150	150	150	150	150
64006	Thermal Warning Delay (Ch1)	10	10	10	10	10	10
64007	Thermal Sensor On/Off (Ch1)	1	1	1	1	1	1
64011	Thermal Probe ID (Ch2)	2	17	32	47	62	77
64012	Thermal Sensor Type (Ch2)	1	1	1	1	1	1
64013	Thermal Alarm Limit (Ch2)	200	200	200	200	200	200
64014	Thermal Alarm Delay (Ch2)	10	10	10	10	10	10
64015	Thermal Warning Limit (Ch2)	150	150	150	150	150	150
64016	Thermal Warning Delay (Ch2)	10	10	10	10	10	10
64017	Thermal Sensor On/Off (Ch2)	1	1	1	1	1	1

The thermal readings for each Modbus register are shown in the Thermal Readings Window. These are shown PowerView chassis slot that holds a Thermocouple Input Board.

Figure 6-21: Thermal Readings window

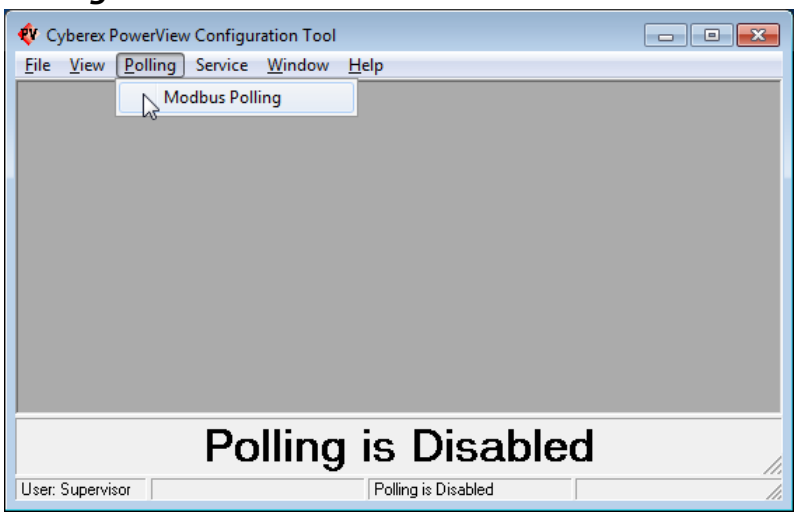


Reg	Description	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6
63501	Thermal Status (Ch1)	0	0	0	0	0	0
63502	Thermal Value (Ch1)	0	0	0	0	0	0
63503	Thermal Max Value (Ch1)	0	0	0	0	0	0
63504	Thermal Min Value (Ch1)	65535	65535	65535	65535	65535	65535
63506	Thermal Status (Ch2)	0	0	0	0	0	0
63507	Thermal Value (Ch2)	0	0	0	0	0	0
63508	Thermal Max Value (Ch2)	0	0	0	0	0	0
63509	Thermal Min Value (Ch2)	65535	65535	65535	65535	65535	65535
63511	Thermal Status (Ch3)	0	0	0	0	0	0
63512	Thermal Value (Ch3)	0	0	0	0	0	0
63513	Thermal Max Value (Ch3)	0	0	0	0	0	0
63514	Thermal Min Value (Ch3)	65535	65535	65535	65535	65535	65535
63516	Thermal Status (Ch4)	0	0	0	0	0	0
63517	Thermal Value (Ch4)	0	0	0	0	0	0

6.5 Polling Menu

This menu controls Modbus polling. The Modbus port can be closed and reopened without exiting the program by clicking "Polling" on the menu bar and unticking the "Modbus Polling" menu item as shown below. This is convenient to use when you want to temporarily communicate with the PowerView with another application.

Figure 6-22: Modbus Polling window



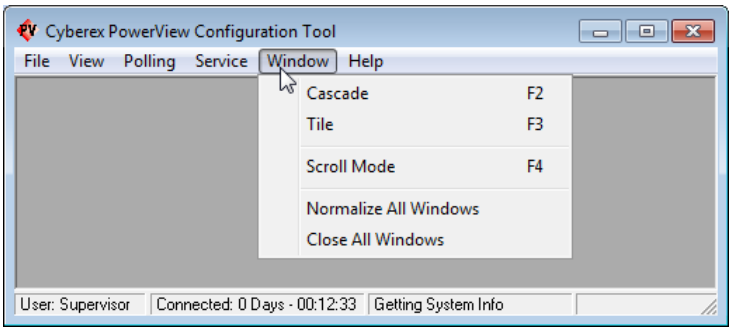
6.6 Service Menu

The Service menu contains features for configuring and calibrating your PowerView. This menu is accessible only when logged in at Level 2. See your ABB service representative for more information on calibration and configuration of your PowerView.

6.7 Window Menu

This menu contains standard Windows commands for arranging windows in the configuration tool.

Figure 6-23: Window Menu



Child windows can be automatically arranged inside of the main parent window by selecting "Cascade" or "Tile" in the menu under "Window" as shown below, or by simply pressing the F2 or F3 key, respectively. If "Tile" is selected when there are a lot of child windows open, some of them will usually go out of the viewing area and a vertical scrollbar will then appear. You can then use this scrollbar (with the mouse) to view the child windows that are currently out of the viewing area.

The scrollbars on the main parent window can also be operated by the navigation keys on the keyboard as follows. First, press the F4 key (or select Window>

Scroll Mode as shown below) to enter a special "Scroll Mode". When in Scroll Mode, the Page Up, Page Down, and arrow keys will operate the scrollbars on the main parent window. To exit Scroll Mode, press the Esc key, or click the mouse anywhere.

Selecting "Normalize All Windows" in the menu below will cause any minimized child windows to re-open.

Selecting "Close All Windows" will close all open child windows.

7 System maintenance

Minimal periodic maintenance of the unit is required. As with all electrical distribution components, this system should be regularly inspected for electrical connection integrity, signs of excessive temperature, accumulation of dirt, and proper system operation. Follow all safety and maintenance procedures listed in your RPP or PDU manual.

As with any electronic devices, critical circuits are subject to normal life cycle effects. ABB offers various service plan levels to keep your equipment in peak operating condition as the unit ages. Contact ABB Service Sales at ric_servicesales@ us.abb.com or go to https://new.abb.com/ups/service-ups-and-power-conditioning to learn more.

Warning	
	**WARNING** – Only qualified service personnel should perform maintenance on the PowerView – Exercise extreme care to avoid equipment damage or injury to personnel. Follow all safety procedures listed in your RPP or PDU manual. – Lethal voltages exist inside the distribution product during normal operation.

7.1 Software upgrades

Power View software upgrades must be completed by certified ABB personnel, who have the proper system security access. Please contact your ABB representative to upgrade the system software.

7.2 Adding monitoring capabilities

PowerView monitoring capabilities can be changed or upgraded by changing or adding ACBs. These changes must be completed by certified ABB personnel. Please contact your ABB representative to learn more.

8 Specifications

8.1 Standards

The PowerView is compliant with the applicable requirements of:

- Recognized Component by ETL to Underwriters Laboratories (UL) 60950-1 Information Technology Equipment – Safety
- Enclosure: NEMA 1
- Accuracy: ANSI/NEMA C12.1 – 2015 (at 60Hz)
- Electromagnetic Compatibility (EMC): FCC compliant (part 15)

8.2 Metering ranges and accuracy

Metering measurements are completed through an ACB or PSB. Temperature measurements are completed through a TIB.

8.2.1 Metering ranges

Table 8-1: Meter ranges

Parameter	Branch Circuit Monitoring	All other monitoring
Full load rating	60A/branch (100A optional)	Configurable
Overload capacity	115%	115%
System voltage rating	277/480V – 3 Φ	600V – 3 Φ
Frequency (nominal)	50-60 Hz	50-60 Hz

8.2.2 Measurement accuracy

Table 8-2: Measurement accuracy (60Hz)

Parameter	Branch Circuit Monitoring	All other monitoring
Current	+/-1% from 1A to 70A/branch	+/-1% from 10% of full load rating to full load rating
Voltage	+/-1%	+/-1%
Power factor	+/-0.01	+/-0.01
Power (KW)	+/-1% from 1A to 70A/branch	+/-1% from 10% of full load rating to full load rating
Frequency	+/-0.01Hz	+/-0.01Hz

8.2.3 Thermal Measurement

Table 8-3: Temperature parameters

Parameter	Capability
Measurement Accuracy	+/-1%, +/-2° full scale
Range at Rated Accuracy	0°C to 250°C
Maximum Temperature	250°C
Temperature Resolution	0.25 °C

8.3 Communications

The PowerView shall support the following communication options:

- RS485 port with Modbus RTU protocol: 2-wire or 4-wire connection, up to 38400 baud
- Modbus TCP/IP, ability to be pinged by up to 5 building monitoring systems BMS
- USB for data downloads and service access

8.4 Environmental characteristics

The PowerView has the capability of withstanding any combinations of environmental conditions listed below without mechanical or electrical damage or degradation of operation.

- Operating ambient temperature: 0 to 40° C
- Non-operating and storage ambient temperature: -40 to 60° C
- Relative Humidity: 10% to 95% non-condensing
- 1000m (3300ft) above sea level.
- Non-operating altitude: 15,000m
- Equipment is designated for indoor use in a clean (dust-free), temperature and humidity-controlled environment

8.5 Monitoring Capacity

Monitoring capacity depends on your system's exact combination of daughter cards. Installed systems can be upgraded to maximum monitoring capacity with additional plug-in daughter cards.

Power View capacity upgrades must be completed by certified ABB personnel. Please contact your ABB representative to upgrade the system software or hardware.

8.5.1 PDU Monitoring

PDU measurement supports both Delta-Y and Y-Y transformers.

1 PSB or 2 ACB's are required to monitor voltage, current and power on the PDU transformer. Up to 2 sources can be measured with either configuration.

PDU input current can be measured with either configuration, when connected to appropriate current transformers.

8.5.2 Branch Circuit Monitoring (BCM)

Number of panels per ACB: 1

Number of branches per panel: 42 or 84

Total number of branches: 252 (assumes 6 ACBs)

Voltage sensing options:

Number of 3 Φ sources: 1 to 6 sources (1 source per ACB)

8.5.3 Sub-feed Circuit Monitoring (SFCM)

Sub-feeds are recommended to be monitored with an ACB.

Number of sub-feeds per ACB

With neutral: 10

Without neutral: 13

Total number of sub-feeds

With neutral: 60 (assumes 6 ACBs)

Without neutral: 67 (assumes 6 ACBs)

Voltage sensing options:

Number of 3 Φ sources: 1 to 6 sources (1 source per ACB, 2 sources per PSB)

8.5.4 Discrete Input Capacity

PowerView has capacity for up to 150 input sensors, 25 per DIB, up to 6 DIB's.

8.5.5 Thermocouple Input Capacity

PowerView has capacity for up to 90 thermal sensors, 15 per TIB, up to 6 TIB's.

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Note

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94-1100-00002861 D0