Series PM130 PLUS Powermeters
PM130P/PM130E/PM130EH

Modbus Communications Protocol

Reference Guide

BG0427 Rev. A6

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For further information regarding a particular installation, operation or maintenance of equipment, contact the manufacturer or your local representative or distributor.

REVISION HISTORY

A1	Nov 2007	Release
A2	Dec 2009	F/W versions 11.1.6 or higher. Added DNP 16-bit and 32-bit frozen binary counter and analog input objects. Added DNP Object 50 Time and Date to the Class 0 point list. F/W versions 11.1.11 or higher. Added TCP event notification client. Added GPRS setup and communication counters. Added time triggers. Added DI change event log. F/W versions 11.2.1 or higher. Added 8 tariffs. F/W versions 11.3.1 or higher. Added event and data log setup and file transfer registers.
A3	Oct 2010	F/W versions 11.3.3 or higher. Added kVAh import/export and 4-quadrant kvarh registers.
A4	Jan 2013	Added support for the 12DI/4RO module and IEC 60870 setup.
A5	June 2017	Added WiFi module support.
A6	Nov 2017	Added "1LL3" wiring configuration support.

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Table of Contents

1 General

This document specifies a subset of the Modbus serial communications protocol used to transfer data between a master computer station and the PM130. The document provides the complete information necessary to develop third-party communications software capable of communication with Series PM130 devices. For additional information concerning operating the device, configuring the communication parameters, and communication connections see the PM130 PLUS Installation and Operation Manual.

The document is applicable to PM130A, PM130P, PM130E and PM130EH meters.

IMPORTANT

In 3-wire connection schemes, the unbalanced current and phase readings for power factor, active power, and reactive power will be zeros, because they have no meaning. Only the total three-phase power values are provided.

Most of the advanced features are configured using multiple setup parameters that can be accessed in a number of contiguous registers. When writing the setup registers, it is recommended to write all the registers at once using a single request, or to clear (zero) the setup before writing into separate registers.

Designations used in the guide:

E - available in the PM130E and PM130EH
EH - available in the PM130EH

2 Modbus Protocol Implementation

For detailed information about Modbus protocol, Modbus message framing and error checking, refer to the "Modicon Modbus Protocol Reference Guide". It can be downloaded from the www.modbus.org Website. The following paragraphs outline some issues concerning the implementation of the Modbus protocol in the PM130.

2.1 Transmission Modes

The PM130 can be set up to communicate on a Modbus network using RTU transmission mode. Refer to the "Series PM130 PLUS Powermeters, Installation and Operation Manual" on how to select the transmission mode in your meter.

2.2 Address Field

The address field contains a user assigned address of the instrument (1-247) on a Modbus network. Broadcast mode using address 0 is not supported.

2.3 Function Field

The Modbus functions implemented in the PM130 are shown in Table 2-1. Function 04 can be used in the same context as function 03.

Table 2-2 Modbus Function Codes

Code (decimal)	Meaning in Modbus	Action
03	Read holding registers	Read multiple registers
04	Read input registers	Read multiple registers
06	Preset single register	Write single register
16	Preset multiple registers	Write multiple registers
08[1]	Loop-back test	Communications test

[1] The PM130 supports only diagnostic code 0 - return query data.

2.4 Exception Responses

The instrument sends an exception response when an error is detected in the received message. To indicate that the response is notification of an error, the high order bit of the function code is set to 1.

Implemented exception response codes:

01 - Illegal function
02 - Illegal data address
03 - Illegal data value
04 - Device failure

When the character framing, parity, or redundancy check detects a communication error, processing of the master's request stops. The instrument will not act on or respond to the message.

2.5 Transaction Timing

The PM130 response time to master requests is indicated in Table 2-2.

Table 2-2 Response Time

Baud Rate, bps	Response Time, ms		
	Min	Max	Typical
9600	13	15	13
19200	11	12	11
57600	9	10	9
115200	9	10	9

2.6 Modbus Register Addresses

The PM130 Modbus registers are numbered in the range of 0 to 65535. From the Modbus applications, the PM130 Modbus registers can be accessed by simulating holding registers of the Modicon 584, 884 or 984 Programmable Controller, using a 5-digit "4XXXX" or 6-digit "4XXXXX" addressing scheme.

To map the PM130 register address to the range of the Modbus holding registers, add a value of 40001 to the PM130 register address. When a register address exceeds 9999, use a 6-digit addressing scheme by adding 400001 to the PM130 register address.

2.7 Data Formats

The PM130 uses four data formats to pass data between a master application and the instrument: 16-bit short integer, 32-bit long integer, 32-bit floating point and 32-bit modulo-10000 formats. Binary values and counters are always transmitted in 32-bit registers, while analog values can be read both in 32-bit and in 16-bit scaled registers.

32-bit analog and energy registers and counters can be read either in long integer or in single precision floating point format. The register type can be selected in the meter separately for analog registers, binary counters and energy registers via Modbus register 246 (see Section 3.1, Modbus Setup Registers). Refer to the "PM130 PLUS Powermeters, Installation and Operation Manual, Device Options Setup" for information on how to setup the type of 32-bit registers in your meter.

Analog registers 256 through 308 and 6656 through 10935 contain scaled 16-bit data.

2.7.1 16-bit Scaled Integer Format

16-bit scaled analog data is transmitted in a single 16-bit Modbus register being scaled to the range of 0 to 9999. To get a true reading, a reverse conversion should be done using the following formula:

$$Y = \frac{X \times (HI - LO)}{9999} + LO$$

where:

Y	-	True reading in engineering units
X	-	Raw input data in the range of 0 to 9999
LO and HI	-	Data low and high scales in engineering units

The engineering scales are indicated for every scaled 16-bit register. Refer to Section 4 "Data Scales and Units" for applicable data scales and measurement units.

The default voltage scale in the device is 144V (120V+20%). It can be changed through register 242 (see Section 3.1, Device Data Scales), or via the supplemental PAS software. The recommended voltage scale is 120V+20% = 144V for using with external PT's, and 690V+20% = 828V for a direct connection to power line.

CONVERSION EXAMPLES

1. Voltage readings

a) Assume device settings (direct wiring): PT ratio = 1; Voltage scale = 828V (690V + 20%).

Voltage engineering scales (see Section 4):

HI_ENG = Vmax = 828.0 × PT ratio = 828.0 × 1 = 828.0V

LO_ENG = 0V

If the raw data reading is 1449 then the voltage reading in engineering units will be as follows:

Volts reading = 1449 × (828.0 - 0)/(9999 - 0) + 0 = 120.0V

b) Assume device settings (wiring via PT): PT ratio = 14,400V : 120V = 120; Voltage scale = 144V.

Voltage engineering scales (see Section 4):

HI_ENG = Vmax = 144.0 × PT ratio = 144 × 120 = 17,280V

LO_ENG = 0V

If the raw data reading is 8314 then the voltage reading in engineering units will be as follows:

Volts reading = 8314 × (17,280 - 0)/9999 + 0 = 14,368V

2. Current readings

Assume device settings: CT primary current = 200A.

Current engineering scales (see Section 4):

HI_ENG = Imax = CT primary current × 2 = 200.00 × 2 = 400.00A

LO_ENG = 0A

If the raw data reading is 250 then the current reading in engineering units will be as follows:

Amps reading = 250 × (400.00 - 0)/(9999 - 0) + 0 = 10.00A

3. Power readings

a) Assume device settings (direct wiring): Wiring 4LL3; PT = 1; CT primary current = 200A; Voltage scale = 828V.

Active Power engineering scales (rounded to whole kW, see Section 4):

HI_ENG = Pmax = Vmax × Imax × 2 = (828.0 × 1) × (200.00 × 2) × 2 = 662,400W = 662 kW

LO_ENG = -Pmax = -662 kW

If the raw data reading is 5500 then the power reading in engineering units will be as follows:

Watts reading = 5500 × (662 - (-662))/(9999 - 0) + (-662) = 66.3 kW

If the raw data reading is 500 then the power reading in engineering units will be as follows:

Watts reading = 500 × (662 - (-662))/(9999 - 0) + (-662) = -595.8 kW

b) Assume device settings (wiring via PT): Wiring 4LN3; PT = 120; CT primary current = 200A.

Active Power engineering scales (rounded to whole kW, see Section 4):

HI_ENG = Pmax = Vmax × Imax × 3 = (828 × 120) × (200.00 × 2) × 3/1000 = 119,232 kW

LO_ENG = -Pmax = -119,232 kW

If the raw data reading is 5500 then the power reading in engineering units will be as follows:

Watts reading = 5500 × (119,232 - (-119,232))/(9999 - 0) + (-119,232) = 11,936 kW

If the raw data reading is 500 then the power reading in engineering units will be as follows:

Watts reading = 500 × (119,232 - (-119,232))/(9999 - 0) + (-119,232) = -107,307 kW

4. Power Factor readings

Power factor engineering scales (see Section 3.3):

HI_ENG = 1.000.

LO_ENG = -1.000.

If the raw data reading is 8900 then the power factor in engineering units will be as follows:

Power factor reading = 8900 × (1.000 - (-1.000))/(9999 - 0) + (-1.000) = 0.78

2.7.2 32-bit Long Integer Format

32-bit long integer data is transmitted in two adjacent 16-bit Modbus registers as unsigned (UINT32) or signed (INT32) whole numbers. The first register contains the low-order word (lower 16 bits) and the second register contains the high order word (higher 16 bits). The low-order word always starts at an even Modbus address.

The value range for unsigned data is 0 to 4,294,967,295; for signed data the range is -2,147,483,648 to 2,147,483,647.

If your Modbus driver does not support a 32-bit long integer format, you can read the two 16-bit registers separately, and then convert them into a 32-bit value as follows (using C notation):

32-bit value = (signed short)high_order_register × 65536L + (unsigned short)low_order_register

EXAMPLES

1. Unsigned 32-bit Values

If you read unsigned Voltage V1 of 69,000V from registers 13952-13953, then the register readings will be as follows:

(13952) = 3464

(13953) = 1

The 32-bit value is (1 x 65536 + 3464) = 69000V.

2. Signed 32-bit Values

If you read signed kW of -789kW from registers 14336-14337, then the register readings will be:

(14336) = 64747 (unsigned)

(14337) = 65535 (unsigned) or -1(signed value).

To take the high order register as a signed value, compare it with 32767. If the value is less or equal to 32767, use it as is. If it is greater than 32767, then this is a negative number in a two's complement code (like in our example) - just subtract it from 65536 to get the original negative value.

The 32-bit reading is (-1 x 65536 + 64747) = -789kW.

Fractional 32-bit data is transmitted using a decimal pre-multiplier to pass fractional numbers in an integer format. Fractional numbers are pre-multiplied by 10 to the power N, where N is the number of digits in the fractional part. For example, the frequency reading of 50.01 Hz is transmitted as 5001, having been pre-multiplied by 100.

Whenever a data register contains a fractional number, the register measurement unit is given with a multiplier ×0.1, ×0.01 or ×0.001, showing the weight of the least significant decimal digit. To get an actual fractional number with specified precision, multiply the register value by the given multiplier. To write a fractional number into the register, divide the number by the given multiplier.

2.7.3 32-bit Floating Point Format

32-bit analog registers, energy registers and binary counters, and 32-bit Min/Max registers (see Sections 3.3-3.5) can be read in IEEE single precision floating point format in two adjacent 16-bit Modbus registers, the low order register first.

The low-order register always starts at an even Modbus address.

2.7.4 32-bit Modulo-10000 Format

Energy counters 287-294 and 301-302 are read in two contiguous 16-bit registers in a modulo-10000 format. The first (low order) register contains the value mod 10000, and the second (high order) register contains the value/10000. To get the true energy reading, the high order register value should be multiplied by 10,000 and added to the low order register.

2.8 User Assignable Registers

The PM130 provides 120 user assignable registers in the address range of 0 to 119. You can re-map any register available in the meter to any assignable register so that Modbus registers that reside at different locations may be simply accessed using a single request by re-mapping them to adjacent addresses. Refer to Configuring Modbus in the PM130 PLUS Installation and Operation Manual for information on how to configure the assignable registers via PAS.

The actual addresses of the assignable registers, which are accessed via addresses 0 through 119, are specified in the register map (registers 120 through 239), where register 120 contains the actual address of the register accessed via register 0, register 121 contains the actual address of the register accessed via register 1, and so on. The assignable registers and the map registers themselves may not be re-mapped.

Initially these registers are reserved and none of them points to an actual register address. To build your own register map, write to map registers 120 to 239 the actual addresses you

want to read from or write to via the assignable area (registers 0 to 119). 32-bit long registers should always be aligned at even addresses. For example, if you want to read registers 7136 (1-second V1 voltage, scaled short integer) and 14720-14721 (kWh Import, long integer) via registers 0-2, do the following:

- write 14720 to register 120
- write 14721 to register 121
- write 7136 to register 122

Reading from registers 0-2 will return the kWh reading in registers 0 (low 16 bits) and 1 (high 16 bits), and the voltage reading in register 2.

2.9 Password Protection

The PM130 has a password protection option allowing you to protect your setups, cumulative registers and logs from being changed or cleared through communications. You can disable or enable password protection through communications or via the front display. For details, refer to your instrument Installation and Operation Manual.

When password protection is enabled, the user password you set in your instrument should be written into the device authorization register (2575) before another write request is issued. If the correct password is not supplied while password protection is enabled, the instrument will respond to all write requests with the exception code 01 (illegal operation).

It is recommended to clear the password register after you have completed your changes in order to activate password protection.

2.10 Data Recording and File Transfers

2.10.1 Log File Organization

Historical files are stored to the non-volatile memory. Memory is allocated for each file statically when you set up your files and will not change unless you re-organize the files. The meter automatically performs de-fragmentation of the memory each time you re-organize your files. This helps keep all free memory in one continuous chunk and thus prevents possible leakage of memory caused by fragmentation.

Data records in a file are arranged in the order of their recording. Each record has a unique 16-bit sequence number that is incremented modulo 65536 with each new record. The sequence number can be used to point to a particular record in the file, or to check the sequence of records when uploading files from the device.

Each file has a write position pointer that indicates the place where the next record will be recorded, and a read position pointer that indicates the place from where the current record will be read. Both pointers show sequence numbers of the records they point to rather than record offsets in the file.

After acknowledging a record you have read, the read pointer automatically advances to the next record in the file. When the read pointer gets to the record to which the file write pointer points, the end-of-file (EOF) flag is set. It is automatically cleared when a new record is added to the file, or when you explicitly move the read pointer to any record within a file.

If a file has a wrap-around attribute (circular file), the most recent records can overwrite the oldest records. When this happens at the current read position, the read pointer automatically advances forward in order to point to the oldest record in the file.

The meter keeps a separate read pointer for each communication port so that access to the same file through a different port will not affect current active sessions for other ports.

Multi-section Files

Log files can have one or more (up to 8) sections for multi-channel recording. An ordinal file consists of a single section. A daily profile log file is arranged as multi-section file.

A multi-section file is subdivided into multiple sections of the same structure, one section per recording channel. The number of sections in each file is defined at the time you set up

your files and may not change unless you re-organize the file. Each section within a multi-section file can be addressed by a section number, or by a section channel ID.

A multi-section file has a single write position pointer for all sections and stores data in all sections simultaneously. This means that records with the same sequence number in all sections are associated with the same event. A multi-section file has also a single read position pointer for all sections.

Data Log File

A data log file can store up to 9 measured parameters per a record. Any data measured by the device can be stored in the log file. The number of parameters that each record will hold and the list of parameters you want to be recorded in the file can be selected through the Data log setup registers for a particular file.

Recording data to the data log files can be triggered through the setpoints, either on a time basis using the meter clock or periodic timers, or upon any event detected by the setpoints.

Profile Data Log File

Data log file #16 can be configured for a daily profile log of the energy usage and maximum demand registers. A profile log file is organized as a multi-section file that has a separate section for each energy and maximum demand register. A file record stores the summary data (total of all tariffs) and all tariff data for each configured Summary/TOU register. See Section 3.10 for information on the file record structure.

The number of sections is taken automatically from the Summary/TOU Registers setup. Since each Summary/TOU energy register has a shadow maximum demand register, the number of sections in the file can be twice the number of the allocated Summary/TOU registers. Always configure the Summary/TOU registers before you allocate memory for your profile log file.

New records are added to the file automatically every day at midnight. You can review the list of parameters recorded to the file through the file info request/response blocks using info requests with variation 2 (see Section 3.9), or through the Data log #16 setup - it shows the list of parameters for the first file section, which represents the first configured energy usage register.

Real-time Waveforms

Real-time waveforms are read as a multi-section file that stores data for each recording channel in a separate section. A real-time waveform contains six AC channels - three voltage and three current waveforms, which are recorded in successive sections.

A single waveform record for a channel contains 512 points of the sampled input signal. Refer to the line frequency field in the channel header record to correctly set up the time scale for the waveforms.

2.10.2 File Transfers

File transfer protocol provides both data transfer and information services. File transfer is performed through two blocks of registers: a 32-word master request block and a 648-word read-only file response block. After a master application has written the request into the file request block, the requested data is available for a read through the file response block registers. File transfer functions allow changing the file or section position in order to point to the desired record.

The information services use separate 8-word file info request and 200-word file info response blocks. The extended file information is available including current file pointers' positions, file contents, the number of records in the file, allocated file size, time of the last file update, and more.

See Section 3.9 File Transfer Registers for information on register locations.

Common File Transfer

Log files can be read either in a sequence record-by-record, or in a random order. Each Read-File request fills the file response block with the data of the record pointed to by the

file (or section) read pointer. If you want to begin reading a file from a particular record, which sequence number is known, you can change the pointer position by issuing the Set-File-Position request with the desired sequence number. If you want to read a file from the beginning, send the Reset-File-Position request that moves the pointer to the oldest file record. If you do not change the file position, then you will continue reading the file from the record following the one you have read the last time you accessed the file.

You need not explicitly move the file position to the following record if you want to continue reading a file in sequence after you have uploaded the current record. Instead, issue an acknowledgment request that automatically advances the file pointer to the next record, and then read the record data through the file response block.

The file response block can contain more than one record. The number of records available in the block and the file record size in words are always reported in the block heading. There are no special rules on how to read records from the file transfer block. You can read a single record or all records together, or begin reading from the last record and end with the first record. However, you should remember: 1) after an acknowledgment, the file position moves to the record following the last one you have accessed in the file transfer block; and 2) data in the file transfer block does not change until you either issue an acknowledgment, or explicitly change the file position by the Set-File-Position or Reset-File-Position requests.

The file transfer is completed after you have read the last record of the file. Before storing a file record to your database, always check bit 9 in the record status word, which contains the end-of-file (EOF) flag. This bit set to 1 indicates that the file read pointer does not point to any record within the file, and you should not store any record that has this bit set. The EOF flag is set only after you have acknowledged the last record of the file, so that testing for end-of-file requires one extra read. If you wish to stop the transfer just after storing the last file record, acknowledge the record and check bit 0 in the record status word. Bit 0 is set to 1 only once when you read the last record of the file.

The following gives a summary of steps you should do to read an ordinal log file:

1. If you wish to begin reading a file from a particular record or from the first record, use either the Set-File-Position request with the desired record sequence number, or the Reset-File-Position request. Preset a section number and channel ID to zero.
2. Write the Read-File request with a section number and channel ID set to zero.
3. Read the record data from the file response block.
4. Write an acknowledgment for the file. You need not fill all the request fields: only the file function is required. The file pointer will be moved to the next file record.
5. Repeat steps 3-4 until all the file records are read.

Reading Multi-section Data Log Files

In a multi-section data log file, all user requests including an acknowledgment, the Read-File, Set-File-Position and Reset-File-Position requests, relate to a particular file section rather than to the file itself. The only request that affects the entire file is the Erase-File that clears all the file sections together.

A file section can be requested either by a section number, or by a section channel ID. If you use a channel ID, preset the section number field to 0xFFFF. If a section number is specified, the channel ID field will not be checked. The device returns both fields in the response block heading, so you can always identify what channel data is being read from the present file section. If you want to know which channels are recorded to the file sections, check the file channel mask in the file info block. This is a bitmap that contains one in a bit position if a channel with an ID equal to the bit number is recorded to the file, and contains zero if it is not.

The following gives a summary of steps for reading a multi-section data log file:

1. If you wish to begin reading a file section from a particular record or from the first record, use either the Set-File-Position request with the desired record sequence number, or the Reset-File-Position request. Specify either a section number, or the channel ID for the section from where you want to read data. If you use a channel ID, preset the section number field to 0xFFFF.

2. Write the Read-File request with the section number and channel ID as shown in the previous step.
3. Read the record data from the file response block.
4. Write an acknowledgment for the file. The file section pointer will be moved to the next record.
5. Repeat steps 3-4 until all the section records are read.

Reading Real-time Waveforms

Writing the Read-File request for file 128 provides a simultaneous capture of 6 real-time waveform records – three voltage and three current waveforms – into a communication buffer that can be read through the common file response block. The following gives a summary of steps for reading real-time waveforms:

1. Write the Read-File request for file 128. Address you request to the first file section (its number is always zero), or to the first file channel (if you know channel's ID). If you use a channel ID, preset the section number field to 0xFFFF.
2. Read the channel's data from the file response block.
3. Write the Read-File request for the next file section or channel. The file response block will be refilled with the data for the requested channel.
4. Repeat steps 3, 4 until all the channel records are read.
5. Write an acknowledgment to release the buffer.

2.11 TCP Notification Client

The TCP notification client can establish connections with a remote Modbus/TCP server and send notification messages either on events, or periodically on a time basis.

Notification messages are sent via a block of 16 Modbus registers using write function 16. The following table shows the message exchange structure.

Modbus Register	Description	Type	Comment
+0-1	Device serial number	UINT32	
+2-4	Device MAC address	CHAR6	
+5	Device address	UINT16	Device port address
+6-7	Device IP address	UINT32	Network byte order
+8	Event type	UINT16	See F22 in Section 5
+9	Event sequence number	UINT16	Not used
+10-11	Event timestamp, seconds	UINT32	Local time since Jan 1, 1970
+12-13	Event timestamp, seconds fraction, in microseconds	UINT32	
+14-15	Reserved	UINT32	Written as 0

After receiving a write acknowledgement from a server, a TCP connection is still open for 10 seconds (20 seconds via GPRS) to give the server an opportunity to access meter registers through an open socket. It may help you access the meter from outside your local network when the server is located on another network, or when using wireless GPRS communications. The notification client will respond to all server requests as if it were a regular incoming connection.

If the server does not close a connection, it will be closed in 20 seconds if there is no activity on the socket. In the event a connection attempt was unsuccessful, the notification client retries two more times before announcing a connection failure.

The server's IP address, port number and starting Modbus register address are programmable in the meter. See "TCP Notification Client Setup" for more information on the client setup. To configure and enable the notification client in your meter via PAS, select Communication Setup in the Meter Setup menu, and click on the TCP Notification Client Setup tab.

Client connections are triggered via programmable setpoints. To send event notifications to a server, configure a setpoint to respond to a desired trigger or to periodic time events and put "Notification" to the setpoint action list.

3 Modbus Register Map

3.1 Modbus Setup Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
Assignable Modbus Registers							
0-119							
+0		Register 0 contents	0-65535		UINT16	R/W	
+1		Register 1 contents	0-65535		UINT16	R/W	
		...					
+119		Register 119 contents	0-65535		UINT16	R/W	
Assignable Registers Map							
120-239							
+0		Mapped register 0 address	0-65535		UINT16	R/W	
+1		Mapped register 1 address	0-65535		UINT16	R/W	
+119		Mapped register 119 address	0-65535		UINT16	R/W	
Modbus Conversion Scales							
240		Low raw scale	0		UINT16	R	
241		High raw scale	9999		UINT16	R	
Device Data Scales							
242		Voltage scale, secondary volts	60-828	1V	UINT16	R/W	Default 144V
243		Current scale, secondary amps	10-100	×0.1A	UINT16	R/W	Default 2×CT secondary
244-245		Reserved	0		UINT16	R	
32-bit Register Type							
246		Type of 32-bit registers	Bits 0-1 - analog values: 0 = 32-bit integer 1 = 32-bit floating point Bits 2-3 - binary counters: 0 = 32-bit integer 1 = 32-bit floating point Bit 4-5 - energy counters: 0 = 32-bit integer 1 = 32-bit floating point		UINT16	R/W	Default 0

3.2 16-bit Scaled Analog Registers and Energy Counters - Basic Register Set

Address	Point ID	Description	Low and High Scales[2]	Units[2]	Type	R/W	Notes
256-308							
+0	0x1100	V1/V12 Voltage	0-Vmax	U1	UINT16	R	1
+1	0x1101	V2/V23 Voltage	0-Vmax	U1	UINT16	R	1
+2	0x1102	V3/V31 Voltage	0-Vmax	U1	UINT16	R	1
+3	0x1103	I1 Current	0-Imax	U2	UINT16	R	
+4	0x1104	I2 Current	0-Imax	U2	UINT16	R	
+5	0x1105	I3 Current	0-Imax	U2	UINT16	R	
+6	0x1106	kW L1	-Pmax-Pmax	U3	INT16	R	
+7	0x1107	kW L2	-Pmax-Pmax	U3	INT16	R	
+8	0x1108	kW L3	-Pmax-Pmax	U3	INT16	R	
+9	0x1109	kvar L1	-Pmax-Pmax	U3	INT16	R	
+10	0x110A	kvar L2	-Pmax-Pmax	U3	INT16	R	
+11	0x110B	kvar L3	-Pmax-Pmax	U3	INT16	R	
+12	0x110C	kVA L1	-Pmax-Pmax	U3	UINT16	R	
+13	0x110D	kVA L2	-Pmax-Pmax	U3	UINT16	R	
+14	0x110E	kVA L3	-Pmax-Pmax	U3	UINT16	R	
+15	0x110F	Power factor L1	-1.000-1.000	0.001	INT16	R	
+16	0x1110	Power factor L2	-1.000-1.000	0.001	INT16	R	
+17	0x1111	Power factor L3	-1.000-1.000	0.001	INT16	R	
+18	0x1403	Total PF	-1.000-1.000	0.001	INT16	R	
+19	0x1400	Total kW	-Pmax-Pmax	U3	INT16	R	
+20	0x1401	Total kvar	-Pmax-Pmax	U3	INT16	R	
+21	0x1402	Total kVA	-Pmax-Pmax	U3	UINT16	R	
+22	0x1501	In (neutral) Current	0-Imax	U2	UINT16	R	
+23	0x1502	Frequency	45.00-65.00	0.01Hz	UINT16	R	
+24	0x3709	Maximum kW import sliding window demand	-Pmax-Pmax	U3	UINT16	R	
+25	0x160F	kW import accumulated demand	-Pmax-Pmax	U3	UINT16	R	
+26	0x370B	Maximum kVA sliding window demand	-Pmax-Pmax	U3	UINT16	R	
+27	0x1611	kVA accumulated demand	-Pmax-Pmax	U3	UINT16	R	
+28	0x3703	I1 Maximum ampere demand	0-Imax	U2	UINT16	R	
+29	0x3704	I2 Maximum ampere demand	0-Imax	U2	UINT16	R	
+30	0x3705	I3 Maximum ampere demand	0-Imax	U2	UINT16	R	
+31		kWh import (low)	0-9999	1kWh	UINT16	R	5
+32		kWh import (high)	0-9999	×10MWh	UINT16	R	5
+33		kWh export (low)	0-9999	1kWh	UINT16	R	5
+34		kWh export (high)	0-9999	×10MWh	UINT16	R	5
+35		+kvarh net (low)	0-9999	1kvarh	UINT16	R	3, 5
+36		+kvarh net (high)	0-9999	×10Mvarh	UINT16	R	3, 5
+37		-kvarh net (low)	0-9999	1kvarh	UINT16	R	4, 5
+38		-kvarh net (high)	0-9999	×10Mvarh	UINT16	R	4, 5

Address	Point ID	Description	Low and High Scales[2]	Units[2]	Type	R/W	Notes
+39	0x1112	V1/V12 Voltage THD	0-999.9	0.1%	UINT16	R	[1] 3-sec value
+40	0x1113	V2/V23 Voltage THD	0-999.9	0.1%	UINT16	R	[1] 3-sec value
+41	0x1114	V3/V31 Voltage THD	0-999.9	0.1%	UINT16	R	[1] 3-sec value
+42	0x1115	I1 Current THD	0-999.9	0.1%	UINT16	R	3-sec value
+43	0x1116	I2 Current THD	0-999.9	0.1%	UINT16	R	3-sec value
+44	0x1117	I3 Current THD	0-999.9	0.1%	UINT16	R	3-sec value
+45		kVAh (low)	0-9999	1kVAh	UINT16	R	[5]
+46		kVAh (high)	0-9999	10MVAh	UINT16	R	[5]
+47	0x1609	Present kW import sliding window demand	-Pmax-Pmax	U3	UINT16	R	
+48	0x160B	Present kVA sliding window demand	-Pmax-Pmax	U3	UINT16	R	
+49	0x1615	PF (import) at Max. kVA sliding window demand	0-1.000	0.001	UINT16	R	
+50	0x111B	I1 Current TDD	0-100.0	0.1%	UINT16	R	3-sec value
+51	0x111C	I2 Current TDD	0-100.0	0.1%	UINT16	R	3-sec value
+52	0x111D	I3 Current TDD	0-100.0	0.1%	UINT16	R	3-sec value

NOTES:

Energy and power demand readings are only available in PM130E and PM130EH meters. Total harmonics are only available in PM130EH meters.

[1] Voltage and Voltage Harmonics Readings:

When the 4LN3, 3LN3 or 3BLN3 wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line voltages.

[2] All analog registers except of harmonics are 1-second average values. For volts, amps and power scales and units, refer to Section 4 "Data Scales and Units". For analog data scaling formulas and examples, see Section 2.7.1, "16-bit Scaled Integer Format".

[3] Positive readings of kvarh net

[4] Negative readings of kvarh net

[5] If you use these energy registers instead of 32-bit registers, limit the energy roll value to 8 digits to avoid overflow (see Device Options Setup).

3.3 16-bit Scaled Analog Registers, Binary Registers and Counters

Address	Point ID	Description	Low and High Scales[2]	Units[2, 4]	Type	R/W	Notes
6656	0x0000	**None**	0		UINT16	R	
		Special Inputs					
6697	0x0101	Phase rotation order	0=error, 1=positive (ABC), 2=negative (CBA)		UINT16	R	
6896	0x0600	**Digital Inputs**	0x0000-0x0FFF		UINT16	R	Bitmap: 0=open, 1=closed
6976	0x0800	**Relay Outputs**	0x0000-0x000F		UINT16	R	Bitmap: 0=open, 1=closed
7056-7063		**Counters**					
+0,1	0x0A00	Counter #1	0-99,999		UINT32	R/W	
+2,3	0x0A01	Counter #2	0-99,999		UINT32	R/W	
+4,5	0x0A02	Counter #3	0-99,999		UINT32	R/W	
+6,7	0x0A03	Counter #4	0-99,999		UINT32	R/W	
7136-7168		**1-Cycle Phase Values**					
+0	0x0C00	V1/V12 Voltage	0-Vmax	U1	UINT16	R	[1]
+1	0x0C01	V2/V23 Voltage	0-Vmax	U1	UINT16	R	[1]
+2	0x0C02	V3/V31 Voltage	0-Vmax	U1	UINT16	R	[1]
+3	0x0C03	I1 Current	0-Imax	U2	UINT16	R	
+4	0x0C04	I2 Current	0-Imax	U2	UINT16	R	
+5	0x0C05	I3 Current	0-Imax	U2	UINT16	R	
+6	0x0C06	kW L1	-Pmax-Pmax	U3	INT16	R	
+7	0x0C07	kW L2	-Pmax-Pmax	U3	INT16	R	
+8	0x0C08	kW L3	-Pmax-Pmax	U3	INT16	R	
+9	0x0C09	kvar L1	-Pmax-Pmax	U3	INT16	R	
+10	0x0C0A	kvar L2	-Pmax-Pmax	U3	INT16	R	
+11	0x0C0B	kvar L3	-Pmax-Pmax	U3	INT16	R	
+12	0x0C0C	kVA L1	0-Pmax	U3	UINT16	R	
+13	0x0C0D	kVA L2	0-Pmax	U3	UINT16	R	
+14	0x0C0E	kVA L3	0-Pmax	U3	UINT16	R	
+15	0x0C0F	Power factor L1	-1.000-1.000	0.001	INT16	R	
+16	0x0C10	Power factor L2	-1.000-1.000	0.001	INT16	R	
+17	0x0C11	Power factor L3	-1.000-1.000	0.001	INT16	R	
+18	0x0C12	V1/V12 Voltage THD	0-999.9	0.1%	UINT16	R	[1] 2-cycle value
+19	0x0C13	V2/V23 Voltage THD	0-999.9	0.1%	UINT16	R	[1] 2-cycle value
+20	0x0C14	V3/V31 Voltage THD	0-999.9	0.1%	UINT16	R	[1] 2-cycle value
+21	0x0C15	I1 Current THD	0-999.9	0.1%	UINT16	R	2-cycle value
+22	0x0C16	I2 Current THD	0-999.9	0.1%	UINT16	R	2-cycle value
+23	0x0C17	I3 Current THD	0-999.9	0.1%	UINT16	R	2-cycle value
+24	0x0C18	I1 K-Factor	1.0-999.9	0.1	UINT16	R	2-cycle value
+25	0x0C19	I2 K-Factor	1.0-999.9	0.1	UINT16	R	2-cycle value
+26	0x0C1A	I3 K-Factor	1.0-999.9	0.1	UINT16	R	2-cycle value
+27	0x0C1B	I1 Current TDD	0-100.0	0.1%	UINT16	R	2-cycle value

Address	Point ID	Description	Low and High Scales[2]	Units[2, 4]	Type	R/W	Notes
+28	0x0C1C	I2 Current TDD	0-100.0	0.1%	UINT16	R	2-cycle value
+29	0x0C1D	I3 Current TDD	0-100.0	0.1%	UINT16	R	2-cycle value
+30	0x0C1E	V12 Voltage	0-Vmax	U1	UINT16	R	
+31	0x0C1F	V23 Voltage	0-Vmax	U1	UINT16	R	
+32	0x0C20	V31 Voltage	0-Vmax	U1	UINT16	R	
7256-7359		**1-Cycle Total Values**					
+0	0x0F00	Total kW	-Pmax-Pmax	U3	INT16	R	
+1	0x0F01	Total kvar	-Pmax-Pmax	U3	INT16	R	
+2	0x0F02	Total kVA	0-Pmax	U3	UINT16	R	
+3	0x0F03	Total PF	-1.000-1.000	0.001	INT16	R	
+4	0x0F04	Total PF lag	0-1.000	0.001	UINT16	R	
+5	0x0F05	Total PF lead	0-1.000	0.001	UINT16	R	
+5	0x0F06	Total kW import	0-Pmax	U3	UINT32	R	
+7	0x0F07	Total kW export	0-Pmax	U3	UINT32	R	
+8	0x0F08	Total kvar import	0-Pmax	U3	UINT32	R	
+9	0x0F09	Total kvar export	0-Pmax	U3	UINT32	R	
+10	0x0F0A	3-phase average L-N/L-L voltage	0-Vmax	U1	UINT32	R	1
+11	0x0F0B	3-phase average L-L voltage	0-Vmax	U1	UINT32	R	
+12	0x0F0C	3-phase average current	0-Imax	U2	UINT32	R	
7296-7300		**1-Cycle Auxiliary Values**					
+0	0x1000	Not used			UINT16	R	
+1	0x1001	In (neutral) Current	0-Imax	U2	UINT16	R	
+2	0x1002	Frequency	0-Fmax	0.01Hz	UINT16	R	
+3	0x1003	Voltage unbalance	0-300	%	UINT16	R	
+4	0x1004	Current unbalance	0-300	%	UINT16	R	
7316-7331		**Phasor**					
+0	0x1080	V1/V12 Voltage magnitude	0-Vmax	U1	UINT16	R	1
+1	0x1081	V2/V23 Voltage magnitude	0-Vmax	U1	UINT16	R	1
+2	0x1082	V3/V31 Voltage magnitude	0-Vmax	U1	UINT16	R	1
+3	0x1083	Not used			UINT16	R	
+4	0x1084	I1 Current magnitude	0-Imax	U2	UINT16	R	
+5	0x1085	I2 Current magnitude	0-Imax	U2	UINT16	R	
+5	0x1086	I3 Current magnitude	0-Imax	U2	UINT16	R	
+7	0x1087	Not used			UINT16	R	
+8	0x1088	V1/V12 Voltage angle	-180.0-180.0	0.1º	INT16	R	1
+9	0x1089	V2/V23 Voltage angle	-180.0-180.0	0.1º	INT16	R	1
+10	0x108A	V3/V31 Voltage angle	-180.0-180.0	0.1º	INT16	R	1
+11	0x108B	Not used			INT16	R	
+12	0x108C	I1 Current angle	-180.0-180.0	0.1º	INT16	R	
+13	0x108D	I2 Current angle	-180.0-180.0	0.1º	INT16	R	
+14	0x108E	I3 Current angle	-180.0-180.0	0.1º	INT16	R	
+15	0x108F	Not used			INT16	R	

Address	Point ID	Description	Low and High Scales[2]	Units[2, 4]	Type	R/W	Notes
7336-7368		**1-Second Phase Values**					
+0	0x1100	V1/V12 Voltage	0-Vmax	U1	UINT16	R	[1]
+1	0x1101	V2/V23 Voltage	0-Vmax	U1	UINT16	R	[1]
+2	0x1102	V3/V31 Voltage	0-Vmax	U1	UINT16	R	[1]
+3	0x1103	I1 Current	0-Imax	U2	UINT16	R	
+4	0x1104	I2 Current	0-Imax	U2	UINT16	R	
+5	0x1105	I3 Current	0-Imax	U2	UINT16	R	
+6	0x1106	kW L1	-Pmax-Pmax	U3	INT16	R	
+7	0x1107	kW L2	-Pmax-Pmax	U3	INT16	R	
+8	0x1108	kW L3	-Pmax-Pmax	U3	INT16	R	
+9	0x1109	kvar L1	-Pmax-Pmax	U3	INT16	R	
+10	0x110A	kvar L2	-Pmax-Pmax	U3	INT16	R	
+11	0x110B	kvar L3	-Pmax-Pmax	U3	INT16	R	
+12	0x110C	kVA L1	0-Pmax	U3	UINT16	R	
+13	0x110D	kVA L2	0-Pmax	U3	UINT16	R	
+14	0x110E	kVA L3	0-Pmax	U3	UINT16	R	
+15	0x110F	Power factor L1	-1.000-1.000	0.001	INT16	R	
+16	0x1110	Power factor L2	-1.000-1.000	0.001	INT16	R	
+17	0x1111	Power factor L3	-1.000-1.000	0.001	INT16	R	
+18	0x1112	V1/V12 Voltage THD	0-999.9	0.1%	UINT16	R	[1] 3-sec value
+19	0x1113	V2/V23 Voltage THD	0-999.9	0.1%	UINT16	R	[1] 3-sec value
+20	0x1114	V3/V31 Voltage THD	0-999.9	0.1%	UINT16	R	[1] 3-sec value
+21	0x1115	I1 Current THD	0-999.9	0.1%	UINT16	R	3-sec value
+22	0x1116	I2 Current THD	0-999.9	0.1%	UINT16	R	3-sec value
+23	0x1117	I3 Current THD	0-999.9	0.1%	UINT16	R	3-sec value
+24	0x1118	I1 K-Factor	1.0-999.9	0.1	UINT16	R	3-sec value
+25	0x1119	I2 K-Factor	1.0-999.9	0.1	UINT16	R	3-sec value
+26	0x111A	I3 K-Factor	1.0-999.9	0.1	UINT16	R	3-sec value
+27	0x111B	I1 Current TDD	0-100.0	0.1%	UINT16	R	3-sec value
+28	0x111C	I2 Current TDD	0-100.0	0.1%	UINT16	R	3-sec value
+29	0x111D	I3 Current TDD	0-100.0	0.1%	UINT16	R	3-sec value
+30	0x111E	V12 Voltage	0-Vmax	U1	UINT16	R	
+31	0x111F	V23 Voltage	0-Vmax	U1	UINT16	R	
+32	0x1120	V31 Voltage	0-Vmax	U1	UINT16	R	
7456-7459		**1-Second Total Values**					
+0	0x1400	Total kW	-Pmax-Pmax	U3	INT16	R	
+1	0x1401	Total kvar	-Pmax-Pmax	U3	INT16	R	
+2	0x1402	Total kVA	0-Pmax	U3	UINT16	R	
+3	0x1403	Total PF	-1.000-1.000	0.001	INT16	R	
+4	0x1404	Total PF lag	0-1.000	0.001	UINT16	R	
+5	0x1405	Total PF lead	0-1.000	0.001	UINT16	R	
+5	0x1406	Total kW import	0-Pmax	U3	UINT32	R	
+7	0x1407	Total kW export	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Low and High Scales[2]	Units[2, 4]	Type	R/W	Notes
+8	0x1408	Total kvar import	0-Pmax	U3	UINT32	R	
+9	0x1409	Total kvar export	0-Pmax	U3	UINT32	R	
+10	0x140A	3-phase average L-N/L-L voltage	0-Vmax	U1	UINT32	R	1
+11	0x140B	3-phase average L-L voltage	0-Vmax	U1	UINT32	R	
+12	0x140C	3-phase average current	0-Imax	U2	UINT32	R	
7496-7500		**1-Second Auxiliary Values**					
+0	0x1500	Not used			UINT16	R	
+1	0x1501	In (neutral) Current	0-Imax	U2	UINT16	R	
+2	0x1502	Frequency	0-Fmax	0.01Hz	UINT16	R	
+3	0x1503	Voltage unbalance	0-300	%	UINT16	R	
+4	0x1504	Current unbalance	0-300	%	UINT16	R	
7536-7565		**Present Volt, Ampere and Power Demands**					
+0	0x1600	V1/V12 Volt demand	0-Vmax	U1	UINT16	R	1
+1	0x1601	V2/V23 Volt demand	0-Vmax	U1	UINT16	R	1
+2	0x1602	V3/V31 Volt demand	0-Vmax	U1	UINT16	R	1
+3	0x1603	I1 Ampere demand	0-Imax	U2	UINT16	R	
+4	0x1604	I2 Ampere demand	0-Imax	U2	UINT16	R	
+5	0x1605	I3 Ampere demand	0-Imax	U2	UINT16	R	
+6	0x1606	kW import block demand	0-Pmax	U3	UINT16	R	
+7	0x1607	kvar import block demand	0-Pmax	U3	UINT16	R	
+8	0x1608	kVA block demand	0-Pmax	U3	UINT16	R	
+9	0x1609	kW import sliding window demand	0-Pmax	U3	UINT16	R	
+10	0x160A	kvar import sliding window demand	0-Pmax	U3	UINT16	R	
+11	0x160B	kVA sliding window demand	0-Pmax	U3	UINT16	R	
+12	0x160C	Not used			UINT16	R	
+13	0x160D	Not used			UINT16	R	
+14	0x160E	Not used			UINT16	R	
+15	0x160F	kW import accumulated demand	0-Pmax	U3	UINT16	R	
+16	0x1610	kvar import accumulated demand	0-Pmax	U3	UINT16	R	
+17	0x1611	kVA accumulated demand	0-Pmax	U3	UINT16	R	
+18	0x1612	kW import predicted sliding window demand	0-Pmax	U3	UINT16	R	
+19	0x1613	kvar import predicted sliding window demand	0-Pmax	U3	UINT16	R	
+20	0x1614	kVA predicted sliding window demand	0-Pmax	U3	UINT16	R	
+21	0x1615	PF (import) at Max. kVA sliding window demand	0-1.000	0.001	UINT16	R	
+22	0x1616	kW export block demand	0-Pmax	U3	UINT16	R	
+23	0x1617	kvar export block demand	0-Pmax	U3	UINT16	R	
+24	0x1618	kW export sliding window demand	0-Pmax	U3	UINT16	R	
+25	0x1619	kvar export sliding window demand	0-Pmax	U3	UINT16	R	
+26	0x161A	kW export accumulated demand	0-Pmax	U3	UINT16	R	
+27	0x161B	kvar export accumulated demand	0-Pmax	U3	UINT16	R	
+28	0x161C	kW export predicted sliding window demand	0-Pmax	U3	UINT16	R	
+29	0x161D	kvar export predicted sliding window demand	0-Pmax	U3	UINT16	R	
+30	0x161E	Not used			UINT16	R	

Address	Point ID	Description	Low and High Scales[2]	Units[2, 4]	Type	R/W	Notes
+31	0x161F	Not used			UINT16	R	
+32	0x1620	Not used			UINT16	R	
+33	0x1621	Not used			UINT16	R	
+34	0x1622	In Ampere demand	0-Imax	U2	UINT16	R	
7576-7609		**Total Energies [E]**					
+0,1	0x1700	kWh import	0-999,999,999	kWh	UINT32	R	
+2,3	0x1701	kWh export	0-999,999,999	kWh	UINT32	R	
+4,5		Not used			INT32	R	
+6,7		Not used			UINT32	R	
+8,9	0x1704	kvarh import	0-999,999,999	kvarh	UINT32	R	
+10,11	0x1705	kvarh export	0-999,999,999	kvarh	UINT32	R	
+12,13		Not used			INT32	R	
+14,15		Not used			UINT32	R	
+16,17	0x1708	kVAh total	0-999,999,999	kVAh	UINT32	R	
+18,19	0x1709	Not used			UINT32	R	
+20,21	0x170A	Not used			UINT32	R	
+22,23	0x170B	kVAh import	0-999,999,999	kVAh	UINT32	R	
+24,25	0x170C	kVAh export	0-999,999,999	kVAh	UINT32	R	
+26,27	0x1712	kvarh Q1	0-999,999,999	kvarh	UINT32	R	
+28,29	0x1713	kvarh Q2	0-999,999,999	kvarh	UINT32	R	
+30,31	0x1714	kvarh Q3	0-999,999,999	kvarh	UINT32	R	
+32,33	0x1715	kvarh Q4	0-999,999,999	kvarh	UINT32	R	
7616-7633		**Phase Energies [E]**					
+0,1	0x1800	kWh import L1	0-999,999,999	kWh	UINT32	R	
+2,3	0x1801	kWh import L2	0-999,999,999	kWh	UINT32	R	
+4,5	0x1802	kWh import L3	0-999,999,999	kWh	UINT32	R	
+6,7	0x1803	kvarh import L1	0-999,999,999	kvarh	UINT32	R	
+8,9	0x1804	kvarh import L2	0-999,999,999	kvarh	UINT32	R	
+10,11	0x1805	kvarh import L3	0-999,999,999	kvarh	UINT32	R	
+12,13	0x1806	kVAh total L1	0-999,999,999	kVAh	UINT32	R	
+14,15	0x1807	kVAh total L2	0-999,999,999	kVAh	UINT32	R	
+16,17	0x1808	kVAh total L3	0-999,999,999	kVAh	UINT32	R	
7656-7695		**V1/V12 Harmonic Distortion [EH]**					1
+0	0x1900	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1901	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+39	0x1927	H40 Harmonic distortion	0-100.00	0.01%	UINT16	R	
7696-7735		**V2/V23 Harmonic Distortion [EH]**					1
+0	0x1A00	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1A01	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+39	0x1A27	H40 Harmonic distortion	0-100.00	0.01%	UINT16	R	

Address	Point ID	Description	Low and High Scales[2]	Units[2, 4]	Type	R/W	Notes
7736-7775		**V3/V31 Harmonic Distortion EH**					[1]
+0	0x1B00	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1B01	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+39	0x1B27	H40 Harmonic distortion	0-100.00	0.01%	UINT16	R	
7776-7815		**I1 Harmonic Distortion EH**					
+0	0x1C00	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1C01	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+39	0x1C27	H40 Harmonic distortion	0-100.00	0.01%	UINT16	R	
7816-7855		**I2 Harmonic Distortion EH**					
+0	0x1D00	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1D01	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+39	0x1D27	H40 Harmonic distortion	0-100.00	0.01%	UINT16	R	
7856-7895		**I3 Harmonic Distortion EH**					
+0	0x1E00	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1E01	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+39	0x1E27	H40 Harmonic distortion	0-100.00	0.01%	UINT16	R	
8296-8313		**Fundamental Phase Values EH**					2-cycle values
+0	0x2900	V1/V12 Voltage	0-Vmax	U1	UINT16	R	[1]
+1	0x2901	V2/V23 Voltage	0-Vmax	U1	UINT16	R	[1]
+2	0x2902	V3/V31 Voltage	0-Vmax	U1	UINT16	R	[1]
+3	0x2903	I1 Current	0-Imax	U2	UINT16	R	
+4	0x2904	I2 Current	0-Imax	U2	UINT16	R	
+5	0x2905	I3 Current	0-Imax	U2	UINT16	R	
+6	0x2906	kW L1	-Pmax-Pmax	U3	INT16	R	
+7	0x2907	kW L2	-Pmax-Pmax	U3	INT16	R	
+8	0x2908	kW L3	-Pmax-Pmax	U3	INT16	R	
+9	0x2909	kvar L1	-Pmax-Pmax	U3	INT16	R	
+10	0x290A	kvar L2	-Pmax-Pmax	U3	INT16	R	
+11	0x290B	kvar L3	-Pmax-Pmax	U3	INT16	R	
+12	0x290C	kVA L1	0-Pmax	U3	UINT16	R	
+13	0x290D	kVA L2	0-Pmax	U3	UINT16	R	
+14	0x290E	kVA L3	0-Pmax	U3	UINT16	R	
+15	0x290F	Power factor L1	-1.000-1.000	0.001	INT16	R	
+16	0x2910	Power factor L2	-1.000-1.000	0.001	INT16	R	
+17	0x2911	Power factor L3	-1.000-1.000	0.001	INT16	R	
8336-8343		**Fundamental Total Values EH**					2-cycle values
+0	0x2A00	Total fundamental kW	-Pmax-Pmax	U3	INT16	R	
+1	0x2A01	Total fundamental kvar	-Pmax-Pmax	U3	INT16	R	

Address	Point ID	Description	Low and High Scales[2]	Units[2, 4]	Type	R/W	Notes
+2	0x2A02	Total fundamental kVA	0-Pmax	U3	UINT16	R	
+3	0x2A03	Total fundamental PF	-1.000-1.000	0.001	INT16	R	
8416-8445		**Minimum 1-Cycle Phase Values**					
+0	0x2C00	V1/V12 Voltage	0-Vmax	U1	UINT16	R	1
+1	0x2C01	V2/V23 Voltage	0-Vmax	U1	UINT16	R	1
+2	0x2C02	V3/V31 Voltage	0-Vmax	U1	UINT16	R	1
+3	0x2C03	I1 Current	0-Imax	U2	UINT16	R	
+4	0x2C04	I2 Current	0-Imax	U2	UINT16	R	
+5	0x2C05	I3 Current	0-Imax	U2	UINT16	R	
8456-8459		**Minimum 1-Cycle Total Values**					
+0	0x2D00	Total kW	-Pmax-Pmax	U3	INT16	R	
+1	0x2D01	Total kvar	-Pmax-Pmax	U3	INT16	R	
+2	0x2D02	Total kVA	0-Pmax	U3	UINT16	R	
+3	0x2D03	Total PF	0-1.000	0.001	UINT16	R	Absolute value
8496-8498		**Minimum 1-Cycle Auxiliary Values**					
+0	0x2E00	Not used		U2	UINT16	R	
+1	0x2E01	In Current	0-Imax	U2	UINT16	R	
+2	0x2E02	Frequency	0-Fmax	0.01Hz	UINT16	R	
8736-8765		**Maximum 1-Cycle Phase Values**					
+0	0x3400	V1/V12 Voltage	0-Vmax	U1	UINT16	R	1
+1	0x3401	V2/V23 Voltage	0-Vmax	U1	UINT16	R	1
+2	0x3402	V3/V31 Voltage	0-Vmax	U1	UINT16	R	1
+3	0x3403	I1 Current	0-Imax	U2	UINT16	R	
+4	0x3404	I2 Current	0-Imax	U2	UINT16	R	
+5	0x3405	I3 Current	0-Imax	U2	UINT16	R	
8776-8779		**Maximum 1-Cycle Total Values**					
+0	0x3500	Total kW	-Pmax-Pmax	U3	INT16	R	
+1	0x3501	Total kvar	-Pmax-Pmax	U3	INT16	R	
+2	0x3502	Total kVA	0-Pmax	U3	UINT16	R	
+3	0x3503	Total PF	0-1.000	0.001	UINT16	R	Absolute value
881608818		**Maximum 1-Cycle Auxiliary Values**					
+0	0x3600	Not used		U2	UINT16	R	
+1	0x3601	In Current	0-Imax	U2	UINT16	R	
+2	0x3602	Frequency	0-Fmax	0.01Hz	UINT16	R	
8856-8872		**Maximum Demands**					
+0	0x3700	V1/V12 Maximum volt demand	0-Vmax	U1	UINT16	R	1
+1	0x3701	V2/V23 Maximum volt demand	0-Vmax	U1	UINT16	R	1
+2	0x3702	V3/V31 Maximum volt demand	0-Vmax	U1	UINT16	R	1
+3	0x3703	I1 Maximum ampere demand	0-Imax	U2	UINT16	R	
+4	0x3704	I2 Maximum ampere demand	0-Imax	U2	UINT16	R	
+5	0x3705	I3 Maximum ampere demand	0-Imax	U2	UINT16	R	
+6	0x3706	Not used			UINT16	R	
+7	0x3707	Not used			UINT16	R	

Address	Point ID	Description	Low and High Scales[2]	Units[2, 4]	Type	R/W	Notes
+8	0x3708	Not used			UINT16	R	
+9	0x3709	Maximum kW import sliding window demand	0-Pmax	U3	UINT16	R	
+10	0x370A	Maximum kvar import sliding window demand	0-Pmax	U3	UINT16	R	
+11	0x370B	Maximum kVA sliding window demand	0-Pmax	U3	UINT16	R	
+12	0x370C	Not used			UINT16	R	
+13	0x370D	Not used			UINT16	R	
+14	0x370E	Not used			UINT16	R	
+15	0x370F	Maximum kW export sliding window demand	0-Pmax	U3	UINT16	R	
+16	0x3710	Maximum kvar export sliding window demand	0-Pmax	U3	UINT16	R	
+17	0x3711	Not used			UINT16	R	
+18	0x3712	Not used			UINT16	R	
+19	0x3713	Not used			UINT16	R	
+20	0x3714	Not used			UINT16	R	
+21	0x3715	In Maximum ampere demand	0-Imax	U2	UINT16	R	
9056-9057		**TOU Parameters [E]**					
+0	0x3C00	Active tariff	0-7		UINT16	R/W	
+1	0x3C01	Active profile	0-15: 0-3 = Season 1 Profile #1-4, 4-7 = Season 2 Profile #1-4, 8-11 = Season 3 Profile #1-4, 12-15 = Season 4 Profile #1-4		UINT16	R/W	
9076-9079		**Scaled Analog Outputs**					
+0	0x3C80	Analog output AO1	0-4095		UINT16	R/W	
+1	0x3C81	Analog output AO2	0-4095		UINT16	R/W	
+2	0x3C82	Analog output AO3	0-4095		UINT16	R/W	
+3	0x3C83	Analog output AO4	0-4095		UINT16	R/W	
9096-9111		**TOU Energy Register #1 [E]**					
+0,1	0x3D00	Tariff #1 register	0-999,999,999	kWh	UINT32	R	
+2,3	0x3D01	Tariff #2 register	0-999,999,999	kWh	UINT32	R	
		…				R	
+14,15	0x3D07	Tariff #8 register	0-999,999,999	kWh	UINT32	R	
9136-9151		**TOU Energy Register #2 [E]**					
+0,1	0x3E00	Tariff #1 register	0-999,999,999	kWh	UINT32	R	
+2,3	0x3E01	Tariff #2 register	0-999,999,999	kWh	UINT32	R	
		…				R	
+14,15	0x3E07	Tariff #8 register	0-999,999,999	kWh	UINT32	R	
9176-9191		**TOU Energy Register #3 [E]**					
+0,1	0x3F00	Tariff #1 register	0-999,999,999	kWh	UINT32	R	
+2,3	0x3F01	Tariff #2 register	0-999,999,999	kWh	UINT32	R	
		…				R	
+14,15	0x3F07	Tariff #8 register	0-999,999,999	kWh	UINT32	R	
9216-9231		**TOU Energy Register #4 [E]**					

Address	Point ID	Description	Low and High Scales[2]	Units[2, 4]	Type	R/W	Notes
+0,1	0x4000	Tariff #1 register	0-999,999,999	kWh	UINT32	R	
+2,3	0x4001	Tariff #2 register	0-999,999,999	kWh	UINT32	R	
		…				R	
+14,15	0x4007	Tariff #8 register	0-999,999,999	kWh	UINT32	R	
9416-9419		**Summary Energy Accumulated Demands [E]**					
+0	0x4500	Summary register #1 demand	0-Pmax	U3	UINT16	R	
+1	0x4501	Summary register #2 demand	0-Pmax	U3	UINT16	R	
+2	0x4502	Summary register #3 demand	0-Pmax	U3	UINT16	R	
+3	0x4503	Summary register #4 demand	0-Pmax	U3	UINT16	R	
9436-9439		**Summary Energy Block Demands [E]**					
+0	0x4580	Summary register #1 demand	0-Pmax	U3	UINT16	R	
+1	0x4581	Summary register #2 demand	0-Pmax	U3	UINT16	R	
+2	0x4582	Summary register #3 demand	0-Pmax	U3	UINT16	R	
+3	0x4583	Summary register #4 demand	0-Pmax	U3	UINT16	R	
9456-9459		**Summary Energy Sliding Window Demands [E]**					
+0	0x4600	Summary register #1 demand	0-Pmax	U3	UINT16	R	
+1	0x4601	Summary register #2 demand	0-Pmax	U3	UINT16	R	
+2	0x4602	Summary register #3 demand	0-Pmax	U3	UINT16	R	
+3	0x4603	Summary register #4 demand	0-Pmax	U3	UINT16	R	
9516-9519		**Summary Energy Maximum Demands [E]**					
+0	0x4780	Summary register #1 maximum demand	0-Pmax	U3	UINT16	R	
+1	0x4781	Summary register #2 maximum demand	0-Pmax	U3	UINT16	R	
+2	0x4782	Summary register #3 maximum demand	0-Pmax	U3	UINT16	R	
+3	0x4783	Summary register #4 maximum demand	0-Pmax	U3	UINT16	R	
9536-9543		**TOU Maximum Demand Register #1 [E]**					
+0	0x4800	Tariff #1 maximum demand	0-Pmax	U3	UINT16	R	
+1	0x4801	Tariff #2 maximum demand	0-Pmax	U3	UINT16	R	
		…				R	
+7	0x4807	Tariff #8 maximum demand	0-Pmax	U3	UINT16	R	
9576-9583		**TOU Maximum Demand Register #2 [E]**					
+0	0x4900	Tariff #1 maximum demand	0-Pmax	U3	UINT16	R	
+1	0x4901	Tariff #2 maximum demand	0-Pmax	U3	UINT16	R	
		…				R	
+7	0x4907	Tariff #8 maximum demand	0-Pmax	U3	UINT16	R	
9616-9623		**TOU Maximum Demand Register #3 [E]**					
+0	0x4A00	Tariff #1 maximum demand	0-Pmax	U3	UINT16	R	
+1	0x4A01	Tariff #2 maximum demand	0-Pmax	U3	UINT16	R	
		…				R	
+7	0x4A07	Tariff #8 maximum demand	0-Pmax	U3	UINT16	R	
9556-9563		**TOU Maximum Demand Register #4 [E]**					

Address	Point ID	Description	Low and High Scales[2]	Units[2, 4]	Type	R/W	Notes
+0	0x4880	Tariff #1 maximum demand	0-Pmax	U3	UINT16	R	
+1	0x4881	Tariff #2 maximum demand	0-Pmax	U3	UINT16	R	
		…				R	
+7	0x4887	Tariff #8 maximum demand	0-Pmax	U3	UINT16	R	
10656-10695		**V1/V12 Harmonic Angles EH**					1, 3
+0	0x6400	H01 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
+1	0x6400	H02 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
		…					
+39	0x6427	H40 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
10696-10735		**V2/V23 Harmonic Angles EH**					1, 3
+0	0x6500	H01 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
+1	0x6500	H02 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
		…					
+39	0x6527	H40 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
10736-10775		**V1/V31 Harmonic Angles EH**					1, 3
+0	0x6600	H01 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
+1	0x6600	H02 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
		…					
+39	0x6627	H40 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
10816-10855		**I1 Harmonic Angles EH**					3
+0	0x6700	H01 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
+1	0x6700	H02 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
		…					
+39	0x6727	H40 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
10856-10895		**I2 Harmonic Angles EH**					3
+0	0x6800	H01 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
+1	0x6800	H02 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
		…					
+39	0x6827	H40 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
10896-10935		**I3 Harmonic Angles EH**					3
+0	0x6900	H01 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
+1	0x6900	H02 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
		…					
+39	0x6927	H40 Harmonic angle	-180.0-180.0	0.1º	INT16	R	
11616	0x7C00	**Setpoint Status**	0x0000-0xFFFF		UINT16	R	Bitmap: 0=released, 1=operated

NOTES:

Energy and power demand readings are only available in PM130E and PM130EH meters. Harmonics are only available in PM130EH meters.

1 Voltage and voltage harmonics readings:
When the 4LN3, 3LN3 or 3BLN3 wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line voltages.

[2] For volts, amps, power and frequency scales and units refer to Section 4 ”Data Scales and Units”. For analog data scaling formulas and examples, see Section 2.7.1, “16-bit Scaled Integer Format”.

[3] Harmonic angles are referenced to the fundamental voltage harmonic H01 on phase L1.

[4] The binary counters and energy registers can be read either as 32-bit integer, or 32-bit floating-point values. Refer to Section 2.7 for details.

3.4 32-bit Analog Registers, Binary Registers and Counters

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
11776-11777	0x0000	**None**	0		UINT32	R	
		Special Inputs					
11904-11905	0x0101	Phase rotation order	0=error, 1=positive (ABC), 2=negative (CBA)		UINT32	R	
12544-12545	0x0600	**Digital Inputs**	0x00000000-0x00000FFF		UINT32	R	Bitmap: 0=open, 1=closed
12800-12801	0x0800	**Relay Outputs**	0x00000000-0x0000000F		UINT32	R	Bitmap: 0=open, 1=closed
13056-13063		**Counters**					
+0,1	0x0A00	Counter #1	0-99,999		UINT32	R/W	
+2,3	0x0A01	Counter #2	0-99,999		UINT32	R/W	
+4,5	0x0A02	Counter #3	0-99,999		UINT32	R/W	
+6,7	0x0A03	Counter #4	0-99,999		UINT32	R/W	
13312-13377		**1-Cycle Phase Values**					
+0,1	0x0C00	V1/V12 Voltage	0-Vmax	U1	UINT32	R	[1]
+2,3	0x0C01	V2/V23 Voltage	0-Vmax	U1	UINT32	R	[1]
+4,5	0x0C02	V3/V31 Voltage	0-Vmax	U1	UINT32	R	[1]
+6,7	0x0C03	I1 Current	0-Imax	U2	UINT32	R	
+8,9	0x0C04	I2 Current	0-Imax	U2	UINT32	R	
+10,11	0x0C05	I3 Current	0-Imax	U2	UINT32	R	
+12,13	0x0C06	kW L1	-Pmax-Pmax	U3	INT32	R	
+14,15	0x0C07	kW L2	-Pmax-Pmax	U3	INT32	R	
+16,17	0x0C08	kW L3	-Pmax-Pmax	U3	INT32	R	
+18,19	0x0C09	kvar L1	-Pmax-Pmax	U3	INT32	R	
+20,21	0x0C0A	kvar L2	-Pmax-Pmax	U3	INT32	R	
+22,23	0x0C0B	kvar L3	-Pmax-Pmax	U3	INT32	R	
+24,25	0x0C0C	kVA L1	0-Pmax	U3	UINT32	R	
+26,27	0x0C0D	kVA L2	0-Pmax	U3	UINT32	R	
+28,29	0x0C0E	kVA L3	0-Pmax	U3	UINT32	R	
+30,31	0x0C0F	Power factor L1	-1000-1000	×0.001	INT32	R	
+32,33	0x0C10	Power factor L2	-1000-1000	×0.001	INT32	R	
+34,35	0x0C11	Power factor L3	-1000-1000	×0.001	INT32	R	
+36,37	0x0C12	V1/V12 Voltage THD	0-9999	×0.1%	UINT32	R	[1] 2-cycle value
+38,39	0x0C13	V2/V23 Voltage THD	0-9999	×0.1%	UINT32	R	[1] 2-cycle value
+40,41	0x0C14	V3/V31 Voltage THD	0-9999	×0.1%	UINT32	R	[1] 2-cycle value
+42,43	0x0C15	I1 Current THD	0-9999	×0.1%	UINT32	R	2-cycle value
+44,45	0x0C16	I2 Current THD	0-9999	×0.1%	UINT32	R	2-cycle value
+46,47	0x0C17	I3 Current THD	0-9999	×0.1%	UINT32	R	2-cycle value
+48,49	0x0C18	I1 K-Factor	10-9999	×0.1	UINT32	R	2-cycle value
+50,51	0x0C19	I2 K-Factor	10-9999	×0.1	UINT32	R	2-cycle value
+52,53	0x0C1A	I3 K-Factor	10-9999	×0.1	UINT32	R	2-cycle value
+54,55	0x0C1B	I1 Current TDD	0-1000	×0.1%	UINT32	R	2-cycle value

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
+56,57	0x0C1C	I2 Current TDD	0-1000	×0.1%	UINT32	R	2-cycle value
+58,59	0x0C1D	I3 Current TDD	0-1000	×0.1%	UINT32	R	2-cycle value
+60,61	0x0C1E	V12 Voltage	0-Vmax	U1	UINT32	R	
+62,63	0x0C1F	V23 Voltage	0-Vmax	U1	UINT32	R	
+64,65	0x0C20	V31 Voltage	0-Vmax	U1	UINT32	R	
13696-13721		**1-Cycle Total Values**					
+0,1	0x0F00	Total kW	-Pmax-Pmax	U3	INT32	R	
+2,3	0x0F01	Total kvar	-Pmax-Pmax	U3	INT32	R	
+4,5	0x0F02	Total kVA	0-Pmax	U3	UINT32	R	
+6,7	0x0F03	Total PF	-1000-1000	×0.001	INT32	R	
+8,9	0x0F04	Total PF lag	0-1000	×0.001	UINT16	R	
+10,11	0x0F05	Total PF lead	0-1000	×0.001	UINT16	R	
+12,13	0x0F06	Total kW import	0-Pmax	U3	UINT32	R	
+14,15	0x0F07	Total kW export	0-Pmax	U3	UINT32	R	
+16,17	0x0F08	Total kvar import	0-Pmax	U3	UINT32	R	
+18,19	0x0F09	Total kvar export	0-Pmax	U3	UINT32	R	
+20,21	0x0F0A	3-phase average L-N/L-L voltage	0-Vmax	U1	UINT32	R	1
+22,23	0x0F0B	3-phase average L-L voltage	0-Vmax	U1	UINT32	R	
+24,25	0x0F0C	3-phase average current	0-Imax	U2	UINT32	R	
13824-13833		**1-Cycle Auxiliary Values**					
+0,1	0x1000	Not used			UINT32	R	
+2,3	0x1001	In (neutral) Current	0-Imax	U2	UINT32	R	
+4,5	0x1002	Frequency	0-Fmax	×0.01Hz	UINT32	R	
+6,7	0x1003	Voltage unbalance	0-300	%	UINT32	R	
+8,9	0x1004	Current unbalance	0-300	%	UINT32	R	
13864-13895		**Phasor**					
+0,1	0x1080	V1/V12 Voltage magnitude	0-Vmax	U1	UINT32	R	1
+2,3	0x1081	V2/V23 Voltage magnitude	0-Vmax	U1	UINT32	R	1
+4,5	0x1082	V3/V31 Voltage magnitude	0-Vmax	U1	UINT32	R	1
+6,7	0x1083	Not used			UINT32	R	
+8,9	0x1084	I1 Current magnitude	0-Imax	U2	UINT32	R	
+10,11	0x1085	I2 Current magnitude	0-Imax	U2	UINT32	R	
+12,13	0x1086	I3 Current magnitude	0-Imax	U2	UINT32	R	
+14,15	0x1087	Not used			UINT32	R	
+16,17	0x1088	V1/V12 Voltage angle	-1800-1800	×0.1º	INT32	R	1
+18,19	0x1089	V2/V23 Voltage angle	-1800-1800	×0.1º	INT32	R	1
+20,21	0x108A	V3/V31 Voltage angle	-1800-1800	×0.1º	INT32	R	1
+22,23	0x108B	Not used			INT32	R	
+24,25	0x108C	I1 Current angle	-1800-1800	×0.1º	INT32	R	
+26,27	0x108D	I2 Current angle	-1800-1800	×0.1º	INT32	R	
+28,29	0x108E	I3 Current angle	-1800-1800	×0.1º	INT32	R	
+30,31	0x108F	Not used			INT32	R	

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
13952-14017		**1-Second Phase Values**					
+0,1	0x1100	V1/V12 Voltage	0-Vmax	U1	UINT32	R	[1]
+2,3	0x1101	V2/V23 Voltage	0-Vmax	U1	UINT32	R	[1]
+4,5	0x1102	V3/V31 Voltage	0-Vmax	U1	UINT32	R	[1]
+6,7	0x1103	I1 Current	0-Imax	U2	UINT32	R	
+8,9	0x1104	I2 Current	0-Imax	U2	UINT32	R	
+10,11	0x1105	I3 Current	0-Imax	U2	UINT32	R	
+12,13	0x1106	kW L1	-Pmax-Pmax	U3	INT32	R	
+14,15	0x1107	kW L2	-Pmax-Pmax	U3	INT32	R	
+16,17	0x1108	kW L3	-Pmax-Pmax	U3	INT32	R	
+18,19	0x1109	kvar L1	-Pmax-Pmax	U3	INT32	R	
+20,21	0x110A	kvar L2	-Pmax-Pmax	U3	INT32	R	
+22,23	0x110B	kvar L3	-Pmax-Pmax	U3	INT32	R	
+24,25	0x110C	kVA L1	0-Pmax	U3	UINT32	R	
+26,27	0x110D	kVA L2	0-Pmax	U3	UINT32	R	
+28,29	0x110E	kVA L3	0-Pmax	U3	UINT32	R	
+30,31	0x110F	Power factor L1	-1000-1000	×0.001	INT32	R	
+32,33	0x1110	Power factor L2	-1000-1000	×0.001	INT32	R	
+34,35	0x1111	Power factor L3	-1000-1000	×0.001	INT32	R	
+36,37	0x1112	V1/V12 Voltage THD	0-9999	×0.1%	UINT32	R	[1] 3-sec value
+38,39	0x1113	V2/V23 Voltage THD	0-9999	×0.1%	UINT32	R	[1] 3-sec value
+40,41	0x1114	V3/V31 Voltage THD	0-9999	×0.1%	UINT32	R	[1] 3-sec value
+42,43	0x1115	I1 Current THD	0-9999	×0.1%	UINT32	R	3-sec value
+44,45	0x1116	I2 Current THD	0-9999	×0.1%	UINT32	R	3-sec value
+46,47	0x1117	I3 Current THD	0-9999	×0.1%	UINT32	R	3-sec value
+48,49	0x1118	I1 K-Factor	10-9999	×0.1	UINT32	R	3-sec value
+50,51	0x1119	I2 K-Factor	10-9999	×0.1	UINT32	R	3-sec value
+52,53	0x111A	I3 K-Factor	10-9999	×0.1	UINT32	R	3-sec value
+54,55	0x111B	I1 Current TDD	0-1000	×0.1%	UINT32	R	3-sec value
+56,57	0x111C	I2 Current TDD	0-1000	×0.1%	UINT32	R	3-sec value
+58,59	0x111D	I3 Current TDD	0-1000	×0.1%	UINT32	R	3-sec value
+60,61	0x111E	V12 Voltage	0-Vmax	U1	UINT32	R	
+62,63	0x111F	V23 Voltage	0-Vmax	U1	UINT32	R	
+64,65	0x1120	V31 Voltage	0-Vmax	U1	UINT32	R	
14336-14361		**1-Second Total Values**					
+0,1	0x1400	Total kW	-Pmax-Pmax	U3	INT32	R	
+2,3	0x1401	Total kvar	-Pmax-Pmax	U3	INT32	R	
+4,5	0x1402	Total kVA	0-Pmax	U3	UINT32	R	
+6,7	0x1403	Total PF	-1000-1000	×0.001	INT32	R	
+8,9	0x1404	Total PF lag	0-1000	×0.001	UINT16	R	
+10,11	0x1405	Total PF lead	0-1000	×0.001	UINT16	R	
+12,13	0x1406	Total kW import	0-Pmax	U3	UINT32	R	
+14,15	0x1407	Total kW export	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
+16,17	0x1408	Total kvar import	0-Pmax	U3	UINT32	R	
+18,19	0x1409	Total kvar export	0-Pmax	U3	UINT32	R	
+20,21	0x140A	3-phase average L-N/L-L voltage	0-Vmax	U1	UINT32	R	1
+22,23	0x140B	3-phase average L-L voltage	0-Vmax	U1	UINT32	R	
+24,25	0x140C	3-phase average current	0-Imax	U2	UINT32	R	
14464-14473		**1-Second Auxiliary Values**					
+0,1	0x1500	Not used			UINT32	R	
+2,3	0x1501	In (neutral) Current	0-Imax	U2	UINT32	R	
+4,5	0x1502	Frequency	0-Fmax	×0.01Hz	UINT32	R	
+6,7	0x1503	Voltage unbalance	0-300	%	UINT32	R	
+8,9	0x1504	Current unbalance	0-300	%	UINT32	R	
14592-14651		**Present Volt, Ampere and Power Demands**					
+0,1	0x1600	V1/V12 Volt demand	0-Vmax	U1	UINT32	R	1
+2,3	0x1601	V2/V23 Volt demand	0-Vmax	U1	UINT32	R	1
+4,5	0x1602	V3/V31 Volt demand	0-Vmax	U1	UINT32	R	1
+6,7	0x1603	I1 Ampere demand	0-Imax	U2	UINT32	R	
+8,9	0x1604	I2 Ampere demand	0-Imax	U2	UINT32	R	
+10,11	0x1605	I3 Ampere demand	0-Imax	U2	UINT32	R	
+12,13	0x1606	kW import block demand	0-Pmax	U3	UINT32	R	
+14,15	0x1607	kvar import block demand	0-Pmax	U3	UINT32	R	
+16,17	0x1608	kVA block demand	0-Pmax	U3	UINT32	R	
+18,19	0x1609	kW import sliding window demand	0-Pmax	U3	UINT32	R	
+20,21	0x160A	kvar import sliding window demand	0-Pmax	U3	UINT32	R	
+22,23	0x160B	kVA sliding window demand	0-Pmax	U3	UINT32	R	
+24,25	0x160C	Not used			UINT32	R	
+26,27	0x160D	Not used			UINT32	R	
+28,29	0x160E	Not used			UINT32	R	
+30,31	0x160F	kW import accumulated demand	0-Pmax	U3	UINT32	R	
+32,33	0x1610	kvar import accumulated demand	0-Pmax	U3	UINT32	R	
+34,35	0x1611	kVA accumulated demand	0-Pmax	U3	UINT32	R	
+36,37	0x1612	kW import predicted sliding window demand	0-Pmax	U3	UINT32	R	
+38,39	0x1613	kvar import predicted sliding window demand	0-Pmax	U3	UINT32	R	
+40,41	0x1614	kVA predicted sliding window demand	0-Pmax	U3	UINT32	R	
+42,43	0x1615	PF (import) at Max. kVA sliding window demand	0-1000	×0.001	UINT32	R	
+44,45	0x1616	kW export block demand	0-Pmax	U3	UINT32	R	
+46,47	0x1617	kvar export block demand	0-Pmax	U3	UINT32	R	
+48,49	0x1618	kW export sliding window demand	0-Pmax	U3	UINT32	R	
+50,51	0x1619	kvar export sliding window demand	0-Pmax	U3	UINT32	R	
+52,53	0x161A	kW export accumulated demand	0-Pmax	U3	UINT32	R	
+54,55	0x161B	kvar export accumulated demand	0-Pmax	U3	UINT32	R	
+56,57	0x161C	kW export predicted sliding window demand	0-Pmax	U3	UINT32	R	
+58,59	0x161D	kvar export predicted sliding window demand	0-Pmax	U3	UINT32	R	
+60,61	0x161E	Not used			UINT32	R	

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
+62,63	0x161F	Not used			UINT32	R	
+64,65	0x1620	Not used			UINT32	R	
+66,67	0x1621	Not used			UINT32	R	
+68,69	0x1622	In Ampere demand	0-Imax	U2	UINT32	R	
14720-14753		**Total Energies [E]**					
+0,1	0x1700	kWh import	0-999,999,999	kWh	UINT32	R	
+2,3	0x1701	kWh export	0-999,999,999	kWh	UINT32	R	
+4,5	0x1702	Not used			INT32	R	
+6,7	0x1703	Not used			UINT32	R	
+8,9	0x1704	kvarh import	0-999,999,999	kvarh	UINT32	R	
+10,11	0x1705	kvarh export	0-999,999,999	kvarh	UINT32	R	
+12,13	0x1706	Not used			INT32	R	
+14,15	0x1707	Not used			UINT32	R	
+16,17	0x1708	kVAh total	0-999,999,999	kVAh	UINT32	R	
+18,19	0x1709	Not used			UINT32	R	
+20,21	0x170A	Not used			UINT32	R	
+22,23	0x170B	kVAh import	0-999,999,999	kVAh	UINT32	R	
+24,25	0x170C	kVAh export	0-999,999,999	kVAh	UINT32	R	
+26,27	0x1712	kvarh Q1	0-999,999,999	kvarh	UINT32	R	
+28,29	0x1713	kvarh Q2	0-999,999,999	kvarh	UINT32	R	
+30,31	0x1714	kvarh Q3	0-999,999,999	kvarh	UINT32	R	
+32,33	0x1715	kvarh Q4	0-999,999,999	kvarh	UINT32	R	
14760-14767		**Summary Energy Registers [E]**					
+0,1	0x1780	Summary energy register #1	0-999,999,999	kWh	UINT32	R	
+2,3	0x1781	Summary energy register #2	0-999,999,999	kWh	UINT32	R	
+4,5	0x1782	Summary energy register #3	0-999,999,999	kWh	UINT32	R	
+6,7	0x1783	Summary energy register #4	0-999,999,999	kWh	UINT32	R	
14848-14865		**Phase Energies [E]**					
+0,1	0x1800	kWh import L1	0-999,999,999	kWh	UINT32	R	
+2,3	0x1801	kWh import L2	0-999,999,999	kWh	UINT32	R	
+4,5	0x1802	kWh import L3	0-999,999,999	kWh	UINT32	R	
+6,7	0x1803	kvarh import L1	0-999,999,999	kvarh	UINT32	R	
+8,9	0x1804	kvarh import L2	0-999,999,999	kvarh	UINT32	R	
+10,11	0x1805	kvarh import L3	0-999,999,999	kvarh	UINT32	R	
+12,13	0x1806	kVAh total L1	0-999,999,999	kVAh	UINT32	R	
+14,15	0x1807	kVAh total L2	0-999,999,999	kVAh	UINT32	R	
+16,17	0x1808	kVAh total L3	0-999,999,999	kVAh	UINT32	R	
14976-15055		**V1/V12 Harmonic Distortions [EH]**					1
+0,1	0x1900	H01 Harmonic distortion	0-10000	0.01%	UINT32	R	
+2,3	0x1901	H02 Harmonic distortion	0-10000	0.01%	UINT32	R	
		...					
+78,79	0x1927	H40 Harmonic distortion	0-10000	0.01%	UINT32	R	

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
15104-15183		**V2/V23 Harmonic Distortions EH**					1
+0,1	0x1A00	H01 Harmonic distortion	0-10000	0.01%	UINT32	R	
+2,3	0x1A01	H02 Harmonic distortion	0-10000	0.01%	UINT32	R	
		...					
+78,79	0x1A27	H40 Harmonic distortion	0-10000	0.01%	UINT32	R	
15232-15311		**V3/V31 Harmonic Distortions EH**					1
+0,1	0x1B00	H01 Harmonic distortion	0-10000	0.01%	UINT32	R	
+2,3	0x1B01	H02 Harmonic distortion	0-10000	0.01%	UINT32	R	
		...					
+78,79	0x1B27	H40 Harmonic distortion	0-10000	0.01%	UINT32	R	
15360-15439		**I1 Harmonic Distortions EH**					
+0,1	0x1C00	H01 Harmonic distortion	0-10000	0.01%	UINT32	R	
+2,3	0x1C01	H02 Harmonic distortion	0-10000	0.01%	UINT32	R	
		...					
+78,79	0x1C27	H40 Harmonic distortion	0-10000	0.01%	UINT32	R	
15488-15567		**I2 Harmonic Distortions EH**					
+0,1	0x1D00	H01 Harmonic distortion	0-10000	0.01%	UINT32	R	
+2,3	0x1D01	H02 Harmonic distortion	0-10000	0.01%	UINT32	R	
		...					
+78,79	0x1D27	H40 Harmonic distortion	0-10000	0.01%	UINT32	R	
15616-15695		**I3 Harmonic Distortions EH**					
+0,1	0x1E00	H01 Harmonic distortion	0-10000	0.01%	UINT32	R	
+2,3	0x1E01	H02 Harmonic distortion	0-10000	0.01%	UINT32	R	
		...					
+78,79	0x1E27	H40 Harmonic distortion	0-10000	0.01%	UINT32	R	
17024-17059		**Fundamental (H01) Phase Values EH**					2-cycle values
+0,1	0x2900	V1/V12 Voltage	0-Vmax	U1	UINT32	R	1
+2,3	0x2901	V2/V23 Voltage	0-Vmax	U1	UINT32	R	1
+4,5	0x2902	V3/V31 Voltage	0-Vmax	U1	UINT32	R	1
+6,7	0x2903	I1 Current	0-Imax	U2	UINT32	R	
+8,9	0x2904	I2 Current	0-Imax	U2	UINT32	R	
+10,11	0x2905	I3 Current	0-Imax	U2	UINT32	R	
+12,13	0x2906	kW L1	-Pmax-Pmax	U3	INT32	R	
+14,15	0x2907	kW L2	-Pmax-Pmax	U3	INT32	R	
+16,17	0x2908	kW L3	-Pmax-Pmax	U3	INT32	R	
+18,19	0x2909	kvar L1	-Pmax-Pmax	U3	INT32	R	
+20,21	0x290A	kvar L2	-Pmax-Pmax	U3	INT32	R	
+22,23	0x290B	kvar L3	-Pmax-Pmax	U3	INT32	R	
+24,25	0x290C	kVA L1	0-Pmax	U3	UINT32	R	
+26,27	0x290D	kVA L2	0-Pmax	U3	UINT32	R	
+28,29	0x290E	kVA L3	0-Pmax	U3	UINT32	R	
+30,31	0x290F	Power factor L1	-1000-1000	×0.001	INT32	R	

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
+32,33	0x2910	Power factor L2	-1000-1000	×0.001	INT32	R	
+34,35	0x2911	Power factor L3	-1000-1000	×0.001	INT32	R	
17152-17164		**Harmonic Total Values EH**					2-cycle values
+0,1	0x2A00	Total fundamental kW	-Pmax-Pmax	U3	INT32	R	
+2,3	0x2A01	Total fundamental kvar	-Pmax-Pmax	U3	INT32	R	
+4,5	0x2A02	Total fundamental kVA	0-Pmax	U3	UINT32	R	
+6,7	0x2A03	Total fundamental PF	-1000-1000	×0.001	INT32	R	
17408-17467		**Minimum 1-Cycle Phase Values**					
+0,1	0x2C00	V1/V12 Voltage	0-Vmax	U1	UINT32	R	1
+2,3	0x2C01	V2/V23 Voltage	0-Vmax	U1	UINT32	R	1
+4,5	0x2C02	V3/V31 Voltage	0-Vmax	U1	UINT32	R	1
+6,7	0x2C03	I1 Current	0-Imax	U2	UINT32	R	
+8,9	0x2C04	I2 Current	0-Imax	U2	UINT32	R	
+10,11	0x2C05	I3 Current	0-Imax	U2	UINT32	R	
17536-17543		**Minimum 1-Cycle Total Values**					
+0,1	0x2D00	Total kW	-Pmax-Pmax	U3	INT32	R	
+2,3	0x2D01	Total kvar	-Pmax-Pmax	U3	INT32	R	
+4,5	0x2D02	Total kVA	0-Pmax	U3	UINT32	R	
+6,7	0x2D03	Total PF	0-1000	×0.001	UINT32	R	Absolute value
17664-17669		**Minimum 1-Cycle Auxiliary Values**					
+0,1	0x2E00	Not used			UINT32	R	
+2,3	0x2E01	In Current	0-Imax	U2	UINT32	R	
+4,5	0x2E02	Frequency	0-Fmax	×0.01Hz	UINT32	R	
18432-18491		**Maximum 1-Cycle Phase Values**					
+0,1	0x3400	V1/V12 Voltage	0-Vmax	U1	UINT32	R	1
+2,3	0x3401	V2/V23 Voltage	0-Vmax	U1	UINT32	R	1
+4,5	0x3402	V3/V31 Voltage	0-Vmax	U1	UINT32	R	1
+6,7	0x3403	I1 Current	0-Imax	U2	UINT32	R	
+8,9	0x3404	I2 Current	0-Imax	U2	UINT32	R	
+10,11	0x3405	I3 Current	0-Imax	U2	UINT32	R	
18560-18567		**Maximum 1-Cycle Total Values**					
+0,1	0x3500	Total kW	-Pmax-Pmax	U3	INT32	R	
+2,3	0x3501	Total kvar	-Pmax-Pmax	U3	INT32	R	
+4,5	0x3502	Total kVA	0-Pmax	U3	UINT32	R	
+6,7	0x3503	Total PF	0-1000	×0.001	UINT32	R	Absolute value
18688-18693		**Maximum 1-Cycle Auxiliary Values**					
+0,1	0x3600	Not used			UINT32	R	
+2,3	0x3601	In Current	0-Imax	U2	UINT32	R	
+4,5	0x3602	Frequency	0-Fmax	×0.01Hz	UINT32	R	
18816-18849		**Maximum Demands**					
+0,1	0x3700	V1/V12 Maximum volt demand	0-Vmax	U1	UINT32	R	1
+2,3	0x3701	V2/V23 Maximum volt demand	0-Vmax	U1	UINT32	R	1
+4,5	0x3702	V3/V31 Maximum volt demand	0-Vmax	U1	UINT32	R	1

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
+6,7	0x3703	I1 Maximum ampere demand	0-Imax	U2	UINT32	R	
+8,9	0x3704	I2 Maximum ampere demand	0-Imax	U2	UINT32	R	
+10,11	0x3705	I3 Maximum ampere demand	0-Imax	U2	UINT32	R	
+12,13	0x3706	Not used			UINT32	R	
+14,15	0x3707	Not used			UINT32	R	
+16,17	0x3708	Not used			UINT32	R	
+18,19	0x3709	Maximum kW import sliding window demand	0-Pmax	U3	UINT32	R	
+20,21	0x370A	Maximum kvar import sliding window demand	0-Pmax	U3	UINT32	R	
+22,23	0x370B	Maximum kVA sliding window demand	0-Pmax	U3	UINT32	R	
+24,25	0x3737	Not used			UINT32	R	
+26,27	0x370D	Not used			UINT32	R	
+28,29	0x370E	Not used			UINT32	R	
+30,31	0x370F	Maximum kW export sliding window demand	0-Pmax	U3	UINT32	R	
+32,33	0x3710	Maximum kvar export sliding window demand	0-Pmax	U3	UINT32	R	
+34,35	0x3711	Not used			UINT32	R	
+36,37	0x3712	Not used			UINT32	R	
+38,39	0x3713	Not used			UINT32	R	
+40,41	0x3714	Not used			UINT32	R	
+42,43	0x3715	In Maximum ampere demand	0-Imax	U2	UINT32	R	
19456-19459		**TOU Parameters [E]**					
+0,1	0x3C00	Active tariff	0-7		UINT32	R	
+2,3	0x3C01	Active profile	0-15: 1-3 = Season 1 Profile #1-4, 4-7 = Season 2 Profile #1-4, 8-11 = Season 3 Profile #1-4, 12-15 = Season 4 Profile #1-4		UINT32	R	
19496-19503		**Scaled Analog Outputs**					
+0,1	0x3C80	Analog output AO1	0-4095		UINT32	R/W	
+2,3	0x3C81	Analog output AO2	0-4095		UINT32	R/W	
+4,5	0x3C82	Analog output AO3	0-4095		UINT32	R/W	
+6,7	0x3C83	Analog output AO4	0-4095		UINT32	R/W	
19584-19599		**TOU Energy Register #1 [E]**					
+0,1	0x3D00	Tariff #1 register	0-999,999,999	kWh	UINT32	R	
+2,3	0x3D01	Tariff #2 register	0-999,999,999	kWh	UINT32	R	
		…				R	
+14,15	0x3D07	Tariff #8 register	0-999,999,999	kWh	UINT32	R	
19712-19727		**TOU Energy Register #2 [E]**					
+0,1	0x3E00	Tariff #1 register	0-999,999,999	kWh	UINT32	R	
+2,3	0x3E01	Tariff #2 register	0-999,999,999	kWh	UINT32	R	
		…				R	
+14,15	0x3E07	Tariff #8 register	0-999,999,999	kWh	UINT32	R	
19840-19855		**TOU Energy Register #3 [E]**					
+0,1	0x3F00	Tariff #1 register	0-999,999,999	kWh	UINT32	R	

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
+2,3	0x3F01	Tariff #2 register	0-999,999,999	kWh	UINT32	R	
		…				R	
+14,15	0x3F07	Tariff #8 register	0-999,999,999	kWh	UINT32	R	
19968-19983		**TOU Energy Register #4 E**					
+0,1	0x4000	Tariff #1 register	0-999,999,999	kWh	UINT32	R	
+2,3	0x4001	Tariff #2 register	0-999,999,999	kWh	UINT32	R	
		…				R	
+14,15	0x4007	Tariff #8 register	0-999,999,999	kWh	UINT32	R	
20608-20615		**Summary Energy Accumulated Demands E**					
+0,1	0x4500	Summary register #1 demand	0-Pmax	U3	UINT32	R	
+2,3	0x4501	Summary register #2 demand	0-Pmax	U3	UINT32	R	
+4,5	0x4502	Summary register #3 demand	0-Pmax	U3	UINT32	R	
+6,7	0x4503	Summary register #4 demand	0-Pmax	U3	UINT32	R	
20648-20655		**Summary Energy Block Demands E**					
+0,1	0x4580	Summary register #1 demand	0-Pmax	U3	UINT32	R	
+2,3	0x4581	Summary register #2 demand	0-Pmax	U3	UINT32	R	
+4,5	0x4582	Summary register #3 demand	0-Pmax	U3	UINT32	R	
+6,7	0x4583	Summary register #4 demand	0-Pmax	U3	UINT32	R	
20736-20743		**Summary Energy Sliding Window Demands E**					
+0,1	0x4600	Summary register #1 demand	0-Pmax	U3	UINT32	R	
+2,3	0x4601	Summary register #2 demand	0-Pmax	U3	UINT32	R	
+4,5	0x4602	Summary register #3 demand	0-Pmax	U3	UINT32	R	
+6,7	0x4603	Summary register #4 demand	0-Pmax	U3	UINT32	R	
20904-20911		**Summary Energy Maximum Demands E**					
+0,1	0x4780	Summary register #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4781	Summary register #2 maximum demand	0-Pmax	U3	UINT32	R	
+4,5	0x4782	Summary register #3 maximum demand	0-Pmax	U3	UINT32	R	
+6,7	0x4783	Summary register #4 maximum demand	0-Pmax	U3	UINT32	R	
20992-21023		**TOU Maximum Demand Register #1 E**					
+0,1	0x4800	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4801	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		…				R	
+14,15	0x4807	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
21120-21135		**TOU Maximum Demand Register #2 E**					
+0,1	0x4900	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4901	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		…				R	
+14,15	0x4907	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
21248-21263		**TOU Maximum Demand Register #3 E**					
+0,1	0x4A00	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
+2,3	0x4A01	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		…				R	
+14,15	0x4A07	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
21032-21047		**TOU Maximum Demand Register #4 E**					
+0,1	0x4880	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4881	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		…				R	
+14,15	0x4887	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
24576-24655		**V1/V12 Harmonic Angles EH**					1, 3
+0,1	0x6400	H01 Harmonic angle	-1800-1800	×0.1º	INT32	R	
+2,3	0x6400	H02 Harmonic angle	-1800-1800	×0.1º	INT32	R	
		…					
+78,79	0x6427	H40 Harmonic angle	-1800-1800	×0.1º	INT32	R	
24704-24783		**V2/V23 Harmonic Angles EH**					1, 3
+0,1	0x6500	H01 Harmonic angle	-1800-1800	×0.1º	INT32	R	
+2,3	0x6500	H02 Harmonic angle	-1800-1800	×0.1º	INT32	R	
		…					
+78,79	0x6527	H40 Harmonic angle	-1800-1800	×0.1º	INT32	R	
24832-24911		**V1/V31 Harmonic Angles EH**					1, 3
+0,1	0x6600	H01 Harmonic angle	-1800-1800	×0.1º	INT32	R	
+2,3	0x6600	H02 Harmonic angle	-1800-1800	×0.1º	INT32	R	
		…					
+78,79	0x6627	H40 Harmonic angle	-1800-1800	×0.1º	INT32	R	
25088-25167		**I1 Harmonic Angles EH**					3
+0,1	0x6700	H01 Harmonic angle	-1800-1800	×0.1º	INT32	R	
+2,3	0x6700	H02 Harmonic angle	-1800-1800	×0.1º	INT32	R	
		…					
+78,79	0x6727	H40 Harmonic angle	-1800-1800	×0.1º	INT32	R	
25216-25295		**I2 Harmonic Angles EH**					3
+0,1	0x6800	H01 Harmonic angle	-1800-1800	×0.1º	INT32	R	
+2,3	0x6800	H02 Harmonic angle	-1800-1800	×0.1º	INT32	R	
		…					
+78,79	0x6827	H40 Harmonic angle	-1800-1800	×0.1º	INT32	R	
25344-25423		**I3 Harmonic Angles EH**					3
+0,1	0x6900	H01 Harmonic angle	-1800-1800	×0.1º	INT32	R	
+2,3	0x6900	H02 Harmonic angle	-1800-1800	×0.1º	INT32	R	
		…					
+78,79	0x6927	H40 Harmonic angle	-1800-1800	×0.1º	INT32	R	
27648-27649	0x7C00	**Setpoint Status**	0x00000000-0x0000FFFF		UINT32	R	Bitmap: 0=released, 1=operated
		Generic TOU Season Energy Registers					Point references
	0x7000	Tariff #1 register	0-999,999,999	kWh	UINT32		

Address	Point ID	Description	Options/Range[2]	Units[2, 4]	Type[2]	R/W	Notes
	0x7001	Tariff #2 register	0-999,999,999	kWh	UINT32		
		…					
	0x7007	Tariff #8 register	0-999,999,999	kWh	UINT32		
		Generic TOU Season Maximum Demand Registers					Point references
	0x7100	Tariff #1 register	0-Pmax	U3	UINT32		
	0x7101	Tariff #2 register	0-Pmax	U3	UINT32		
		…					
	0x7107	Tariff #8 register	0-Pmax	U3	UINT32		
		Generic Data					Point references
	0x7400	V1 voltage	0-Vmax	U1	UINT32		
	0x7401	V2 voltage	0-Vmax	U1	UINT32		
	0x7402	V3 voltage	0-Vmax	U1	UINT32		
	0x7404	V12 voltage	0-Vmax	U1	UINT32		
	0x7405	V23 voltage	0-Vmax	U1	UINT32		
	0x7406	V31 voltage	0-Vmax	U1	UINT32		
	0x7407	I1 current	0-Imax	U2	UINT32		
	0x7408	I2 current	0-Imax	U2	UINT32		
	0x7409	I3 current	0-Imax	U2	UINT32		

NOTES:

Energy and power demand readings are only available in PM130E and PM130EH meters. Harmonics are only available in PM130EH meters.

1 Voltage and voltage harmonics readings:
When the 4LN3, 3LN3 or 3BLN3 wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line voltages.

2 For volts, amps, power and frequency scales and units, refer to Section 4 ”Data Scales and Units”.

3 Harmonic angles are referenced to the fundamental voltage harmonic H01 on phase L1.

4 The registers can be read as 32-bit integer or 32-bit floating-point values. Refer to Section 2.7 for details.

3.5 Minimum/Maximum Log Registers

Address	Point ID	Description	Options/Range/Format[2]	Units[2, 3]	Type	R/W	Notes
35840-35959		**Minimum Phase Values**					
+0,1 +2,3	0x2C00	Min. V1/V12 Voltage Timestamp	0-Vmax F1	U1 sec	UINT32 UINT32	R R	[1]
+4,5 +6,7	0x2C01	Min. V2/V23 Voltage Timestamp	0-Vmax F1	U1 sec	UINT32 UINT32	R R	[1]
+8,9 +10,11	0x2C02	Min. V3/V31 Voltage Timestamp	0-Vmax F1	U1 sec	UINT32 UINT32	R R	[1]
+12,13 +14,15	0x2C03	Min. I1 Current Timestamp	0-Imax F1	U2 sec	UINT32 UINT32	R R	
+16,17 +18,19	0x2C04	Min. I2 Current Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+20,21 +22,23	0x2C05	Min. I3 Current Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
36096-36111		**Minimum Total Values**					
+0,1 +2,3	0x2D00	Min. Total kW Timestamp	-Pmax-Pmax	U3 sec	INT32 UINT32	R R	
+4,5 +6,7	0x2D01	Min. Total kvar Timestamp	-Pmax-Pmax	U3 sec	INT32 UINT32	R R	
+8,9 +10,11	0x2D02	Min. Total kVA Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+12,13 +14,15	0x2D03	Min. Total PF Timestamp	-1000-1000	×0.001 sec	INT32 UINT32	R R	
36352-36362		**Minimum Auxiliary Values**					
+0,1 +2,3	0x2E00	Not used			UINT32 UINT32	R R	
+4,5 +6,7	0x2E01	Min. In Current Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+8,9 +10,11	0x2E02	Min. Frequency Timestamp	0-Fmax	×0.01Hz sec	UINT32 UINT32	R R	
36864-36983		**Maximum Phase Values**					
+0,1 +2,3	0x3400	Max. V1/V12 Voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	[1]
+4,5 +6,7	0x3401	Max. V2/V23 Voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	[1]
+8,9 +10,11	0x3402	Max. V3/V31 Voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	[1]
+12,13 +14,15	0x3403	Max. I1 Current Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+16,17 +18,19	0x3404	Max. I2 Current Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+20,21	0x3405	Max. I3 Current	0-Imax	U2	UINT32	R	

Address	Point ID	Description	Options/Range/Format[2]	Units[2, 3]	Type	R/W	Notes
+22,23		Timestamp		sec	UINT32	R	
37120-37135		**Maximum Total Values**					
+0,1 +2,3	0x3500	Max. Total kW Timestamp	-Pmax-Pmax	U3 sec	INT32 UINT32	R R	
+4,5 +6,7	0x3501	Max. Total kvar Timestamp	-Pmax-Pmax	U3 sec	INT32 UINT32	R R	
+8,9 +10,11	0x3502	Max. Total kVA Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+12,13 +14,15	0x3503	Max. Total PF Timestamp	-1000-1000	×0.001 sec	INT32 UINT32	R R	
37376-37387		**Maximum Auxiliary Values**					
+0,1 +2,3	0x3600	Not used			UINT32 UINT32	R R	
+4,5 +6,7	0x3601	Max. In Current Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+8,9 +10,11	0x3602	Max. Frequency Timestamp	0-Fmax	×0.01Hz sec	UINT32 UINT32	R R	
37504-37535		**Summary Energy Maximum Demands [E]**					
+0,1 +2,3	0x4780	Summary register #1 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
+4,5 +6,7	0x4781	Summary register #2 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
		…					
+12,13 +14,15	0x4783	Summary register #4 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
37632-37695		**Maximum Demands**					
+0,1 +2,3	0x3700	V1/V12 Maximum volt demand Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	[1]
+4,5 +6,7	0x3701	V2/V23 Maximum volt demand Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	[1]
+8,9 +10,11	0x3702	V3/V31 Maximum volt demand Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	[1]
+12,13 +14,15	0x3703	I1 Maximum ampere demand Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+16,17 +18,19	0x3704	I2 Maximum ampere demand Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+20,21 +22,23	0x3705	I3 Maximum ampere demand Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+24,25 +26,27	0x3706	Not used Timestamp			UINT32 UINT32	R R	
+28,29 +30,31	0x3707	Not used Timestamp			UINT32 UINT32	R R	
+32,33 +34,35	0x3708	Not used Timestamp			UINT32 UINT32	R R	

Address	Point ID	Description	Options/Range/Format[2]	Units[2, 3]	Type	R/W	Notes
+36,37 +38,39	0x3709	Maximum kW import sliding window demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+40,41 +42,43	0x370A	Maximum kvar import sliding window demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+44,45 +46,47	0x370B	Maximum kVA sliding window demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+48,49 +50,51	0x3737	Not used Timestamp			UINT32 UINT32	R R	
+52,53 +54,55	0x370D	Not used Timestamp			UINT32 UINT32	R R	
+56,57 +58,59	0x370E	Not used Timestamp			UINT32 UINT32	R R	
+60,61 +62,63	0x370F	Maximum kW export sliding window demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+64,65 +66,67	0x3710	Maximum kvar export sliding window demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+68,69 +70,71	0x3711	Not used Timestamp			UINT32 UINT32	R R	
+71,73 +74,75	0x3712	Not used Timestamp			UINT32 UINT32	R R	
+76,77 +78,79	0x3713	Not used Timestamp			UINT32 UINT32	R R	
+80,81 +82,83	0x3714	Not used Timestamp			UINT32 UINT32	R R	
+84,85 +86,87	0x3715	In Maximum ampere demand Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
38144-38175		**TOU Maximum Demand Register #1 E**					
+0,1 +2,3	0x4800	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4801	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		…				R	
+28,29 +30,31	0x4807	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38400-38431		**TOU Maximum Demand Register #2 E**					
+0,1 +2,3	0x4900	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4901	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		…				R	
+28,29 +30,31	0x4907	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	

Address	Point ID	Description	Options/Range/Format[2]	Units[2, 3]	Type	R/W	Notes
38656-38687		**TOU Maximum Demand Register #3 E**					
+0,1 +2,3	0x4A00	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4A01	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		…				R	
+28,29 +30,31	0x4A07	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38272-38313		**TOU Maximum Demand Register #4 E**					
+0,1 +2,3	0x4880	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4881	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		…				R	
+28,29 +30,31	0x4887	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	

NOTES:

Power demand readings are only available in PM130E and PM130EH meters.

1 Voltage and voltage harmonics readings:
When the 4LN3, 3LN3 or 3BLN3 wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line voltages.

2 For volts, amps, power and frequency scales and units, refer to Section 4 ”Data Scales and Units”.

3 The Min/Max register values can be read as 32-bit integer or 32-bit floating-point values. Refer to Section 2.7 for details.

3.6 Device Control and Status Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
Device Restart Register							
2560		Warm restart of the device	0 when read, 0xFFFF when written = restart the device		UINT16	R/W	
Device Authorization Registers							
2575		When write: 4-digit password. When read: 0 = access permitted, -1 = authorization required.	0-9999 (write) 0/-1 (read)		INT16	R/W	
44378-44379		When write: 8-digit password. When read: 0 = access permitted, -1 = authorization required.	0 - 99999999 (write) 0/-1 (read)		INT32	R/W	
Remote Relay Control							
3244-3247							
+0		Remote relay command	0 = remove a remote command 1 = operate relay 2 = remove a remote command and release a locally latched relay		UINT16	W	
3244		**RO1 Control**					
3245		**RO2 Control**					
3246		**RO3 Control**					
3247		**RO4 Control**					
Device Reset/Clear Registers							
3404		Clear total energy registers	0		UINT16	W	
3405		Clear total maximum demand registers	0 = Clear all maximum demands 1 = Clear power demands [E] 2 = Clear volt, ampere and harmonic demands		UINT16	W	
3406		Clear TOU energy registers [E]	0		UINT16	W	
3407		Clear TOU maximum demand registers [E]	0		UINT16	W	
3408		Clear pulse counters	0 = Clear all counters 1-4 = Clear counter #1-#4		UINT16	W	
3409		Clear Min/Max log	0		UINT16	W	
3414		Clear operation/event counters	6=reset communication counters		UINT16	W	
Device Identification							
2561-2562		Reserved	0		UINT16	R	
2563		Firmware build number	1-99		UINT16	R	
2564		Reserved	0		UINT16	R	
2565		Firmware version number	1100-1199		UINT16	R	Two higher decimal digits = major version number, two lower decimal digits = minor version number
2566,2567		Instrument options	F28		UINT32	R	
3484		Current serial port number	0=COM1, 1=COM2		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
Device Status Registers							
3452		Relay status	0x0000-0x000F		UINT16	R	Bitmap: 0=open, 1= closed
3453		Reserved	0		UINT16	R	
3454		Digital (status) inputs	0x0000-0x0FFF		UINT16	R	Bitmap: 0=open, 1=closed
3455		Present setpoint status	0x0000-0xFFFF		UINT16	R	Bitmap: 0=released, 1=operated
Alarm Notification Registers							
3474		Latched setpoint SP1-SP16 alarm status. Nonvolatile register.	0x0000-0xFFFF		UINT16	R/W	Bitmap: Read - 1=setpoint has been operated at least once since last reset; Write – 0=clear alarm, 1=has no effect.
3475-3476		Device diagnostics. Nonvolatile register.	F23		UINT16	R/W	Bitmap: Read – 1=diagnostic failed at least once since last reset; Write – 0=clear diagnostic flag, 1=has no effect.
DI Change Events							
4368-4397							
+0,1		Timestamp, seconds since 1/1/1970	F1	sec	UINT32	R	
+2,3		Timestamp, seconds fraction, µsec	0-999000	µsec	UINT32	R	
+4		DI number	0-11 = DI1-DI12		UINT16	R	
+5		DI status	0=open, 1=closed		UINT16	R	
4368-4373		**Event 1 (oldest)**					
4374-4379		**Event 2**					
4380-4385		**Event 3**					
4386-4391		**Event 4**					
4392-4397		**Event 5 (most recent)**					
Memory Status Registers							
44262-44263		Memory size, bytes	59520		UINT32	R	
44264-44265		Free memory, bytes			UINT32	R	
44266-44277		Reserved			UINT32	R	
Log Notification Registers (bit map)							
44278-44279		0 = no new logs, 1 = new record logged	0x00000000 - 0x0001FFFF		UINT32	R	
Communication Status							
44394		Cellular received signal strength (RSSI), dBm	0 = not known or not detectable, 51-113 = -51 to -113 dBm		UINT16	R	
44395		Cellular connection status	0 = not connected, 1 = not registered, 2 = registered		UINT16	R	
44396		WiFi signal quality. %	0 = not known or not detectable, 1-100 %		UINT16	R	
44397		WiFi connection status	0 = not connected, 1 = connected		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
44398-44409		Reserved			UINT16	R	65535 = N/A
Communication Counters							
44410		Successful eXpertPower client connections	0-65534		UINT16	R	
44411		Failed eXpertPower client connections	0-65534		UINT16	R	
44412		Successful TCP notification client connections	0-65534		UINT16	R	
44413		Failed TCP notification client connections	0-65534		UINT16	R	
44414-44441		Reserved			UINT16	R	65535 = N/A

3.7 Device Setup Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
Device Identification							
46080-46111							
+0,1		Device serial number	0-999999		UINT32	R	
+2,3		Device model ID	13010=PM130P, 13011=PM130A, 13020=PM130E, 13030-13032=PM130EH		UINT32	R	
+4-11		Device model name	"PM130P", "PM130E","PM130EH"		CHAR16	R	Null-terminated string
+12-13		Device options (bitmap)	0		UINT32	R	
+14-19		Reserved			UINT16	R	
+20		Device firmware version number	1101-1199		UINT16	R	Two higher decimal digits = major version number, two lower decimal digits = minor version number
+21		Device firmware build number	1-99		UINT16	R	
+22,23		Reserved			UINT16	R	
+24		Boot loader version number	0101-0199		UINT16	R	Two higher decimal digits = major version number, two lower decimal digits = minor version number
+25		Boot loader build number	1-99		UINT16	R	
+26-31		Reserved			UINT16	R	
Factory Device Settings							
46112-46178							
+0		V1-V3 input range	690, 120 (option U)	V	UINT16	R	Does not limit the 690V input range
+1		V1-V3 input overload	120	%	UINT16	R	
+2,3		Reserved			UINT16	R	
+4		I1-I3 input range	1, 5	A	UINT16	R	
+5		I1-I3 input overload	200	%	UINT16	R	
+6-13		Reserved			UINT16	R	
+14-63		Unused			UINT16		
+64		Ethernet MAC address 0-1	0x0500		UINT16	R	
+65		Ethernet MAC address 2-3	0x00F0		UINT16	R	
+66		Ethernet MAC address 4-5	0x0000-0xFFFF		UINT16	R	
Basic Setup							
2304-2324							
+0		Wiring mode	F26		UINT16	R/W	
+1		PT ratio	10 to 65000	×0.1	UINT16	R/W	
+2		CT primary current	1 to 50,000	A	UINT16	R/W	
+3		Power block demand period [E]	1,2,3,5,10,15,20,30,60 min, 255 = external synchronization	min	UINT16	R/W	If the external synchronization is selected, the DI1 input is considered a pulse or KYZ input.

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
							The pulse edge restarts the power demand block accumulation interval. E
+4		Volt/ampere demand period	0 to 1800	sec	UINT16	R/W	
+5-7		Reserved			UINT16	R/W	Read as 65535
+8		Number of blocks in a sliding window E	1 to 15		UINT16	R/W	E
+9,10		Reserved			UINT16	R/W	Read as 65535
+11		Nominal line frequency	25, 50, 60, 400	Hz	UINT16	R/W	
+12		Maximum demand load current	0 to 50,000 (0=CT primary current)	A	UINT16	R/W	
+13-19		Reserved			UINT16	R/W	Read as 65535
+20		PT ratio multiplication factor	×1, ×10		UINT16	R/W	
Communication Ports Setup							
2344-2359							
+0		Communication protocol	COM1: 0=SATEC ASCII, 1=Modbus RTU, 2=DNP3.0 COM2: 0=SATEC ASCII, 1=Modbus RTU, 2=DNP3.0, 5=Profibus DP		UINT16	R/W	
+1		Interface	COM1: 2=RS-485 COM2: 0=RS-232, 1=RS-422, 2=RS-485, 5=RF, 6=Ethernet, 7=Profibus		UINT16	R/W	
+2		Device address	SATEC ASCII: 0-99 Modbus RTU: 1-247 DNP3.0: 0–65532 Profibus DP: 0-126		UINT16	R/W	
+3		Baud rate	1=300 bps, 2=600 bps, 3=1200 bps, 4=2400 bps, 5=4800 bps, 6=9600 bps, 7=19200 bps, 8=38400 bps, 9=57600 bps, 10=115200 bps		UINT16	R/W	
+4		Data format	0=7 bits/even parity, 1=8 bits/no parity, 2=8 bits/even parity		UINT16	R/W	
+5		Flow control	0=no flow control 1=software (XON/XOFF) 2=hardware (CTS)		UINT16	R/W	N/A for COM1 (read as 65535)
+6		RTS mode	0=not used, 1=RTS is permanently asserted 2=RTS is asserted during the transmission		UINT16	R/W	N/A for COM1 (read as 65535)
+7		ASCII compatibility mode	0=disabled, 1=enabled		UINT16	R/W	
2344-2351		**COM1 Setup**					
2352-2359		**COM2 Setup**					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
Device Options Setup							
2376-2390							
+0		Power calculation mode	0=using reactive power: S=f(P,Q), 1=using non-active power: Q=f(S,P)		UINT16	R/W	
+1		Energy roll value [E]	0=1×10^4, 1=1×10^5, 2=1×10^6, 3=1×10^7, 4=1×10^8, 5=1×10^9		UINT16	R/W	Default 1×10^8
+2		Phase energy calculation mode [E]	0=disabled, 1=enabled		UINT16	R/W	
+3-9		Reserved			UINT16	R/W	Read as 65535
+10		Energy LED test mode [E]	0=disabled, 1=Wh test, 2=varh test		UINT16	R/W	LED pulse rate is 10,000 pulses/kWh
+11		Starting voltage, percent of FS voltage	15-50	×0.1%	UINT16	R/W	Default 1.5%
+12-13		Reserved			UINT16	R/W	Read as 65535
+14		Device resolution (see Section 4 for details)	0 = Low resolution, 1 = High resolution		UINT16	R/W	Default 0
Local Settings							
4320-4330							
+0		Daylight savings time (DST) option	0 = DST disabled (standard time only), 1 = DST enabled		UINT16	R/W	
+1		DST start month	1-12		UINT16	R/W	
+2		DST start week of the month	1-4 = 1st, 2nd, 3rd and 4th week, 5=the last week of the month		UINT16	R/W	
+3		DST start weekday	1-7 (1=Sun, 7=Sat)		UINT16	R/W	
+4		DST end month	1-12		UINT16	R/W	
+5		DST end week of the month	1-4=1st, 2nd, 3rd and 4th week, 5=the last week of the month		UINT16	R/W	
+6		DST end weekday	1-7 (1=Sun, 7=Sat)		UINT16	R/W	
+7		Clock synchronization source	1-12 = DI1-DI12, 32767 = meter clock		UINT16	R/W	A DI input is considered a pulse or KYZ input. The pulse edge adjusts the clock at the nearest whole minute.
+8		Country code	ITU calling number		UINT16	R/W	
+9		DST start hour	1-6		UINT16	R/W	
+10		DST end hour	1-6		UINT16	R/W	
Clock Indication and Setup							
4352-4358							
+0		Seconds	0-59		UINT16	R/W	
+1		Minutes	0-59		UINT16	R/W	
+2		Hour	0-23		UINT16	R/W	
+3		Day of month	1-31		UINT16	R/W	
+4		Month	1-12		UINT16	R/W	
+5		Year (calendar year minus 2000)	0-99		UINT16	R/W	
+6		Weekday	1-7 (1=Sun, 7=Sat)		UINT16	R/W	Ignored when written

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
Alarm/Event Setpoints Setup							
2576-2703							
+0		Trigger parameter ID	F12		UINT16	R/W	
+1		Action	F14		UINT16	R/W	
+2		Operate delay	0-9999	×0.1 sec	UINT16	R/W	
+3		Release delay	0-9999	×0.1 sec	UINT16	R/W	
+4,5		Operate limit	See Section 3.3		UINT32	R/W	Scaled value
+6,7		Release limit	See Section 3.3		UINT32	R/W	Scaled value
2576-2583		**Setpoint #1**					
2584-2591		**Setpoint #2**					
2592-2599		**Setpoint #3**					
2600-2607		**Setpoint #4**					
2608-2615		**Setpoint #5**					
2616-2623		**Setpoint #6**					
2624-2631		**Setpoint #7**					
2632-2639		**Setpoint #8**					
2640-2647		**Setpoint #9**					
2648-2655		**Setpoint #10**					
2656-2663		**Setpoint #11**					
2664-2671		**Setpoint #12**					
2672-2679		**Setpoint #13**					
2680-2687		**Setpoint #14**					
2688-2695		**Setpoint #15**					
2696-2703		**Setpoint #16**					
Pulse Counters Setup							
2940-2947							
+0		Source digital input ID	0=not assigned, 1-12=DI1-DI12		UINT16	R/W	
+1		Multiplier	0-9999		UINT16	R/W	
2940-2941		**Counter #1 Setup**					
2942-2943		**Counter #2 Setup**					
2944-2945		**Counter #3 Setup**					
2946-2947		**Counter #4 Setup**					
Analog Outputs Setup							
3148-3153							
+0		Output parameter ID	F18		UINT16	R/W	
+1		Zero scale value (0/4 mA)	See Section 3.3		UINT16	R/W	Scaled value
+2		Full scale value (1/20 mA)	See Section 3.3		UINT16	R/W	Scaled value
3148-3150		**AO1 Setup**					
3151-3153		**AO2 Setup**					
Network Setup							
46576-46703							
+0,1		Device IP Address	0x01000000-0xFFFFFFFF		UINT32	R/W	Network byte order

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+2,3		Network subnet mask	0x00000001-0xFFFFFFFF		UINT32	R/W	Network byte order
+4,5		Network default gateway	0x00000000-0xFFFFFFFF		UINT32	R/W	Network byte order
+6,7		Use DHCP	0 = NO, 1 = YES		UINT32	R/W	
+8,9		TCP service port	502 = Modbus/TCP, 20000 = DNP3.0/TCP		UINT32	R/W	
+10-127		Reserved				R/W	
WiFi Station Setup							
59178-59211							
+0-7		Network name (SSID)	1-15 ASCII characters		CHAR16	R/W	
+8,9		Security/encryption type	0=Unsecured, 1=Open/WEP, 2=Shared/WEP, 3=WPA/TKIP, 4=WPA/AES, 5=WPA/TKIP+AES		UINT32	R/W	
+10-17		Security key	WEP: 5 or 13 ASCII characters TKIP/AES: 8-15 ASCII characters		CHAR16	R/W	
+18-33		Reserved				R/W	
WiFi Access Point Setup							
59212-59253							
+0,1		Access point enable	0=disabled, 1=enabled		UINT32	R/W	
+2,3		WiFi protocol	0=802.11b, 1=802.11g, 2=802.11n, 3=802.11b/g, 4=802.11b/g/n		UINT32	R/W	
+4,5		LAN IP address	0x01000000-0xFFFFFFFF		UINT32	R/W	Network byte order
+6,7		LAN subnet mask	0x00000001-0xFFFFFFFF		UINT32	R/W	Network byte order
+8-15		Network name (SSID)	1-15 ASCII characters		CHAR16	R/W	
+16,17		Security/encryption type	0=Unsecured, 1=Open/WEP, 2=Shared/WEP, 3=WPA/TKIP, 4=WPA/AES, 5=WPA/TKIP+AES		UINT32	R/W	
+18-25		Security key	WEP: 5 or 13 ASCII characters TKIP/AES: 8-15 ASCII characters		CHAR16	R/W	
+26,27		WiFi channel	0=auto, 1-11=CH1-CH11		UINT32	R/W	
+28-41		Reserved				R/W	
Password Setup							
46704-46707							
+0,1		Communications password (4 digits)	0-9999		UINT32	R/W	Read as 0
+2		Password protection enabled	0 = disabled, 1 = enabled		UINT16	R/W	
+3		Reserved			UINT16	R/W	
Expert Power Service Setup							
46768-46783							
+0,1		Expert Power server IP Address	0x01000000-0xFFFFFFFF		UINT32	R/W	Default = 207.232.60.18
+2,3		Expert Power server TCP service port	0-65535		UINT32	R/W	Default = 5001
+4,5		Expert Power client enabled	0 = client disabled, 1 = client enabled		UINT32	R/W	
+6,7		Time to next session	1-99999	min	UINT32	R/W	
+8,9		Time to next session	1-99999	min	UINT32	R	Same as previous

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+10-15		Reserved					
Internet Service Provider (ISP) accounts							
46784-46831							
+0-15		ISP telephone number			CHAR32	R/W	
+16-31		Login name			CHAR32	R/W	
+32-47		Login password			CHAR32	R/W	
GPRS Setup							
46832-46879							
+0-15		Access Point Name (APN)			CHAR32	R/W	
+16-31		User name			CHAR32	R/W	
+32-39		Password			CHAR16	R/W	
+40-47		Reserved			CHAR16	R/W	
TCP Notification Client Setup							
46896-46991							
+0,1		Client enabled	0 = disabled, 1 = enabled		UINT32	R/W	
+2,3		Server address	0x01000000-0xFFFFFFFF		UINT32	R/W	
+4,5		Server port	0-65535		UINT32	R/W	
+6,7		Message exchange address	0-65535		UINT32	R/W	
+8-15		Reserved					
Transformer Correction Setup							
47072-47099							
+0		Ratio correction factor	700-1300	×0.001	UINT16	R/W	
+1		Phase angle error	-600 to 600	min	INT16	R/W	
+2, 3		Reserved			INT16	R/W	
47072-47075		**V1 transformer correction**					
47076-47079		**V2 transformer correction**					
47080-47083		**V3 transformer correction**					
47084-47087		**Reserved**					
47088-47091		**I1 transformer correction**					
47092-47095		**I2 transformer correction**					
47096-47099		**I3 transformer correction**					
IEC 60870-5 Options Setup							
49460-49494							
+0		Maximum length of variable frame, octets	32-255		UINT16	R/W	
+1		Link address length, octets	1-2		UINT16	R/W	
+2		Cause of transmission length, octets	1-2		UINT16	R/W	
+3		Length of common address of ASDU, octets	1-2		UINT16	R/W	
+4		Length of information object address, octets	1-3		UINT16	R/W	
+5		Select-before-operate timeout, s	0-30		UINT16	R/W	
+6		Short pulse duration, ms	100-3000	ms	UINT16	R/W	
+7		Long pulse duration, ms	100-3000	ms	UINT16	R/W	
+8,9		Time synchronization period, s	1-86400, 0=not active	s	UINT32	R/W	
+10		Local counter freeze period, min	1-60, 0=not active	min	UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+11		Cyclic data transmission period, ms	100-30000, 0=not active	ms	UINT16	R/W	
+12,13		Client IP address for cyclic data transmission	0-0xFFFFFE, 0=not active		UINT32	R/W	
+14,15		Client IP address for spontaneous transmission	0-0xFFFFFE, 0=not active		UINT32	R/W	
+16,17		Not used	0		UINT32	R/W	
+18		Not used	0		UINT16	R/W	
+19		Respond with class 1 data to class 2 requests	0=disabled, 1=enabled		UINT16	R/W	
+20		Single point start mapped address	1-4095		UINT16	R/W	
+21		Single point default static object type	F30		UINT16	R/W	
+22		Single point default event object type	F31		UINT16	R/W	
+23		Double point start mapped address	1-4095		UINT16	R/W	
+24		Double point default static object type	F32		UINT16	R/W	
+25		Double point default event object type	F33		UINT16	R/W	
+26		Measured value start mapped address	1-4095		UINT16	R/W	
+27		Measured value default static object type	F34		UINT16	R/W	
+28		Measured value default event object type	F35		UINT16	R/W	
+29		Integrated totals start mapped address	1-4095		UINT16	R/W	
+30		Integrated totals default static object type	F36		UINT16	R/W	
+31		Integrated totals default event object type	F37		UINT16	R/W	
+32		Voltage units	0=V, 1=kV		UINT16	R/W	
+33		Current units	0=A, 1=kA		UINT16	R/W	
+34		Power units	0=kW, 1=MW		UINT16	R/W	
IEC 60870-5 Class 2 Data and Counters Setup							
49524-49619							
+0		Information object type and flags	Bits 0:7 – static object type identification (F30, F32, F34, F36), Bit 8=1 – freeze with reset, Bit 9=1 – local freeze, Bit 10=1 – cyclic data transmission, Bit 11=1 – general interrogation, Bits 12:15 – interrogation group = 0-15 (0=no group assigned)				
+1		Start information object address	1-65535		UINT16	R/W	
+2		Number of elements in the range	1-128		UINT16	R/W	
49524-49526		**Object address range #1**					
49527-49529		**Object address range #2**					
…		**…**					
49617-46619		**Object address range #32**					
IEC 60870-5 Assignable Point Map and Events Setup							
49716-49971					UINT16	R/W	
+0		Point ID	See Section 3.4		UINT16	R/W	
+1		Information object type and flags	Bits 0:7 – static object type identification (F3, F5, F7), Bits 8:9 – relation (0=delta, 1= more than, 2 = less than)		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
			Bit 10=1 – class 1 assignment				
+2,3		Deadband/threshold	See Section 3.4 for the point range and resolution		INT32	R/W	
49716-49719		**Mapped static/event point #1**					
49720-49723		**Mapped static/event point #2**					
…		**…**					
49968-49971		**Mapped static/event point #64**					
DNP Options Setup							
51158-51183							
+0		Default Binary Input Static object variation	F24 (default 0)		UINT16	R/W	
+1		Reserved			UINT16	R/W	
+2		Default Binary Counter object variation	F24 (default 3)		UINT16	R/W	
+3		Default Frozen Binary Counter object variation	F3 (default 4)		UINT16	R/W	
+4-5		Reserved			UINT16	R/W	
+6		Default Analog Input object variation	F24 (default 3)		UINT16	R/W	
+7-10		Reserved			UINT16	R/W	
+11		16-bit BC scaling	0=×1 (default), 1=×10, 2=×100, 3=×1000		UINT16	R/W	
+12		16-bit AI scaling	0=scaling is OFF, 1=scaling is ON		UINT16	R/W	
+13-5		Reserved			UINT16	R/W	
+16		Select/Operate Timeout	2 to 30 seconds (default 10 sec)		UINT16	R/W	
+17		Multi Fragment Interval	5 to 500 ms (default 10 ms)		UINT16	R/W	
+18-21		Reserved	Read as 65535		UINT16	R/W	
+22,23		Time Sync Period	0 to 86400 seconds (default 86400 sec)		UINT32	R/W	
51184-51189		Reserved					
DNP Class 0 Point Assignments							
51702-51797							
+0		DNP object and variation	F25		UINT16	R/W	
+1		DNP point number	Point number for the selected object		UINT16	R/W	
+2		Number of points	0-128		UINT16	R/W	
51702-51704		**DNP Class 0 Points Range 1**					
51705-51707		**DNP Class 0 Points Range 2**					
		…					
51795-51797		**DNP Class 0 Points Range 32**					
51798-51893		Reserved					
File Setup [E]							
52598-52767							
+0		File type	0		UINT16	R/W	
+1		File attributes (bitmap)	F3		UINT16	R/W	
+2		Number of records in the file	0-65535 (0 = delete file)		UINT16	R/W	
+3		Number of sections/channels in the file	0-8		UINT16	R/W	0 = non-partitioned file

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+4		Number of parameters per section record	1-9		UINT16	R/W	
+5		Not used	0		UINT16	R/W	
+6		Section record size, bytes (for info only)			UINT16	R	
+7		File record size, bytes (for info only)			UINT16	R	
+8, 9		Allocated file size, bytes (for info only)			UINT32	R	
52598-52607		**Event Log File Setup**					
52608-52617		**Data Log #1 File Setup**					
52758-52767		**Data Log #16 File Setup**					
Data Log Setup [E]							
54006-54517							
+0		Data log parameter #1 ID	0x0000-0xFFFF		UINT16	R/W	
+1		Data log parameter #2 ID	0x0000-0xFFFF		UINT16	R/W	
+2		Data log parameter #3 ID	0x0000-0xFFFF		UINT16	R/W	
+3		Data log parameter #4 ID	0x0000-0xFFFF		UINT16	R/W	
+4		Data log parameter #5 ID	0x0000-0xFFFF		UINT16	R/W	
+5		Data log parameter #6 ID	0x0000-0xFFFF		UINT16	R/W	
+6		Data log parameter #7 ID	0x0000-0xFFFF		UINT16	R/W	
+7		Data log parameter #8 ID	0x0000-0xFFFF		UINT16	R/W	
+8		Data log parameter #9 ID	0x0000-0xFFFF		UINT16	R/W	
+9-31		Reserved			UINT16	R/W	
54006-54037		**Data log #1 Setup**					
54486-54517		**Data log #16 Setup**					
TOU Daily Profile Setup [E]							
55574-55701							
+0		1st tariff change	F10		UINT16	R/W	
+1		2nd tariff change	F10		UINT16	R/W	
+2		3rd tariff change	F10		UINT16	R/W	
+3		4th tariff change	F10		UINT16	R/W	
+4		5th tariff change	F10		UINT16	R/W	
+5		6th tariff change	F10		UINT16	R/W	
+6		7th tariff change	F10		UINT16	R/W	
+7		8th tariff change	F10		UINT16	R/W	
55574-55581		**Daily profile #1: Season 1, Day type 1**					
55582-55589		**Daily profile #2: Season 1, Day type 2**					
55590-55597		**Daily profile #3: Season 1, Day type 3**					
55598-55605		**Daily profile #4: Season 1, Day type 4**					
55606-55613		**Daily profile #5: Season 2, Day type 1**					
55614-55621		**Daily profile #6: Season 2, Day type 2**					
55622-55629		**Daily profile #7: Season 2, Day type 3**					
55630-55637		**Daily profile #8: Season 2, Day type 4**					
55638-55645		**Daily profile #9: Season 3, Day type 1**					
55646-55653		**Daily profile #10: Season 3, Day type 2**					
55654-55661		**Daily profile #11: Season 3, Day type 3**					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
55662-55669		**Daily profile #12: Season 3, Day type 4**					
55670-55677		**Daily profile #13: Season 4, Day type 1**					
55678-55685		**Daily profile #14: Season 4, Day type 2**					
55686-55693		**Daily profile #15: Season 4, Day type 3**					
55694-55701		**Daily profile #16: Season 4, Day type 4**					
55702-55711		Reserved					
TOU Calendar Setup [E]							
55712-56031							
+0-9		**Calendar entry record**				R/W	
+0		Daily profile	0-3 = Season 1, Day types 0-3 4-7 = Season 2, Day types 0-3 8-11 = Season 3, Day types 0-3 12-15 = Season 4, Day types 0-3		UINT16	R/W	
+1		Week of month	0=all, 1=1st, 2=2nd, 3=3rd, 4=4th, 5=last week of the month		UINT16	R/W	
+2		Weekday	0=all, 1-7 (Sun=1, Sat=7)		UINT16	R/W	
+3		Till Weekday	0=all, 1-7 (Sun=1, Sat=7)		UINT16	R/W	
+4		Month	0=all, 1-12=January - December		UINT16	R/W	
+5		Day of month	0=all, 1-31=day 1-31		UINT16	R/W	
+6		Till Month	0=all, 1-12=January - December		UINT16	R/W	
+7		Till Day of month	0=all, 1-31=day 1-31		UINT16	R/W	
+8-9		Reserved			UINT16	R/W	
55712-55721		**Calendar entry #1**					
55722-55731		**Calendar entry #2**					
55732-55741		**Calendar entry #3**					
…							
56022-56031		**Calendar entry #32**					
56032-56191		Reserved					
Summary Energy/TOU Registers Setup [E]							
56672-56703							
+0		Not used			UINT16	R/W	
+1		Units of measurement	0=none, 1=kWh, 2=kvarh, 3=kVAh, 4=m^3, 5=CF (cubic feet), 6=CCF (hundred cubic feet)		UINT16	R/W	
+2		Flags (bitmap)	Bit 0=1 - TOU enabled		UINT16	R/W	
+3		Not used	0		UINT16	R/W	
56672-56675		**Register #1 Setup**					
56676-56679		**Register #2 Setup**					
56680-56683		**Register #3 Setup**					
56684-56687		**Register #4 Setup**					
Summary Energy/TOU Registers Source Setup [E]							
56928-57183							
+0		Energy source ID	F11		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+1		Target summary register number	0-7 = register #1-#8		UINT16	R/W	
+2,3		Multiplier	0-1000000	×0.001	INT32	R/W	
56928-56931		**Energy Source #1**					
56932-56935		**Energy Source #2**					
56936-56939		**Energy Source #3**					
56940-56943		**Energy Source #4**					
Digital Inputs Setup							
61728-61775							
+0		Pulse mode	0 = pulse, 1 = KYZ		UINT16	R/W	
+1		Polarity	Bit 0 – pulse polarity: 0=normal, 1=inverting Bit 1 – input polarity: 0=normal, 1=inverting		UINT16	R/W	
+2		De-bounce time, ms	1-100		UINT16	R/W	The same debounce time is set in groups of 4 inputs
+3		Reserved			UINT16	R/W	
61728-61731		**DI1 Setup**					
61732-61735		**DI2 Setup**					
		…					
61772-61775		**DI12 Setup**					
Relay Outputs Setup							
61984-62007							
+0		Operation Mode	0=unlatched, 1=latched, 2=pulse, 3=KYZ		UINT16	R/W	
+1		Polarity	0=normal, 1=inverting		UINT16	R/W	
+2		Pulse width, ms	1-1000		UINT16	R/W	
+3		Pulse source ID [E]	F17		UINT16	R/W	
+4		Units per pulse	1-10000	x0.1	UINT16	R/W	
+5		Reserved			UINT16	R/W	
61984-61989		**RO1 Setup**					
61990-61995		**RO2 Setup**					
61996-62001		**RO3 Setup**					
62002-62007		**RO4 Setup**					
Analog Outputs Setup							
62560-62571							
+0		Output parameter ID	F18		UINT16	R/W	
+1		Not used	0		UINT16	R/W	
+2,3		Zero scale value (0/4 mA)	See Section 3.4		INT32	R/W	
+4,5		Full scale value (20/1 mA)	See Section 3.4		INT32	R/W	
62560-62565		**AO1 Setup**					
62566-62571		**AO2 Setup**					

3.8 Analog and Digital I/O Configuration

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
I/O Slots Configuration Info							
63008-63055							
+0		I/O type	F29		UINT16	R	
+1		Number of I/Os on the slot	0-4		UINT16	R	
+2		First I/O number on the slot	0		UINT16	R	
+3		Last I/O number on the slot	0-4		UINT16	R	
63008-63011		**DI Slot Configuration**					
63012-63015		**RO Slot Configuration**					
63016-63019		**AI/AO Slot Configuration**					
63020-63055		Reserved					
I/O Type Info							
63056-63119							
+0		Number of I/O slots of this type	0-1		UINT16	R	
+1		Total number of I/O's of this type	0-4		UINT16	R	
+2		Number of I/O's on the slot	0-4		UINT16	R	
+3		Not used	0		UINT16	R	
63056-63059		**DI Type Info**					
63060-63063		**RO Type Info**					
63064-63067		**AI Type Info**					
63068-63071		**AO Type Info**					
63076-63119		Reserved					

3.9 File Transfer Registers E

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
File Transfer Control Blocks							
63120-63151		**File Request Block**					
+0		File function	1 = ACK - acknowledgement 3 = set file position 5 = reset file position 7 = find 11 = read file 127 = erase file		UINT16	R/W	1 - clears the file transfer block 3 - changes the file position 5 - sets the file position at the first (oldest) record 7 - finds a record matching an event or/and time (see Note 3) 11 - opens the file for reading from the present file position
+1		File ID	F2		UINT16	R/W	
+2		Section number (functions 3, 5, 11)	0-7, 0xFFFF = use channel ID		UINT16	R/W	
+3		Section channel ID (functions 3, 5, 11)	F6, F7		UINT16	R/W	
+4		Record sequence number (functions 3, 11)	0-65535		UINT16	R/W	The record sequence number with function 11 does not change the file position (see Note 2).
+5		Request variation (function 11)	0		UINT16	R/W	See file response headings
+6		Find key: N/A			UINT16	R/W	
+7		Find key: N/A			UINT16	R/W	
+8, 9		Find key: Start time, seconds since 1/1/1970	F1	sec	UINT32	R/W	Note 3
+10, 11		Find key: Start time, fractional seconds in µsec		µsec	UINT32	R/W	Note 3
+12, 13		Find key: End time, seconds since 1/1/1970	F1	sec	UINT32	R/W	Note 3
+14, 15		Find key: End time, fractional seconds in µsec		µsec	UINT32	R/W	Note 3
+16-31		Reserved			UINT16	R/W	
63152-63799		**File Response Block**					
		Data transfer area [0 – 647]			UINT16	R	
64944-64951		**File Info Request Block**					
+0		File function	9 = read file info		UINT16	R/W	
+1		File ID	F2		UINT16	R/W	
+2		Section number	0-7, 0xFFFF = use channel ID		UINT16	R/W	
+3		Section channel ID	F6, F7		UINT16	R/W	
+4		Not used	0		UINT16	R/W	
+5		Request variation	0, 1, 2		UINT16	R/W	
+6-7		Reserved			UINT16	R/W	
64952-65151		**File Info Response Block**					
		Data transfer area [0 - 199]			UINT16	R	

NOTES:

1. File sections for partitioned (multi-section) files, like Summary/TOU profile log files, can be requested either by a section number, or by a section channel ID. If a section number is set to 0xFFFF, the section channel ID will be used to identify the section. The section number will be returned in the response block. If a section number is written, then the corresponding channel ID will be returned in the file response block.

2. The record sequence number with function 11 (Read-File) does not change the file position and is used only as a reference to track the order of records. The file transfer block will continue to hold the same data until it is acknowledged, or until the file position is explicitly moved to another record. For multi-section, the Read-File request, which addresses a different file section, will refill the transfer block with data of the record from the requested file section with the identical sequence number. After acknowledgment, the file position will be moved to the next record.
3. Function 7 (Find) puts into the file request block the sequence number of the first record in the file that matches the event time. Any one of the find keys can be omitted by setting it to 0. If one or a number of find keys are omitted, the device will use the remaining keys to locate the matching record. If the record could not be found, the device responds to the write request with the exception code 3 (illegal data). The status of the operation can be read through the file status word in the file info block.

File Response Blocks

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
File Info Response Block (Variation 0 – File info)							
64952-64959		**Block Heading**					
+0		File function	9		UINT16	R	
+1		File ID	16		UINT16	R	
+2		Section number	0-31		UINT16	R	
+3		Section channel ID	F6, F7		UINT16	R	
+4		Maximum number of records in the block	1		UINT16	R	
+5		Record size, words	36		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
64960-64997		**File Info**					
+0		File type	0		UINT16	R	
+1		File attributes	F3		UINT16	R	
+2		File (section) status	F4		UNT16	R	
+3		Number of sections in the file	0-32		UINT16	R	0 = non-partitioned file
+4,5		File channel mask (channels 1-32), bitmap	F8, F9		UINT32	R	
+6,7		File channel mask (channels 33-64), bitmap	F8, F9		UINT32	R	
+8		Number of records in the file	0-65535		UINT16	R	
+9		Number of records until the end of the file	0-65535		UINT16	R	
+10		Current record (read position) sequence number	0-65535		UINT16	R	
+11		Current write position sequence number	0-65535		UINT16	R	
+12		First (oldest) record sequence number	0-65535		UINT16	R	
+13		Last (newest) record sequence number	0-65535		UINT16	R	
+14,15		Last record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+16,17		Last record time, fractional seconds		µsec	UINT32	R	
+18,19		First record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+20,21		First record time, fractional seconds		µsec	UINT32	R	
+22,23		Null	0		UINT32	R	
+24,25		Null	0	µsec	UINT32	R	
+26,27		Null	0	sec	UINT32	R	
+28,29		Null	0	µsec	UINT32	R	
+30		Maximum number of records	0-65535		UINT16	R	
+31		Number of parameters per data section record	0-16		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+32		Section record size, bytes		Byte	UINT16	R	
+33		File record size, bytes		Byte	UINT16	R	
+34,35		Allocated file size, bytes		Byte	UINT32	R	
File Info Response Block (Variation 1 – Current record info)							
64952-64959		**Block Heading**					
+0		File function	9		UINT16	R	
+1		File ID	F2		UINT16	R	
+2		Section number	0-31		UINT16	R	
+3		Section channel ID	F6, F7		UINT16	R	
+4		Maximum number of records in the block	1		UINT16	R	
+5		Record size, words	8		UINT16	R	
+6		Request variation	1		UINT16	R	
+7		Reserved	0		UINT16	R	
64960-64997		**File Info**					
+0		File (section) status	F4		UNT16	R	
+1		Number of records in the file	0-65535		UINT16	R	
+2		Number of records until the end of the file	0-65535		UINT16	R	
+3		Current record (read position) sequence number	0-65535		UINT16	R	
+4,5		Current record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+6,7		Current record time, fractional seconds		µsec	UINT32	R	
File Info Response Block (Variation 2 – Data log record structure)							
64952-64959		**Block Heading**					
+0		File function	9		UINT16	R	
+1		File ID	1,16		UINT16	R	
+2		Section number	0-7		UINT16	R	
+3		Section channel ID	F6, F7		UINT16	R	
+4		Number of records in the block	1		UINT16	R	
+5		Record size, words	18		UINT16	R	
+6		Request variation	2		UINT16	R	
+7		Reserved	0		UINT16	R	
64960-64997		**File Info**					
+0		Not used	0		UINT16	R	
+1		Number of fields in a data record	1-9		UINT16	R	
+2		Field 1 parameter ID	0-0xFFFF		UINT16	R	
+3		Field 2 parameter ID	0-0xFFFF		UINT16	R	
		…					
+10		Field 9 parameter ID	0-0xFFFF		UINT16	R	
Event Log Response Block							
63152-63159		**Block Heading**					
+0		Last file function	1, 3, 5, 11		UINT16	R	
+1		File ID	0		UINT16	R	
+2		Section number	0		UINT16	R	
+3		Section channel ID	0		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+4		Maximum number of records in the block	32		UINT16	R	
+5		Record size, words	12		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
63160-63543		**Event Log Records**					
+0		Record status	F5		INT16	R	
+1		Record sequence number	0-65535		UINT16	R	
+2,3		Trigger time, seconds since 1/1/1970	F1	sec	UINT32	R	
+4,5		Trigger time, fractional seconds in µsec		µsec	UINT32	R	
+6		Event number	1-65535		UINT16	R	
+7		Event point/source ID	F19		UINT16	R	
+8		Event effect	F20		UINT16	R	
+9		Reserved	0		UINT16	R	
+10,11		Value triggered			INT32	R	
63160-63171		**Record #1**					
		…					
63532-63543		**Record #32**					
Data Log Response Block							
63152-63159		**Block Heading**					
+0		Last file function	1, 3, 5, 11		UINT16	R	
+1		File ID	1,16		UINT16	R	
+2		Section number	0-7		UINT16	R	
+3		Section channel ID	F6		UINT16	R	
+4		Maximum number of records in the block	8 for regular log, 4 for profile log		UINT16	R	
+5		Record size, words	8 + 2× Number of parameters		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
63160-63367		**Data Log Records**					
+0		Record status	F5		INT16	R	
+1		Record sequence number	0-65535		UINT16	R	
+2,3		Record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+4,5		Record time, fractional seconds in µsec		µsec	UINT32	R	
+6		Trigger event type	F22		INT16	R	
+7		Trigger event number	0		UINT16	R	
+8,9		Log value #1			INT32	R	
+10,11		Log value #2			INT32	R	
		…				R	
63160-…		**Record #1** (variable length)					
		…					
		Record #8 (variable length)					
RT Waveform Response Block							
63152-63159		**Block Heading**					
+0		Last file function	1, 3, 5, 11		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+1		File ID	128		UINT16	R	
+2		Section number	0-9		UINT16	R	
+3		Section channel ID	F7		UINT16	R	
+4		Maximum number of records in the block	1		UINT16	R	
+5		Record size, words	640		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
63160-63799		**Waveform Record**					
+0		Record status	F5		INT16	R	
+1		Record sequence number	0		UINT16	R	
+2,3		Start time, seconds since 1/1/1970	F1	sec	UINT32	R	
+4,5		Start time, fractional seconds		µsec	UINT32	R	
+6,7		Trigger time, seconds since 1/1/1970	F1	sec	UINT32	R	
+8,9		Trigger time, fractional seconds		µsec	UINT32	R	
+10		Record series number	1-65535		UINT16	R	
+11		Record serial number in a series	0-65535		UINT16	R	
+12		Trigger event type	0		UINT16	R	
+13		Trigger event number	0		UINT16	R	
+14		Source point ID (generic)	See Generic Data in Section 3.4		UINT16	R	
+15		Trigger reference sample index	0–511		UINT16	R	
+16		Sampling rate, µsec/sample	600-27000	×0.1µsec	UINT16	R	
+17		Sampling rate, samples/cycle	32, 64, 128		UINT16	R	
+18		Sampling frequency	4500 – 6500	×0.01Hz	UINT16	R	
+19		Channel offset, sampling units	0		INT16	R	
+20,21		Channel multiplier, primary units	See Generic Data in Section 3.4		UINT32	R	
+22		Channel divisor, sampling units	4095		UINT16	R	
+23		Length of a sample series, data points	512		UINT16	R	
+24-127		Not used	0		UINT16	R	
+128		**Sample Series**					
+128-639		Sample data series points [0...511]	-4096 - 4095		INT16	R	[1]

[1] To restore the original sampled data in the channel units (e.g., Volts, Amps), the following conversion should be applied:

$$\text{Sampled Data [primary units]} = \frac{(\text{Data Sample} - \text{Channel Offset}) \times \text{Channel Multiplier}}{\text{Channel Divisor}}$$

NOTE

If a file is read through a TCP connection, your assignments for the transfer will be effective only within the current connection socket. Since the device cannot guarantee that your next connection will be made through the same socket, you should not make any assumptions regarding the present block settings. When you open a new connection, always check the file status and pointers before reading file records.

3.10 Billing/TOU Daily Profile Data Log [E]

File Channel/ Section [1]	Record Field No. [2]	Point Label	Point ID	Description	Range	Units [3]	Type	Notes
0/0				**Energy Register #1**				
	1	REG1	0x1780	Summary (total) energy reading	0-999,999,999	kWh	UINT32	
	2	TRF1	0x7000	Tariff #1 energy reading	0-999,999,999	kWh	UINT32	
	3	TRF2	0x7001	Tariff #2 energy reading	0-999,999,999	kWh	UINT32	
	4	TRF3	0x7002	Tariff #3 energy reading	0-999,999,999	kWh	UINT32	
	5	TRF4	0x7003	Tariff #4 energy reading	0-999,999,999	kWh	UINT32	
	6	TRF5	0x7004	Tariff #5 energy reading	0-999,999,999	kWh	UINT32	
	7	TRF6	0x7005	Tariff #6 energy reading	0-999,999,999	kWh	UINT32	
	8	TRF7	0x7006	Tariff #7 energy reading	0-999,999,999	kWh	UINT32	
	9	TRF8	0x7007	Tariff #8 energy reading	0-999,999,999	kWh	UINT32	
…				…				
3/3				**Energy Register #4**				
	1	REG4	0x1783	Summary (total) energy reading	0-999,999,999	kWh	UINT32	
	2	TRF1	0x7000	Tariff #1 energy reading	0-999,999,999	kWh	UINT32	
	3	TRF2	0x7001	Tariff #2 energy reading	0-999,999,999	kWh	UINT32	
	4	TRF3	0x7002	Tariff #3 energy reading	0-999,999,999	kWh	UINT32	
	5	TRF4	0x7003	Tariff #4 energy reading	0-999,999,999	kWh	UINT32	
	6	TRF5	0x7004	Tariff #5 energy reading	0-999,999,999	kWh	UINT32	
	7	TRF6	0x7005	Tariff #6 energy reading	0-999,999,999	kWh	UINT32	
	8	TRF7	0x7006	Tariff #7 energy reading	0-999,999,999	kWh	UINT32	
	9	TRF8	0x7007	Tariff #8 energy reading	0-999,999,999	kWh	UINT32	
16/4				**Daily Maximum Demand Register #1**				
	1	REG1 MD	0x4780	Summary (total) max. demand reading	0-Pmax	U3	UINT32	
	2	TRF1 MD	0x7100	Tariff #1 max. demand reading	0-Pmax	U3	UINT32	
	3	TRF2 MD	0x7101	Tariff #2 max. demand reading	0-Pmax	U3	UINT32	
	4	TRF3 MD	0x7102	Tariff #3 max. demand reading	0-Pmax	U3	UINT32	
	5	TRF4 MD	0x7103	Tariff #4 max. demand reading	0-Pmax	U3	UINT32	
	6	TRF5 MD	0x7104	Tariff #5 max. demand reading	0-Pmax	U3	UINT32	
	7	TRF6 MD	0x7105	Tariff #6 max. demand reading	0-Pmax	U3	UINT32	
	8	TRF7 MD	0x7106	Tariff #7 max. demand reading	0-Pmax	U3	UINT32	
	9	TRF8 MD	0x7107	Tariff #8 max. demand reading	0-Pmax	U3	UINT32	
…				…				
19/7				**Daily Maximum Demand Register #4**				
	1	REG4 MD	0x4783	Summary (total) max. demand reading	0-Pmax	U3	UINT32	
	2	TRF1 MD	0x7100	Tariff #1 max. demand reading	0-Pmax	U3	UINT32	
	3	TRF2 MD	0x7101	Tariff #2 max. demand reading	0-Pmax	U3	UINT32	
	4	TRF3 MD	0x7102	Tariff #3 max. demand reading	0-Pmax	U3	UINT32	
	5	TRF4 MD	0x7103	Tariff #4 max. demand reading	0-Pmax	U3	UINT32	

File Channel/ Section [1]	Record Field No. [2]	Point Label	Point ID	Description	Range	Units [3]	Type	Notes
	6	TRF5 MD	0x7104	Tariff #5 max. demand reading	0-Pmax	U3	UINT32	
	7	TRF6 MD	0x7105	Tariff #6 max. demand reading	0-Pmax	U3	UINT32	
	8	TRF7 MD	0x7106	Tariff #7 max. demand reading	0-Pmax	U3	UINT32	
	9	TRF8 MD	0x7107	Tariff #8 max. demand reading	0-Pmax	U3	UINT32	

[1] An energy use profile section is allocated for registers for which a source input is selected in the Summary/TOU Register setup and for which energy use profile is enabled. A maximum demand profile section is allocated for registers for which maximum demand profile is enabled in the Summary/TOU Register setup. Not configured sections/channels are not available for download. Refer to the file channel mask in the file info for configured channels.

[2] The number of parameters in a section is automatically configured depending on the number of actually used tariffs selected in the TOU Daily Profiles.

[3] For power scale and units, refer to Section 4 ”Data Scales and Units”.

4 Data Scales and Units

Code	Condition	Value/Range	Notes
Data Scales			
Vmax		Voltage scale × PT Ratio, V	2
Imax		Current scale × CT Ratio, A	1, 3
Pmax	Wiring 4LN3, 3LN3, 3BLN3	Vmax × Imax × 3, W	4
	Wiring 4LL3, 3LL3, 3BLL3, 3OP2, 3OP3, 3DIR2	Vmax × Imax × 2, W	
Fmax	Nominal frequency 25, 50 or 60 Hz	100 Hz	
	Nominal frequency 400Hz	500 Hz	
Data Units – Low Resolution Option			
U1		1V	
U2		1A	
U3		1kW/kvar/kVA	
Data Units – High Resolution Option			
U1	PT Ratio = 1	0.1V	
	PT Ratio > 1	1V	
U2		0.01A	
U3	PT Ratio = 1	1W/Var/VA	
	PT Ratio > 1	1kW/kvar/kVA	

See Device Options Setup for information on selecting the device resolution option.

1 CT Ratio = CT primary current/CT secondary current

2 The default Voltage scale is 144V (120V +20%). You can change it via the Device Data Scale setup (see Section 3.1) or via the Device Options setup in PAS.

3 The default Current scale is 2 × CT secondary current (2.0A with 1A secondaries, 10.A with 5A secondaries). You can change it via the Device Data Scale setup (see Section 3.1) or via the Device Options setup in PAS.

4 Pmax is rounded to whole kilowatts. With PT=1.0, if Pmax is greater than 9,999,000 W, it is truncated to 9,999,000 W.

5 Data Formats

Format Code	Value	Description	Notes
Timestamp			
F1		Local time in a UNIX-style format. Represents the number of seconds since midnight (00:00:00), January 1, 1970. The time is valid after January 1, 2000.	
File ID			
F2	0	Event log	
	1	Data log #1	
	16	Data log #16	
	128	Real time waveform	
File Attributes			
F3	Bit 0 = 0	Non-wrap file (stop when full)	
	Bit 0 = 1	Wrap-around (circular) file	
	Bit 1 = 1	Fixed (non-changeable) file attributes	
	Bits 4:6 =	Multi-section data log file attributes:	
	0	Regular file	
	2	TOU daily profile log	Multi-section file
File Status Word (bitmap)			
F4	Bit 0 = 1	The last record of the file is being read	
	Bit 8 = 1	File is empty	
	Bit 9 = 1	Reading after EOF	
	Bit 10 = 1	Corrupted record (CRC error)	
	Bit 11 = 1	No file section found for the requested channel	
	Bit 12 = 1	Reading after the end of a data block	
	Bit 13 = 1	File is not accessible	
	Bit 14 = 1	Record not found	
	Bit 15 = 1	Generic read error (with one of the bits 8-14)	
File Record Status Word (bitmap)			
F5	Bit 0 = 1	The last record of the file is being read	
	Bit 8 = 1	File is empty	
	Bit 9 = 1	Reading after EOF	
	Bit 10 = 1	Corrupted record (CRC error)	
	Bit 11 = 1	No file section found for the requested channel	
	Bit 12 = 1	Reading after the end of a data block	
	Bit 13 = 1	File is not accessible	
	Bit 14 = 1	Record not found	
	Bit 15 = 1	Generic read error (with one of the bits 8-14)	
TOU Profile Log Channel ID			
F6	0-3	Summary/TOU energy/usage registers #1-#4	
	16-19	Summary/TOU maximum demand registers #1-#4	
Waveform Log Channel ID			
F7	0	V1/V12	3
	1	V2/V23	3
	2	V3/V31	3
	4	I1	
	5	I2	
	6	I3	
Profile Log Sections Mask			
F8	Bit 0:3 = 1	Summary/TOU energy/usage registers #1-#4	
	Bit 16:19 = 1	Summary/TOU maximum demand registers #1-#4	
Waveform Channel Mask			
F9	Bit 0 = 1	Channel V1/V12	3
	Bit 1 = 1	Channel V2/V23	3
	Bit 2 = 1	Channel V3/V31	3
	Bit 3 = 1	N/A	
	Bit 4 = 1	Channel I1	
	Bit 5 = 1	Channel I2	
	Bit 6 = 1	Channel I3	
TOU Tariff Change Time			
F10	Bits 8:15 = 0-7	Tariff number #1-#8	
	Bits 2:7 = 0-23	Tariff start hour	
	Bits 0:1 = 0-3	Tariff start quarter of an hour	
Summary/TOU Energy Register Source ID			
F11	0x0000	None	

Format Code	Value	Description	Notes
	0x0700-0x070B	Pulse input DI1-DI12	
	0x1700	kWh import	
	0x1701	kWh export	
	0x1704	kvarh import	
	0x1705	kvarh export	
	0x1708	kVAh total	
	0x1709	kVAh import	
	0x170A	kVAh export	
	0x170B	kvarh Q1	
	0x170C	kvarh Q2	
	0x170D	kvarh Q3	
	0x170E	kvarh Q4	
Setpoint Trigger Parameters ID			
F12	0x0000	None (condition is not active)	
		Status Inputs	
	0x0600	Status input #1 ON	
	0x0601	Status input #2 ON	
	0x0602	Status input #3 ON	
	0x0603	Status input #4 ON	
	0x0604	Status input #5 ON	
	0x0605	Status input #6 ON	
	0x0606	Status input #7 ON	
	0x0607	Status input #8 ON	
	0x0608	Status input #9 ON	
	0x0609	Status input #10 ON	
	0x060A	Status input #11 ON	
	0x060B	Status input #12 ON	
	0x8600	Status input #1 OFF	
	0x8601	Status input #2 OFF	
	0x8602	Status input #3 OFF	
	0x8603	Status input #4 OFF	
	0x8604	Status input #5 OFF	
	0x8605	Status input #6 OFF	
	0x8606	Status input #7 OFF	
	0x8607	Status input #8 OFF	
	0x8608	Status input #9 OFF	
	0x8609	Status input #10 OFF	
	0x860A	Status input #11 OFF	
	0x860B	Status input #12 OFF	
		Relays	
	0x0800	Relay #1 ON	
	0x0801	Relay #2 ON	
	0x0802	Relay #3 ON	
	0x0803	Relay #4 ON	
	0x8800	Relay #1 OFF	
	0x8801	Relay #2 OFF	
	0x8802	Relay #3 OFF	
	0x8803	Relay #4 OFF	
		Phase Reversal	2
	0x8901	Positive phase rotation reversal	2-cycle response
	0x8902	Negative phase rotation reversal	2-cycle response
		1-Cycle Values on any Phase	
	0x0E00	High voltage	
	0x8D00	Low voltage	
	0x0E01	High current	
	0x8D01	Low current	
	0x0E07	High voltage THD EH	2-cycle values
	0x0E08	High current THD EH	2-cycle values
	0x0E09	High K-Factor EH	2-cycle values
	0x0E0A	High current TDD EH	2-cycle values
		1-Cycle Auxiliary Values	
	0x1002	High frequency	
	0x9002	Low frequency	
	0x1003	High voltage unbalance	
	0x1004	High current balance	
		1-Sec Phase Values	
	0x1103	High I1 current	

Format Code	Value	Description	Notes
	0x1104	High I2 current	
	0x1105	High I3 current	
	0x9103	Low I1 current	
	0x9104	Low I2 current	
	0x9105	Low I3 current	
		1-Sec Values on any Phase	
	0x1300	High voltage	
	0x9200	Low voltage	
	0x1301	High current	
	0x9201	Low current	
		1-Sec Total Values	
	0x1406	High total kW import	
	0x1407	High total kW export	
	0x1408	High total kvar import	
	0x1409	High total kvar export	
	0x1402	High total kVA	
	0x9404	Low total PF Lag	
	0x9405	Low total PF Lead	
		1-Sec Auxiliary Values	
	0x1501	High neutral current	
	0x1502	High frequency	
	0x9502	Low frequency	
		Present Demands	
	0x1600	High V1/V12 Volt demand	
	0x1601	High V2/V23 Volt demand	
	0x1602	High V3/V31 Volt demand	
	0x1603	High I1 Ampere demand	
	0x1604	High I2 Ampere demand	
	0x1605	High I3 Ampere demand	
	0x1606	High block kW import demand [E]	
	0x1608	High block kVA demand [E]	
	0x1609	High sliding window kW import demand [E]	
	0x160B	High sliding window kVA demand [E]	
	0x160F	High accumulated kW import demand [E]	
	0x1611	High accumulated kVA demand [E]	
	0x1612	High predicted kW import demand [E]	
	0x1614	High predicted kVA demand [E]	
		Time and Date Parameters	
	0x0B02	Day of week	
	0x0B03	Year	
	0x0B04	Month	
	0x0B05	Day of month	
	0x0B06	Hour	
	0x0B07	Minutes	
	0x0B08	Seconds	
	0x0B09	Minute interval (1,2,3,4,5,10,15,20,30,60 min)	
Setpoint Action ID			
F14	0x0000	No action	
	0x3000	Operate Relay #1	
	0x3001	Operate Relay #2	
	0x3002	Operate Relay #3	
	0x3003	Operate Relay #4	
	0x3100	Release latched Relay #1	
	0x3101	Release latched Relay #2	
	0x3102	Release latched Relay #3	
	0x3103	Release latched Relay #4	
	0x4000	Increment counter #1	
	0x4001	Increment counter #2	
	0x4002	Increment counter #3	
	0x4003	Increment counter #4	
	0x4400	Count operating time using counter #1	
	0x4401	Count operating time using counter #2	
	0x4402	Count operating time using counter #3	
	0x4403	Count operating time using counter #4	
	0x5100	Send event notification	
	0x7100	Data log #1	

Format Code	Value	Description	Notes
Counter Source ID			
F16	0x0000	None	
	0x0001-0x000C	Pulse input DI1-DI12	
Relay Output Pulse Source ID			
F17	0x0000	None	
	0x0400	kWh import pulse [E]	
	0x0401	kWh export pulse [E]	
	0x0403	kvarh import pulse [E]	
	0x0404	kvarh export pulse [E]	
	0x0405	kvarh total pulse [E]	
	0x0406	kVAh pulse [E]	
AO Parameters ID			
F18	0x0000	None (output disabled)	[2]
		1-Cycle Phase Values	
	0x0C00	V1/V12 Voltage	
	0x0C01	V2/V23 Voltage	
	0x0C02	V3/V31 Voltage	
	0x0C03	I1 Current	
	0x0C04	I2 Current	
	0x0C05	I3 Current	
	0x0C1E	V12 Voltage	
	0x0C1F	V23 Voltage	
	0x0C20	V31 Voltage	
		1-Cycle Total Values	
	0x0F00	Total kW	
	0x0F01	Total kvar	
	0x0F02	Total kVA	
	0x0F03	Total PF	
	0x0F04	Total PF Lag	
	0x0F05	Total PF Lead	
		1-Cycle Auxiliary Values	
	0x1001	In Current	
	0x1002	Frequency	
		1-Sec Phase Values	
	0x1100	V1/V12 Voltage	
	0x1101	V2/V23 Voltage	
	0x1102	V3/V31 Voltage	
	0x1103	I1 Current	
	0x1104	I2 Current	
	0x1105	I3 Current	
	0x111E	V12 Voltage	
	0x111F	V23 Voltage	
	0x1120	V31 Voltage	
		1-Sec Total Values	
	0x1400	Total kW	
	0x1401	Total kvar	
	0x1402	Total kVA	
	0x1403	Total PF	
	0x1404	Total PF Lag	
	0x1405	Total PF Lead	
		1-Sec Auxiliary Values	
	0x1501	In Current	
	0x1502	Frequency	
		Present Demands [E]	
	0x160F	Accumulated kW import demand	
	0x1610	Accumulated kvar import demand	
	0x1611	Accumulated kVA demand	
	0x161A	Accumulated kW export demand	
	0x161B	Accumulated kvar export demand	
Event Cause/Point ID			
F19		**Communications Events**	
	0x5B00-0x5BFF	Point ID (low byte, see F21)	
		Front Panel Operations	
	0x5C00-0x5CFF	Point ID (low byte, see F21)	
		Self-Check Diagnostics Events	
	0x5D00-0x5DFF	Point ID (low byte, see F21)	
		Hardware Diagnostics Events	

Format Code	Value	Description	Notes
	0x6202	RAM/Data error	
	0x6203	Hardware watchdog reset	
	0x6204	Sampling fault	
	0x6205	CPU exception	
	0x6206	Reserved	
	0x6207	Software watchdog reset	
	0x620D	Low battery	
	0x620F	EEPROM fault	
		External Events	
	0x6300	Power down	
	0x6308	Power up	
	0x6309	External reset	
Event Effect ID			
F20		**Communications/Self-check/Front Panel Events**	
	0x0000	None	
	0x6000	Total energy registers cleared	
	0x6100	All total maximum demands cleared	
	0x6101	Power maximum demands cleared	
	0x6102	Volt/Ampere maximum demands cleared	
	0x6200	Summary/TOU energy registers cleared	
	0x6300	Summary/TOU maximum demand registers cleared	
	0x6400	All counters cleared	
	0x6401-0x6403	Counter cleared (low byte = counter ID)	
	0x6500	Min/Max log cleared	
	0x6A00-0x6A1A	Log file cleared (low byte = File ID)	
	0x6B06	Communication counters cleared	
	0xF100-0xF10F	Setpoint cleared (low byte = setpoint ID)	
	0xF200	Setup/Data cleared	
	0xF300	Setup reset (set by default)	
	0xF400	Setup changed	
	0xF500	RTC set	
Data Point ID			
F21		**Data Locations**	
	0x03	Data memory	
	0x04	Factory setup	
	0x05	Access/Password setup	
	0x06	Basic setup	
	0x07	Communications setup	
	0x08	Real-time clock	[4]
	0x09	Digital inputs setup	
	0x0A	Pulse counters setup	
	0x0B	AO setup	
	0x0E	Timers setup	
	0x10	Event/alarm setpoints	
	0x11	Pulsing setup	
	0x12	User assignable register map	
	0x14	Data log setup	
	0x15	File/Memory setup	
	0x16	TOU energy registers setup	
	0x18	TOU daily profiles	
	0x19	TOU calendar	
	0x1B	RO Setup	
	0x1C	User selectable options	
	0x1F	DNP 3.0 class 0 map	
	0x20	DNP 3.0 options setup	
	0x21	DNP 3.0 events setup	
	0x22	DNP 3.0 event setpoints	
	0x23	Calibration registers	
	0x24	Date/Time Setup	
	0x25	Net setup	
Event Type ID			
F22		**Setpoint Events**	
	0x0000	SP: Generic setpoint event	
	0x0001-0x0010	SP1-SP16: Setpoint #1-#16 event	
Device Diagnostics			
F23	Reg. 3475 - Bit 0	Reserved	
	Reg. 3475 - Bit 1	Reserved	

Format Code	Value	Description	Notes
	Reg. 3475 - Bit 2 = 1	RAM/Data error	
	Reg. 3475 - Bit 3 = 1	CPU watchdog reset	
	Reg. 3475 - Bit 4 = 1	Sampling fault	
	Reg. 3475 - Bit 5 = 1	CPU exception	
	Reg. 3475 - Bit 6	Reserved	
	Reg. 3475 - Bit 7 = 1	Software watchdog reset	
	Reg. 3475 - Bit 8 = 1	Power down	
	Reg. 3475 - Bit 9 = 1	Device reset	
	Reg. 3475 - Bit 10 = 1	Configuration reset	
	Reg. 3475 - Bit 11 = 1	RTC fault	
	Reg. 3475 - Bit 12	Reserved	
	Reg. 3475 - Bit 13	Reserved	
	Reg. 3475 - Bit 14	Reserved	
	Reg. 3475 - Bit 15 = 1	EEPROM fault	
	Reg. 3476 – Bit 0	Reserved	
	Reg. 3476 – Bit 1	Reserved	
	Reg. 3476 – Bit 2	Reserved	
	Reg. 3476 – Bit 3	Correct wiring configuration verification:	
DNP Object Variations			
F24		**Static Binary Input Objects**	
	0	Single-Bit Binary Input	
	1	Binary Input With Status	
		Static Binary Counters	
	0	32-bit Binary Counter	
	1	32-bit Binary Counter Without Flag	
	2	16-bit Binary Counter	
	3	16-bit Binary Counter Without Flag	
		Frozen Binary Counters	
	0	32-bit Frozen Counter	
	1	32-bit Frozen Counter Without Flag	
	2	32-bit Frozen Counter With Time of Freeze	
	3	16-bit Frozen Counter	
	4	16-bit Frozen Counter Without Flag	
	5	16-bit Frozen Counter With Time of Freeze	
		Static Analog Input Objects	
	0	32-bit Analog Input	
	1	32-bit Analog Input Without Flag	
	2	16-bit Analog Input	
	3	16-bit Analog Input Without Flag	
DNP Class 0 Objects			
F25	0x1E01	Analog Input 30:01	
	0x1E02	Analog Input 30:02	
	0x1E03	Analog Input 30:03	
	0x1E04	Analog Input 30:04	
	0x1F01	Frozen Analog Input 31:01	
	0x1F02	Frozen Analog Input 31:02	
	0x1F03	Frozen Analog Input 31:03	
	0x1F04	Frozen Analog Input 31:04	
	0x1F05	Frozen Analog Input 31:05	
	0x1F06	Frozen Analog Input 31:06	
	0x2801	Analog Output 40:01	
	0x2802	Analog Output 40:02	
	0x0101	Binary Input 01:01	
	0x0102	Binary Input 01:02	
	0x0A01	Binary Output 10:01	
	0x0A02	Binary Output Status 10:02	
	0x1401	Binary Counter 20:01	
	0x1402	Binary Counter 20:02	
	0x1405	Binary Counter 20:05	
	0x1406	Binary Counter 20:06	
	0x1501	Frozen Counter 21:01	
	0x1502	Frozen Counter 21:02	
	0x1505	Frozen Counter 21:05	
	0x1506	Frozen Counter 21:06	
	0x1509	Frozen Counter 21:09	
	0x150A	Frozen Counter 21:10	
	0x3201	Time and Date 50:01	

Format Code	Value		Description	Notes
Wiring Mode				
F26	0		3OP2 - 3-wire open delta using 2 CTs (2 element)	
	1		4LN3 - 4-wire WYE using 3 PTs (3 element), line-to-neutral voltage readings	
	2		3DIR2 - 3-wire direct connection using 2 CTs (2 element)	
	3		4LL3 - 4-wire WYE using 3 PTs (3 element), line-to-line voltage readings	
	4		3OP3 - 3-wire open delta using 3 CTs (2 1/2 element)	
	5		3LN3 - 4-wire WYE using 2 PTs (2 1/2 element), line-to-neutral voltage readings	
	6		3LL3 - 4-wire WYE using 2 PTs (2 1/2 element), line-to-line voltage readings	
	7		2LL1 – 2-wire connection using the current from one phase (1 CT) and the L-L voltage from the other two phases	
	8		3BLN3 - 3-wire broken delta using 2 PTs (2 1/2 element), line-to-neutral voltage readings	
	9		3BLL3 - 3-wire broken delta using 2 PTs (2 1/2 element), line-to-line voltage readings	
	15		1LL3 - 2-wire connection using the current from the same phase of three separate branches (3 CT) and the L-L voltage from the other two phases (1 PT)	
Instrument Options				
F28	Bit 0=1		120V Option	
	Bit 1=1		690V Option	
	Bits 2-5		Reserved	
	Bit 6=1		Analog output 0/4 or 4/20mA	
	Bit 7=1		Analog output 0-1mA	
	Bit 8=1		Analog output ±1mA	
	Bit 9=1		RO option	
	Bit 10=1		DI option	
	Bit 11=1		Reserved	
	Bit 12=1		Setup is secured by a password (authorization required)	
	Bits 13-15		Reserved	
	Bits 16-18		Number of RO - 1	
	Bits 19-22		Number of DI – 1	
	Bits 23-24		Number of AO - 1	
	Bits 25-31		Reserved	
I/O Slot Types				
F29	DI	DRY	00000000B	
	RO		00100000B	
	AI	±1 mA	01010000B	
	AI	0-20 mA	01010001B	
	AI	4-20 mA	01010010B	
	AI	0-1 mA	01010011B	
	AO	±1 mA	01100000B	
	AO	0-20 mA	01100001B	
	AO	4-20 mA	01100010B	
	AO	0-1 mA	01100011B	
	Empty slot		11111111B	

NOTES:

[1] **Analog Outputs**

1) For bi-directional analog output (±1 mA), the zero scale setup corresponds to the center (0 mA) of the scale range, and the direction of the current matches the sign of the output parameter. Unsigned parameters are output within the current range 0 to +1 mA and can be scaled as in the case of single-ended analog output (0-1 mA).

For signed values, such as powers and signed power factor, the scale is always symmetrical with regard to 0 mA, and the full scale corresponds to +1 mA output for positive readings and to -1 mA output for negative readings. The zero scale (0 mA output) is permanently set in the instrument to zero for all parameters except the signed power factor for which it is set to 1.000 (see Note 2). In write requests, the zero scale is ignored.

2) Except for the signed power factor, the setup scale is continuous within the entire value range. For signed power factor, the setup scale is broken at +1.000 in order to provide continuous output current when the power factor changes close to ±1.000. The setup scale is symmetrical in the range of -0 to +0 with a center at 1.000 (-1.000 is assumed to be equal to +1.000). Negative power factor is output as -1.000 minus measured value, and non-negative power factor is output as +1.000 minus measured value. To set the entire range for power factor from-0 to +0, the scales would be specified as -0 to 0. Because of the

fact that negative zero may not be transmitted through communications, the value of -0.001 is used to specify the scale of -0, and both +0.001 and 0.000 are used to specify the scale of +0.

[2] **Phase Reversal Trigger**
The setpoint is operated when the actual phase sequence does not match the designated phase rotation order.

[3] In 3OP2 and 3OP3 wiring modes, the voltage waveforms represent line-to-line voltages; in any other wiring mode, they will be line-to-neutral voltages.

[4] The event value field shows the present meter time in the F1 format.