



# **Powermeter and Power Quality Analyzer PM175**

## Modbus Communications Protocol

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### Reference Guide

Every effort has been made to ensure that the material herein is complete and accurate. However, the manufacturer is not responsible for any mistakes in printing or faulty instructions contained in this book. Notification of any errors or misprints will be received with appreciation.

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

#### REVISION HISTORY

A3	Sep 2007	F/W version 25.1.9 or higher. Added the AX8 Analog expander setup.
A4	Oct 2007	F/W version 25.1.10 or higher. Added 3-min power demand interval. Added a tampering attempt event.
A5	Jun 2008	F/W version 25.1.11 or higher. Added DST start/end hour setup. Added the current unbalance trigger. Added DNP3 protocol support (F/W version 25.2.1 or higher). Fixed EN50160 Harmonic and Interharmonic voltage compliance statistics record structure. Fixed 16-bit I1-I3 harmonic angles addresses.
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A7	Nov 2009	F/W version 25.2.6 or higher. Added four-quadrant kvarh and imported/exported kVAh energy counters Added TCP event notification client. Added GPRS setup and communication counters.

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# 1 General

This document specifies a subset of the Modbus serial communications protocol used to transfer data between a master computer station and the PM175. The document provides the complete information necessary to develop third-party communications software capable of communication with the PM175. Refer to the PM175 Installation and Operation Manual for more information on communication connections and configuring communication parameters in your device.



## 2 Modbus Protocol Implementation

For detailed information on the Modbus protocol, message framing and error checking, refer to the Modbus Protocol Reference Guide. It can be downloaded from the [www.modbus.org](http://www.modbus.org) Website. The following paragraphs outline some issues concerning the implementation of the Modbus protocol in the PM175.

### 2.1 Transmission Modes

The PM175 can be set up to communicate on a serial Modbus network using either RTU, or ASCII serial transmission mode, and via the Internet using Modbus/TCP mode. Refer to the PM175 Installation and Operation Manual for information on selecting 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.

When communicating via the Internet, the address field is not checked and is returned in the response message header.

### 2.3 Function Field

The Modbus functions implemented in the PM175 are shown in Table 2-1. Function 04 can be used in the same context as function 03.

**Table 2-1 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 <sup>1</sup>	Loop-back test	Communications test

<sup>1</sup> The PM175 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 Modbus Register Addresses

The PM175 Modbus registers are numbered in the range of 0 to 65535. From the Modbus applications, the PM175 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 PM175 register address to the range of the Modbus holding registers, add a value of 40001 to the PM175 register address. When a register address exceeds 9999, use a 6-digit addressing scheme by adding 400001 to the PM175 register address.

## 2.6 Data Formats

The PM175 uses three data formats to pass data between a master application and the instrument: 16-bit short integer, 32-bit long integer 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.

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

### 2.6.1 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):

$$\begin{aligned} HI\_ENG &= V_{max} = 828.0 \times PT \text{ ratio} = 828.0 \times 1 = 828.0V \\ LO\_ENG &= 0V \end{aligned}$$

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

$$\text{Volts reading} = 1449 \times (828.0 - 0) / (9999 - 0) + 0 = 120.0V$$

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

Voltage engineering scales (see Section 4):

$$\begin{aligned} HI\_ENG &= V_{max} = 144.0 \times PT \text{ ratio} = 144 \times 120 = 17,280V \\ LO\_ENG &= 0V \end{aligned}$$

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

$$\text{Volts reading} = 8314 \times (17,280 - 0) / 9999 + 0 = 14,368V$$

#### 2. Current readings

Assume device settings: CT primary current = 200A.

Current engineering scales (see Section 4):

$$HI\_ENG = I_{max} = CT \text{ primary current} \times 2 = 200.00 \times 2 = 400.00A$$

$$LO\_ENG = 0A$$

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

$$\text{Amps reading} = 250 \times (400.00 - 0)/(9999 - 0) + 0 = 10.00A$$

### 3. Power readings

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

Active Power engineering scales (see Section 4):

$$HI\_ENG = P_{max} = V_{max} \times I_{max} \times 2 = (828.0 \times 1) \times (200.00 \times 2) \times 2 = 662,400W = 662.400kW$$

$$LO\_ENG = -P_{max} = -662.400kW$$

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

$$\text{Watts reading} = 5500 \times (662.400 - (-662.400))/(9999 - 0) + (-662.400) = 66.313kW$$

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

$$\text{Watts reading} = 500 \times (662.400 - (-662.400))/(9999 - 0) + (-662.400) = -596.153kW$$

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

Active Power engineering scales (see Section 4):

$$HI\_ENG = P_{max} = V_{max} \times I_{max} \times 3 = (828 \times 120) \times (200.00 \times 2) \times 3/1000 = 119,232kW$$

$$LO\_ENG = -P_{max} = -119,232kW$$

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

$$\text{Watts reading} = 5500 \times (119,232 - (-119,232))/(9999 - 0) + (-119,232) = 11,936kW$$

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

$$\text{Watts reading} = 500 \times (119,232 - (-119,232))/(9999 - 0) + (-119,232) = -107,307kW$$

### 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:

$$\text{Power factor reading} = 8900 \times (1.000 - (-1.000))/(9999 - 0) + (-1.000) = 0.78$$

## 2.6.2 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):

$$\text{32-bit value} = (\text{signed short}) \text{ high\_order\_register} \times 65536L + (\text{unsigned short}) \text{ low\_order\_register}$$

### 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  $(1 \times 65536 + 3464) = 69000V$ .

## 2. Signed 32-bit Values

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

$$(14336) = 64747 \text{ (unsigned)}$$

$$(14337) = 65535 \text{ (unsigned) or } -1 \text{ (signed value).}$$

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  $(-1 \times 65536 + 64747) = -789kW$ .

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  $\times 0.1$ ,  $\times 0.01$  or  $\times 0.001$ , 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.

### 2.6.3 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.

## 2.7 User Assignable Registers

The PM175 contains 120 user assignable registers in the address range of 0 to 119, any of which you can map to any register address accessible in the instrument. Registers that reside in different locations may be accessed by a single request by re-mapping them to adjacent addresses in the user assignable registers area.

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.

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.

## 2.8 Password Protection

The PM175 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.

## 2.9 Data Recording and File Transfers

### 2.9.1 Log File Organization

Historical files are stored to the non-volatile memory with a battery backup. Memory is allocated for each file statically when you set up your files and will not change unless you re-organize the files. The PM175 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 PM175 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 16) sections for multi-channel recording. An ordinal file consists of a single section. Some files, such as daily profile log files and waveform log files, are arranged as multi-section files.

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 Files

Data log files can store up to 16 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 Files

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 3.12 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.

## Power Quality Statistics Log Files

Data log files #9 and #10 are configured to store the power quality statistics data on a daily or weekly basis. They are organized as multi-section files. See Sections 3.10-3.11 for more information on the file record structure. You can review the list of parameters recorded to the files through the file info request/response blocks using info requests with variation 2 (see Section 3.9).

## Waveform Log Files

Waveform log files are organized as multi-section files that store data for each recording channel in a separate section. A waveform log file can record up to six AC channels simultaneously: three voltage and three current waveforms. The number of sections in a file, or channels that a file can store, is defined when you set up the file. The channels that a file will record are selected in the waveform log setup. All selected channels are recorded in successive file sections.

A waveform file has a single read pointer for all sections, so that data from all channels of a single record can be read together without repositioning the file pointer. When you point to a particular file record, data from all sections related to the same event are all available for a read. Moreover, the PM175 takes all channel data for the currently accessed record to a separate buffer, so that even when the record is overwritten at the time of reading, you are still prevented from receiving partially updated data.

A single waveform record for a channel can contain up to 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.

If a waveform log is configured to record more samples per event than a single record can hold, the waveform recorder will store as many records per event as required to record the entire event. All waveform records related to the event are merged in a series and have the same series number, so that they can be plotted together. Each record within a series has a unique serial number that allows tracking the sequence of records in a series. A single waveform series can hold up to 81,920 points (2,560 cycles at a rate of 32 samples per cycle) of a sampled AC signal.

## 2.9.2 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 Multi-section Waveform Files**

Waveform files can be read as conventional multi-section files in the order described above. Another way is to take advantage of the fact that waveform files have a single read pointer for all file sections, so you can read records of all the channels related to the same event at once without repositioning the file pointer. The following gives a summary of steps for reading waveform files:

- 1) If you want 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 the section field to zero.
- 2) Write the Read-File request. 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.
- 3) Read the channel's data from the file response block. Store the received record's sequence number.
- 4) Write the Read-File request for the next file section or channel using the stored record sequence number. The file response block will be refilled with the data for the requested channel that is related to the record with the same sequence number.
- 5) Repeat steps 3, 4 until all the channel records with the current sequence number are read.
- 6) Write an acknowledgment. The file pointer will be moved to the next record.

Repeat steps 2-6 until all the file records are read.

### **Reading Real-time Waveforms**

Real-time waveforms are accessed through the same transfer blocks just like the waveform log files by addressing file 128. 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.

## **2.10 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	
+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 desired triggers or to periodic time events and add the "Send notification" action to the end of the setpoint actions list.

# 3 Modbus Register Map

## 3.1 Modbus Setup Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Modbus Assignable Registers</b>							
<b>0-119</b>							
+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	
<b>Assignable Registers Map</b>							
<b>120-239</b>							
+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	
<b>Modbus Conversion Scales</b>							
240		Low raw scale	0		UINT16	R	
241		High raw scale	9999		UINT16	R	
<b>Device Data Scales</b>							
242		Voltage scale, in secondary volts	60-828 (default 144V)	1V	UINT16	R/W	
243		Current scale, in secondary amps = CT secondary current (1A, 5A) × Current overload	20, 100 (2.0A, 10.0A)	×0.1A	UINT16	R	

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

Address	Point ID	Description	Low and High Scales <sup>2</sup>	Units <sup>2</sup>	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	6
+32		kWh import (high)	0-9999	×10MWh	UINT16	R	6
+33		kWh export (low)	0-9999	1kWh	UINT16	R	6
+34		kWh export (high)	0-9999	×10MWh	UINT16	R	6
+35		+kvarh net (low)	0-9999	1kvarh	UINT16	R	4, 6
+36		+kvarh net (high)	0-9999	×10Mvarh	UINT16	R	4, 6
+37		-kvarh net (low)	0-9999	1kvarh	UINT16	R	5, 6
+38		-kvarh net (high)	0-9999	×10Mvarh	UINT16	R	5, 6

Address	Point ID	Description	Low and High Scales <sup>2</sup>	Units <sup>2</sup>	Type	R/W	Notes
+39	0x1112	V1/V12 Voltage THD	0-999.9	0.1%	UINT16	R	3
+40	0x1113	V2/V23 Voltage THD	0-999.9	0.1%	UINT16	R	3
+41	0x1114	V3/V31 Voltage THD	0-999.9	0.1%	UINT16	R	3
+42	0x1115	I1 Current THD	0-999.9	0.1%	UINT16	R	3
+43	0x1116	I2 Current THD	0-999.9	0.1%	UINT16	R	3
+44	0x1117	I3 Current THD	0-999.9	0.1%	UINT16	R	3
+45		kVAh (low)	0-9999	1kVAh	UINT16	R	6
+46		kVAh (high)	0-9999	10MVAh	UINT16	R	6
+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
+51	0x111C	I2 Current TDD	0-100.0	0.1%	UINT16	R	3
+52	0x111D	I3 Current TDD	0-100.0	0.1%	UINT16	R	3

**NOTES:**

<sup>1</sup> 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.

<sup>2</sup> 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 2.6.1, "16-bit Scaled Integer Format".

<sup>3</sup> On a 3-s interval.

<sup>4</sup> Positive readings of kvarh net.

<sup>5</sup> Negative readings of kvarh net.

<sup>6</sup> If you use these energy registers instead of 32-bit registers, limit the energy roll value to 8 digits (see Device Options Setup) to avoid overflow.

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

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
3584	0x0000	<b>None</b>	0		UINT16	R	
3616	0x0080	<b>Setpoint Status (bitmap)</b>	0x0000-0xFFFF		UINT16	R	
3648-3649		<b>Special Inputs</b>					
+0	0x0100	Not used	0		UINT16	R	
+1	0x0101	Phase rotation order	0=error, 1=positive (ABC), 2=negative (CBA)		UINT16	R	
3776	0x0300	<b>Event Flags (bitmap)</b>	0x0000-0x00FF		UINT16	R	
3968	0x0600	<b>Digital Inputs (bitmap)</b>	0x0000-0x0003		UINT16	R	
4096	0x0800	<b>Relay Outputs (bitmap)</b>	0x0000-0x0003		UINT16	R	
4224-4231		<b>Counters</b>					
+0,1	0x0A00	Counter #1	0-999,999		UINT32	R/W	
+2,3	0x0A01	Counter #2	0-999,999		UINT32	R/W	
+4,5	0x0A02	Counter #3	0-999,999		UINT32	R/W	
+6,7	0x0A03	Counter #4	0-999,999		UINT32	R/W	
4320-4331		<b>1/2-Cycle Values</b>					
+0	0x0B80	V1 Voltage	0-Vmax	U1	UINT16	R	1
+1	0x0B81	V2 Voltage	0-Vmax	U1	UINT16	R	1
+2	0x0B82	V3 Voltage	0-Vmax	U1	UINT16	R	1
+3	0x0B83	Not used	0		UINT16	R	
+4	0x0B84	V12 Voltage	0-Vmax	U1	UINT16	R	
+5	0x0B85	V23 Voltage	0-Vmax	U1	UINT16	R	
+5	0x0B86	V31 Voltage	0-Vmax	U1	UINT16	R	
+7	0x0B87	I1 Current	0-Imax	U2	UINT16	R	
+8	0x0B88	I2 Current	0-Imax	U2	UINT16	R	
+9	0x0B89	I3 Current	0-Imax	U2	UINT16	R	
+10	0x0B8A	Not used	0		UINT16	R	
+11	0x0B8B	In Current	0-Imax	U2	UINT16	R	
4352-4384		<b>1-Cycle Phase Values</b>					
+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	

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+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	2, 5
+19	0x0C13	V2/V23 Voltage THD	0-999.9	0.1%	UINT16	R	2, 5
+20	0x0C14	V3/V31 Voltage THD	0-999.9	0.1%	UINT16	R	2, 5
+21	0x0C15	I1 Current THD	0-999.9	0.1%	UINT16	R	5
+22	0x0C16	I2 Current THD	0-999.9	0.1%	UINT16	R	5
+23	0x0C17	I3 Current THD	0-999.9	0.1%	UINT16	R	5
+24	0x0C18	I1 K-Factor	1.0-999.9	0.1	UINT16	R	5
+25	0x0C19	I2 K-Factor	1.0-999.9	0.1	UINT16	R	5
+26	0x0C1A	I3 K-Factor	1.0-999.9	0.1	UINT16	R	5
+27	0x0C1B	I1 Current TDD	0-100.0	0.1%	UINT16	R	5
+28	0x0C1C	I2 Current TDD	0-100.0	0.1%	UINT16	R	5
+29	0x0C1D	I3 Current TDD	0-100.0	0.1%	UINT16	R	5
+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	
4544-4556		<b>1-Cycle Total Values</b>					
+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	0x0FOA	3-phase average L-N/L-L voltage	0-Vmax	U1	UINT32	R	1
+11	0x0FOB	3-phase average L-L voltage	0-Vmax	U1	UINT32	R	
+12	0x0FOC	3-phase average current	0-Imax	U2	UINT32	R	
4608-4612		<b>1-Cycle Auxiliary Values</b>					
+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	0-300.0	0.1%	UINT16	R	
+4	0x1004	Current unbalance	0-300.0	0.1%	UINT16	R	
4640-4655		<b>Phasor</b>					
+0	0x1080	V1/V12 Voltage magnitude	0-Vmax	U1	UINT16	R	2

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+1	0x1081	V2/V23 Voltage magnitude	0-Vmax	U1	UINT16	R	2
+2	0x1082	V3/V31 Voltage magnitude	0-Vmax	U1	UINT16	R	2
+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	0.1°	INT16	R	2
+9	0x1089	V2/V23 Voltage angle	-180.0-180.0	0.1°	INT16	R	2
+10	0x108A	V3/V31 Voltage angle	-180.0-180.0	0.1°	INT16	R	2
+11	0x108B	Not used			INT16	R	
+12	0x108C	I1 Current angle	-180.0-180.0	0.1°	INT16	R	
+13	0x108D	I2 Current angle	-180.0-180.0	0.1°	INT16	R	
+14	0x108E	I3 Current angle	-180.0-180.0	0.1°	INT16	R	
+15	0x108F	Not used			INT16	R	
4672-4704		<b>1-Second Phase Values</b>					
+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	2,6
+19	0x1113	V2/V23 Voltage THD	0-999.9	0.1%	UINT16	R	2,6
+20	0x1114	V3/V31 Voltage THD	0-999.9	0.1%	UINT16	R	2,6
+21	0x1115	I1 Current THD	0-999.9	0.1%	UINT16	R	6
+22	0x1116	I2 Current THD	0-999.9	0.1%	UINT16	R	6
+23	0x1117	I3 Current THD	0-999.9	0.1%	UINT16	R	6
+24	0x1118	I1 K-Factor	1.0-999.9	0.1	UINT16	R	6
+25	0x1119	I2 K-Factor	1.0-999.9	0.1	UINT16	R	6
+26	0x111A	I3 K-Factor	1.0-999.9	0.1	UINT16	R	6

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+27	0x111B	I1 Current TDD	0-100.0	0.1%	UINT16	R	6
+28	0x111C	I2 Current TDD	0-100.0	0.1%	UINT16	R	6
+29	0x111D	I3 Current TDD	0-100.0	0.1%	UINT16	R	6
+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	
4864-4876		<b>1-Second Total Values</b>					
+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	
+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	
4928-4932		<b>1-Second Auxiliary Values</b>					
+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	0-300.0	0.1%	UINT16	R	
+4	0x1504	Current unbalance	0-300.0	0.1%	UINT16	R	
4960-4971		<b>Present Harmonic Demands</b>					
+0	0x1580	V1/V12 THD demand	0-999.9	0.1%	UINT16	R	2
+1	0x1581	V2/V23 THD demand	0-999.9	0.1%	UINT16	R	2
+2	0x1582	V3/V31 THD demand	0-999.9	0.1%	UINT16	R	2
+3	0x1583	Not used			UINT16	R	
+4	0x1584	I1 THD demand	0-999.9	0.1%	UINT16	R	
+5	0x1585	I2 THD demand	0-999.9	0.1%	UINT16	R	
+5	0x1586	I3 THD demand	0-999.9	0.1%	UINT16	R	
+7	0x1587	Not used			UINT16	R	
+8	0x1588	I1 TDD demand	0-100.0	0.1%	UINT16	R	
+9	0x1589	I2 TDD demand	0-100.0	0.1%	UINT16	R	
+10	0x158A	I3 TDD demand	0-100.0	0.1%	UINT16	R	
+11	0x158B	Not used			UINT16	R	
4992-5021		<b>Present Volt, Ampere and Power Demands</b>					
+0	0x1600	V1/V12 Volt demand	0-Vmax	U1	UINT16	R	2
+1	0x1601	V2/V23 Volt demand	0-Vmax	U1	UINT16	R	2
+2	0x1602	V3/V31 Volt demand	0-Vmax	U1	UINT16	R	2



Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+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	
5056-5099		<b>Total Energies</b>					
+0,1	0x1700	kWh import	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x1701	kWh export	0-999,999,999	1 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	1 kvarh	UINT32	R	
+10,11	0x1705	kvarh export	0-999,999,999	1 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	1 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	0x170D	Not used			UINT32	R	
+28,29	0x170E	Not used			UINT32	R	

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+30,31	0x170F	Not used			UINT32	R	
+32,33	0x1710	Not used			UINT32	R	
+34,35	0x1711	Not used			UINT32	R	
+36,37	0x1712	kvarh Q1	0-999,999,999	kvarh	UINT32	R	
+38,39	0x1713	kvarh Q2	0-999,999,999	kvarh	UINT32	R	
+40,41	0x1714	kvarh Q3	0-999,999,999	kvarh	UINT32	R	
+42,43	0x1715	kvarh Q4	0-999,999,999	kvarh	UINT32	R	
5120-5137		<b>Phase Energies</b>					
+0,1	0x1800	kWh import L1	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x1801	kWh import L2	0-999,999,999	1 kWh	UINT32	R	
+4,5	0x1802	kWh import L3	0-999,999,999	1 kWh	UINT32	R	
+6,7	0x1803	kvarh import L1	0-999,999,999	1 kvarh	UINT32	R	
+8,9	0x1804	kvarh import L2	0-999,999,999	1 kvarh	UINT32	R	
+10,11	0x1805	kvarh import L3	0-999,999,999	1 kvarh	UINT32	R	
+12,13	0x1806	kVAh total L1	0-999,999,999	1 kVAh	UINT32	R	
+14,15	0x1807	kVAh total L2	0-999,999,999	1 kVAh	UINT32	R	
+16,17	0x1808	kVAh total L3	0-999,999,999	1 kVAh	UINT32	R	
5152-5161		<b>Symmetrical Components</b>					
+0	0x1880	Positive-sequence voltage	0-Vmax	U1	UINT16	R	
+1	0x1881	Negative-sequence voltage	0-Vmax	U1	UINT16	R	
+2	0x1882	Zero-sequence voltage	0-Vmax	U1	UINT16	R	
+3	0x1883	Negative-sequence voltage unbalance	0-300.0	0.1%	UINT16	R	
+4	0x1884	Zero-sequence voltage unbalance	0-300.0	0.1%	UINT16	R	
+5	0x1885	Positive-sequence current	0-Imax	U2	UINT16	R	
+6	0x1886	Negative-sequence current	0-Imax	U2	UINT16	R	
+7	0x1887	Zero-sequence current	0-Imax	U2	UINT16	R	
+8	0x1888	Negative-sequence current unbalance	0-300.0	0.1%	UINT16	R	
+9	0x1889	Zero-sequence current unbalance	0-300.0	0.1%	UINT16	R	
5184-5233		<b>V1/V12 Harmonic Distortion</b>					2
+0	0x1900	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1901	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+49	0x1931	H50 Harmonic distortion	0-100.00	0.01%	UINT16	R	
5248-5297		<b>V2/V23 Harmonic Distortion</b>					2
+0	0x1A00	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1A01	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+49	0x1A31	H50 Harmonic distortion	0-100.00	0.01%	UINT16	R	
5312-5361		<b>V3/V31 Harmonic Distortion</b>					2
+0	0x1B00	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1B01	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+49	0x1B31	H50 Harmonic distortion	0-100.00	0.01%	UINT16	R	

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
5376-5425		<b>I1 Harmonic Distortion</b>					
+0	0x1C00	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1C01	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+49	0x1C31	H50 Harmonic distortion	0-100.00	0.01%	UINT16	R	
5440-5489		<b>I2 Harmonic Distortion</b>					
+0	0x1D00	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1D01	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+49	0x1D31	H50 Harmonic distortion	0-100.00	0.01%	UINT16	R	
5504-5553		<b>I3 Harmonic Distortions</b>					
+0	0x1E00	H01 Harmonic distortion	0-100.00	0.01%	UINT16	R	
+1	0x1E01	H02 Harmonic distortion	0-100.00	0.01%	UINT16	R	
		...					
+49	0x1E31	H50 Harmonic distortion	0-100.00	0.01%	UINT16	R	
6208-6225		<b>Fundamental Phase Values</b>					5
+0	0x2900	V1/V12 Voltage	0-Vmax	U1	UINT16	R	2
+1	0x2901	V2/V23 Voltage	0-Vmax	U1	UINT16	R	2
+2	0x2902	V3/V31 Voltage	0-Vmax	U1	UINT16	R	2
+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	
6240-6251		<b>Flicker</b>					2
+0	0x2980	V1 Pst	0-100.00	0.01	UINT16	R	
+1	0x2981	V2 Pst	0-100.00	0.01	UINT16	R	
+2	0x2982	V3 Pst	0-100.00	0.01	UINT16	R	
+3	0x2983	V1 Plt	0-100.00	0.01	UINT16	R	
+4	0x2984	V2 Plt	0-100.00	0.01	UINT16	R	
+5	0x2985	V3 Plt	0-100.00	0.01	UINT16	R	
6272-6275		<b>Fundamental Total Values</b>					5
+0	0x2A00	Total fundamental kW	-Pmax-Pmax	U3	INT16	R	

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+1	0x2A01	Total fundamental kvar	-Pmax-Pmax	U3	INT16	R	
+2	0x2A02	Total fundamental kVA	0-Pmax	U3	UINT16	R	
+3	0x2A03	Total fundamental PF	-1.000-1.000	0.001	INT16	R	
6400-6429		<b>Minimum 1-Cycle Phase Values</b>					
+0	0x2C00	V1/V12 Voltage	0-Vmax	U1	UINT16	R	2
+1	0x2C01	V2/V23 Voltage	0-Vmax	U1	UINT16	R	2
+2	0x2C02	V3/V31 Voltage	0-Vmax	U1	UINT16	R	2
+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	
+6-17	0x2C06- 0x2C11	Not used	0		INT16	R	
+18	0x2C12	V1/V12 Voltage THD	0-9999	0.1%	UINT16	R	2, 5
+19	0x2C13	V2/V23 Voltage THD	0-9999	0.1%	UINT16	R	2, 5
+20	0x2C14	V3/V31 Voltage THD	0-999.9	0.1%	UINT16	R	2, 5
+21	0x2C15	I1 Current THD	0-999.9	0.1%	UINT16	R	5
+22	0x2C16	I2 Current THD	0-999.9	0.1%	UINT16	R	5
+23	0x2C17	I3 Current THD	0-999.9	0.1%	UINT16	R	5
+24	0x2C18	I1 K-Factor	1.0-999.9	0.1	UINT16	R	5
+25	0x2C19	I2 K-Factor	1.0-999.9	0.1	UINT16	R	5
+26	0x2C1A	I3 K-Factor	1.0-999.9	0.1	UINT16	R	5
+27	0x2C1B	I1 Current TDD	0-100.0	0.1%	UINT16	R	5
+28	0x2C1C	I2 Current TDD	0-100.0	0.1%	UINT16	R	5
+29	0x2C1D	I3 Current TDD	0-100.0	0.1%	UINT16	R	5
6464-6467		<b>Minimum 1-Cycle Total Values</b>					
+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
6528-6530		<b>Minimum 1-Cycle Auxiliary Values</b>					
+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	
6912-6941		<b>Maximum 1-Cycle Phase Values</b>					
+0	0x3400	V1/V12 Voltage	0-Vmax	U1	UINT16	R	2
+1	0x3401	V2/V23 Voltage	0-Vmax	U1	UINT16	R	2
+2	0x3402	V3/V31 Voltage	0-Vmax	U1	UINT16	R	2
+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	
+6-17	0x3406- 0x3411	Not used	0		INT16	R	
+18	0x3412	V1 Voltage THD	0-999.9	0.1%	UINT16	R	2, 5

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+19	0x3413	V2 Voltage THD	0-999.9	0.1%	UINT16	R	2, 5
+20	0x3414	V3 Voltage THD	0-999.9	0.1%	UINT16	R	2, 5
+21	0x3415	I1 Current THD	0-999.9	0.1%	UINT16	R	5
+22	0x3416	I2 Current THD	0-999.9	0.1%	UINT16	R	5
+23	0x3417	I3 Current THD	0-999.9	0.1%	UINT16	R	5
+24	0x3418	I1 K-Factor	1.0-999.9	0.1	UINT16	R	5
+25	0x3419	I2 K-Factor	1.0-999.9	0.1	UINT16	R	5
+26	0x341A	I3 K-Factor	1.0-999.9	0.1	UINT16	R	5
+27	0x341B	I1 Current TDD	0-100.0	0.1%	UINT16	R	5
+28	0x341C	I2 Current TDD	0-100.0	0.1%	UINT16	R	5
+29	0x341D	I3 Current TDD	0-100.0	0.1%	UINT16	R	5
6976-6979		<b>Maximum 1-Cycle Total Values</b>					
+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
7040-7042		<b>Maximum 1-Cycle Auxiliary Values</b>					
+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	
7104-7120		<b>Maximum Demands</b>					
+0	0x3700	V1/V12 Maximum volt demand	0-Vmax	U1	UINT16	R	2
+1	0x3701	V2/V23 Maximum volt demand	0-Vmax	U1	UINT16	R	2
+2	0x3702	V3/V31 Maximum volt demand	0-Vmax	U1	UINT16	R	2
+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	
+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	
7200-7211		<b>Maximum Harmonic Demands</b>					
+0	0x3880	V1/V12 THD demand	0-999.9	0.1%	UINT16	R	2
+1	0x3881	V2/V23 THD demand	0-999.9	0.1%	UINT16	R	2
+2	0x3882	V3/V31 THD demand	0-999.9	0.1%	UINT16	R	2
+3	0x3883	Not used			UINT16	R	

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+4	0x3884	I1 THD demand	0-999.9	0.1%	UINT16	R	
+5	0x3885	I2 THD demand	0-999.9	0.1%	UINT16	R	
+6	0x3886	I3 THD demand	0-999.9	0.1%	UINT16	R	
+7	0x3887	Not used			UINT16	R	
+8	0x3888	I1 TDD demand	0-100.0	0.1%	UINT16	R	
+9	0x3889	I2 TDD demand	0-100.0	0.1%	UINT16	R	
+10	0x388A	I3 TDD demand	0-100.0	0.1%	UINT16	R	
+11	0x388B	Not used			UINT16	R	
7360-7361		<b>Scaled Analog Inputs</b>					
+0	0x3B00	Analog input AI1	AI1min-AI1Max		UINT16	R	
+1	0x3B01	Analog input AI2	AI2min-AI2Max		UINT16	R	
7392-7393		<b>Raw Analog Inputs</b>					
+0	0x3B80	Analog input AI1	0-4095		UINT16	R	
+1	0x3B81	Analog input AI2	0-4095		UINT16	R	
7424-7425		<b>TOU Parameters</b>					
+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	
7456-7457		<b>Scaled Analog Outputs</b>					
+0	0x3C80	Analog output AO1	0-4095		UINT16	R/W	
+1	0x3C81	Analog output AO2	0-4095		UINT16	R/W	
7488-7503		<b>TOU Energy Register #1</b>					
+0,1	0x3D00	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x3D01	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x3D07	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
7552-7567		<b>TOU Energy Register #2</b>					
+0,1	0x3E00	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x3E01	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x3E07	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
7616-7631		<b>TOU Energy Register #3</b>					
+0,1	0x3F00	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x3F01	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x3F07	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
7680-7695		<b>TOU Energy Register #4</b>					
+0,1	0x4000	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x4001	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+14,15	0x4007	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
7744-7759		<b>TOU Energy Register #5</b>					
+0,1	0x4100	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x4101	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x4107	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
7808-7823		<b>TOU Energy Register #6</b>					
+0,1	0x4200	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x4201	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x4207	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
7872-7887		<b>TOU Energy Register #7</b>					
+0,1	0x4300	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x4301	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x4307	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
7936-7951		<b>TOU Energy Register #8</b>					
+0,1	0x4400	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x4401	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x4407	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
8000-8007		<b>Summary Energy Accumulated Demands</b>					
+0	0x4500	Summary register #1 demand	0-Pmax	U3	UINT16	R	
+1	0x4501	Summary register #2 demand	0-Pmax	U3	UINT16	R	
		...				R	
+7	0x4507	Summary register #8 demand	0-Pmax	U3	UINT16	R	
8032-8039		<b>Summary Energy Block Demands</b>					
+0	0x4580	Summary register #1 demand	0-Pmax	U3	UINT16	R	
+1	0x4581	Summary register #2 demand	0-Pmax	U3	UINT16	R	
		...				R	
+7	0x4587	Summary register #8 demand	0-Pmax	U3	UINT16	R	
8064-8071		<b>Summary Energy Sliding Window Demands</b>					
+0	0x4600	Summary register #1 demand	0-Pmax	U3	UINT16	R	
+1	0x4601	Summary register #2 demand	0-Pmax	U3	UINT16	R	
		...				R	
+7	0x4607	Summary register #8 demand	0-Pmax	U3	UINT16	R	
8160-8167		<b>Summary Energy Maximum Demands</b>					
+0	0x4780	Summary register #1 maximum demand	0-Pmax	U3	UINT16	R	
+1	0x4781	Summary register #2 maximum demand	0-Pmax	U3	UINT16	R	
		...				R	
+7	0x4787	Summary register #8 maximum demand	0-Pmax	U3	UINT16	R	
8192-8199		<b>TOU Maximum Demand Register #1</b>					
+0	0x4800	Tariff #1 maximum demand	0-Pmax	U3	UINT16	R	

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+1	0x4801	Tariff #2 maximum demand	0-Pmax	U3	UINT16	R	
		...				R	
+7	0x4807	Tariff #8 maximum demand	0-Pmax	U3	UINT16	R	
8256-8263		<b>TOU Maximum Demand Register #2</b>					
+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	
8320-8327		<b>TOU Maximum Demand Register #3</b>					
+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	
8224-8231		<b>TOU Maximum Demand Register #4</b>					
+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	
8288-8295		<b>TOU Maximum Demand Register #5</b>					
+0	0x4980	Tariff #1 maximum demand	0-Pmax	U3	UINT16	R	
+1	0x4981	Tariff #2 maximum demand	0-Pmax	U3	UINT16	R	
		...				R	
+7	0x4987	Tariff #8 maximum demand	0-Pmax	U3	UINT16	R	
8352-8359		<b>TOU Maximum Demand Register #6</b>					
+0	0x4A80	Tariff #1 maximum demand	0-Pmax	U3	UINT16	R	
+1	0x4A81	Tariff #2 maximum demand	0-Pmax	U3	UINT16	R	
		...				R	
+7	0x4A87	Tariff #8 maximum demand	0-Pmax	U3	UINT16	R	
8896-8903		<b>TOU Maximum Demand Register #7</b>					
+0	0x5300	Tariff #1 maximum demand	0-Pmax	U3	UINT16	R	
+1	0x5301	Tariff #2 maximum demand	0-Pmax	U3	UINT16	R	
		...				R	
+7	0x5307	Tariff #8 maximum demand	0-Pmax	U3	UINT16	R	
8928-8935		<b>TOU Maximum Demand Register #8</b>					
+0	0x5380	Tariff #1 maximum demand	0-Pmax	U3	UINT16	R	
+1	0x5381	Tariff #2 maximum demand	0-Pmax	U3	UINT16	R	
		...				R	
+7	0x5387	Tariff #8 maximum demand	0-Pmax	U3	UINT16	R	
9984-10033		<b>V1/V12 Harmonic Angles</b>					2, 4
+0	0x6400	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6401	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+49	0x6431	H50 Harmonic angle	-180.0-180.0	0.1°	INT16	R	



Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
10048-10097		<b>V2/V23 Harmonic Angles</b>					2, 4
+0	0x6500	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6501	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+49	0x6531	H50 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
10112-10161		<b>V3/V31 Harmonic Angles</b>					2, 4
+0	0x6600	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6601	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+49	0x6631	H50 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
10240-10289		<b>I1 Harmonic Angles</b>					4
+0	0x6800	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6801	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+49	0x6831	H50 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
10304-10353		<b>I2 Harmonic Angles</b>					4
+0	0x6900	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6901	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+49	0x6931	H50 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
10368-10417		<b>I3 Harmonic Angles</b>					4
+0	0x6A00	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6A01	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+49	0x6A31	H50 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
10560-10584		<b>10-Minute RMS Values</b>					
+0	0x6D00	V1 Voltage	0-Vmax	U1	UINT16	R	2
+1	0x6D01	V2 Voltage	0-Vmax	U1	UINT16	R	2
+2	0x6D02	V3 Voltage	0-Vmax	U1	UINT16	R	2
+3-16	0x6D03-0x6D10	Not used	0		UINT16	R	
+17	0x6D11	Zero-sequence voltage	0-Vmax	U1	UINT16	R	
+18	0x6D12	Zero-sequence current	0-Imax	U2	UINT16	R	
+19	0x6D13	Not used	0		UINT16	R	
+20	0x6D14	Negative-sequence voltage unbalance	0-300.0	0.1%	UINT16	R	
+21	0x6D15	Negative-sequence current unbalance	0-300.0	0.1%	UINT16	R	
+22-24	0x6D16-0x6D18	Not used	0		UINT16	R	
10688-10706		<b>10-Minute Total Harmonics</b>					
+0	0x6F00	V1 THD	0-999.9	0.1%	UINT16	R	2
+1	0x6F01	V2 THD	0-999.9	0.1%	UINT16	R	2
+2	0x6F02	V3 THD	0-999.9	0.1%	UINT16	R	2
+3	0x6F03	Not used	0		UINT16	R	

Address	Point ID	Description	Low and High Scales <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+4	0x6F04	I1 THD	0-999.9	0.1%	UINT16	R	
+5	0x6F05	I2 THD	0-999.9	0.1%	UINT16	R	
+6	0x6F06	I3 THD	0-999.9	0.1%	UINT16	R	
+7	0x6F07	Not used	0		UINT16	R	
+8	0x6F08	V1 interharmonic THD	0-999.9	0.1%	UINT16	R	2
+9	0x6F09	V2 interharmonic THD	0-999.9	0.1%	UINT16	R	2
+10	0x6FOA	V3 interharmonic THD	0-999.9	0.1%	UINT16	R	2
+11	0x6FOB	Not used	0		UINT16	R	
+12	0x6FOC	I1 interharmonic THD	0-999.9	0.1%	UINT16	R	
+13	0x6F0D	I2 interharmonic THD	0-999.9	0.1%	UINT16	R	
+14	0x6FOE	I3 interharmonic THD	0-999.9	0.1%	UINT16	R	
+15	0x6FOF	Not used	0		UINT16	R	
+16	0x6F10	I1 TDD	0-100.0	0.1%	UINT16	R	
+17	0x6F11	I2 TDD	0-100.0	0.1%	UINT16	R	
+18	0x6F12	I3 TDD	0-100.0	0.1%	UINT16	R	

**NOTES:**

- <sup>1</sup> When the 4LN3, 4LL3, 3LN3, 3LL3, 3BLN3 or 3BLL3 wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line.
- <sup>2</sup> 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.
- <sup>3</sup> 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 2.6.1, "16-bit Scaled Integer Format".
- <sup>4</sup> Harmonic angles are referenced to the fundamental voltage harmonic H01 on phase L1.
- <sup>5</sup> On a 0.2-s interval.
- <sup>6</sup> On a 3-s interval.

### 3.4 32-bit Analog Registers, Binary Registers and Counters

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
11776-11777	0x0000	<b>None</b>	0		UINT32	R	
11840	0x0080	<b>Setpoint Status SP1-SP16 (bitmap)</b>	0x00000000-0x0000FFFF		UINT32	R	
11904-11907		<b>Special Inputs</b>					
+0,1	0x0100	Not used	0		UINT32	R	
+2,3	0x0101	Phase rotation order	0=error, 1=positive (ABC), 2=negative (CBA)		UINT32	R	
12160-12161	0x0300	<b>Event Flags (bitmap)</b>	0x00000000-0x000000FF		UINT32	R	
12544-12545	0x0600	<b>Digital Inputs (bitmap)</b>	0x00000000-0x00000003		UINT32	R	
12800-12801	0x0800	<b>Relay Outputs (bitmap)</b>	0x00000000-0x00000003		UINT32	R	
13056-13063		<b>Counters</b>					
+0,1	0x0A00	Counter #1	0-999,999		UINT32	R/W	
+2,3	0x0A01	Counter #2	0-999,999		UINT32	R/W	
+4,5	0x0A02	Counter #3	0-999,999		UINT32	R/W	
+6,7	0x0A03	Counter #4	0-999,999		UINT32	R/W	
13248-13297		<b>1/2-Cycle Values</b>					
+0, 1	0x0B80	V1 Voltage	0-Vmax	U1	UINT32	R	1
+2, 3	0x0B81	V2 Voltage	0-Vmax	U1	UINT32	R	1
+4, 5	0x0B82	V3 Voltage	0-Vmax	U1	UINT32	R	1
+6, 7	0x0B83	Not used	0		UINT32	R	
+8, 9	0x0B84	V12 Voltage	0-Vmax	U1	UINT32	R	
+10, 11	0x0B85	V23 Voltage	0-Vmax	U1	UINT32	R	
+12, 13	0x0B86	V31 Voltage	0-Vmax	U1	UINT32	R	
+14, 15	0x0B87	I1 Current	0-Imax	U2	UINT32	R	
+16, 17	0x0B88	I2 Current	0-Imax	U2	UINT32	R	
+18, 19	0x0B89	I3 Current	0-Imax	U2	UINT32	R	
+20, 21	0x0B8A	Not used	0		UINT32	R	
+22, 23	0x0B8B	In Current	0-Imax	U2	UINT32	R	
13312-13377		<b>1-Cycle Phase Values</b>					
+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	

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+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	2, 5
+38,39	0x0C13	V2/V23 Voltage THD	0-9999	×0.1%	UINT32	R	2, 5
+40,41	0x0C14	V3/V31 Voltage THD	0-9999	×0.1%	UINT32	R	2, 5
+42,43	0x0C15	I1 Current THD	0-9999	×0.1%	UINT32	R	5
+44,45	0x0C16	I2 Current THD	0-9999	×0.1%	UINT32	R	5
+46,47	0x0C17	I3 Current THD	0-9999	×0.1%	UINT32	R	5
+48,49	0x0C18	I1 K-Factor	10-9999	×0.1	UINT32	R	5
+50,51	0x0C19	I2 K-Factor	10-9999	×0.1	UINT32	R	5
+52,53	0x0C1A	I3 K-Factor	10-9999	×0.1	UINT32	R	5
+54,55	0x0C1B	I1 Current TDD	0-1000	×0.1%	UINT32	R	5
+56,57	0x0C1C	I2 Current TDD	0-1000	×0.1%	UINT32	R	5
+58,59	0x0C1D	I3 Current TDD	0-1000	×0.1%	UINT32	R	5
+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	
13696-13703		<b>1-Cycle Total Values</b>					
+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	0-1.000	×0.001	UINT16	R	
+10,11	0x0F05	Total PF lead	0-1.000	×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	0x0FOA	3-phase average L-N/L-L voltage	0-Vmax	U1	UINT32	R	1
+22,23	0x0FOB	3-phase average L-L voltage	0-Vmax	U1	UINT32	R	
+24,25	0x0FOC	3-phase average current	0-Imax	U2	UINT32	R	
13824-13833		<b>1-Cycle Auxiliary Values</b>					
+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	0-3000	×0.1%	UINT32	R	
+8,9	0x1004	Current unbalance	0-3000	×0.1%	UINT32	R	
13888-13919		<b>Phasor</b>					
+0,1	0x1080	V1/V12 Voltage magnitude	0-Vmax	U1	UINT32	R	2

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+2,3	0x1081	V2/V23 Voltage magnitude	0-Vmax	U1	UINT32	R	2
+4,5	0x1082	V3/V31 Voltage magnitude	0-Vmax	U1	UINT32	R	2
+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	×0.1°	INT32	R	2
+18,19	0x1089	V2/V23 Voltage angle	-1800-1800	×0.1°	INT32	R	2
+20,21	0x108A	V3/V31 Voltage angle	-1800-1800	×0.1°	INT32	R	2
+22,23	0x108B	Not used			INT32	R	
+24,25	0x108C	I1 Current angle	-1800-1800	×0.1°	INT32	R	
+26,27	0x108D	I2 Current angle	-1800-1800	×0.1°	INT32	R	
+28,29	0x108E	I3 Current angle	-1800-1800	×0.1°	INT32	R	
+30,31	0x108F	Not used			INT32	R	
13952-14017		<b>1-Second Phase Values</b>					
+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	2,6
+38,39	0x1113	V2/V23 Voltage THD	0-9999	×0.1%	UINT32	R	2,6
+40,41	0x1114	V3/V31 Voltage THD	0-9999	×0.1%	UINT32	R	2,6
+42,43	0x1115	I1 Current THD	0-9999	×0.1%	UINT32	R	6
+44,45	0x1116	I2 Current THD	0-9999	×0.1%	UINT32	R	6
+46,47	0x1117	I3 Current THD	0-9999	×0.1%	UINT32	R	6
+48,49	0x1118	I1 K-Factor	10-9999	×0.1	UINT32	R	6
+50,51	0x1119	I2 K-Factor	10-9999	×0.1	UINT32	R	6
+52,53	0x111A	I3 K-Factor	10-9999	×0.1	UINT32	R	6

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+54,55	0x111B	I1 Current TDD	0-1000	×0.1%	UINT32	R	6
+56,57	0x111C	I2 Current TDD	0-1000	×0.1%	UINT32	R	6
+58,59	0x111D	I3 Current TDD	0-1000	×0.1%	UINT32	R	6
+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	
14336-14343		<b>1-Second Total Values</b>					
+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	0-1.000	×0.001	UINT16	R	
+10,11	0x1405	Total PF lead	0-1.000	×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	
+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		<b>1-Second Auxiliary Values</b>					
+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	0-3000	×0.1%	UINT32	R	
+8,9	0x1504	Current unbalance	0-3000	×0.1%	UINT32	R	
14528-14551		<b>Present Harmonic Demands</b>					
+0,1	0x1580	V1/V12 THD demand	0-9999	×0.1%	UINT32	R	2
+2,3	0x1581	V2/V23 THD demand	0-9999	×0.1%	UINT32	R	2
+4,5	0x1582	V3/V31 THD demand	0-9999	×0.1%	UINT32	R	2
+6,7	0x1583	Not used			UINT32	R	
+8,9	0x1584	I1 THD demand	0-9999	×0.1%	UINT32	R	
+10,11	0x1585	I2 THD demand	0-9999	×0.1%	UINT32	R	
+12,13	0x1586	I3 THD demand	0-9999	×0.1%	UINT32	R	
+14,15	0x1587	Not used			UINT32	R	
+16,17	0x1588	I1 TDD demand	0-1000	×0.1%	UINT32	R	
+18,19	0x1589	I2 TDD demand	0-1000	×0.1%	UINT32	R	
+20,21	0x158A	I3 TDD demand	0-1000	×0.1%	UINT32	R	
+22,23	0x158B	Not used			UINT32	R	
14592-14651		<b>Present Volt, Ampere and Power Demands</b>					
+0,1	0x1600	V1/V12 Volt demand	0-Vmax	U1	UINT32	R	2
+2,3	0x1601	V2/V23 Volt demand	0-Vmax	U1	UINT32	R	2
+4,5	0x1602	V3/V31 Volt demand	0-Vmax	U1	UINT32	R	2

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+6,7	0x1603	I1 Ampere demand	0-I <sub>max</sub>	U2	UINT32	R	
+8,9	0x1604	I2 Ampere demand	0-I <sub>max</sub>	U2	UINT32	R	
+10,11	0x1605	I3 Ampere demand	0-I <sub>max</sub>	U2	UINT32	R	
+12,13	0x1606	kW import block demand	0-P <sub>max</sub>	U3	UINT32	R	
+14,15	0x1607	kvar import block demand	0-P <sub>max</sub>	U3	UINT32	R	
+16,17	0x1608	kVA block demand	0-P <sub>max</sub>	U3	UINT32	R	
+18,19	0x1609	kW import sliding window demand	0-P <sub>max</sub>	U3	UINT32	R	
+20,21	0x160A	kvar import sliding window demand	0-P <sub>max</sub>	U3	UINT32	R	
+22,23	0x160B	kVA sliding window demand	0-P <sub>max</sub>	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-P <sub>max</sub>	U3	UINT32	R	
+32,33	0x1610	kvar import accumulated demand	0-P <sub>max</sub>	U3	UINT32	R	
+34,35	0x1611	kVA accumulated demand	0-P <sub>max</sub>	U3	UINT32	R	
+36,37	0x1612	kW import predicted sliding window demand	0-P <sub>max</sub>	U3	UINT32	R	
+38,39	0x1613	kvar import predicted sliding window demand	0-P <sub>max</sub>	U3	UINT32	R	
+40,41	0x1614	kVA predicted sliding window demand	0-P <sub>max</sub>	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-P <sub>max</sub>	U3	UINT32	R	
+46,47	0x1617	kvar export block demand	0-P <sub>max</sub>	U3	UINT32	R	
+48,49	0x1618	kW export sliding window demand	0-P <sub>max</sub>	U3	UINT32	R	
+50,51	0x1619	kvar export sliding window demand	0-P <sub>max</sub>	U3	UINT32	R	
+52,53	0x161A	kW export accumulated demand	0-P <sub>max</sub>	U3	UINT32	R	
+54,55	0x161B	kvar export accumulated demand	0-P <sub>max</sub>	U3	UINT32	R	
+56,57	0x161C	kW export predicted sliding window demand	0-P <sub>max</sub>	U3	UINT32	R	
+58,59	0x161D	kvar export predicted sliding window demand	0-P <sub>max</sub>	U3	UINT32	R	
14720-14763		<b>Total Energies</b>					
+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	0x170D	Not used			UINT32	R	
+28,29	0x170E	Not used			UINT32	R	

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+30,31	0x170F	Not used			UINT32	R	
+32,33	0x1710	Not used			UINT32	R	
+34,35	0x1711	Not used			UINT32	R	
+36,37	0x1712	kvarh Q1	0-999,999,999	kvarh	UINT32	R	
+38,39	0x1713	kvarh Q2	0-999,999,999	kvarh	UINT32	R	
+40,41	0x1714	kvarh Q3	0-999,999,999	kvarh	UINT32	R	
+42,43	0x1715	kvarh Q4	0-999,999,999	kvarh	UINT32	R	
14784-14799		<b>Summary Energy Registers</b>					
+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	
		...					
+14,15	0x1787	Summary energy register #8	0-999,999,999	kWh	UINT32	R	
14848-14865		<b>Phase Energies</b>					
+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	
14912-14931		<b>Symmetrical Components</b>					
+0, 1	0x1880	Positive-sequence voltage	0-Vmax	U1	UINT32	R	
+2, 3	0x1881	Negative-sequence voltage	0-Vmax	U1	UINT32	R	
+4, 5	0x1882	Zero-sequence voltage	0-Vmax	U1	UINT32	R	
+6, 7	0x1883	Negative-sequence voltage unbalance	0-3000	×0.1%	UINT32	R	
+8, 9	0x1884	Zero-sequence voltage unbalance	0-3000	×0.1%	UINT32	R	
+10, 11	0x1885	Positive-sequence current	0-Imax	U2	UINT32	R	
+12, 13	0x1886	Negative-sequence current	0-Imax	U2	UINT32	R	
+14, 15	0x1887	Zero-sequence current	0-Imax	U2	UINT32	R	
+16, 17	0x1888	Negative-sequence current unbalance	0-3000	×0.1%	UINT32	R	
+18, 19	0x1889	Zero-sequence current unbalance	0-3000	×0.1%	UINT32	R	
14976-15075		<b>V1/V12 Harmonic Distortion</b>					2
+0,1	0x1900	H01 Harmonic distortion	0-10000	×0.01%	UINT32	R	
+2,3	0x1901	H02 Harmonic distortion	0-10000	×0.01%	UINT32	R	
		...					
+98,99	0x1931	H50 Harmonic distortion	0-10000	×0.01%	UINT32	R	
15104-15203		<b>V2/V23 Harmonic Distortion</b>					2
+0,1	0x1A00	H01 Harmonic distortion	0-10000	×0.01%	UINT32	R	
+2,3	0x1A01	H02 Harmonic distortion	0-10000	×0.01%	UINT32	R	
		...					
+98,99	0x1A31	H50 Harmonic distortion	0-10000	×0.01%	UINT32	R	



Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
15232-15331		<b>V3/V31 Harmonic Distortion</b>					2
+0,1	0x1B00	H01 Harmonic distortion	0-10000	×0.01%	UINT32	R	
+2,3	0x1B01	H02 Harmonic distortion	0-10000	×0.01%	UINT32	R	
		...					
+98,99	0x1B31	H50 Harmonic distortion	0-10000	×0.01%	UINT32	R	
15360-15459		<b>I1 Harmonic Distortion</b>					
+0,1	0x1C00	H01 Harmonic distortion	0-10000	×0.01%	UINT32	R	
+2,3	0x1C01	H02 Harmonic distortion	0-10000	×0.01%	UINT32	R	
		...					
+98,99	0x1C31	H50 Harmonic distortion	0-10000	×0.01%	UINT32	R	
15488-15587		<b>I2 Harmonic Distortion</b>					
+0,1	0x1D00	H01 Harmonic distortion	0-10000	×0.01%	UINT32	R	
+2,3	0x1D01	H02 Harmonic distortion	0-10000	×0.01%	UINT32	R	
		...					
+98,99	0x1D31	H50 Harmonic distortion	0-10000	×0.01%	UINT32	R	
15616-15715		<b>I3 Harmonic Distortion</b>					
+0,1	0x1E00	H01 Harmonic distortion	0-10000	×0.01%	UINT32	R	
+2,3	0x1E01	H02 Harmonic distortion	0-10000	×0.01%	UINT32	R	
		...					
+98,99	0x1E31	H50 Harmonic distortion	0-10000	×0.01%	UINT32	R	
17024-17059		<b>Fundamental Phase Values</b>					5
+0,1	0x2900	V1/V12 Voltage	0-Vmax	U1	UINT32	R	2
+2,3	0x2901	V2/V23 Voltage	0-Vmax	U1	UINT32	R	2
+4,5	0x2902	V3/V31 Voltage	0-Vmax	U1	UINT32	R	2
+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	
+32,33	0x2910	Power factor L2	-1000-1000	×0.001	INT32	R	
+34,35	0x2911	Power factor L3	-1000-1000	×0.001	INT32	R	
17088-17099		<b>Flicker</b>					2
+0,1	0x2980	V1 Pst	0-10000	×0.01	UINT32	R	
+2,3	0x2981	V2 Pst	0-10000	×0.01	UINT32	R	
+4,5	0x2982	V3 Pst	0-10000	×0.01	UINT32	R	

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+6,7	0x2983	V1 Plt	0-10000	×0.01	UINT32	R	
+8,9	0x2984	V2 Plt	0-10000	×0.01	UINT32	R	
+10,11	0x2985	V3 Plt	0-10000	×0.01	UINT32	R	
17152-17159		<b>Fundamental Total Values</b>					5
+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		<b>Minimum 1-Cycle Phase Values</b>					
+0,1	0x2C00	V1/V12 Voltage	0-Vmax	U1	UINT32	R	2
+2,3	0x2C01	V2/V23 Voltage	0-Vmax	U1	UINT32	R	2
+4,5	0x2C02	V3/V31 Voltage	0-Vmax	U1	UINT32	R	2
+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	
+12-35	0x2C06-0x2C11	Not used	0		INT32	R	
+36,37	0x2C12	V1/V12 Voltage THD	0-9999	×0.1%	UINT32	R	2, 5
+38,39	0x2C13	V2/V23 Voltage THD	0-9999	×0.1%	UINT32	R	2, 5
+40,41	0x2C14	V3/V31 Voltage THD	0-9999	×0.1%	UINT32	R	2, 5
+42,43	0x2C15	I1 Current THD	0-9999	×0.1%	UINT32	R	5
+44,45	0x2C16	I2 Current THD	0-9999	×0.1%	UINT32	R	5
+46,47	0x2C17	I3 Current THD	0-9999	×0.1%	UINT32	R	5
+48,49	0x2C18	I1 K-Factor	10-9999	×0.1	UINT32	R	5
+50,51	0x2C19	I2 K-Factor	10-9999	×0.1	UINT32	R	5
+52,53	0x2C1A	I3 K-Factor	10-9999	×0.1	UINT32	R	5
+54,55	0x2C1B	I1 Current TDD	0-1000	×0.1%	UINT32	R	5
+56,57	0x2C1C	I2 Current TDD	0-1000	×0.1%	UINT32	R	5
+58,59	0x2C1D	I3 Current TDD	0-1000	×0.1%	UINT32	R	5
17536-17543		<b>Minimum 1-Cycle Total Values</b>					
+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		<b>Minimum 1-Cycle Auxiliary Values</b>					
+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		<b>Maximum 1-Cycle Phase Values</b>					
+0,1	0x3400	V1/V12 Voltage	0-Vmax	U1	UINT32	R	2
+2,3	0x3401	V2/V23 Voltage	0-Vmax	U1	UINT32	R	2
+4,5	0x3402	V3/V31 Voltage	0-Vmax	U1	UINT32	R	2
+6,7	0x3403	I1 Current	0-Imax	U2	UINT32	R	

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+8,9	0x3404	I2 Current	0-Imax	U2	UINT32	R	
+10,11	0x3405	I3 Current	0-Imax	U2	UINT32	R	
+12-35	0x3406-0x3411	Not used	0		INT32	R	
+36,37	0x3412	V1/V12 Voltage THD	0-9999	×0.1%	UINT32	R	2, 5
+38,39	0x3413	V2/V23 Voltage THD	0-9999	×0.1%	UINT32	R	2, 5
+40,41	0x3414	V3/V31 Voltage THD	0-9999	×0.1%	UINT32	R	2, 5
+42,43	0x3415	I1 Current THD	0-9999	×0.1%	UINT32	R	5
+44,45	0x3416	I2 Current THD	0-9999	×0.1%	UINT32	R	5
+46,47	0x3417	I3 Current THD	0-9999	×0.1%	UINT32	R	5
+48,49	0x3418	I1 K-Factor	10-9999	×0.1	UINT32	R	5
+50,51	0x3419	I2 K-Factor	10-9999	×0.1	UINT32	R	5
+52,53	0x341A	I3 K-Factor	10-9999	×0.1	UINT32	R	5
+54,55	0x341B	I1 Current TDD	0-1000	×0.1%	UINT32	R	5
+56,57	0x341C	I2 Current TDD	0-1000	×0.1%	UINT32	R	5
+58,59	0x341D	I3 Current TDD	0-1000	×0.1%	UINT32	R	5
18560-18567		<b>Maximum 1-Cycle Total Values</b>					
+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		<b>Maximum 1-Cycle Auxiliary Values</b>					
+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		<b>Maximum Demands</b>					
+0,1	0x3700	V1/V12 Maximum volt demand	0-Vmax	U1	UINT32	R	2
+2,3	0x3701	V2/V23 Maximum volt demand	0-Vmax	U1	UINT32	R	2
+4,5	0x3702	V3/V31 Maximum volt demand	0-Vmax	U1	UINT32	R	2
+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	

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
19008-19031		<b>Maximum Harmonic Demands</b>					
+0,1	0x3880	V1/V12 THD demand	0-9999	×0.1%	UINT32	R	2
+2,3	0x3881	V2/V23 THD demand	0-9999	×0.1%	UINT32	R	2
+4,5	0x3882	V3/V31 THD demand	0-9999	×0.1%	UINT32	R	2
+6,7	0x3883	Not used			UINT32	R	
+8,9	0x3884	I1 THD demand	0-9999	×0.1%	UINT32	R	
+10,11	0x3885	I2 THD demand	0-9999	×0.1%	UINT32	R	
+12,13	0x3886	I3 THD demand	0-9999	×0.1%	UINT32	R	
+14,15	0x3887	Not used			UINT32	R	
+16,17	0x3888	I1 TDD demand	0-1000	×0.1%	UINT32	R	
+18,19	0x3889	I2 TDD demand	0-1000	×0.1%	UINT32	R	
+20,21	0x388A	I3 TDD demand	0-1000	×0.1%	UINT32	R	
+22,23	0x388B	Not used			UINT32	R	
19328-19359		<b>Scaled Analog Inputs</b>					
+0,1	0x3B00	Analog input A11	A11min-A11Max		UINT32	R	
+2,3	0x3B01	Analog input A12	A12min-A12Max		UINT32	R	
19392-19393		<b>Raw Analog Inputs</b>					
+0,1	0x3B80	Analog input A11	0-4095		UINT32	R	
+2,3	0x3B81	Analog input A12	0-4095		UINT32	R	
19456-19459		<b>TOU Parameters</b>					
+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	
19520-19524		<b>Scaled Analog Outputs</b>					
+0,1	0x3C80	Analog output AO1	0-4095		UINT32	R/W	
+2,3	0x3C81	Analog output AO2	0-4095		UINT32	R/W	
19584-19599		<b>TOU Energy Register #1</b>					
+0,1	0x3D00	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x3D01	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x3D07	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
19712-19727		<b>TOU Energy Register #2</b>					
+0,1	0x3E00	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x3E01	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x3E07	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
19840-19855		<b>TOU Energy Register #3</b>					
+0,1	0x3F00	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x3F01	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+14,15	0x3F07	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
19968-19983		<b>TOU Energy Register #4</b>					
+0,1	0x4000	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x4001	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x4007	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
20096-20111		<b>TOU Energy Register #5</b>					
+0,1	0x4100	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x4101	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x4107	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
20224-20239		<b>TOU Energy Register #6</b>					
+0,1	0x4200	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x4201	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x4207	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
20352-20367		<b>TOU Energy Register #7</b>					
+0,1	0x4300	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x4301	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x4307	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
20480-20495		<b>TOU Energy Register #8</b>					
+0,1	0x4400	Tariff #1 register	0-999,999,999	1 kWh	UINT32	R	
+2,3	0x4401	Tariff #2 register	0-999,999,999	1 kWh	UINT32	R	
		...				R	
+14,15	0x4407	Tariff #8 register	0-999,999,999	1 kWh	UINT32	R	
20608-20623		<b>Summary Energy Accumulated Demands</b>					
+0,1	0x4500	Summary register #1 demand	0-Pmax	U3	UINT32	R	
+2,3	0x4501	Summary register #2 demand	0-Pmax	U3	UINT32	R	
		...					
+14,15	0x4507	Summary register #8 demand	0-Pmax	U3	UINT32	R	
20672-20687		<b>Summary Energy Block Demands</b>					
+0,1	0x4580	Summary register #1 demand	0-Pmax	U3	UINT32	R	
+2,3	0x4581	Summary register #2 demand	0-Pmax	U3	UINT32	R	
		...					
+14,15	0x4587	Summary register #8 demand	0-Pmax	U3	UINT32	R	
20736-20751		<b>Summary Energy Sliding Window Demands</b>					
+0,1	0x4600	Summary register #1 demand	0-Pmax	U3	UINT32	R	
+2,3	0x4601	Summary register #2 demand	0-Pmax	U3	UINT32	R	
		...					
+14,15	0x4607	Summary register #8 demand	0-Pmax	U3	UINT32	R	
20928-20943		<b>Summary Energy Maximum Demands</b>					
+0,1	0x4780	Summary register #1 maximum demand	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+2,3	0x4781	Summary register #2 maximum demand	0-Pmax	U3	UINT32	R	
		...					
+14,15	0x4787	Summary register #8 maximum demand	0-Pmax	U3	UINT32	R	
20992-21023		<b>TOU Maximum Demand Register #1</b>					
+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		<b>TOU Maximum Demand Register #2</b>					
+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		<b>TOU Maximum Demand Register #3</b>					
+0,1	0x4A00	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+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	
21056-21071		<b>TOU Maximum Demand Register #4</b>					
+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	
21184-21199		<b>TOU Maximum Demand Register #5</b>					
+0,1	0x4980	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4981	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x4987	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
21312-21325		<b>TOU Maximum Demand Register #6</b>					
+0,1	0x4A80	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4A81	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x4A87	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
22400-22415		<b>TOU Maximum Demand Register #7</b>					
+0,1	0x5300	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x5301	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x5307	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
22464-22479		<b>TOU Maximum Demand Register #8</b>					
+0,1	0x5380	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x5381	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x5387	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
24576-24675		<b>V1/V12 Harmonic Angles</b>					2, 4
+0,1	0x6400	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6401	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+98,99	0x6431	H50 Harmonic angle	-1800-1800	×0.1°	INT32	R	
24704-24803		<b>V2/V23 Harmonic Angles</b>					2, 4
+0,1	0x6500	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6501	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+98,99	0x6531	H50 Harmonic angle	-1800-1800	×0.1°	INT32	R	
24832-24931		<b>V3/V31 Harmonic Angles</b>					2, 4
+0,1	0x6600	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6601	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+98,99	0x6631	H50 Harmonic angle	-1800-1800	×0.1°	INT32	R	
25088-25187		<b>I1 Harmonic Angles</b>					4
+0,1	0x6800	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6801	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+98,99	0x6831	H50 Harmonic angle	-1800-1800	×0.1°	INT32	R	
25216-25315		<b>I2 Harmonic Angles</b>					4
+0,1	0x6900	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6901	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+98,99	0x6931	H50 Harmonic angle	-1800-1800	×0.1°	INT32	R	
25344-25443		<b>I3 Harmonic Angles</b>					4
+0,1	0x6A00	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6A01	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+98,99	0x6A31	H50 Harmonic angle	-1800-1800	×0.1°	INT32	R	
25728-25777		<b>10-Minute RMS Values</b>					
+0,1	0x6D00	V1 Voltage	0-Vmax	U1	UINT32	R	2
+2,3	0x6D01	V2 Voltage	0-Vmax	U1	UINT32	R	2
+4,5	0x6D02	V3 Voltage	0-Vmax	U1	UINT32	R	2
+6-33		Not used	0		UINT32	R	
+34,35	0x6D11	Zero-sequence voltage	0-Vmax	U1	UINT32	R	
+36,37	0x6D12	Zero-sequence current	0-Imax	U2	UINT32	R	
+38,39	0x6D13	Not used	0		UINT32	R	
+40,41	0x6D14	Negative-sequence voltage unbalance	0-3000	×0.1%	UINT32	R	
+42,43	0x6D15	Negative-sequence current unbalance	0-3000	×0.1%	UINT32	R	
+44-49	0x6D16-0x6D18	Not used	0		UINT32	R	

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
25984-26021		<b>10-Minute Total Harmonics</b>					
+0,1	0x6F00	V1 THD	0-9999	×0.1%	UINT32	R	2
+2,3	0x6F01	V2 THD	0-9999	×0.1%	UINT32	R	2
+4,5	0x6F02	V3 THD	0-9999	×0.1%	UINT32	R	2
+6,7	0x6F03	Not used	0		UINT32	R	
+8,9	0x6F04	I1 THD	0-9999	×0.1%	UINT32	R	
+10,11	0x6F05	I2 THD	0-9999	×0.1%	UINT32	R	
+12,13	0x6F06	I3 THD	0-9999	×0.1%	UINT32	R	
+14,15	0x6F07	Not used	0		UINT32	R	
+16,17	0x6F08	V1 interharmonic THD	0-9999	×0.1%	UINT32	R	2
+18,19	0x6F09	V2 interharmonic THD	0-9999	×0.1%	UINT32	R	2
+20,21	0x6FOA	V3 interharmonic THD	0-9999	×0.1%	UINT32	R	2
+22,23	0x6FOB	Not used	0		UINT32	R	
+24,25	0x6FOC	I1 interharmonic THD	0-9999	×0.1%	UINT32	R	
+26,27	0x6FOD	I2 interharmonic THD	0-9999	×0.1%	UINT32	R	
+28,29	0x6FOE	I3 interharmonic THD	0-9999	×0.1%	UINT32	R	
+30,31	0x6FOF	Not used	0		UINT32	R	
+32,33	0x6F10	I1 TDD	0-1000	×0.1%	UINT32	R	
+34,35	0x6F11	I2 TDD	0-1000	×0.1%	UINT32	R	
+36,37	0x6F12	I3 TDD	0-1000	×0.1%	UINT32	R	
		<b>Generic TOU Season Energy Registers</b>					Point references
	0x7000	Tariff #1 register	0-999,999,999	1 kWh	UINT32		
	0x7001	Tariff #2 register	0-999,999,999	1 kWh	UINT32		
		...					
	0x7007	Tariff #8 register	0-999,999,999	1 kWh	UINT32		
		<b>Generic TOU Season Maximum Demand Registers</b>					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		
		<b>Generic Data</b>					Point references
	0x7400	V1 voltage	0-Vmax	U1	UINT32		1
	0x7401	V2 voltage	0-Vmax	U1	UINT32		1
	0x7402	V3 voltage	0-Vmax	U1	UINT32		1
	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		
	0x7414	Voltage unbalance	0-3000	×0.1%	UINT32		
	0x7418	Frequency	0-10000	×0.01Hz	UINT32		



Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
	0x7419	V1 THD	0-9999	×0.1%	UINT32		2
	0x741A	V2 THD	0-9999	×0.1%	UINT32		2
	0x741B	V3 THD	0-9999	×0.1%	UINT32		2
	0x7421	V1 interharmonic THD	0-9999	×0.1%	UINT32		2
	0x7422	V2 interharmonic THD	0-9999	×0.1%	UINT32		2
	0x7423	V3 interharmonic THD	0-9999	×0.1%	UINT32		2
	0x750F	V1 impulsive voltage	0-Vmax	U1	UINT32		
	0x7510	V2 impulsive voltage	0-Vmax	U1	UINT32		
	0x7511	V3 impulsive voltage	0-Vmax	U1	UINT32		
	0x7513	V12 impulsive voltage	0-Vmax	U1	UINT32		
	0x7514	V23 impulsive voltage	0-Vmax	U1	UINT32		
	0x7515	V31 impulsive voltage	0-Vmax	U1	UINT32		
	0x1900	V1 H01 harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x1901	V1 H02 harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
		...					
	0x1931	V1 H50 harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x1A00	V2 H01 harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x1A01	V2 H02 harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
		...					
	0x1A31	V2 H50 harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x1B00	V3 H01 harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x1B01	V3 H02 harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
		...					
	0x1B31	V3 H50 harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x2980	V1 Pst	0-10000	×0.01	UINT32		2
	0x2981	V2 Pst	0-10000	×0.01	UINT32		2
	0x2982	V3 Pst	0-10000	×0.01	UINT32		2
	0x2983	V1 Plt	0-10000	×0.01	UINT32		2
	0x2984	V2 Plt	0-10000	×0.01	UINT32		2
	0x2985	V3 Plt	0-10000	×0.01	UINT32		2
	0x5B02	Rapid voltage change on phase V1, %Un		0.01%	UINT32		
	0x5B04	Rapid voltage change on phase V2, %Un		0.01%	UINT32		
	0x5B06	Rapid voltage change on phase V3, %Un		0.01%	UINT32		
	0x6005	V1 Frq1 %Un, 1st signaling voltage magnitude V1	0-10000	×0.01%	UINT32		2
	0x6006	V1 Frq2 %Un, 2nd signaling voltage magnitude V1	0-10000	×0.01%	UINT32		2
	0x6007	V1 Frq3 %Un, 3rd signaling voltage magnitude V1	0-10000	×0.01%	UINT32		2
	0x6008	V1 Frq4 %Un, 4th signaling voltage magnitude V1	0-10000	×0.01%	UINT32		2
	0x600A	V2 Frq1 %Un, 1st signaling voltage magnitude V2	0-10000	×0.01%	UINT32		2
	0x600B	V2 Frq2 %Un, 2nd signaling voltage magnitude V2	0-10000	×0.01%	UINT32		2
	0x600C	V2 Frq3 %Un, 3rd signaling voltage magnitude V2	0-10000	×0.01%	UINT32		2
	0x600D	V2 Frq4 %Un, 4th signaling voltage magnitude V2	0-10000	×0.01%	UINT32		2
	0x600F	V3 Frq1 %Un, 1st signaling voltage magnitude V3	0-10000	×0.01%	UINT32		2
	0x6010	V3 Frq2 %Un, 2nd signaling voltage magnitude V3	0-10000	×0.01%	UINT32		2

Address	Point ID	Description	Options/Range <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
	0x6011	V3 Frq3 %Un, 3rd signaling voltage magnitude V3	0-10000	×0.01%	UINT32		2
	0x6012	V3 Frq4 %Un, 4th signaling voltage magnitude V3	0-10000	×0.01%	UINT32		2

**NOTES:**

- <sup>1</sup> When the 4LN3, 4LL3, 3LN3, 3LL3, 3BLN3 or 3BLL3 wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line.
- <sup>2</sup> 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.
- <sup>3</sup> For volts, amps, power and frequency scales and units, refer to Section 4 "Data Scales and Units".
- <sup>4</sup> Harmonic angles are referenced to the fundamental voltage harmonic H01 on phase L1.
- <sup>5</sup> On a 0.2-s interval.
- <sup>6</sup> On a 3-s interval.

### 3.5 Minimum/Maximum Log Registers

Address	Point ID	Description	Options/Range/Format <sup>2</sup>	Units <sup>2</sup>	Type	R/W	Notes
35840-35959		<b>Minimum Phase Values</b>					
+0,1 +2,3	0x2C00	Min. V1/V12 Voltage Timestamp	0-Vmax F1	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+4,5 +6,7	0x2C01	Min. V2/V23 Voltage Timestamp	0-Vmax F1	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+8,9 +10,11	0x2C02	Min. V3/V31 Voltage Timestamp	0-Vmax F1	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+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	
+24-71	0x2C06- 0x2C11	Not used	0		INT32	R	
+72,73 +74,75	0x2C12	Min. V1/V12 Voltage THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>1, 3</sup>
+76,77 +78,79	0x2C13	Min. V2/V23 Voltage THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>1, 3</sup>
+80,81 +82,83	0x2C14	Min. V3/V31 Voltage THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>1, 3</sup>
+84,85 +86,87	0x2C15	Min. I1 Current THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
+88,89 +90,91	0x2C16	Min. I2 Current THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
+92,93 +94,95	0x2C17	Min. I3 Current THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
+96,97 +98,99	0x2C18	Min. I1 K-Factor Timestamp	10-9999	×0.1 sec	UINT32 UINT32	R R	<sup>3</sup>
+100,101 +102,103	0x2C19	Min. I2 K-Factor Timestamp	10-9999	×0.1 sec	UINT32 UINT32	R R	<sup>3</sup>
+104,105 +106,107	0x2C1A	Min. I3 K-Factor Timestamp	10-9999	×0.1 sec	UINT32 UINT32	R R	<sup>3</sup>
+108,109 +110,111	0x2C1B	Min. I1 Current TDD Timestamp	0-1000	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
+112,113 +114,115	0x2C1C	Min. I2 Current TDD Timestamp	0-1000	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
+116,117 +118,119	0x2C1D	Min. I3 Current TDD Timestamp	0-1000	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>

Address	Point ID	Description	Options/Range/Format <sup>2</sup>	Units <sup>2</sup>	Type	R/W	Notes
36096-36111		<b>Minimum Total Values</b>					
+0,1 +2,3	0x2D00	Min. Total kW Timestamp	-Pmax-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x2D01	Min. Total kvar Timestamp	-Pmax-Pmax	U3 sec	UINT32 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		<b>Minimum Auxiliary Values</b>					
+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		<b>Maximum Phase Values</b>					
+0,1 +2,3	0x3400	Max. V1/V12 Voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+4,5 +6,7	0x3401	Max. V2/V23 Voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+8,9 +10,11	0x3402	Max. V3/V31 Voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+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 +22,23	0x3405	Max. I3 Current Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+24-71	0x3406- 0x3411	Not used	0		INT32	R	
+72,73 +74,75	0x3412	Max. V1/V12 Voltage THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>1, 3</sup>
+76,77 +78,79	0x3413	Max. V2/V23 Voltage THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>1, 3</sup>
+80,81 +82,83	0x3414	Max. V3/V31 Voltage THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>1, 3</sup>
+84,85 +86,87	0x3415	Max. I1 Current THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
+88,89 +90,91	0x3416	Max. I2 Current THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
+92,93 +94,95	0x3417	Max. I3 Current THD Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
+96,97	0x3418	Max. I1 K-Factor	10-9999	×0.1	UINT32	R	<sup>3</sup>

Address	Point ID	Description	Options/Range/Format <sup>2</sup>	Units <sup>2</sup>	Type	R/W	Notes
+98,99		Timestamp		sec	UINT32	R	
+100,101 +102,103	0x3419	Max. I2 K-Factor Timestamp	10-9999	×0.1 sec	UINT32 UINT32	R R	<sup>3</sup>
+104,105 +106,107	0x341A	Max. I3 K-Factor Timestamp	10-9999	×0.1 sec	UINT32 UINT32	R R	<sup>3</sup>
+108,109 +110,111	0x341B	Max. I1 Current TDD Timestamp	0-1000	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
+112,113 +114,115	0x341C	Max. I2 Current TDD Timestamp	0-1000	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
+116,117 +118,119	0x341D	Max. I3 Current TDD Timestamp	0-1000	×0.1% sec	UINT32 UINT32	R R	<sup>3</sup>
37120-37135		<b>Maximum Total Values</b>					
+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		<b>Maximum Auxiliary Values</b>					
+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		<b>Summary Energy Maximum Demands</b>					
+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	
		...					
+28,29 +30,31	0x4783	Summary register #8 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
37632-37695		<b>Maximum Demands</b>					
+0,1 +2,3	0x3700	V1/V12 Maximum volt demand Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+4,5 +6,7	0x3701	V2/V23 Maximum volt demand Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+8,9 +10,11	0x3702	V3/V31 Maximum volt demand Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+12,13 +14,15	0x3703	I1 Maximum ampere demand Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	

Address	Point ID	Description	Options/Range/Format <sup>2</sup>	Units <sup>2</sup>	Type	R/W	Notes
+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	
+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	
38016-38063		<b>Maximum Harmonic Demands</b>					
+0,1 +2,3	0x3880	V1/V12 THD demand Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>1</sup>
+4,5 +6,7	0x3881	V2/V23 THD demand Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>1</sup>
+8,9 +10,11	0x3882	V3/V31 THD demand Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	<sup>1</sup>
+12,13 +14,15	0x3883	Not used			UINT32 UINT32	R R	
+16,17 +18,19	0x3884	I1 THD demand Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	
+20,21 +22,23	0x3885	I2 THD demand Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	
+24,25 +26,27	0x3886	I3 THD demand Timestamp	0-9999	×0.1% sec	UINT32 UINT32	R R	
+28,29 +30,31	0x3887	Not used			UINT32 UINT32	R R	
+32,33	0x3888	I1 TDD demand	0-1000	×0.1%	UINT32	R	

Address	Point ID	Description	Options/Range/Format <sup>2</sup>	Units <sup>2</sup>	Type	R/W	Notes
+34,35		Timestamp		sec	UINT32	R	
+36,37	0x3889	I2 TDD demand	0-1000	×0.1%	UINT32	R	
+38,39		Timestamp		sec	UINT32	R	
+40,41	0x388A	I3 TDD demand	0-1000	×0.1%	UINT32	R	
+42,43		Timestamp		sec	UINT32	R	
+44,45	0x388B	Not used			UINT32	R	
+46,47					UINT32	R	
38144-38175		<b>TOU Maximum Demand Register #1</b>					
+0,1	0x4800	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3		Timestamp		sec	UINT32	R	
+4,5	0x4801	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
+6,7		Timestamp		sec	UINT32	R	
		...				R	
+28,29	0x4807	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
+30,31		Timestamp		sec	UINT32	R	
38400-38431		<b>TOU Maximum Demand Register #2</b>					
+0,1	0x4900	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3		Timestamp		sec	UINT32	R	
+4,5	0x4901	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
+6,7		Timestamp		sec	UINT32	R	
		...				R	
+28,29	0x4907	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
+30,31		Timestamp		sec	UINT32	R	
38656-38687		<b>TOU Maximum Demand Register #3</b>					
+0,1	0x4A00	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3		Timestamp		sec	UINT32	R	
+4,5	0x4A01	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
+6,7		Timestamp		sec	UINT32	R	
		...				R	
+28,29	0x4A07	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
+30,31		Timestamp		sec	UINT32	R	
38272-38313		<b>TOU Maximum Demand Register #4</b>					
+0,1	0x4880	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3		Timestamp		sec	UINT32	R	
+4,5	0x4881	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
+6,7		Timestamp		sec	UINT32	R	
		...				R	
+28,29	0x4887	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
+30,31		Timestamp		sec	UINT32	R	
38528-38559		<b>TOU Maximum Demand Register #5</b>					
+0,1	0x4980	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3		Timestamp		sec	UINT32	R	
+4,5	0x4981	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
+6,7		Timestamp		sec	UINT32	R	

Address	Point ID	Description	Options/Range/Format <sup>2</sup>	Units <sup>2</sup>	Type	R/W	Notes
		...				R	
+28,29 +30,31	0x4987	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38784-38815		<b>TOU Maximum Demand Register #6</b>					
+0,1 +2,3	0x4A80	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4A81	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		...				R	
+28,29 +30,31	0x4A87	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38912-38943		<b>TOU Maximum Demand Register #7</b>					
+0,1 +2,3	0x5300	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x5301	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		...				R	
+28,29 +30,31	0x5307	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
39040-39071		<b>TOU Maximum Demand Register #8</b>					
+0,1 +2,3	0x5380	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x5381	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		...				R	
+28,29 +30,31	0x5387	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	

**NOTES:**

<sup>1</sup> 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.

<sup>2</sup> For volts, amps, power and frequency scales and units, refer to Section 4 "Data Scales and Units".

<sup>3</sup> On a 0.2-s interval.



### 3.6 Device Control and Status Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Device Restart Register</b>							
2560		Warm restart of the device	0 when read, 0xFFFF when written = restart the device		UINT16	R/W	
<b>Device Identification</b>							
2561-2562		Not used	0		UINT16	R	
2563		Firmware build number	1-99		UINT16	R	
2564		Not used	0		UINT16	R	
2565		Firmware version number	2500-2599		UINT16	R	Two higher decimal digits = major version number, two lower decimal digits = minor version number
2566,2567		Instrument options	F28		UINT32	R	
<b>Device Authorization Registers</b>							
2575		Write: 4-digit password. Read: 0 = access permitted, -1 = authorization required.	0-9999 (write) 0/-1 (read)		INT16	R/W	
44378-44379		Write: 8-digit password. Read: 0 = access permitted, -1 = authorization required.	0 - 99999999 (write) 0/-1 (read)		INT32	R/W	
<b>Event Flags Registers (bit map)</b>							
44032		Event flags set register (0 = no effect, 1 = set)	0x0000 - 0x00FF		UINT16	W	
44034		Event flags clear register (0=clear, 1 = no effect)	0x0000 - 0x00FF		UINT16	W	
44036		Event flags status (0 = cleared, 1 = set)	0x0000 - 0x00FF		UINT16	R	
<b>Remote Relay Control Registers (bit map)</b>							
44038-44045		Not used			UINT16		
44046		Force relay operate register (0 = no effect, 1 = operate)	0x0000 - 0x0003		UINT16	W	
44050		Force relay release register (0 = no effect, 1 = release)	0x0000 - 0x0003		UINT16	W	
44054		Locally latched relays status (0 = unlatched, 1 = locally latched)	0x0000 - 0x0003		UINT16	R	
44058		Remote latched relays status (0 = unlatched, 1 = remote latched)	0x0000 - 0x0003		UINT16	R	
44062		Remote relay control disabled status (0 = remote control enabled, 1 = remote control disabled)	0x0000 - 0x0003		UINT16	R	Remote relay control is disabled if the internal pulse source is linked to the relay
44066		Relay status (0 = open, 1 = closed)	0x0000 - 0x0003		UINT16	R	
44070		Latch relays (0 = not latched mode, 1 = latched mode)	0x0000 - 0x0003		UINT16	R	
44074		Pulse relays (0 = not pulse mode, 1 = pulse mode)	0x0000 - 0x0003		UINT16	R	
44078		KYZ relays (0 = not KYZ mode, 1 = KYZ mode)	0x0000 - 0x0003		UINT16	R	
44082		Relay polarity (0 = normal mode, 1 = inverting mode)	0x0000 - 0x0003		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
44086-44101		Reserved			UINT16		
<b>Reset/Clear Registers</b>							
44102		Clear energies	0		UINT16	W	
44103		Clear maximum demands	0 = clear all maximum demands 1 = clear power demands 2 = clear volt, ampere and harmonic demands		UINT16	W	
44104		Clear summary and TOU energy registers	0		UINT16	W	
44105		Clear summary and TOU maximum demands	0		UINT16	W	
44106		Clear counters	0 = clear all counters, 1-4 = clear counter #1-#4		UINT16	W	
44107		Clear Min/Max log	0		UINT16	W	
44108		Clear operation/event counters	0 = clear EN50160 counters 6 = clear communication counters		UINT16	W	
44109-44133		Reserved			UINT16		
<b>Device Mode Control Registers</b>							
44134-44135		Reserved			UINT16		
44136		PQ recorder	0 = disabled, 1 = enabled		UINT16	R/W	
44137-44165		Reserved			UINT16		
<b>Memory Status Registers</b>							
44262-44263		Memory size, bytes			UINT32	R	
44264-44265		Free memory, bytes			UINT32	R	
44266-44277		Reserved			UINT32	R	
<b>Log Notification Registers (bit map)</b>							
44278-44279		Files 0-31 (0 = no new logs, 1 = new record logged)	0x00000000 - 0xFFFFFFFF		UINT32	R	
44280-44293		Reserved	0		UINT32	R	
<b>Setpoint Status Registers (bit map)</b>							
44294-44295		Setpoints 1-16 status (0 = released, 1 = operated)	0x00000000 - 0x0000FFFF		UINT32	R	
44296-44309		Reserved			UINT32	R	
<b>Setpoint Alarm Latch Registers (bit map)</b>							
44310-44311		Setpoints 1-16 alarm status. When read: 0 = no setpoint operations logged, 1 = setpoint has been operated at least once since the last alarm bit reset. When written: 0 = clear setpoint alarm bit, 1 = no effect.	0x00000000 - 0x0000FFFF		UINT32	R/W	
44312-44325		Reserved					
<b>Device Diagnostics Register (bit map)</b>							
44326-44327		Device self-diagnostics flags. When read: 0 = no faults logged, 1 = a fault bit has been set at least once since the last reset. When written: 0 = clear a fault bit, 1 = no effect.	F23		UINT32	R/W	
44328-44341		Reserved					
<b>Current Port Number</b>							
44342		Active port number	0-1 = serial port COM1-COM2		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
44343-44345		Reserved					
<b>Current Network Settings</b>							
44346-44377							
+0, 1		Active device IP Address			UINT32	R	Network byte order
+2, 3		Active network subnet mask			UINT32	R	Network byte order
+4, 5		Active network default gateway			UINT32	R	Network byte order
44352-44377		Reserved					
<b>Communication Status</b>							
44394		RSSI (received signal strength)	0 = not known or not detectable, 51-113 = -51 to -113 dBm		UINT16	R	
44395		GPRS status	0 = not connected, 1 = not registered, 2 = registered		UINT16	R	
44396-44409		Reserved			UINT16	R	65535 = N/A
<b>Communication Counters</b>							
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
<b>Device Identification</b>							
46080-46111							
+0,1		Device serial number	0-999999		UINT32	R	
+2,3		Device model ID	17500		UINT32	R	
+4-11		Device model name	"PM175"		CHAR16	R	Null-terminated string
+12-13		Device options (bitmap)	0		UINT32	R	
+14-19		Not used			UINT16	R	
+20		Device firmware version number	2500-2599		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		Not used			UINT16	R	
+24		Boot loader version number			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	
<b>Factory Device Settings</b>							
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		Not used			UINT16	R	
+4		I1-I3 input range	1, 5	A	UINT16	R	
+5		I1-I3 input overload	200	%	UINT16	R	
+6-13		Not used			UINT16	R	
+13-63		Not used			UINT16	R	
+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	
<b>Basic Setup</b>							
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	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. The pulse edge restarts the power demand block accumulation interval.

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+4		Volt/ampere/harmonic demand period	0 to 1800	sec	UINT16	R/W	
+5-7		Reserved			UINT16	R	Read as 65535
+8		Number of blocks in a sliding window	1 to 15		UINT16	R/W	
+9-10		Reserved			UINT16	R	Read as 65535
+11		Nominal line frequency	50, 60	Hz	UINT16	R/W	
+12		Maximum demand load current	0 to 50,000 (0 = CT primary current)	A	UINT16	R/W	
+13		Nominal secondary voltage (alternative register)	500 to 7000, 65535 = N/A	×0.1V	UINT16	R/W	Available starting with version 25.2.4
+14-17		Reserved			UINT16	R	Read as 65535
+18		Nominal secondary voltage	50 to 700	V	UINT16	R/W	
+19		Reserved			UINT16	R	Read as 65535
+20		PT ratio multiplication factor	×1, ×10		UINT16	R/W	
<b>Communication Ports Setup</b>							
2344-2359							
+0		Communication protocol	COM1: 0=Modbus RTU, 1=Modbus ASCII, 2=DNP3.0, 5=Profibus DP COM2: 0=Modbus RTU, 1=Modbus ASCII, 2=DNP3.0		UINT16	R/W	
+1		Interface	COM1: 0=RS-232, 1=RS-422, 2=RS-485, 4=Dial-up Modem, 6=Ethernet, 7=Profibus, 8=GSM/GPRS COM2: 1=RS-422, 2=RS-485		UINT16	R/W	
+2		Device address	Modbus: 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 COM2 (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 COM2 (read as 65535)
2344-2351		<b>COM1 Setup</b>					
2352-2359		<b>COM2 Setup</b>					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Device Options Setup</b>							
2376-2386							
+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	0= $1 \times 10^4$ , 1= $1 \times 10^5$ , 2= $1 \times 10^6$ , 3= $1 \times 10^7$ , 4= $1 \times 10^8$ , 5= $1 \times 10^9$		UINT16	R/W	
+2		Phase energy calculation mode	0=disabled, 1=enabled		UINT16	R/W	
+3		Reserved			UINT16	R/W	Read as 65535
+4		Analog expander output option	0=none 1=0-20 mA 2=4-20 mA 3=0-1 mA 4= $\pm 1$ mA		UINT16	R/W	
+5		Battery mode	0 = battery is OFF, 1 = battery is ON		UINT16	R/W	
+6-9		Reserved			UINT16	R/W	Read as 65535
+10		Energy LED test mode	0=disabled, 1=Wh test, 2=varh test		UINT16	R/W	LED pulse rate is 10,000 pulses/kWh
<b>Alarm/Event Setpoints Setup</b>							
352-1055							
+0		Condition #1: Logical operator	0 = OR, 1 = AND		UINT16	R/W	
+1		Condition #1: Trigger parameter ID	F12		UINT16	R/W	
+2		Condition #1: Not used	0		UINT16	R/W	
+3		Condition #1: Not used	0		UINT16	R/W	
+4,5		Condition #1: Operate limit	See Section 3.3		UINT32	R/W	Scaled value
+6,7		Condition #1: Release limit	See Section 3.3		UINT32	R/W	Scaled value
+8		Condition #2: Logical operator	0 = OR, 1 = AND		UINT16	R/W	
+9		Condition #2: Trigger parameter ID	F12		UINT16	R/W	
+10		Condition #2: Not used	0		UINT16	R/W	
+11		Condition #2: Not used	0		UINT16	R/W	
+12,13		Condition #2: Operate limit	See Section 3.3		UINT32	R/W	Scaled value
+14,15		Condition #2: Release limit	See Section 3.3		UINT32	R/W	Scaled value
+16		Condition #3: Logical operator	0 = OR, 1 = AND		UINT16	R/W	
+17		Condition #3: Trigger parameter ID	F12		UINT16	R/W	
+18		Condition #3: Not used	0		UINT16	R/W	
+19		Condition #3: Not used	0		UINT16	R/W	
+20,21		Condition #3: Operate limit	See Section 3.3		UINT32	R/W	Scaled value
+22,23		Condition #3: Release limit	See Section 3.3		UINT32	R/W	Scaled value
+24		Condition #4: Logical operator	0 = OR, 1 = AND		UINT16	R/W	
+25		Condition #4: Trigger parameter ID	F12		UINT16	R/W	
+26		Condition #4: Not used	0		UINT16	R/W	
+27		Condition #4: Not used	0		UINT16	R/W	
+28,29		Condition #4: Operate limit	See Section 3.3		UINT32	R/W	Scaled value

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+30,31		Condition #4: Release limit	See Section 3.3		UINT32	R/W	Scaled value
+32		Action #1: Action type	F14		UINT16	R/W	
+33		Action #1: Action target	F14		UINT16	R/W	
+34		Action #2: Action type	F14		UINT16	R/W	
+35		Action #2: Action target	F14		UINT16	R/W	
+36		Action #3: Action type	F14		UINT16	R/W	
+37		Action #3: Action target	F14		UINT16	R/W	
+38		Action #4: Action type	F14		UINT16	R/W	
+39		Action #4: Action target	F14		UINT16	R/W	
+40		Not used	0		UINT16	R/W	
+41		Operate delay	0-9999	×0.1 sec	UINT16	R/W	
+42		Release delay	0-9999	×0.1 sec	UINT16	R/W	
+43		Not used	0		UINT16	R/W	
352-395		<b>Setpoint #1</b>					
396-439		<b>Setpoint #2</b>					
440-483		<b>Setpoint #3</b>					
484-527		<b>Setpoint #4</b>					
528-571		<b>Setpoint #5</b>					
572-615		<b>Setpoint #6</b>					
616-659		<b>Setpoint #7</b>					
660-703		<b>Setpoint #8</b>					
704-747		<b>Setpoint #9</b>					
748-791		<b>Setpoint #10</b>					
792-835		<b>Setpoint #11</b>					
836-879		<b>Setpoint #12</b>					
880-923		<b>Setpoint #13</b>					
924-967		<b>Setpoint #14</b>					
968-1011		<b>Setpoint #15</b>					
1012-1055		<b>Setpoint #16</b>					
<b>Pulse Counters Setup</b>							
2940-2947							
+0		Source digital input ID	0=not assigned, 1=DI1, 2=DI2		UINT16	R/W	
+1		Multiplier	0-9999		UINT16	R/W	
2940-2941		<b>Counter #1 Setup</b>					
2942-2943		<b>Counter #2 Setup</b>					
2944-2945		<b>Counter #3 Setup</b>					
2946-2947		<b>Counter #4 Setup</b>					
<b>Local Settings</b>							
46400-46415							
+0		Reserved			INT16	R/W	
+1		Daylight savings time (DST) option	0=DST disabled (standard time only), 1=DST enabled		UINT16	R/W	
+2		DST start month	1-12		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+3		DST start week of the month	1=1st, 2=2nd, 3=3rd, 4=4th week, 5=the last week of the month		UINT16	R/W	
+4		DST start weekday	1-7 (1=Sun, 7=Sat)		UINT16	R/W	
+5		DST end month	1-12		UINT16	R/W	
+6		DST end week of the month	1=1st, 2=2nd, 3=3rd, 4=4th week, 5=the last week of the month		UINT16	R/W	
+7		DST end weekday	1-7 (1=Sun, 7=Sat)		UINT16	R/W	
+8		Clock synchronization source	1-2 = DI1-DI2, 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.
+9		Country code	ITU country calling code		UINT16	R/W	
+10		DST start hour	1-6		UINT16	R/W	
+11		DST end hour	1-6		UINT16	R/W	
+12-15		Reserved			UINT16	R/W	
<b>Clock Indication and Setup</b>							
46416-46447							
+0,1		Local time, in seconds, since Jan 1, 1970	F1	sec	UINT32	R/W	
+2,3		Fractional seconds, $\mu$ sec		$\mu$ sec	UINT32	R/W	
+4		Fractional seconds, milliseconds	0-999	ms	UINT16	R/W	
+5		Seconds	0-59		UINT16	R/W	
+6		Minutes	0-59		UINT16	R/W	
+7		Hour	0-23		UINT16	R/W	
+8		Day of month	1-31		UINT16	R/W	
+9		Month	1-12		UINT16	R/W	
+10		Year (calendar year minus 2000)	0-99		UINT16	R/W	
+11		Weekday	1-7 (1=Sun, 7=Sat)		UINT16	R	
+12		Daylight savings time status	0=standard time is active, 1=daylight savings time is active		UINT16	R	
+13-31		Reserved			UINT16		
<b>Network Setup</b>							
46576-46703							
+0,1		Device IP Address	0x01000000-0xFFFFFFFF		UINT32	R/W	Network byte order
+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	
<b>Password Setup</b>							
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	



Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+3		Reserved			UINT16	R/W	
<b>Expert Power Service Setup</b>							
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
+10-15		Reserved					
<b>Internet Service Provider (ISP) Account</b>							
46784-46831							
+0-15		Telephone number			CHAR32	R/W	
+16-31		Login name			CHAR32	R/W	
+32-47		Login password			CHAR32	R/W	
<b>GPRS Setup</b>							
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	
<b>TCP Notification Client Setup</b>							
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					
<b>DNP Options Setup</b>							
51158-51183							
+0		Default Binary Input Static object variation	F24 (default 0)		UINT16	R/W	
+1		Default Binary Input Change object variation	F24 (default 1)		UINT16	R/W	
+2		Default Binary Counter object variation	F24 (default 3)		UINT16	R/W	
+3		Default Frozen Binary Counter object variation	F24 (default 4)		UINT16	R/W	
+4		Reserved			UINT16	R/W	
+5		Default Binary Counter Change Event object variation	F24 (default 2)		UINT16	R/W	
+6		Default Analog Input object variation	F24 (default 3)		UINT16	R/W	
+7		Reserved			UINT16	R/W	
+8		Reserved			UINT16	R/W	
+9		Default Analog Input Change Event object variation	F24 (default 2)		UINT16	R/W	
+10		Re-mapping static point indices for event objects	0=disabled (default), 1=enabled		UINT16	R/W	
+11		16-bit BC Scaling	0= $\times 1$ (default), 1= $\times 10$ , 2= $\times 100$ , 3= $\times 1000$		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+12		16-bit AI Scaling	0=disabled, 1=enabled (default)		UINT16	R/W	
+13		Number of points allocated for Analog Input change events	0 to 64 (default 32)		UINT16	R/W	
+14		Number of points allocated for Binary Input change events	0 to 32 (default 0)		UINT16	R/W	
+15		Number of points allocated for Binary Counter change events	0 to 64 (default 0)		UINT16	R/W	
+16		Select/Operate Timeout	2 to 30 seconds (default 10 sec)		UINT16	R/W	
+17		Multi Fragment Interval	50 to 500 ms (default 50 ms)		UINT16	R/W	
+18-21		Reserved	Read as 65535		UINT16	R/W	
+22,23		Time Sync Period	1 to 86400 seconds (default 86400 sec)		UINT32	R/W	
+24		Voltage scale, volts secondary	60 to 828V (default 144V)	V	UINT16	R/W	
+25		Current scale, amps secondary	100	×0.1A	UINT16	R/W	
51184-51189		Reserved					
<b>DNP Events Setup</b>							
51190-51445							
+0,1		Threshold/Deadband	0 to $4.3 \times 10^9$		UINT32	R/W	A hysteresis for the point return threshold is 0.05Hz for frequency and 2% of the operating threshold for other points
+2		DNP point number	DNP point number available for the selected object		UINT16	R/W	
+3		Event scan control field (bitmap)	Bits 0-1 - DNP Object: 0 = none, 1=AI, 2=BI, 3=BC Bit 2 – Object change event scan: 0= event disabled, 1=enabled Bits 5-6 - DNP event poll class: 0=Class 1, 1=Class 2, 2=Class 3 Bit 7 - Event log on an event: 0= disabled, 1=enabled Bits 8-9 – Threshold/Deadband relation: 0=Delta, 1= more than (over threshold), 2=less than (under threshold)		UINT16	R/W	If Event log is enabled, the source of a DNP event will be recorded to the device Event log file as a general Setpoint #17.
51190-51193		<b>DNP Event #1</b>					
51194-51197		<b>DNP Event #2</b>					
		...					
51442-51445		<b>DNP Event #64</b>					
51446-51701		Reserved					
<b>DNP Class 0 Point Assignments</b>							
51702-51797							
+0		DNP object and variation	F25		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+1		Start point number	Point number for the selected object		UINT16	R/W	
+2		Number of points in a range	0-128		UINT16	R/W	
51702-51704		<b>DNP Class 0 Points Range 1</b>					
51705-51707		<b>DNP Class 0 Points Range 2</b>					
		...					
51795-51797		<b>DNP Class 0 Points Range 32</b>					
51798-51893		Reserved					
<b>EN50160 PQ Recorder Triggers Setup</b> (EN50160 voltage characteristics)							
50134-50453							
+0		Threshold, %	0-2000	×0.1%	UINT16	R/W	
+1		Hysteresis, % of threshold	0-500	×0.1%	UINT16	R/W	
+2		Log options, bitmap	Bit 0 – waveform log on event start: 0 = disabled, 1 = enabled; Bit 1 – waveform log on event end: 0 = disabled, 1 = enabled; Bit 2 – PQ log: 0 = enabled, 1 = disabled.		UINT16	R/W	
+3		Waveform log number	0-1 = log #1 - #2		UINT16	R/W	
+4-15		Not used	0		UINT16	R/W	
50134-50149		<b>Power frequency, dF/Fn</b>					
50150-50165		<b>Voltage variations, dV/Un</b>					
50166-50181		<b>Rapid voltage changes, dV/Un</b>					
50182-50197		<b>Flicker severity, Plt</b>					
50198-50213		<b>Voltage dips, %Un</b>					
50214-50229		<b>Voltage interruptions, %Un</b>					
50230-50245		<b>Temporary overvoltages, %Un</b>					
50246-50261		<b>Transient overvoltages, %Un</b>					
50262-50277		<b>Voltage unbalance, %</b>					
50278-50293		<b>Harmonic THD, %</b>					
50294-50309		<b>Harmonic voltage, %Un</b>					
50310-50325		<b>Interharmonic THD, %</b>					
50326-50341		<b>Interharmonic voltage, %Un</b>					
50342-50357		<b>Mains signaling voltage, %Un</b>					
50358-50453		Reserved					
<b>Advanced EN50160 Setup</b>							
50838-50865							
		<b>EN50160 Compliance Statistics</b>					
+0		Evaluation	0=disabled, 1=enabled		UINT16	R/W	
+1		Evaluation period	0=daily, 1=weekly		UINT16	R/W	
+2		First day of the week	1=Sunday, 7=Saturday		UINT16	R/W	
+3		Not used	0		UINT16	R/W	
		<b>EN50160 Harmonics Survey</b>					
+4		Evaluation	0=disabled, 1=enabled		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+5		Evaluation period	0=daily, 1=weekly		UINT16	R/W	
+6-7		Not used	0		UINT16	R/W	
		<b>Rapid Voltage Changes</b>					
+8		Repetition rate, per hour, maximum	1-10		UINT16	R/W	
+9		Not used	0		UINT16	R/W	
		<b>Flicker</b>					
+10		Pst period	1-10	min	UINT16	R/W	
+11		Not used	0		UINT16	R/W	
		<b>Harmonic Voltage</b>					
+12		THD, up to order	25-50		UINT16	R/W	
+13		Harmonics, up to order	25-50		UINT16	R/W	
+14-15		Not used	0		UINT16	R/W	
		<b>Interharmonic Voltage</b>					
+16		Evaluation	0=disabled, 1=enabled		UINT16	R/W	
+17		THD, up to order	25-50		UINT16	R/W	
+18		Interharmonics, up to order	25-50		UINT16	R/W	
+19		Not used	0		UINT16	R/W	
		<b>Mains Signaling Voltage</b>					
+20		Evaluation	0=disabled, 1=enabled		UINT16	R/W	
+21		1st signaling frequency	1100-30000	×0.1Hz	UINT16	R/W	
+22		2nd signaling frequency	1100-30000	×0.1Hz	UINT16	R/W	
+23		3rd signaling frequency	1100-30000	×0.1Hz	UINT16	R/W	
+24		4th signaling frequency	1100-30000	×0.1Hz	UINT16	R/W	
		<b>Transient Overvoltage</b>					
+25		Transient detection and classification method	0=peak voltage, 1=impulsive voltage		UINT16	R/W	
+26-27		Not used	0		UINT16	R/W	
50866-50901		Reserved	0		UINT16	R/W	
<b>EN50160 Harmonic Voltage Limits</b>							
50902-50965							
+0		H02 limit	1-10000	×0.01%	UINT16	R/W	
+1		H03 limit	1-10000	×0.01%	UINT16	R/W	
+2		H04 limit	1-10000	×0.01%	UINT16	R/W	
		...					
+48		H50 limit	1-10000	×0.01%	UINT16	R/W	
+49-63		Reserved					
<b>EN50160 Interharmonic Voltage Limits</b>							
50966-51029							
+0		H02 limit	1-10000	×0.01%	UINT16	R/W	
+1		H03 limit	1-10000	×0.01%	UINT16	R/W	
+2		H04 limit	1-10000	×0.01%	UINT16	R/W	
		...					
+48		H50 limit	1-10000	×0.01%	UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+49-63		Reserved					
<b>File Setup</b>							
52598-53877							
+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	0-32		UINT16	R/W	0 = non-partitioned file
+4		Number of parameters per section record	1-16 for conventional data files, 34 for EN50160 Statistics log, 52 for EN50160 Harmonics log		UINT16	R/W	Not changeable for non-conventional files
+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		<b>Event Log File Setup</b>					
52608-52617		<b>Data Log #1 File Setup</b>					
52618-52627		<b>Data Log #2 File Setup</b>					
52628-52637		<b>Data Log #3 File Setup</b>					
52638-52647		<b>Data Log #4 File Setup</b>					
52648-52657		<b>Data Log #5 File Setup</b>					
52658-52667		<b>Data Log #6 File Setup</b>					
52668-52677		<b>Data Log #7 File Setup</b>					
52678-52687		<b>Data Log #8 File Setup</b>					
52688-52697		<b>Data Log #9 File Setup</b>					EN50160 compliance statistics
52698-52707		<b>Data Log #10 File Setup</b>					EN50160 harmonic statistics
52708-52717		<b>Data Log #11 File Setup</b>					
52718-52727		<b>Data Log #12 File Setup</b>					
52728-52737		<b>Data Log #13 File Setup</b>					
52738-52747		<b>Data Log #14 File Setup</b>					
52748-52757		<b>Data Log #15 File Setup</b>					
52758-52767		<b>Data Log #16 File Setup</b>					
52768-52777		<b>Waveform Log #1 File Setup</b>					
52778-52787		<b>Waveform Log #2 File Setup</b>					
52788-52857		Reserved					
52858-52867		<b>EN50160 PQ Log File Setup</b>					
52868-53877		Reserved					
<b>Waveform Recorder Setup</b>							
53878-53949							
+0		Sampling rate, samples per cycle	32, 64, 128		UINT16	R/W	Ignored when written
+1		Number of cycles per series	16-2560 (32 samples/cycle), 8-1280 (64 samples/cycle), 4-640 (128 samples/cycle)		UINT16	R/W	
+3		Not used	0		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+4		Number of cycles before a trigger	1-20		UINT16	R/W	
+4,5		File channel mask, bitmap	F9, 0x00000033		UINT32	R/W	Ignored when written
+6,7		Not used	0		UINT32	R/W	
53878-53885		<b>Waveform Log #1 Setup</b>					
53886-53893		<b>Waveform Log #2 Setup</b>					
<b>Data Log Setup</b>							
54006-55541							
+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		Data log parameter #10 ID	0x0000-0xFFFF		UINT16	R/W	
+10		Data log parameter #11 ID	0x0000-0xFFFF		UINT16	R/W	
+11		Data log parameter #12 ID	0x0000-0xFFFF		UINT16	R/W	
+12		Data log parameter #13 ID	0x0000-0xFFFF		UINT16	R/W	
+13		Data log parameter #14 ID	0x0000-0xFFFF		UINT16	R/W	
+14		Data log parameter #15 ID	0x0000-0xFFFF		UINT16	R/W	
+15		Data log parameter #16 ID	0x0000-0xFFFF		UINT16	R/W	
+16-31		Reserved			UINT16	R/W	
54006-54037		<b>Data log #1 Setup</b>					
54038-54069		<b>Data log #2 Setup</b>					
54070-54101		<b>Data log #3 Setup</b>					
54102-54133		<b>Data log #4 Setup</b>					
54134-54165		<b>Data log #5 Setup</b>					
54166-54197		<b>Data log #6 Setup</b>					
54198-54229		<b>Data log #7 Setup</b>					
54230-54261		<b>Data log #8 Setup</b>					
54262-54293		<b>Data log #9 Setup</b>					Read as NONE for EN50160 compliance log
54294-54325		<b>Data log #10 Setup</b>					Read as NONE for EN50160 harmonic log
54326-54357		<b>Data log #11 Setup</b>					
54358-54389		<b>Data log #12 Setup</b>					
54390-54421		<b>Data log #13 Setup</b>					
54422-54453		<b>Data log #14 Setup</b>					
54454-54485		<b>Data log #15 Setup</b>					
54486-54517		<b>Data log #16 Setup</b>					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>TOU Daily Profile Setup</b>							
55574-55701							
+0		1 <sup>st</sup> tariff change	F10		UINT16	R/W	
+1		2 <sup>nd</sup> tariff change	F10		UINT16	R/W	
+2		3 <sup>rd</sup> tariff change	F10		UINT16	R/W	
+3		4 <sup>th</sup> tariff change	F10		UINT16	R/W	
+4		5 <sup>th</sup> tariff change	F10		UINT16	R/W	
+5		6 <sup>th</sup> tariff change	F10		UINT16	R/W	
+6		7 <sup>th</sup> tariff change	F10		UINT16	R/W	
+7		8 <sup>th</sup> tariff change	F10		UINT16	R/W	
55574-55581		<b>Daily profile #1: Season 1, Day type 1</b>					
55582-55589		<b>Daily profile #2: Season 1, Day type 2</b>					
55590-55597		<b>Daily profile #3: Season 1, Day type 3</b>					
55598-55605		<b>Daily profile #4: Season 1, Day type 4</b>					
55606-55613		<b>Daily profile #5: Season 2, Day type 1</b>					
55614-55621		<b>Daily profile #6: Season 2, Day type 2</b>					
55622-55629		<b>Daily profile #7: Season 2, Day type 3</b>					
55630-55637		<b>Daily profile #8: Season 2, Day type 4</b>					
55638-55645		<b>Daily profile #9: Season 3, Day type 1</b>					
55646-55653		<b>Daily profile #10: Season 3, Day type 2</b>					
55654-55661		<b>Daily profile #11: Season 3, Day type 3</b>					
55662-55669		<b>Daily profile #12: Season 3, Day type 4</b>					
55670-55677		<b>Daily profile #13: Season 4, Day type 1</b>					
55678-55685		<b>Daily profile #14: Season 4, Day type 2</b>					
55686-55693		<b>Daily profile #15: Season 4, Day type 3</b>					
55694-55701		<b>Daily profile #16: Season 4, Day type 4</b>					
55702-55711		Reserved					
<b>TOU Calendar Setup</b>							
55712-56031							
+0-9		<b>Calendar entry record</b>				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=3 <sup>rd</sup> , 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		Not used			UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
55712-55721		<b>Calendar entry #1</b>					
55722-55731		<b>Calendar entry #2</b>					
55732-55741		<b>Calendar entry #3</b>					
...							
56022-56031		<b>Calendar entry #32</b>					
56032-56191		Reserved					
<b>Summary Energy/TOU Registers Setup</b>							
56672-56703							
+0		Not used			UINT16	R/W	
+1		Units of measurement	0=none, 1=kWh, 2=kvarh, 3=kVAh, 4=m <sup>3</sup> , 5=CF (cubic feet), 6=CCF (hundred cubic feet)		UINT16	R/W	
+2		Flags (bitmap)	Bit 0=1 - TOU enabled Bit 1=1 - Use profile enabled Bit 2=1 - Max. Demand profile enabled Bit 3=1 - Summary (total) profile enabled		UINT16	R/W	
+3		Not used	0		UINT16	R/W	
56672-56675		<b>Register #1 Setup</b>					
56676-56679		<b>Register #2 Setup</b>					
56680-56683		<b>Register #3 Setup</b>					
56684-56687		<b>Register #4 Setup</b>					
56688-56691		<b>Register #5 Setup</b>					
56692-56695		<b>Register #6 Setup</b>					
56696-56699		<b>Register #7 Setup</b>					
56700-56703		<b>Register #8 Setup</b>					
<b>Summary Energy/TOU Registers Source Setup</b>							
56928-57183							
+0		Energy source ID	F11		UINT16	R/W	
+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		<b>Energy Source #1</b>					
56932-56935		<b>Energy Source #2</b>					
56936-56939		<b>Energy Source #3</b>					
56940-56943		<b>Energy Source #4</b>					
56944-56947		<b>Energy Source #5</b>					
56948-56951		<b>Energy Source #6</b>					
56952-56955		<b>Energy Source #7</b>					
56956-56959		<b>Energy Source #8</b>					
<b>Periodic Timers Setup</b>							
61024-61031							
+0, 1		Time interval, in seconds	0=timer disabled, 1,000-9999,000	0.001 s	UINT32	R/W	



Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
			ms (1-9999 sec)				
61024-61025		<b>Timer #1 Setup</b>		0.001 s	UINT32	R/W	
61026-61027		<b>Timer #2 Setup</b>		0.001 s	UINT32	R/W	
61028-61029		<b>Timer #3 Setup</b>		0.001 s	UINT32	R/W	
61030-61031		<b>Timer #4 Setup</b>		0.001 s	UINT32	R/W	
<b>Digital Inputs Setup</b>							
61728-61735							
+0		Pulse mode	0 = pulse, 1 = KYZ		UINT16	R/W	
+1		Polarity	0 = normal, 1 = inverting		UINT16	R/W	
+2		De-bounce time, ms	1-1000		UINT16	R/W	Debounce time will be the same for both inputs
+3		Not used			UINT16	R/W	
61728-61731		<b>DI1 Setup</b>					
61732-61735		<b>DI2 Setup</b>					
<b>Relay Outputs Setup</b>							
61984-61995							
+0		Operation Mode	0=latched, 1=unlatched, 2=pulse, 3=KYZ		UINT16	R/W	
+1		Polarity	Bit 0 - Polarity: 0=normal, 1=inverting, Bit 1 - Retentive mode: 0=disabled, 1=enabled		UINT16	R/W	
+2		Pulse width, ms	1-1000		UINT16	R/W	
+3		Pulse source ID	F17		UINT16	R/W	
+4		Units per pulse	1-10000	x0.1	UINT16	R/W	
+5		Not used			UINT16	R/W	
61984-61989		<b>RO1 Setup</b>					
61990-61995		<b>RO2 Setup</b>					
<b>Analog Inputs Setup</b>							
62368-62379							
+0		Input parameter ID	0 = input not assigned		UINT16	R/W	
+1		Not used	0		UINT16	R/W	
+2,3		Zero scale value (0/4 mA)			INT32	R/W	
+4,5		Full scale value (20/1 mA)			INT32	R/W	
62368-62373		<b>AI1 Setup</b>					
62374-62379		<b>AI2 Setup</b>					
<b>Analog Outputs Setup</b>							
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	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
62560-62565		<b>AO1 Setup</b>					
62566-62571		<b>AO2 Setup</b>					
<b>Analog Expander Setup</b>							
62752-62847							Analog expander outputs settings will not be in effect until the analog expander output is globally enabled through the Device Options setup
+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	
62752-62757		<b>AX8 #1 Channel 1 Setup</b>					
62758-62763		<b>AX8 #1 Channel 2 Setup</b>					
...		...					
62794-62799		<b>AX8 #1 Channel 8 Setup</b>					
62800-62805		<b>AX8 #2 Channel 1 Setup</b>					
62806-62811		<b>AX8 #2 Channel 2 Setup</b>					
...		...					
62842-62847		<b>AX8 #2 Channel 8 Setup</b>					

### 3.8 Analog and Digital I/O Configuration

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

### 3.9 File Transfer Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>File Transfer Control Blocks</b>							
63120-63151		<b>File Request Block</b>					
+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)	0-31, 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, 4		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		Not used			UINT16	R/W	
63152-64943		<b>File Response Block</b>					
		Data transfer area [0 - 1791]			UINT16	R	
64944-64951		<b>File Info Request Block</b>					
+0		File function	9 = read file info		UINT16	R/W	
+1		File ID	F2		UINT16	R/W	
+2		Section number	0-31, 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		Not used			UINT16	R/W	
64952-65151		<b>File Info Response Block</b>					
		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
<b>File Info Response Block (Variation 0 – File info)</b>							
64952-64959		<b>Block Heading</b>					
+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		Number of records in the block	1		UINT16	R	
+5		Record size, words	36		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Not used	0		UINT16	R	
64960-64997		<b>File Info</b>					
+0		File type	0		UINT16	R	
+1		File attributes	F3		UINT16	R	
+2		File (section) status	F4		UINT16	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	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+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	
+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	
<b>File Info Response Block (Variation 1 – Current record info)</b>							
64952-64959		<b>Block Heading</b>					
+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		Number of records in the block	1		UINT16	R	
+5		Record size, words	8		UINT16	R	
+6		Request variation	1		UINT16	R	
+7		Not used	0		UINT16	R	
64960-64997		<b>File Info</b>					
+0		File (section) status	F4		UINT16	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	
<b>File Info Response Block (Variation 2 – Data log record structure)</b>							
64952-64959		<b>Block Heading</b>					
+0		File function	9		UINT16	R	
+1		File ID	1-16		UINT16	R	
+2		Section number	0-15		UINT16	R	
+3		Section channel ID	F6, F7		UINT16	R	
+4		Number of records in the block	1		UINT16	R	
+5		Record size, words	2 + Number of parameters		UINT16	R	
+6		Request variation	2		UINT16	R	
+7		Not used	0		UINT16	R	
64960-64997		<b>File Info</b>					
+0		Not used	0		UINT16	R	
+1		Number of fields in a data record	1-16 for conventional files, 34 for EN50160 Compliance log, 52 for EN50160 Harmonics log		UINT16	R	
+2		Field 1 parameter ID	0-0xFFFF		UINT16	R	
+3		Field 2 parameter ID	0-0xFFFF		UINT16	R	
...		...					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Event Log Response Block</b>							
63152-63159		<b>Block Heading</b>					
+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	
+4		Number of records in the block	1-32		UINT16	R	
+5		Record size, words	12		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Not used	0		UINT16	R	
63160-63543		<b>Event Log Records</b>					
+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 $\mu$ sec		$\mu$ sec	UINT32	R	
+6		Event number	1-65535		UINT16	R	
+7		Event point/source ID	F19		UINT16	R	
+8		Event effect	F20		UINT16	R	
+9		Not used	0		UINT16	R	
+10, 11		Value triggered			INT32	R	
63160-63171		<b>Record #1</b>					
		...					
63532-63543		<b>Record #32</b>					
<b>Data Log Response Block</b>							
63152-63159		<b>Block Heading</b>					
+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		Number of records in the block	1-16		UINT16	R	
+5		Record size, words	8 + 2×Number of parameters		UINT16	R	
+6		Request variation	0 = regular log, 4 = EN50160 online statistics (with file ID = 9, 10)		UINT16	R	
+7		Not used	0		UINT16	R	
63160-64439		<b>Data Log Records</b>					
+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 $\mu$ sec		$\mu$ sec	UINT32	R	
+6		Trigger event type	F22		INT16	R	
+7		Trigger event number	0-65535		UINT16	R	
+8, 9		Log value #1			INT32	R	
+10, 11		Log value #2			INT32	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
...		...				R	
63160-...		<b>Record #1</b> (variable length)					
...		...					
		<b>Record #16</b> (variable length)					
<b>Waveform Log Response Block</b>							
63152-63159		<b>Block Heading</b>					
+0		Last file function	1, 3, 5, 11		UINT16	R	
+1		File ID	17-18, 128 (F2)		UINT16	R	
+2		Section number	0-9		UINT16	R	
+3		Section channel ID	F7		UINT16	R	
+4		Number of records in the block	1		UINT16	R	
+5		Record size, words	640		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Not used	0		UINT16	R	
63160-63799		<b>Waveform Log Record</b>					
+0		Record status	F5		INT16	R	
+1		Record sequence number	0-65535		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	F22		UINT16	R	
+13		Trigger event number	1-65535		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	×0.1 µsec	UINT16	R	
+17		Sampling rate, samples/cycle	32, 64, 128		UINT16	R	
+18		Sampling frequency	4500-6500	×0.01 Hz	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	32767		UINT16	R	
+23		Length of a sample series, data points	512		UINT16	R	
+24-127		Not used	0		UINT16	R	
+128		<b>Sample Series</b>					
+128-639		Sample data series points [0...511]	-32768 - 32767		INT16	R	<sup>1</sup>
<b>Power Quality (PQ) Log Response Block</b>							
63152-63159		<b>Block Heading</b>					
+0		Last file function	1, 3, 5, 11		UINT16	R	
+1		File ID	26		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		Number of records in the block	1-16		UINT16	R	
+5		Record size, words	18		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Not used	0		UINT16	R	
63160-63799		<b>PQ Log Records</b>					
+0		Record status	F5		INT16	R	
+1		Record sequence number	0-65535		UINT16	R	
+2, 3		Start time, seconds since 1/1/1970	F1	sec	UINT32	R	
+4, 5		Start time, fractional seconds in $\mu$ sec		$\mu$ sec	UINT32	R	
+6, 7		End time, seconds since 1/1/1970	F1	sec	UINT32	R	
+8, 9		End time, fractional seconds in $\mu$ sec		$\mu$ sec	UINT32	R	
+10		PQ event type	F22		UINT16	R	
+11		PQ event number	1-65535		UINT16	R	
+12		Point ID (generic)	See Generic Data in Section 3.4		UINT16	R	
+13		Not used	0		UINT16	R	
+14, 15		Value reference (base), primary units	See Generic Data in Section 3.4		INT32	R	
+16, 17		Value magnitude, primary units	See Generic Data in Section 3.4		INT32	R	
63160-63179		<b>Record #1</b>					
		...					
63430-63447		<b>Record #16</b>					

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

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

#### NOTES:

1. 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.
2. 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.

### 3.10 EN 50160 Compliance Statistics Data Log

File Section	Record Field No.	Point Label	Point ID	Description <sup>1</sup>	Range	Units	Type	Notes
0				<b>Power Frequency</b>				
	1	Nnv	0x5A00	Number of non-valid 10-sec intervals			UINT32	
	2	N	0x5A01	Number of valid 10-sec intervals			UINT32	
	3	N1	0x5A02	Number of incidents $\pm 1\%$ , N1			UINT32	
	4	N2	0x5A03	Number of incidents $+4\%/-6\%$ , N2			UINT32	
	5	N1/N, %	0x5A04	EN50160 compliance ratio, N1/N		0.01%	UINT32	
	6	N2/N, %	0x5A05	EN50160 compliance ratio, N2/N		0.01%	UINT32	
	7	Freq Min	0x5A06	Minimum frequency		0.01Hz	UINT32	
	8	Freq Max	0x5A07	Maximum frequency		0.01Hz	UINT32	
1				<b>Supply Voltage Variations</b>				
	1	Nnv	0x5A80	Number of non-valid 10-min intervals			UINT32	
	2	N	0x5A81	Number of valid 10-min intervals			UINT32	
	3	N1	0x5A82	Number of polyphase incidents $\pm 10\%$ , N1			UINT32	
	4	N2	0x5A83	Number of polyphase incidents $+10\%/-15\%$ , N2			UINT32	
	5	N1/N, %	0x5A84	EN50160 compliance ratio, N1/N		0.01%	UINT32	
	6	N2/N, %	0x5A85	EN50160 compliance ratio, N2/N		0.01%	UINT32	
	7	V1 N1	0x5A86	Number of incidents $\pm 10\%$ on phase V1			UINT32	
	8	V1 Min	0x5A87	Minimum voltage on phase V1		U1	UINT32	
	9	V1 Max	0x5A88	Maximum voltage on phase V1		U1	UINT32	
	10	V2 N1	0x5A89	Number of incidents $\pm 10\%$ on phase V2			UINT32	
	11	V2 Min	0x5A8A	Minimum voltage on phase V2		U1	UINT32	
	12	V2 Max	0x5A8B	Maximum voltage on phase V2		U1	UINT32	
	13	V3 N1	0x5A8C	Number of incidents $\pm 10\%$ on phase V3			UINT32	
	14	V3 Min	0x5A8D	Minimum voltage on phase V3		U1	UINT32	
	15	V3 Max	0x5A8E	Maximum voltage on phase V3		U1	UINT32	
2				<b>Rapid Voltage Changes</b>				
	1	N1	0x5B00	Number of polyphase incidents			UINT32	
	2	V1 N1	0x5B01	Number of incidents on phase V1			UINT32	
	3	V1 dV%	0x5B02	Maximum voltage variation on phase V1, dV/Un%		0.01%	UINT32	
	4	V2 N1	0x5B03	Number of incidents on phase V2			UINT32	
	5	V2 dV%	0x5B04	Maximum voltage variation on phase V2, dV/Un%		0.01%	UINT32	
	6	V3 N1	0x5B05	Number of incidents on phase V3			UINT32	
	7	V3 dV%	0x5B06	Maximum voltage variation on phase V3, dV/Un%		0.01%	UINT32	
3				<b>Flicker</b>				
	1	Nnv	0x5B80	Number of non-valid 2-hour intervals			UINT32	
	2	N	0x5B81	Number of valid 2-hour intervals			UINT32	
	3	N1	0x5B82	Number of polyphase incidents Plt $> 1\%$ , N1			UINT32	
	4	N1/N, %	0x5B83	EN50160 compliance ratio, N1/N		0.01%	UINT32	
	5	V1 N1	0x5B84	Number of incidents Plt $> 1\%$ on phase V1			UINT32	

File Section	Record Field No.	Point Label	Point ID	Description <sup>1</sup>	Range	Units	Type	Notes
	6	V1 Plt Max	0x5B85	Maximum Plt on phase V1		0.01	UINT32	
	7	V2 N1	0x5B86	Number of incidents Plt > 1% on phase V2			UINT32	
	8	V2 Plt Max	0x5B87	Maximum Plt on phase V2		0.01	UINT32	
	9	V3 N1	0x5B88	Number of incidents Plt > 1% on phase V3			UINT32	
	10	V3 Plt Max	0x5B89	Maximum Plt on phase V3		0.01	UINT32	
4				<b>Voltage Dips</b> (indicative statistics)				
	1	N11 90%/100ms	0x5C00	Number of polyphase incidents u<90%/t<100ms			UINT32	
	2	N12 85%/100ms	0x5C01	Number of polyphase incidents u<85%/t<100ms			UINT32	
	3	N13 70%/100ms	0x5C02	Number of polyphase incidents u<70%/t<100ms			UINT32	
	4	N14 40%/100ms	0x5C03	Number of polyphase incidents u<40%/t<100ms			UINT32	
	5	N11 90%/500ms	0x5C04	Number of polyphase incidents u<90%/t<500ms			UINT32	
	6	N12 85%/500ms	0x5C05	Number of polyphase incidents u<85%/t<500ms			UINT32	
	7	N13 70%/500ms	0x5C06	Number of polyphase incidents u<70%/t<500ms			UINT32	
	8	N14 40%/500ms	0x5C07	Number of polyphase incidents u<40%/t<500ms			UINT32	
	9	N11 90%/1s	0x5C08	Number of polyphase incidents u<90%/t<1s			UINT32	
	10	N12 85%/1s	0x5C09	Number of polyphase incidents u<85%/t<1s			UINT32	
	11	N13 70%/1s	0x5C0A	Number of polyphase incidents u<70%/t<1s			UINT32	
	12	N14 40%/1s	0x5C0B	Number of polyphase incidents u<40%/t<1s			UINT32	
	13	N11 90%/3s	0x5C0C	Number of polyphase incidents u<90%/t<3s			UINT32	
	14	N12 85%/3s	0x5C0D	Number of polyphase incidents u<85%/t<3s			UINT32	
	15	N13 70%/3s	0x5C0E	Number of polyphase incidents u<70%/t<3s			UINT32	
	16	N14 40%/3s	0x5C0F	Number of polyphase incidents u<40%/t<3s			UINT32	
	17	N11 90%/20s	0x5C10	Number of polyphase incidents u<90%/t<20s			UINT32	
	18	N12 85%/20s	0x5C11	Number of polyphase incidents u<85%/t<20s			UINT32	
	19	N13 70%/20s	0x5C12	Number of polyphase incidents u<70%/t<20s			UINT32	
	20	N14 40%/20s	0x5C13	Number of polyphase incidents u<40%/t<20s			UINT32	
	21	N11 90%/60s	0x5C14	Number of polyphase incidents u<90%/t<60s			UINT32	
	22	N12 85%/60s	0x5C15	Number of polyphase incidents u<85%/t<60s			UINT32	
	23	N13 70%/60s	0x5C16	Number of polyphase incidents u<70%/t<60s			UINT32	
	24	N14 40%/60s	0x5C17	Number of polyphase incidents u<40%/t<60s			UINT32	
	25	N11 90%/180s	0x5C18	Number of polyphase incidents u<90%/t<180s			UINT32	
	26	N12 85%/180s	0x5C19	Number of polyphase incidents u<85%/t<180s			UINT32	
	27	N13 70%/180s	0x5C1A	Number of polyphase incidents u<70%/t<180s			UINT32	
	28	N14 40%/180s	0x5C1B	Number of polyphase incidents u<40%/t<180s			UINT32	
	29	V1 N1	0x5C1C	Total number of incidents on phase V1			UINT32	
	30	V1 Min	0x5C1D	Minimum residual voltage on phase V1		U1	UINT32	
	31	V2 N1	0x5C1E	Total number of incidents on phase V2			UINT32	
	32	V2 Min	0x5C1F	Minimum residual voltage on phase V2		U1	UINT32	
	33	V3 N1	0x5C20	Total number of incidents on phase V3			UINT32	
	34	V3 Min	0x5C21	Minimum residual voltage on phase V3		U1	UINT32	
5				<b>Voltage Interruptions</b> (indicative statistics)				
	1	N1 1s	0x5D00	Number of polyphase incidents <1s			UINT32	

File Section	Record Field No.	Point Label	Point ID	Description <sup>1</sup>	Range	Units	Type	Notes
	2	N2 180s	0x5D01	Number of polyphase incidents <180s			UINT32	
	3	N3 >180s	0x5D02	Number of polyphase incidents >180s			UINT32	
	4	V1 Min	0x5D03	Minimum residual voltage on phase V1		U1	UINT32	
	5	V2 Min	0x5D04	Minimum residual voltage on phase V2		U1	UINT32	
	6	V3 Min	0x5D05	Minimum residual voltage on phase V3		U1	UINT32	
6				<b>Temporary Overvoltages</b> (indicative statistics)				
	1	N11 110%/1s	0x5D80	Number of polyphase incidents u>110%/t<1s			UINT32	
	2	N12 120%/1s	0x5D81	Number of polyphase incidents u>120%/t<1s			UINT32	
	3	N13 140%/1s	0x5D82	Number of polyphase incidents u>140%/t<1s			UINT32	
	4	N14 160%/1s	0x5D83	Number of polyphase incidents u>160%/t<1s			UINT32	
	5	N15 200%/1s	0x5D84	Number of polyphase incidents u>200%/t<1s			UINT32	
	6	N21 110%/60s	0x5D85	Number of polyphase incidents u>110%/t<60s			UINT32	
	7	N22 120%/60s	0x5D86	Number of polyphase incidents u>120%/t<60s			UINT32	
	8	N23 140%/60s	0x5D87	Number of polyphase incidents u>140%/t<60s			UINT32	
	9	N24 160%/60s	0x5D88	Number of polyphase incidents u>160%/t<60s			UINT32	
	10	N25 200%/60s	0x5D89	Number of polyphase incidents u>200%/t<60s			UINT32	
	11	N31 110%/>60s	0x5D8A	Number of polyphase incidents u>110%/t>60s			UINT32	
	12	N32 120%/>60s	0x5D8B	Number of polyphase incidents u>120%/t>60s			UINT32	
	13	N33 140%/>60s	0x5D8C	Number of polyphase incidents u>140%/t>60s			UINT32	
	14	N34 160%/>60s	0x5D8D	Number of polyphase incidents u>160%/t>60s			UINT32	
	15	N35 200%/>60s	0x5D8E	Number of polyphase incidents u>200%/t>60s			UINT32	
	16	V1 N1	0x5D8F	Total number of incidents on phase V1			UINT32	
	17	V1 Max	0x5D90	Maximum voltage magnitude on phase V1		U1	UINT32	
	18	V2 N1	0x5D91	Total number of incidents on phase V2			UINT32	
	19	V2 Max	0x5D92	Maximum voltage magnitude on phase V2		U1	UINT32	
	20	V3 N1	0x5D93	Total number of incidents on phase V3			UINT32	
	21	V3 Max	0x5D94	Maximum voltage magnitude on phase V3		U1	UINT32	
7				<b>Transient Overvoltages</b> (peak voltage, indicative statistics)				
	1	N1 120%	0x5E00	Number of polyphase incidents u>120%			UINT32	
	2	N2 150%	0x5E01	Number of polyphase incidents u>150%			UINT32	
	3	N3 200%	0x5E02	Number of polyphase incidents u>200%			UINT32	
	4	N4 250%	0x5E03	Number of polyphase incidents u>250%			UINT32	
	5	N5 300%	0x5E04	Number of polyphase incidents u>300%			UINT32	
	6	V1 N1 120%	0x5E05	Number of incidents u>120% on phase V1			UINT32	
	7	V1 N2 150%	0x5E06	Number of incidents u>150% on phase V1			UINT32	
	8	V1 N3 200%	0x5E07	Number of incidents u>200% on phase V1			UINT32	
	9	V1 N4 250%	0x5E08	Number of incidents u>250% on phase V1			UINT32	
	10	V1 N5 300%	0x5E09	Number of incidents u>300% on phase V1			UINT32	
	11	V2 N1 120%	0x5E0A	Number of incidents u>120% on phase V2			UINT32	
	12	V2 N2 150%	0x5E0B	Number of incidents u>150% on phase V2			UINT32	
	13	V2 N3 200%	0x5E0C	Number of incidents u>200% on phase V2			UINT32	
	14	V2 N4 250%	0x5E0D	Number of incidents u>250% on phase V2			UINT32	

File Section	Record Field No.	Point Label	Point ID	Description <sup>1</sup>	Range	Units	Type	Notes
	15	V2 N5 300%	0x5E0E	Number of incidents u>300% on phase V2			UINT32	
	16	V3 N1 120%	0x5E0F	Number of incidents u>120% on phase V3			UINT32	
	17	V3 N2 150%	0x5E10	Number of incidents u>150% on phase V3			UINT32	
	18	V3 N3 200%	0x5E11	Number of incidents u>200% on phase V3			UINT32	
	19	V3 N4 250%	0x5E12	Number of incidents u>250% on phase V3			UINT32	
	20	V3 N5 300%	0x5E13	Number of incidents u>300% on phase V3			UINT32	
	21	V1 Peak Max	0x5E14	Maximum peak voltage on phase V1		U1	UINT32	
	22	V2 Peak Max	0x5E15	Maximum peak voltage on phase V2		U1	UINT32	
	23	V3 Peak Max	0x5E16	Maximum peak voltage on phase V3		U1	UINT32	
7				<b>Transient Overvoltages</b> (impulsive voltage, indicative statistics)				
	1	N1 20%	0x6080	Number of polyphase incidents u>20%			UINT32	
	2	N2 50%	0x6081	Number of polyphase incidents u>50%			UINT32	
	3	N3 100%	0x6082	Number of polyphase incidents u>100%			UINT32	
	4	N4 150%	0x6083	Number of polyphase incidents u>150%			UINT32	
	5	N5 200%	0x6084	Number of polyphase incidents u>200%			UINT32	
	6	V1 N1 20%	0x6085	Number of incidents u>20% on phase V1			UINT32	
	7	V1 N2 50%	0x6086	Number of incidents u>50% on phase V1			UINT32	
	8	V1 N3 100%	0x6087	Number of incidents u>100% on phase V1			UINT32	
	9	V1 N4 150%	0x6088	Number of incidents u>150% on phase V1			UINT32	
	10	V1 N5 200%	0x6089	Number of incidents u>200% on phase V1			UINT32	
	11	V2 N1 20%	0x608A	Number of incidents u>20% on phase V2			UINT32	
	12	V2 N2 50%	0x608B	Number of incidents u>50% on phase V2			UINT32	
	13	V2 N3 100%	0x608C	Number of incidents u>100% on phase V2			UINT32	
	14	V2 N4 150%	0x608D	Number of incidents u>150% on phase V2			UINT32	
	15	V2 N5 200%	0x608E	Number of incidents u>200% on phase V2			UINT32	
	16	V3 N1 20%	0x608F	Number of incidents u>20% on phase V3			UINT32	
	17	V3 N2 50%	0x6090	Number of incidents u>50% on phase V3			UINT32	
	18	V3 N3 100%	0x6091	Number of incidents u>100% on phase V3			UINT32	
	19	V3 N4 150%	0x6092	Number of incidents u>150% on phase V3			UINT32	
	20	V3 N5 200%	0x6093	Number of incidents u>200% on phase V3			UINT32	
	21	V1 Max	0x6094	Maximum impulsive voltage on phase V1		U1	UINT32	
	22	V2 Max	0x6095	Maximum impulsive voltage on phase V2		U1	UINT32	
	23	V3 Max	0x6096	Maximum impulsive voltage on phase V3		U1	UINT32	
8				<b>Supply Voltage Unbalance</b>				
	1	Nnv	0x5E80	Number of non-valid 10-min intervals			UINT32	
	2	N	0x5E81	Number of valid 10-min intervals			UINT32	
	3	N1	0x5E82	Number of incidents V Unb > 2%, N1			UINT32	
	4	N1/N, %	0x5E83	EN50160 compliance ratio, N1/N		0.01%	UINT32	
	5	V Unb% Max	0x5E84	Maximum voltage unbalance		0.1%	UINT32	
9				<b>Harmonic Voltage</b>				
	1	Nnv	0x5F00	Number of non-valid 10-min intervals			UINT32	
	2	N	0x5F01	Number of valid 10-min intervals			UINT32	

File Section	Record Field No.	Point Label	Point ID	Description <sup>1</sup>	Range	Units	Type	Notes
	3	N1	0x5F02	Number of polyphase harmonic voltage incidents, N1			UINT32	
	4	N2	0x5F03	Number of polyphase voltage THD incidents, N2			UINT32	
	5	N1/N, %	0x5F04	EN50160 harmonic voltage compliance ratio, N1/N		0.01%	UINT32	
	6	N2/N, %	0x5F05	EN50160 voltage THD compliance ratio, N2/N		0.01%	UINT32	
	7	V1 N1	0x5F06	Number of harmonic voltage incidents on phase V1			UINT32	
	8	V1 HD% Max	0x5F07	Worst-case harmonic magnitude on phase V1, %Un		0.01%	UINT32	
	9	V1 H#	0x5F08	Worst-case harmonic component number on phase V1	2-50		UINT32	
	10	V1 N2	0x5F09	Number of voltage THD incidents on phase V1			UINT32	
	11	V1 THD Max	0x5F0A	Worst-case voltage THD on phase V1		0.1%	UINT32	
	12	V2 N1	0x5F0B	Number of harmonic voltage incidents on phase V2			UINT32	
	13	V2 HD% Max	0x5F0C	Worst-case harmonic magnitude on phase V2, %Un		0.01%	UINT32	
	14	V2 H#	0x5F0D	Worst-case harmonic component number on phase V2	2-50		UINT32	
	15	V2 N2	0x5F0E	Number of voltage THD incidents on phase V2			UINT32	
	16	V2 THD Max	0x5F0F	Worst-case voltage THD on phase V2		0.1%	UINT32	
	17	V3 N1	0x5F10	Number of harmonic voltage incidents on phase V3			UINT32	
	18	V3 HD% Max	0x5F11	Worst-case harmonic magnitude on phase V3, %Un		0.01%	UINT32	
	19	V3 H#	0x5F12	Worst-case harmonic component number on phase V3	2-50		UINT32	
	20	V3 N2	0x5F13	Number of voltage THD incidents on phase V3			UINT32	
	21	V3 THD Max	0x5F14	Worst-case voltage THD on phase V3		0.1%	UINT32	
10				<b>Interharmonic Voltage</b>				
	1	Nnv	0x5F80	Number of non-valid 10-min intervals			UINT32	
	2	N	0x5F81	Number of valid 10-min intervals			UINT32	
	3	N1	0x5F82	Number of polyphase interharmonic voltage incidents, N1			UINT32	
	4	N2	0x5F83	Number of polyphase interharmonic THD incidents, N2			UINT32	
	5	N1/N, %	0x5F84	EN50160 interharmonic voltage compliance ratio, N1/N		0.01%	UINT32	
	6	N2/N, %	0x5F85	EN50160 interharmonic voltage THD compliance ratio, N2/N		0.01%	UINT32	
	7	V1 N1	0x5F86	Number of interharmonic voltage incidents on phase V1			UINT32	
	8	V1 HD% Max	0x5F87	Worst-case interharmonic magnitude on phase V1, %Un		0.01%	UINT32	
	9	V1 H#	0x5F88	Worst-case interharmonic component number on phase V1	2-50		UINT32	
	10	V1 N2	0x5F89	Number of interharmonic voltage THD incidents on phase V1			UINT32	
	11	V1 THD Max	0x5F8A	Worst-case interharmonic voltage THD on phase V1		0.1%	UINT32	
	12	V2 N1	0x5F8B	Number of interharmonic voltage incidents on phase V2			UINT32	
	13	V2 HD% Max	0x5F8C	Worst-case interharmonic magnitude on phase V2, %Un		0.01%	UINT32	
	14	V2 H#	0x5F8D	Worst-case interharmonic component number on phase V2	2-50		UINT32	
	15	V2 N2	0x5F8E	Number of interharmonic voltage THD incidents on phase V2			UINT32	
	16	V2 THD Max	0x5F8F	Worst-case interharmonic voltage THD on phase V2		0.1%	UINT32	
	17	V3 N1	0x5F90	Number of interharmonic voltage incidents on phase V3			UINT32	
	18	V3 HD% Max	0x5F91	Worst-case interharmonic magnitude on phase V3, %Un		0.01%	UINT32	
	19	V3 H#	0x5F92	Worst-case interharmonic component number on phase V3	2-50		UINT32	
	20	V3 N2	0x5F93	Number of interharmonic voltage THD incidents on phase V3			UINT32	
	21	V3 THD Max	0x5F94	Worst-case interharmonic THD on phase V3		0.1%	UINT32	

File Section	Record Field No.	Point Label	Point ID	Description <sup>1</sup>	Range	Units	Type	Notes
11				<b>Mains Signaling Voltage</b>				
	1	Nnv	0x6000	Number of non-valid 3-sec intervals			UINT32	
	2	N	0x6001	Number of valid 3-sec intervals			UINT32	
	3	N1	0x6002	Number of polyphase incidents, N1			UINT32	
	4	N1/N, %	0x6003	EN50160 compliance ratio, N1/N		0.01%	UINT32	
	5	V1 N1	0x6004	Number of incidents on phase V1			UINT32	
	6	V1 Frq1 %Un	0x6005	Maximum 1st signaling voltage magnitude on phase V1, %Un		0.01%	UINT32	
	7	V1 Frq2 %Un	0x6006	Maximum 2nd signaling voltage magnitude on phase V1, %Un		0.01%	UINT32	
	8	V1 Frq3 %Un	0x6007	Maximum 3rd signaling voltage magnitude on phase V1, %Un		0.01%	UINT32	
	9	V1 Frq4 %Un	0x6008	Maximum 4th signaling voltage magnitude on phase V1, %Un		0.01%	UINT32	
	10	V2 N1	0x6009	Number of incidents on phase V2			UINT32	
	11	V2 Frq1 %Un	0x600A	Maximum 1st signaling voltage magnitude on phase V2, %Un		0.01%	UINT32	
	12	V2 Frq2 %Un	0x600B	Maximum 2nd signaling voltage magnitude on phase V2, %Un		0.01%	UINT32	
	13	V2 Frq3 %Un	0x600C	Maximum 3rd signaling voltage magnitude on phase V2, %Un		0.01%	UINT32	
	14	V2 Frq4 %Un	0x600D	Maximum 4th signaling voltage magnitude on phase V2, %Un		0.01%	UINT32	
	15	V3 N1	0x600E	Number of incidents on phase V3			UINT32	
	16	V3 Frq1 %Un	0x600F	Maximum 1st signaling voltage magnitude on phase V3, %Un		0.01%	UINT32	
	17	V3 Frq2 %Un	0x6010	Maximum 2nd signaling voltage magnitude on phase V3, %Un		0.01%	UINT32	
	18	V3 Frq3 %Un	0x6011	Maximum 3rd signaling voltage magnitude on phase V3, %Un		0.01%	UINT32	
	19	V3 Frq4 %Un	0x6012	Maximum 4th signaling voltage magnitude on phase V3, %Un		0.01%	UINT32	
	20	Frq1	0x6013	1st signaling voltage frequency		0.01Hz	UINT32	
	21	Frq2	0x6014	2nd signaling voltage frequency		0.01Hz	UINT32	
	22	Frq3	0x6015	3rd signaling voltage frequency		0.01Hz	UINT32	
	23	Frq4	0x6016	4th signaling voltage frequency		0.01Hz	UINT32	

<sup>1</sup> When the 4LN3, 3LN3 or 3BLN wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line voltages.

### 3.11 EN 50160 Harmonic Statistics Data Log

File Section	Record Field No.	Point Label	Point ID	Description <sup>1</sup>	Range	Units	Type	Notes
0				<b>V1 Harmonic Voltage</b>			UINT32	
	1	THD MAX	0xC000	Maximum THD on phase		0.1%	UINT32	
	2	THDO MAX	0xC001	Maximum odd harmonics THD		0.1%	UINT32	
	3	THDE MAX	0xC002	Maximum even harmonics THD		0.1%	UINT32	
	4	%HD02 MAX	0xC003	Maximum HD02 harmonic voltage magnitude, %Un		0.01%	UINT32	
	5	%HD03 MAX	0xC004	Maximum HD03 harmonic voltage magnitude, %Un		0.01%	UINT32	
		...					UINT32	
	51	%HD50 MAX	0xC032	Maximum HD50 harmonic voltage magnitude, %Un		0.01%	UINT32	
1				<b>V2 Harmonic Voltage</b>			UINT32	
	1	THD MAX	0xC000	Maximum THD on phase		0.1%	UINT32	
	2	THDO MAX	0xC001	Maximum odd harmonics THD		0.1%	UINT32	

File Section	Record Field No.	Point Label	Point ID	Description <sup>1</sup>	Range	Units	Type	Notes
	3	THDE MAX	0xC002	Maximum even harmonics THD		0.1%	UINT32	
	4	%HD02 MAX	0xC003	Maximum HD02 harmonic voltage magnitude, %Un		0.01%	UINT32	
	5	%HD03 MAX	0xC004	Maximum HD03 harmonic voltage magnitude, %Un		0.01%	UINT32	
		...					UINT32	
	51	%HD50 MAX	0xC032	Maximum HD50 harmonic voltage magnitude, %Un		0.01%	UINT32	
2				<b>V3 Harmonic Voltage</b>			UINT32	
	1	THD MAX	0xC000	Maximum THD on phase		0.1%	UINT32	
	2	THDO MAX	0xC001	Maximum odd harmonics THD		0.1%	UINT32	
	3	THDE MAX	0xC002	Maximum even harmonics THD		0.1%	UINT32	
	4	%HD02 MAX	0xC003	Maximum HD02 harmonic voltage magnitude, %Un		0.01%	UINT32	
	5	%HD03 MAX	0xC004	Maximum HD03 harmonic voltage magnitude, %Un		0.01%	UINT32	
		...					UINT32	
	51	%HD50 MAX	0xC032	Maximum HD50 harmonic voltage magnitude, %Un		0.01%	UINT32	

<sup>1</sup> When the 4LN3, 3LN3 or 3BLN wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line voltages.



### 3.12 Billing/TOU Daily Profile Data Log

File Channel/ Section <sup>1</sup>	Record Field No. <sup>2</sup>	Point Label	Point ID	Description	Range	Units <sup>3</sup>	Type	Notes
0/0				<b>Energy Register #1</b>				
	1	REG1	0x1780	Summary (total) energy reading	0-999,999,999	1 kWh	UINT32	
	2	TRF1	0x7000	Tariff #1 energy reading	0-999,999,999	1 kWh	UINT32	
	3	TRF2	0x7001	Tariff #2 energy reading	0-999,999,999	1 kWh	UINT32	
	4	TRF3	0x7002	Tariff #3 energy reading	0-999,999,999	1 kWh	UINT32	
	5	TRF4	0x7003	Tariff #4 energy reading	0-999,999,999	1 kWh	UINT32	
	6	TRF5	0x7004	Tariff #5 energy reading	0-999,999,999	1 kWh	UINT32	
	7	TRF6	0x7005	Tariff #6 energy reading	0-999,999,999	1 kWh	UINT32	
	8	TRF7	0x7006	Tariff #7 energy reading	0-999,999,999	1 kWh	UINT32	
	9	TRF8	0x7007	Tariff #8 energy reading	0-999,999,999	1 kWh	UINT32	
...				...				
7/7				<b>Energy Register #8</b>				
	1	REG8	0x1787	Summary (total) energy reading	0-999,999,999	1 kWh	UINT32	
	2	TRF1	0x7000	Tariff #1 energy reading	0-999,999,999	1 kWh	UINT32	
	3	TRF2	0x7001	Tariff #2 energy reading	0-999,999,999	1 kWh	UINT32	
	4	TRF3	0x7002	Tariff #3 energy reading	0-999,999,999	1 kWh	UINT32	
	5	TRF4	0x7003	Tariff #4 energy reading	0-999,999,999	1 kWh	UINT32	
	6	TRF5	0x7004	Tariff #5 energy reading	0-999,999,999	1 kWh	UINT32	
	7	TRF6	0x7005	Tariff #6 energy reading	0-999,999,999	1 kWh	UINT32	
	8	TRF7	0x7006	Tariff #7 energy reading	0-999,999,999	1 kWh	UINT32	
	9	TRF8	0x7007	Tariff #8 energy reading	0-999,999,999	1 kWh	UINT32	
16/8				<b>Daily Maximum Demand Register #1</b>				
	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	
...				...				
23/15				<b>Daily Maximum Demand Register #8</b>				
	1	REG8 MD	0x4787	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 <sup>1</sup>	Record Field No. <sup>2</sup>	Point Label	Point ID	Description	Range	Units <sup>3</sup>	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	

<sup>1</sup> 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.

<sup>2</sup> The number of parameters in a section is automatically configured depending on the number of actually used tariffs selected in the TOU Daily Profiles.

<sup>3</sup> For power scale and units, refer to Section 4 "Data Scales and Units".

## 4 Data Scales and Units

Code	Condition	Value/Range	Notes
<b>Data Scales</b>			
Vmax		Voltage scale $\times$ PT Ratio, V	2
I <sub>max</sub>		Current scale $(2A/10A) \times$ CT Ratio = CT Primary current $\times$ 2, A	1, 3
P <sub>max</sub>	Wiring 4LN3, 3LN3, 3BLN3	Vmax $\times$ I <sub>max</sub> $\times$ 3, W	4
	Wiring 4LL3, 3LL3, 3BLL3, 3OP2, 3OP3, 3DIR2	Vmax $\times$ I <sub>max</sub> $\times$ 2, W	
F <sub>max</sub>	Nominal frequency 50 or 60 Hz	100 Hz	
AI <sub>min</sub> AI <sub>max</sub>	+/-1mA	AI <sub>min</sub> = -AI full scale $\times$ 2 AI <sub>max</sub> = AI full scale $\times$ 2	
	0-20mA	AI <sub>min</sub> = AI zero scale AI <sub>max</sub> = AI full scale	
	4-20mA	AI <sub>min</sub> = AI zero scale AI <sub>max</sub> = AI full scale	
	0-1mA	AI <sub>min</sub> = AI zero scale AI <sub>max</sub> = AI full scale	
<b>Data Units</b>			
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	

<sup>1</sup> CT Ratio = CT primary current/CT secondary current

<sup>2</sup> 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.

<sup>3</sup> The default Current scale is 2  $\times$  CT secondary current (2  $\times$  1A or 2  $\times$  5A depending on the order).

<sup>4</sup> P<sub>max</sub> is rounded to whole kilowatts. With PT=1.0, if P<sub>max</sub> is greater than 9,999,000 W, it is truncated to 9,999,000 W.

## 5 Data Formats

Format Code	Value	Description	Notes
<b>Timestamp</b>			
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.	
<b>File ID</b>			
F2	0	Event log	
	1-8, 11-16	Data log #1-8, #11-16	
	9	Data log #9 – EN50160 Compliance Statistics	
	10	Data log #10 – EN50160 Harmonic Statistics	
	17-18	Waveform log #1-2	
	26	Power quality (PQ) log	
	128	Real time waveform capture	
<b>File Attributes</b>			
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
3	EN50160 Compliance Statistics	Multi-section file	
4	EN50160 Survey Statistics - Voltage Harmonics	Multi-section file	
<b>File Status Word (bitmap)</b>			
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)		
<b>File Record Status Word (bitmap)</b>			
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)		
<b>TOU Profile Log Channel ID</b>			
F6	0-7	Summary/TOU energy/usage registers #1-#8	
	16-23	Summary/TOU maximum demand registers #1-#8	
<b>Waveform Log Channel ID</b>			
F7	0	V1/V12	1
	1	V2/V23	1
	2	V3/V31	1
	4	I1	
	5	I2	
	6	I3	
<b>Profile Log Sections Mask</b>			
F8	Bit 0:7 = 1	Summary/TOU energy/usage registers #1-#8	
	Bit 16:23 = 1	Summary/TOU maximum demand registers #1-#8	
<b>Waveform Log Channel Mask</b>			
F9	Bit 0 = 1	Channel V1/V12	1
	Bit 1 = 1	Channel V2/V23	1
	Bit 2 = 1	Channel V3/V31	1
	Bit 3 = 1	N/A	
	Bit 4 = 1	Channel I1	
	Bit 5 = 1	Channel I2	
	Bit 6 = 1	Channel I3	

Format Code	Value	Description	Notes
<b>TOU Tariff Change Time</b>			
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	
<b>Summary/TOU Energy Register Source ID</b>			
F11	0x0000	None	
	0x0700-0x0701	Pulse input DI1-DI2	
	0x1700	kWh import	
	0x1701	kWh export	
	0x1704	kvarh import	
	0x1705	kvarh export	
	0x1708	kVAh total	
<b>Setpoint Trigger Parameters ID</b>			
F12	0x0000	None (condition is not active)	
		<b>Setpoint Status</b>	
	0x0080-0x008F	Setpoint #1-#16 ON	
		<b>Event Flags</b>	
	0x0300-0x0307	Event flag #1-#8 ON	
	0x8300-0x8307	Event flag #1-#8 OFF	
		<b>Internal Events</b>	
	0x0400	kWh import pulse	
	0x0401	kWh export pulse	
	0x0403	kvarh import pulse	
	0x0404	kvarh export pulse	
	0x0405	kvarh total pulse	
	0x0406	kVAh total pulse	
	0x0407	Start new demand interval	
	0x0408	Start new tariff interval	
	0x0409	Start new volt/ampere demand interval	
	0x040A	Start new sliding window demand interval	
		<b>Timers</b>	
	0x0500	Timer #1	
	0x0501	Timer #2	
		<b>Status Inputs</b>	
	0x0600	Status input #1 ON	
	0x0601	Status input #2 ON	
	0x8600	Status input #1 OFF	
	0x8601	Status input #2 OFF	
		<b>Pulse Inputs</b>	
	0x0700	Pulse input #1	
	0x0701	Pulse input #2	
		<b>Relays</b>	
	0x0800	Relay #1 ON	
	0x0801	Relay #2 ON	
	0x8800	Relay #1 OFF	
	0x8801	Relay #2 OFF	
		<b>Static Events</b>	
	0x8901	Positive phase rotation reversal	3
	0x8902	Negative phase rotation reversal	3
	0x0903	EN50160 PQ event	
		<b>Pulse Counters</b>	
	0x0A00	High pulse counter #1	
	0x0A01	High pulse counter #2	
	0x0A02	High pulse counter #3	
	0x0A03	High pulse counter #4	
		<b>Time and Date Parameters</b>	
	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)	
		<b>1-Cycle Phase Values</b>	
	0x0C03	High I1 current	
	0x0C04	High I2 current	

Format Code	Value	Description	Notes
	0x0C05	High I3 current	
	0x8C03	Low I1 current	
	0x8C04	Low I2 current	
	0x8C05	Low I3 current	
		<b>1-Cycle Values on any Phase</b>	
	0x0E00	High voltage	1
	0x8D00	Low voltage	1
	0x0E01	High current	
	0x8D01	Low current	
	0x0E07	High voltage THD	1
	0x0E08	High current THD	
	0x0E09	High K-Factor	
	0x0E0A	High current TDD	
		<b>1-Cycle Auxiliary Values</b>	
	0x1002	High frequency	
	0x9002	Low frequency	
	0x1003	High voltage unbalance	1
	0x1004	High current unbalance	
		<b>1-Sec Phase Values</b>	
	0x1103	High I1 current	
	0x1104	High I2 current	
	0x1105	High I3 current	
	0x9103	Low I1 current	
	0x9104	Low I2 current	
	0x9105	Low I3 current	
		<b>1-Sec Values on any Phase</b>	
	0x1300	High voltage	1
	0x9200	Low voltage	1
	0x1301	High current	
	0x9201	Low current	
		<b>1-Sec Total Values</b>	
	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	
		<b>1-Sec Auxiliary Values</b>	
	0x1501	High neutral current	
	0x1502	High frequency	
	0x9502	Low frequency	
	0x1503	High voltage unbalance	1
	0x1504	High current unbalance	
		<b>Present Demands</b>	
	0x1600	High V1/V12 Volt demand	1
	0x1601	High V2/V23 Volt demand	1
	0x1602	High V3/V31 Volt demand	1
	0x1603	High I1 Ampere demand	
	0x1604	High I2 Ampere demand	
	0x1605	High I3 Ampere demand	
	0x1606	High block kW import demand	
	0x1607	High block kvar import demand	
	0x1608	High block kVA demand	
	0x1609	High sliding window kW import demand	
	0x160A	High sliding window kvar import demand	
	0x160B	High sliding window kVA demand	
	0x160F	High accumulated kW import demand	
	0x1610	High accumulated kvar import demand	
	0x1611	High accumulated kVA demand	
	0x1612	High predicted kW import demand	
	0x1613	High predicted kvar import demand	
	0x1614	High predicted kVA demand	
	0x1616	High block kW export demand	
	0x1617	High block kvar export demand	
	0x1618	High sliding window kW export demand	
	0x1619	High sliding window kvar export demand	

Format Code	Value	Description	Notes
	0x161A	High accumulated kW export demand	
	0x161B	High accumulated kvar export demand	
	0x161C	High predicted kW export demand	
	0x161D	High predicted kvar export demand	
<b>Setpoint Action ID</b>			
F14	<b>Action type</b>	<b>Target</b>	
	0x00	0x00	No action
	0x20	0x00	Set Event flag #1
	0x20	0x01	Set Event flag #2
	0x20	0x02	Set Event flag #3
	0x20	0x03	Set Event flag #4
	0x21	0x00	Clear Event flag #1
	0x21	0x01	Clear Event flag #2
	0x21	0x02	Clear Event flag #3
	0x21	0x03	Clear Event flag #4
	0x30	0x00	Operate Relay #1
	0x30	0x01	Operate Relay #2
	0x31	0x00	Release latched Relay #1
	0x31	0x01	Release latched Relay #2
	0x40	0x00	Increment counter #1
	0x40	0x01	Increment counter #2
	0x40	0x02	Increment counter #3
	0x40	0x03	Increment counter #4
	0x41	0x00	Clear counter #1
	0x41	0x01	Clear counter #2
	0x41	0x02	Clear counter #3
	0x41	0x03	Clear counter #4
	0x64	0x00	Clear all counters
	0x51	0x00	Send event notification
	0x60	0x00	Reset total energy
	0x61	0x00	Reset all total maximum demands
	0x61	0x01	Reset power maximum demands
	0x61	0x02	Reset volt/ampere/harmonic maximum demands
	0x62	0x00	Reset TOU energy
	0x63	0x00	Reset TOU maximum demands
	0x65	0x00	Clear Min/Max registers
	0x70	0x00	Event log
	0x71	0x00	Data log #1
	0x71	0x01	Data log #2
	0x71	0x02	Data log #3
	0x71	0x03	Data log #4
	0x71	0x04	Data log #5
	0x71	0x05	Data log #6
	0x71	0x06	Data log #7
	0x71	0x07	Data log #8
	0x71	0x0A	Data log #11
	0x71	0x0B	Data log #12
	0x71	0x0C	Data log #13
	0x71	0x0D	Data log #14
	0x71	0x0E	Data log #15
	0x71	0x0F	Data log #16
	0x72	0x00	Waveform log #1
	0x73	0x00	Waveform log #2
<b>Counter Source ID</b>			
F16	0x0000	None	
	0x0001-0x0002	Pulse input DI1-DI2	
<b>Relay Output Pulse Source ID</b>			
F17	0x0000	None	
	0x0400	kWh import pulse	
	0x0401	kWh export pulse	
	0x0403	kvarh import pulse	
	0x0404	kvarh export pulse	
	0x0405	kvarh total pulse	
	0x0406	kVAh pulse	
<b>AO Output/Analog Expander Parameters ID</b>			
F18	0x0000	None (output disabled)	<sup>2</sup>
		<b>1-Cycle Phase Values</b>	

Format Code	Value	Description	Notes
	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	
		<b>1-Cycle Total Values</b>	
	0x0F00	Total kW	
	0x0F01	Total kvar	
	0x0F02	Total kVA	
	0x0F03	Total PF	
	0x0F04	Total PF Lag	
	0x0F05	Total PF Lead	
	0x0F0A	3-phase average L-N/L-L voltage	1
	0x0F0B	3-phase average L-L voltage	
	0x0F0C	3-phase average current	
		<b>1-Cycle Auxiliary Values</b>	
	0x1001	In Current	
	0x1002	Frequency	
		<b>1-Sec Phase Values</b>	
	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	
		<b>1-Sec Total Values</b>	
	0x1400	Total kW	
	0x1401	Total kvar	
	0x1402	Total kVA	
	0x1403	Total PF	
	0x1404	Total PF Lag	
	0x1405	Total PF Lead	
	0x140A	3-phase average L-N/L-L voltage	1
	0x140B	3-phase average L-L voltage	
	0x140C	3-phase average current	
		<b>1-Sec Auxiliary Values</b>	
	0x1501	In Current	
	0x1502	Frequency	
		<b>Present Demands</b>	
	0x160F	Accumulated kW import demand	
	0x1610	Accumulated kvar import demand	
	0x1611	Accumulated kVA demand	
	0x161A	Accumulated kW export demand	
	0x161B	Accumulated kvar export demand	
<b>Event Cause/Point ID</b>			
F19		<b>Setpoint Operation Events</b>	
	0x0000-0x59FF	Trigger parameter ID	
	0x6400-0xFFFF	Trigger parameter ID	
		<b>Setpoint Action Events</b>	
	0x5A00-0x5A0F	Setpoint #1-#16	
		<b>Communications Events</b>	
	0x5B00-0x5BFF	Point ID (low byte, see F21)	
		<b>Front Panel Operations</b>	
	0x5C00-0x5CFF	Point ID (low byte, see F21)	
		<b>Self-Check Diagnostics Events</b>	
	0x5D00-0x5DFF	Point ID (low byte, see F21)	
		<b>Self-Update Events</b>	
	0x5E08	RTC DST time update	4
		<b>Hardware Diagnostics Events</b>	
	0x6202	RAM/Data error	



Format Code	Value	Description	Notes
	0x6203	Hardware watchdog reset	
	0x6204	Sampling fault	
	0x6205	CPU exception	
	0x6206	Reserved	
	0x6207	Software watchdog reset	
	0x620D	Low battery	
	0x620F	EEPROM fault	
		<b>External Events</b>	
	0x6300	Power down	
	0x6308	Power up	
	0x6309	External reset	
<b>Event Effect ID</b>			
F20		<b>Communications/Self-check/Front Panel Events</b>	
	0x0000	None	
	0x6000	Total energy registers cleared	
	0x6100	All total maximum demands cleared	
	0x6101	Power maximum demands cleared	
	0x6102	Volt/Ampere/Harmonic 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)	
	0x6B00	EN50160 statistics cleared	
	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	
		<b>Setpoint Operation Events</b>	
	0xE100-0xE10F	Setpoint operated (low byte = setpoint ID)	
	0xE200-0xE20F	Setpoint released (low byte = setpoint ID)	
		<b>Setpoint Action Events</b>	
	See F14	Setpoint action ID	
<b>Data Point ID</b>			
F21		<b>Data Locations</b>	
	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	
	0x13	Programmable Min/Max log setup	
	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	
	0x26	AI setup	

Format Code	Value	Description	Notes
	0x27	Waveform log setup	
	0x2B-0x4E	Reserved	
	0x4F	Tampering attempt	
<b>Event Type ID</b>			
F22		<b>Setpoint Events</b>	
	0x0000	SP: Generic setpoint event	
	0x0001-0x0010	SP1-SP16: Setpoint #1-#16 event	
		<b>PQ Events (EN 50160 categories)</b>	
	0x0500	PQEN: Generic PQ event	
	0x0501	PQEN1: Frequency variations	
	0x0502	PQEN2: Voltage variations	
	0x0503	PQEN3: Rapid voltage changes	
	0x0504	PQEN4: Flicker	
	0x0505	PQEN5: Voltage dips	
	0x0506	PQEN6: Voltage interruptions	
	0x0507	PQEN7: Temporary overvoltages	
	0x0508	PQEN8: Transient overvoltages	
	0x0509	PQEN9: Voltage unbalance	
	0x050A	PQEN10: Harmonic voltage	
	0x050B	PQEN11: Interharmonic voltage	
	0x050C	PQEN12: Mains signaling voltage	
<b>Device Diagnostics</b>			
F23	Bit 0	Reserved	
	Bit 1	Reserved	
	Bit 2 = 1	RAM/Data error	
	Bit 3 = 1	CPU watchdog reset	
	Bit 4 = 1	Sampling fault	
	Bit 5 = 1	CPU exception	
	Bit 6	Reserved	
	Bit 7 = 1	Software watchdog reset	
	Bit 8 = 1	Power down	
	Bit 9 = 1	Device reset	
	Bit 10 = 1	Configuration reset	
	Bit 11 = 1	RTC fault	
	Bit 12	Reserved	
	Bit 13 = 1	Low battery	
	Bit 14	Reserved	
	Bit 15 = 1	EEPROM fault	
<b>DNP Object Types</b>			
F24		<b>Static Binary Input Objects</b>	
	0	Single-Bit Binary Input	
	1	Binary Input With Status	
		<b>Binary Input Change Event Objects</b>	
	0	Binary Input Change Without Time	
	1	Binary Input Change With Time	
		<b>Static Binary Counters</b>	
	0	32-bit Binary Counter	
	1	32-bit Binary Counter Without Flag	
	2	16-bit Binary Counter	
	3	16-bit Binary Counter Without Flag	
		<b>Binary Counter Change Events</b>	
	0	32-bit Counter Change Event Without Time	
	1	32-bit Counter Change Event With Time	
	2	16-bit Counter Change Event Without Time	
	3	16-bit Counter Change Event With Time	
		<b>Frozen Binary Counters</b>	
	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	
		<b>Static Analog Input Objects</b>	
	0	32-bit Analog Input	
	1	32-bit Analog Input Without Flag	
	2	16-bit Analog Input	
	3	16-bit Analog Input Without Flag	

Format Code	Value	Description	Notes
		<b>Analog Input Change Events</b>	
	0	32-bit Analog Change Event Without Time	
	1	32-bit Analog Change Event With Time	
	2	16-bit Analog Change Event Without Time	
	3	16-bit Analog Change Event With Time	
<b>DNP Class 0 Objects</b>			
F25	0x1E01	Analog Input 30:01	
	0x1E02	Analog Input 30:02	
	0x1E03	Analog Input 30:03	
	0x1E04	Analog Input 30:04	
	0x2801	Analog Output 40:01	
	0x2802	Analog Output 40:02	
	0x0101	Binary Input 01:01	
	0x0102	Binary Input 01:02	
	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	
<b>Wiring Mode</b>			
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	
	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	
<b>Instrument Options</b>			
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	Reserved	
	Bit 12=1	Setup is secured by a password (authorization required)	
	Bit 13	Reserved	
	Bit 14=1	Analog expander option ±1mA	
	Bit 15	Reserved	
	Bits 16-18	Number of RO - 1	
	Bits 19-22	Number of DI - 1	
	Bits 23-24	Number of AO - 1	
	Bits 25-29	Reserved	
	Bits 30-31=11	Memory module 1MBytes	
<b>I/O Slot Types</b>			
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
			× = Don't care

Format Code	Value		Description	Notes
	AO	4-20 mA	01100010B	
	AO	0-1 mA	01100011B	
	Empty slot		1111xxxxB	

**NOTES:**

<sup>1</sup> **Voltage**

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

<sup>2</sup> **Analog Outputs**

1) For bi-directional analog output ( $\pm 1$  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  $\pm 1.000$ . 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.

<sup>3</sup> **Phase Reversal Trigger**

The setpoint is operated when the actual phase sequence does not match the designated phase rotation order.

<sup>4</sup> The event value field shows the present meter time in the F1 format (starting with V25.2.4).