



# Series PM130 PLUS Powermeters PM130P/PM130E/PM130EH

## 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

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

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# 1 General

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

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

## **IMPORTANT**

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

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

## **Designations used in the guide:**

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



## 2 Modbus Protocol Implementation

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

### 2.1 Transmission Modes

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

### 2.2 Address Field

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

### 2.3 Function Field

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

**Table 2-2 Modbus Function Codes**

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

<sup>1</sup> The PM130 supports only diagnostic code 0 - return query data.

### 2.4 Exception Responses

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

Implemented exception response codes:

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

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

### 2.5 Transaction Timing

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

**Table 2-2 Response Time**

| Baud Rate, bps | Response Time, ms |           |           |
|----------------|-------------------|-----------|-----------|
|                | Min               | Max       | Typical   |
| <b>9600</b>    | <b>13</b>         | <b>15</b> | <b>13</b> |
| <b>19200</b>   | <b>11</b>         | <b>12</b> | <b>11</b> |
| <b>57600</b>   | <b>9</b>          | <b>10</b> | <b>9</b>  |
| <b>115200</b>  | <b>9</b>          | <b>10</b> | <b>9</b>  |

## 2.6 Modbus Register Addresses

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

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

## 2.7 Data Formats

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

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

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

### 2.7.1 16-bit Scaled Integer Format

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

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

where:

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

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

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

## CONVERSION EXAMPLES

### 1. Voltage readings

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

Voltage engineering scales (see Section 4):

$$HI\_ENG = V_{max} = 828.0 \times PT \text{ ratio} = 828.0 \times 1 = 828.0V$$

$$LO\_ENG = 0V$$

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):

$$HI\_ENG = V_{max} = 144.0 \times PT \text{ ratio} = 144 \times 120 = 17,280V$$

$$\text{LO\_ENG} = 0\text{V}$$

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

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

## 2. Current readings

Assume device settings: CT primary current = 200A.

Current engineering scales (see Section 4):

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

$$\text{LO\_ENG} = 0\text{A}$$

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

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

## 3. Power readings

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

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

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

$$\text{LO\_ENG} = -P_{\text{max}} = -662 \text{ kW}$$

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

$$\text{Watts reading} = 5500 \times (662 - (-662))/(9999 - 0) + (-662) = 66.3 \text{ kW}$$

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

$$\text{Watts reading} = 500 \times (662 - (-662))/(9999 - 0) + (-662) = -595.8 \text{ kW}$$

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

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

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

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

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

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

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

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

## 4. Power Factor readings

Power factor engineering scales (see Section 3.3):

$$\text{HI\_ENG} = 1.000.$$

$$\text{LO\_ENG} = -1.000.$$

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

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

### 2.7.2 32-bit Long Integer Format

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

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

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

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

## 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.

### 2.7.3 32-bit Floating Point Format

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

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

### 2.7.4 32-bit Modulo-10000 Format

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

## 2.8 User Assignable Registers

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

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

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

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

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

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

## **2.9 Password Protection**

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

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

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

## **2.10 Data Recording and File Transfers**

### **2.10.1 Log File Organization**

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

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

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

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

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

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

### **Multi-section Files**

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

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

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

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

### **Data Log File**

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

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

### **Profile Data Log File**

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

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

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

### **Real-time Waveforms**

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

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

## **2.10.2 File Transfers**

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

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

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

### **Common File Transfer**

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

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

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

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

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

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

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

### **Reading Multi-section Data Log Files**

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

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

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

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

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

### Reading Real-time Waveforms

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

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

## 2.11 TCP Notification Client

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

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

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

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

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

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



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

# 3 Modbus Register Map

## 3.1 Modbus Setup Registers

| Address                            | Point ID | Description                    | Options/Range   | Units | Type   | R/W | Notes                  |
|------------------------------------|----------|--------------------------------|---|-------|--------|-----|------------------------|
| <b>Assignable Modbus 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, secondary volts | 60-828  | 1V    | UINT16 | R/W | Default 144V           |
| 243                                |          | Current scale, secondary amps  | 10-100  | ×0.1A | UINT16 | R/W | Default 2×CT secondary |
| 244-245                            |          | Reserved                       | 0   |       | UINT16 | R   |                        |
| <b>32-bit Register Type</b>        |          |                                |   |       |        |     |                        |
| 246                                |          | Type of 32-bit registers       | Bits 0-1 - analog values:<br>0 = 32-bit integer<br>1 = 32-bit floating point<br>Bits 2-3 - binary counters:<br>0 = 32-bit integer<br>1 = 32-bit floating point<br>Bit 4-5 - energy counters:<br>0 = 32-bit integer<br>1 = 32-bit floating point |       | UINT16 | R/W | Default 0              |

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

| Address | Point ID | Description                             | Low and High Scales <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   | 5     |
| +32     |          | kWh import (high)                       | 0-9999                           | ×10MWh             | UINT16 | R   | 5     |
| +33     |          | kWh export (low)                        | 0-9999                           | 1kWh               | UINT16 | R   | 5     |
| +34     |          | kWh export (high)                       | 0-9999                           | ×10MWh             | UINT16 | R   | 5     |
| +35     |          | +kvarh net (low)                        | 0-9999                           | 1kvarh             | UINT16 | R   | 3, 5  |
| +36     |          | +kvarh net (high)                       | 0-9999                           | ×10Mvarh           | UINT16 | R   | 3, 5  |
| +37     |          | -kvarh net (low)                        | 0-9999                           | 1kvarh             | UINT16 | R   | 4, 5  |
| +38     |          | -kvarh net (high)                       | 0-9999                           | ×10Mvarh           | UINT16 | R   | 4, 5  |

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

**NOTES:**

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

<sup>1</sup> Voltage and Voltage Harmonics Readings:

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

<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 2.7.1, "16-bit Scaled Integer Format".

<sup>3</sup> Positive readings of kvarh net

<sup>4</sup> Negative readings of kvarh net

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

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

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

| Address   | Point ID | Description                     | Low and High Scales <sup>2</sup> | Units <sup>2, 4</sup> | Type   | R/W | Notes         |
|-----------|----------|---------------------------------|----------------------------------|-----------------------|--------|-----|---------------|
| +28       | 0x0C1C   | I2 Current TDD                  | 0-100.0                          | 0.1%                  | UINT16 | R   | 2-cycle value |
| +29       | 0x0C1D   | I3 Current TDD                  | 0-100.0                          | 0.1%                  | UINT16 | R   | 2-cycle value |
| +30       | 0x0C1E   | V12 Voltage                     | 0-Vmax                           | U1                    | UINT16 | R   |               |
| +31       | 0x0C1F   | V23 Voltage                     | 0-Vmax                           | U1                    | UINT16 | R   |               |
| +32       | 0x0C20   | V31 Voltage                     | 0-Vmax                           | U1                    | UINT16 | R   |               |
| 7256-7359 |          | <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   |               |
| 7296-7300 |          | <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                            | %                     | UINT16 | R   |               |
| +4        | 0x1004   | Current unbalance               | 0-300                            | %                     | UINT16 | R   |               |
| 7316-7331 |          | <b>Phasor</b>                   |                                  |                       |        |     |               |
| +0        | 0x1080   | V1/V12 Voltage magnitude        | 0-Vmax                           | U1                    | UINT16 | R   | 1             |
| +1        | 0x1081   | V2/V23 Voltage magnitude        | 0-Vmax                           | U1                    | UINT16 | R   | 1             |
| +2        | 0x1082   | V3/V31 Voltage magnitude        | 0-Vmax                           | U1                    | UINT16 | R   | 1             |
| +3        | 0x1083   | Not used                        |                                  |                       | UINT16 | R   |               |
| +4        | 0x1084   | I1 Current magnitude            | 0-Imax                           | U2                    | UINT16 | R   |               |
| +5        | 0x1085   | I2 Current magnitude            | 0-Imax                           | U2                    | UINT16 | R   |               |
| +5        | 0x1086   | I3 Current magnitude            | 0-Imax                           | U2                    | UINT16 | R   |               |
| +7        | 0x1087   | Not used                        |                                  |                       | UINT16 | R   |               |
| +8        | 0x1088   | V1/V12 Voltage angle            | -180.0-180.0                     | 0.1°                  | INT16  | R   | 1             |
| +9        | 0x1089   | V2/V23 Voltage angle            | -180.0-180.0                     | 0.1°                  | INT16  | R   | 1             |
| +10       | 0x108A   | V3/V31 Voltage angle            | -180.0-180.0                     | 0.1°                  | INT16  | R   | 1             |
| +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   |               |

| Address   | Point ID | Description                  | Low and High Scales <sup>2</sup> | Units <sup>2, 4</sup> | Type   | R/W | Notes                    |
|-----------|----------|------------------------------|----------------------------------|-----------------------|--------|-----|--------------------------|
| 7336-7368 |          | <b>1-Second Phase Values</b> |                                  |                       |        |     |                          |
| +0        | 0x1100   | V1/V12 Voltage               | 0-Vmax                           | U1                    | UINT16 | R   | <sup>1</sup>             |
| +1        | 0x1101   | V2/V23 Voltage               | 0-Vmax                           | U1                    | UINT16 | R   | <sup>1</sup>             |
| +2        | 0x1102   | V3/V31 Voltage               | 0-Vmax                           | U1                    | UINT16 | R   | <sup>1</sup>             |
| +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   | <sup>1</sup> 3-sec value |
| +19       | 0x1113   | V2/V23 Voltage THD           | 0-999.9                          | 0.1%                  | UINT16 | R   | <sup>1</sup> 3-sec value |
| +20       | 0x1114   | V3/V31 Voltage THD           | 0-999.9                          | 0.1%                  | UINT16 | R   | <sup>1</sup> 3-sec value |
| +21       | 0x1115   | I1 Current THD               | 0-999.9                          | 0.1%                  | UINT16 | R   | 3-sec value              |
| +22       | 0x1116   | I2 Current THD               | 0-999.9                          | 0.1%                  | UINT16 | R   | 3-sec value              |
| +23       | 0x1117   | I3 Current THD               | 0-999.9                          | 0.1%                  | UINT16 | R   | 3-sec value              |
| +24       | 0x1118   | I1 K-Factor                  | 1.0-999.9                        | 0.1                   | UINT16 | R   | 3-sec value              |
| +25       | 0x1119   | I2 K-Factor                  | 1.0-999.9                        | 0.1                   | UINT16 | R   | 3-sec value              |
| +26       | 0x111A   | I3 K-Factor                  | 1.0-999.9                        | 0.1                   | UINT16 | R   | 3-sec value              |
| +27       | 0x111B   | I1 Current TDD               | 0-100.0                          | 0.1%                  | UINT16 | R   | 3-sec value              |
| +28       | 0x111C   | I2 Current TDD               | 0-100.0                          | 0.1%                  | UINT16 | R   | 3-sec value              |
| +29       | 0x111D   | I3 Current TDD               | 0-100.0                          | 0.1%                  | UINT16 | R   | 3-sec value              |
| +30       | 0x111E   | V12 Voltage                  | 0-Vmax                           | U1                    | UINT16 | R   |                          |
| +31       | 0x111F   | V23 Voltage                  | 0-Vmax                           | U1                    | UINT16 | R   |                          |
| +32       | 0x1120   | V31 Voltage                  | 0-Vmax                           | U1                    | UINT16 | R   |                          |
| 7456-7459 |          | <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   |                          |

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



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

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

| Address   | Point ID  | Description                             | Low and High Scales <sup>2</sup> | Units <sup>2, 4</sup> | Type   | R/W | Notes          |
|-----------|-----------|---|----------------------------------|-----------------------|--------|-----|----------------|
|           | +2 0x2A02 | Total fundamental kVA                   | 0-Pmax                           | U3                    | UINT16 | R   |                |
|           | +3 0x2A03 | Total fundamental PF                    | -1.000-1.000                     | 0.001                 | INT16  | R   |                |
| 8416-8445 |           | <b>Minimum 1-Cycle Phase Values</b>     |                                  |                       |        |     |                |
|           | +0 0x2C00 | V1/V12 Voltage                          | 0-Vmax                           | U1                    | UINT16 | R   | 1              |
|           | +1 0x2C01 | V2/V23 Voltage                          | 0-Vmax                           | U1                    | UINT16 | R   | 1              |
|           | +2 0x2C02 | V3/V31 Voltage                          | 0-Vmax                           | U1                    | UINT16 | R   | 1              |
|           | +3 0x2C03 | I1 Current                              | 0-Imax                           | U2                    | UINT16 | R   |                |
|           | +4 0x2C04 | I2 Current                              | 0-Imax                           | U2                    | UINT16 | R   |                |
|           | +5 0x2C05 | I3 Current                              | 0-Imax                           | U2                    | UINT16 | R   |                |
| 8456-8459 |           | <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 |
| 8496-8498 |           | <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   |                |
| 8736-8765 |           | <b>Maximum 1-Cycle Phase Values</b>     |                                  |                       |        |     |                |
|           | +0 0x3400 | V1/V12 Voltage                          | 0-Vmax                           | U1                    | UINT16 | R   | 1              |
|           | +1 0x3401 | V2/V23 Voltage                          | 0-Vmax                           | U1                    | UINT16 | R   | 1              |
|           | +2 0x3402 | V3/V31 Voltage                          | 0-Vmax                           | U1                    | UINT16 | R   | 1              |
|           | +3 0x3403 | I1 Current                              | 0-Imax                           | U2                    | UINT16 | R   |                |
|           | +4 0x3404 | I2 Current                              | 0-Imax                           | U2                    | UINT16 | R   |                |
|           | +5 0x3405 | I3 Current                              | 0-Imax                           | U2                    | UINT16 | R   |                |
| 8776-8779 |           | <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 |
| 881608818 |           | <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   |                |
| 8856-8872 |           | <b>Maximum Demands</b>                  |                                  |                       |        |     |                |
|           | +0 0x3700 | V1/V12 Maximum volt demand              | 0-Vmax                           | U1                    | UINT16 | R   | 1              |
|           | +1 0x3701 | V2/V23 Maximum volt demand              | 0-Vmax                           | U1                    | UINT16 | R   | 1              |
|           | +2 0x3702 | V3/V31 Maximum volt demand              | 0-Vmax                           | U1                    | UINT16 | R   | 1              |
|           | +3 0x3703 | I1 Maximum ampere demand                | 0-Imax                           | U2                    | UINT16 | R   |                |
|           | +4 0x3704 | I2 Maximum ampere demand                | 0-Imax                           | U2                    | UINT16 | R   |                |
|           | +5 0x3705 | I3 Maximum ampere demand                | 0-Imax                           | U2                    | UINT16 | R   |                |
|           | +6 0x3706 | Not used                                |                                  |                       | UINT16 | R   |                |
|           | +7 0x3707 | Not used                                |                                  |                       | UINT16 | R   |                |

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

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

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

**NOTES:**

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

<sup>1</sup> Voltage and voltage harmonics readings:

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

- <sup>2</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 2.7.1, "16-bit Scaled Integer Format".
- <sup>3</sup> Harmonic angles are referenced to the fundamental voltage harmonic H01 on phase L1.
- <sup>4</sup> The binary counters and energy registers can be read either as 32-bit integer, or 32-bit floating-point values. Refer to Section 2.7 for details.

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

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



| Address     | Point ID | Description                     | Options/Range <sup>2</sup> | Units <sup>2, 4</sup> | Type <sup>2</sup> | R/W | Notes         |
|-------------|----------|---------------------------------|----------------------------|-----------------------|-------------------|-----|---------------|
| +56,57      | 0x0C1C   | I2 Current TDD                  | 0-1000                     | ×0.1%                 | UINT32            | R   | 2-cycle value |
| +58,59      | 0x0C1D   | I3 Current TDD                  | 0-1000                     | ×0.1%                 | UINT32            | R   | 2-cycle value |
| +60,61      | 0x0C1E   | V12 Voltage                     | 0-Vmax                     | U1                    | UINT32            | R   |               |
| +62,63      | 0x0C1F   | V23 Voltage                     | 0-Vmax                     | U1                    | UINT32            | R   |               |
| +64,65      | 0x0C20   | V31 Voltage                     | 0-Vmax                     | U1                    | UINT32            | R   |               |
| 13696-13721 |          | <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                    | 0-1000                     | ×0.001                | UINT16            | R   |               |
| +10,11      | 0x0F05   | Total PF lead                   | 0-1000                     | ×0.001                | UINT16            | R   |               |
| +12,13      | 0x0F06   | Total kW import                 | 0-Pmax                     | U3                    | UINT32            | R   |               |
| +14,15      | 0x0F07   | Total kW export                 | 0-Pmax                     | U3                    | UINT32            | R   |               |
| +16,17      | 0x0F08   | Total kvar import               | 0-Pmax                     | U3                    | UINT32            | R   |               |
| +18,19      | 0x0F09   | Total kvar export               | 0-Pmax                     | U3                    | UINT32            | R   |               |
| +20,21      | 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      | 0xFOC    | 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               | 0-300                      | %                     | UINT32            | R   |               |
| +8,9        | 0x1004   | Current unbalance               | 0-300                      | %                     | UINT32            | R   |               |
| 13864-13895 |          | <b>Phasor</b>                   |                            |                       |                   |     |               |
| +0,1        | 0x1080   | V1/V12 Voltage magnitude        | 0-Vmax                     | U1                    | UINT32            | R   | 1             |
| +2,3        | 0x1081   | V2/V23 Voltage magnitude        | 0-Vmax                     | U1                    | UINT32            | R   | 1             |
| +4,5        | 0x1082   | V3/V31 Voltage magnitude        | 0-Vmax                     | U1                    | UINT32            | R   | 1             |
| +6,7        | 0x1083   | Not used                        |                            |                       | UINT32            | R   |               |
| +8,9        | 0x1084   | I1 Current magnitude            | 0-Imax                     | U2                    | UINT32            | R   |               |
| +10,11      | 0x1085   | I2 Current magnitude            | 0-Imax                     | U2                    | UINT32            | R   |               |
| +12,13      | 0x1086   | I3 Current magnitude            | 0-Imax                     | U2                    | UINT32            | R   |               |
| +14,15      | 0x1087   | Not used                        |                            |                       | UINT32            | R   |               |
| +16,17      | 0x1088   | V1/V12 Voltage angle            | -1800-1800                 | ×0.1°                 | INT32             | R   | 1             |
| +18,19      | 0x1089   | V2/V23 Voltage angle            | -1800-1800                 | ×0.1°                 | INT32             | R   | 1             |
| +20,21      | 0x108A   | V3/V31 Voltage angle            | -1800-1800                 | ×0.1°                 | INT32             | R   | 1             |
| +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   |               |

| Address     | Point ID | Description                  | Options/Range <sup>2</sup> | Units <sup>2, 4</sup> | Type <sup>2</sup> | R/W | Notes                    |
|-------------|----------|------------------------------|----------------------------|-----------------------|-------------------|-----|--------------------------|
| 13952-14017 |          | <b>1-Second Phase Values</b> |                            |                       |                   |     |                          |
| +0,1        | 0x1100   | V1/V12 Voltage               | 0-Vmax                     | U1                    | UINT32            | R   | <sup>1</sup>             |
| +2,3        | 0x1101   | V2/V23 Voltage               | 0-Vmax                     | U1                    | UINT32            | R   | <sup>1</sup>             |
| +4,5        | 0x1102   | V3/V31 Voltage               | 0-Vmax                     | U1                    | UINT32            | R   | <sup>1</sup>             |
| +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   | <sup>1</sup> 3-sec value |
| +38,39      | 0x1113   | V2/V23 Voltage THD           | 0-9999                     | ×0.1%                 | UINT32            | R   | <sup>1</sup> 3-sec value |
| +40,41      | 0x1114   | V3/V31 Voltage THD           | 0-9999                     | ×0.1%                 | UINT32            | R   | <sup>1</sup> 3-sec value |
| +42,43      | 0x1115   | I1 Current THD               | 0-9999                     | ×0.1%                 | UINT32            | R   | 3-sec value              |
| +44,45      | 0x1116   | I2 Current THD               | 0-9999                     | ×0.1%                 | UINT32            | R   | 3-sec value              |
| +46,47      | 0x1117   | I3 Current THD               | 0-9999                     | ×0.1%                 | UINT32            | R   | 3-sec value              |
| +48,49      | 0x1118   | I1 K-Factor                  | 10-9999                    | ×0.1                  | UINT32            | R   | 3-sec value              |
| +50,51      | 0x1119   | I2 K-Factor                  | 10-9999                    | ×0.1                  | UINT32            | R   | 3-sec value              |
| +52,53      | 0x111A   | I3 K-Factor                  | 10-9999                    | ×0.1                  | UINT32            | R   | 3-sec value              |
| +54,55      | 0x111B   | I1 Current TDD               | 0-1000                     | ×0.1%                 | UINT32            | R   | 3-sec value              |
| +56,57      | 0x111C   | I2 Current TDD               | 0-1000                     | ×0.1%                 | UINT32            | R   | 3-sec value              |
| +58,59      | 0x111D   | I3 Current TDD               | 0-1000                     | ×0.1%                 | UINT32            | R   | 3-sec value              |
| +60,61      | 0x111E   | V12 Voltage                  | 0-Vmax                     | U1                    | UINT32            | R   |                          |
| +62,63      | 0x111F   | V23 Voltage                  | 0-Vmax                     | U1                    | UINT32            | R   |                          |
| +64,65      | 0x1120   | V31 Voltage                  | 0-Vmax                     | U1                    | UINT32            | R   |                          |
| 14336-14361 |          | <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                 | 0-1000                     | ×0.001                | UINT16            | R   |                          |
| +10,11      | 0x1405   | Total PF lead                | 0-1000                     | ×0.001                | UINT16            | R   |                          |
| +12,13      | 0x1406   | Total kW import              | 0-Pmax                     | U3                    | UINT32            | R   |                          |
| +14,15      | 0x1407   | Total kW export              | 0-Pmax                     | U3                    | UINT32            | R   |                          |

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

| Address     | Point ID | Description                                     | Options/Range <sup>2</sup> | Units <sup>2, 4</sup> | Type <sup>2</sup> | R/W | Notes |
|-------------|----------|---|----------------------------|-----------------------|-------------------|-----|-------|
| +62,63      | 0x161F   | Not used  |                            |                       | UINT32            | R   |       |
| +64,65      | 0x1620   | Not used  |                            |                       | UINT32            | R   |       |
| +66,67      | 0x1621   | Not used  |                            |                       | UINT32            | R   |       |
| +68,69      | 0x1622   | In Ampere demand                                | 0-Imax                     | U2                    | UINT32            | R   |       |
| 14720-14753 |          | <b>Total Energies<sup>E</sup></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      | 0x1712   | kvarh Q1  | 0-999,999,999              | kvarh                 | UINT32            | R   |       |
| +28,29      | 0x1713   | kvarh Q2  | 0-999,999,999              | kvarh                 | UINT32            | R   |       |
| +30,31      | 0x1714   | kvarh Q3  | 0-999,999,999              | kvarh                 | UINT32            | R   |       |
| +32,33      | 0x1715   | kvarh Q4  | 0-999,999,999              | kvarh                 | UINT32            | R   |       |
| 14760-14767 |          | <b>Summary Energy Registers<sup>E</sup></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   |       |
| +4,5        | 0x1782   | Summary energy register #3                      | 0-999,999,999              | kWh                   | UINT32            | R   |       |
| +6,7        | 0x1783   | Summary energy register #4                      | 0-999,999,999              | kWh                   | UINT32            | R   |       |
| 14848-14865 |          | <b>Phase Energies<sup>E</sup></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   |       |
| 14976-15055 |          | <b>V1/V12 Harmonic Distortions<sup>EH</sup></b> |                            |                       |                   |     | 1     |
| +0,1        | 0x1900   | H01 Harmonic distortion                         | 0-10000                    | 0.01%                 | UINT32            | R   |       |
| +2,3        | 0x1901   | H02 Harmonic distortion                         | 0-10000                    | 0.01%                 | UINT32            | R   |       |
|             |          | ...   |                            |                       |                   |     |       |
| +78,79      | 0x1927   | H40 Harmonic distortion                         | 0-10000                    | 0.01%                 | UINT32            | R   |       |

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

| Address     | Point ID | Description                                | Options/Range <sup>2</sup> | Units <sup>2, 4</sup> | Type <sup>2</sup> | R/W | Notes          |
|-------------|----------|--|----------------------------|-----------------------|-------------------|-----|----------------|
| +32,33      | 0x2910   | Power factor L2                            | -1000-1000                 | ×0.001                | INT32             | R   |                |
| +34,35      | 0x2911   | Power factor L3                            | -1000-1000                 | ×0.001                | INT32             | R   |                |
| 17152-17164 |          | <b>Harmonic Total Values</b> <sup>EH</sup> |                            |                       |                   |     | 2-cycle values |
| +0,1        | 0x2A00   | Total fundamental kW                       | -Pmax-Pmax                 | U3                    | INT32             | R   |                |
| +2,3        | 0x2A01   | Total fundamental kvar                     | -Pmax-Pmax                 | U3                    | INT32             | R   |                |
| +4,5        | 0x2A02   | Total fundamental kVA                      | 0-Pmax                     | U3                    | UINT32            | R   |                |
| +6,7        | 0x2A03   | Total fundamental PF                       | -1000-1000                 | ×0.001                | INT32             | R   |                |
| 17408-17467 |          | <b>Minimum 1-Cycle Phase Values</b>        |                            |                       |                   |     |                |
| +0,1        | 0x2C00   | V1/V12 Voltage                             | 0-Vmax                     | U1                    | UINT32            | R   | 1              |
| +2,3        | 0x2C01   | V2/V23 Voltage                             | 0-Vmax                     | U1                    | UINT32            | R   | 1              |
| +4,5        | 0x2C02   | V3/V31 Voltage                             | 0-Vmax                     | U1                    | UINT32            | R   | 1              |
| +6,7        | 0x2C03   | I1 Current                                 | 0-Imax                     | U2                    | UINT32            | R   |                |
| +8,9        | 0x2C04   | I2 Current                                 | 0-Imax                     | U2                    | UINT32            | R   |                |
| +10,11      | 0x2C05   | I3 Current                                 | 0-Imax                     | U2                    | UINT32            | R   |                |
| 17536-17543 |          | <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   | 1              |
| +2,3        | 0x3401   | V2/V23 Voltage                             | 0-Vmax                     | U1                    | UINT32            | R   | 1              |
| +4,5        | 0x3402   | V3/V31 Voltage                             | 0-Vmax                     | U1                    | UINT32            | R   | 1              |
| +6,7        | 0x3403   | I1 Current                                 | 0-Imax                     | U2                    | UINT32            | R   |                |
| +8,9        | 0x3404   | I2 Current                                 | 0-Imax                     | U2                    | UINT32            | R   |                |
| +10,11      | 0x3405   | I3 Current                                 | 0-Imax                     | U2                    | UINT32            | R   |                |
| 18560-18567 |          | <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   | 1              |
| +2,3        | 0x3701   | V2/V23 Maximum volt demand                 | 0-Vmax                     | U1                    | UINT32            | R   | 1              |
| +4,5        | 0x3702   | V3/V31 Maximum volt demand                 | 0-Vmax                     | U1                    | UINT32            | R   | 1              |

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

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



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

| Address | Point ID | Description  | Options/Range <sup>2</sup> | Units <sup>2, 4</sup> | Type <sup>2</sup> | R/W | Notes            |
|---------|----------|--|----------------------------|-----------------------|-------------------|-----|------------------|
|         | 0x7001   | Tariff #2 register                                 | 0-999,999,999              | kWh                   | UINT32            |     |                  |
|         |          | ...  |                            |                       |                   |     |                  |
|         | 0x7007   | Tariff #8 register                                 | 0-999,999,999              | 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            |     |                  |
|         | 0x7401   | V2 voltage   | 0-Vmax                     | U1                    | UINT32            |     |                  |
|         | 0x7402   | V3 voltage   | 0-Vmax                     | U1                    | UINT32            |     |                  |
|         | 0x7404   | V12 voltage  | 0-Vmax                     | U1                    | UINT32            |     |                  |
|         | 0x7405   | V23 voltage  | 0-Vmax                     | U1                    | UINT32            |     |                  |
|         | 0x7406   | V31 voltage  | 0-Vmax                     | U1                    | UINT32            |     |                  |
|         | 0x7407   | I1 current   | 0-Imax                     | U2                    | UINT32            |     |                  |
|         | 0x7408   | I2 current   | 0-Imax                     | U2                    | UINT32            |     |                  |
|         | 0x7409   | I3 current   | 0-Imax                     | U2                    | UINT32            |     |                  |

**NOTES:**

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

- <sup>1</sup> Voltage and voltage harmonics readings:  
When the 4LN3, 3LN3 or 3BLN3 wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line voltages.
- <sup>2</sup> For volts, amps, power and frequency scales and units, refer to Section 4 "Data Scales and Units".
- <sup>3</sup> Harmonic angles are referenced to the fundamental voltage harmonic H01 on phase L1.
- <sup>4</sup> The registers can be read as 32-bit integer or 32-bit floating-point values. Refer to Section 2.7 for details.

### 3.5 Minimum/Maximum Log Registers

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

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

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

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

**NOTES:**

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

<sup>1</sup> Voltage and voltage harmonics readings:

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

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

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

### 3.6 Device Control and Status Registers

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

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



| Address                       | Point ID | Description                                    | Options/Range | Units | Type   | R/W | Notes       |
|-------------------------------|----------|--|---------------|-------|--------|-----|-------------|
| 44398-44409                   |          | 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                        | 13010=PM130P,<br>13011=PM130A,<br>13020=PM130E,<br>13030-13032=PM130EH |       | UINT32 | R   |   |
| +4-11                          |          | Device model name                      | "PM130P", "PM130E", "PM130EH"  |       | CHAR16 | R   | Null-terminated string  |
| +12-13                         |          | Device options (bitmap)                | 0  |       | UINT32 | R   |   |
| +14-19                         |          | Reserved                               |  |       | UINT16 | R   |   |
| +20                            |          | Device firmware version number         | 1101-1199  |       | UINT16 | R   | Two higher decimal digits = major version number, two lower decimal digits = minor version number |
| +21                            |          | Device firmware build number           | 1-99   |       | UINT16 | R   |   |
| +22,23                         |          | Reserved                               |  |       | UINT16 | R   |   |
| +24                            |          | Boot loader version number             | 0101-0199  |       | UINT16 | R   | Two higher decimal digits = major version number, two lower decimal digits = minor version number |
| +25                            |          | Boot loader build number               | 1-99   |       | UINT16 | R   |   |
| +26-31                         |          | Reserved                               |  |       | UINT16 | R   |   |
| <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                           |          | Reserved                               |  |       | UINT16 | R   |   |
| +4                             |          | I1-I3 input range                      | 1, 5   | A     | UINT16 | R   |   |
| +5                             |          | I1-I3 input overload                   | 200  | %     | UINT16 | R   |   |
| +6-13                          |          | Reserved                               |  |       | UINT16 | R   |   |
| +14-63                         |          | Unused                                 |  |       | UINT16 |     |   |
| +64                            |          | Ethernet MAC address 0-1               | 0x0500   |       | UINT16 | R   |   |
| +65                            |          | Ethernet MAC address 2-3               | 0x00F0   |       | UINT16 | R   |   |
| +66                            |          | Ethernet MAC address 4-5               | 0x0000-0xFFFF  |       | UINT16 | R   |   |
| <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 <sup>E</sup> | 1,2,3,5,10,15,20,30,60 min,<br>255 = external synchronization          | min   | UINT16 | R/W | If the external synchronization is selected, the DI1 input is considered a pulse or KYZ input.    |

| Address                          | Point ID | Description                                       | Options/Range  | Units | Type   | R/W | Notes  |
|----------------------------------|----------|---|--|-------|--------|-----|--|
|                                  |          |   |  |       |        |     | The pulse edge restarts the power demand block accumulation interval. <sup>E</sup> |
| +4                               |          | Volt/ampere demand period                         | 0 to 1800  | sec   | UINT16 | R/W |  |
| +5-7                             |          | Reserved  |  |       | UINT16 | R/W | Read as 65535  |
| +8                               |          | Number of blocks in a sliding window <sup>E</sup> | 1 to 15  |       | UINT16 | R/W | <sup>E</sup>   |
| +9,10                            |          | Reserved  |  |       | UINT16 | R/W | Read as 65535  |
| +11                              |          | Nominal line frequency                            | 25, 50, 60, 400  | Hz    | UINT16 | R/W |  |
| +12                              |          | Maximum demand load current                       | 0 to 50,000 (0=CT primary current)   | A     | UINT16 | R/W |  |
| +13-19                           |          | Reserved  |  |       | UINT16 | R/W | Read as 65535  |
| +20                              |          | PT ratio multiplication factor                    | ×1, ×10  |       | UINT16 | R/W |  |
| <b>Communication Ports Setup</b> |          |   |  |       |        |     |  |
| 2344-2359                        |          |   |  |       |        |     |  |
| +0                               |          | Communication protocol                            | COM1: 0=SATEC ASCII, 1=Modbus RTU, 2=DNP3.0<br>COM2: 0=SATEC ASCII, 1=Modbus RTU, 2=DNP3.0, 5=Profibus DP                  |       | UINT16 | R/W |  |
| +1                               |          | Interface   | COM1: 2=RS-485<br>COM2: 0=RS-232, 1=RS-422, 2=RS-485, 5=RF, 6=Ethernet, 7=Profibus   |       | UINT16 | R/W |  |
| +2                               |          | Device address                                    | SATEC ASCII: 0-99<br>Modbus RTU: 1-247<br>DNP3.0: 0-65532<br>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,<br>1=8 bits/no parity,<br>2=8 bits/even parity   |       | UINT16 | R/W |  |
| +5                               |          | Flow control                                      | 0=no flow control<br>1=software (XON/XOFF)<br>2=hardware (CTS)   |       | UINT16 | R/W | N/A for COM1 (read as 65535)   |
| +6                               |          | RTS mode  | 0=not used,<br>1=RTS is permanently asserted<br>2=RTS is asserted during the transmission                                  |       | UINT16 | R/W | N/A for COM1 (read as 65535)   |
| +7                               |          | ASCII compatibility mode                          | 0=disabled, 1=enabled  |       | UINT16 | R/W |  |
| 2344-2351                        |          | <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>       |          |   |  |       |        |     |  |
| 2376-2390                         |          |   |  |       |        |     |  |
| +0                                |          | Power calculation mode                        | 0=using reactive power: $S=f(P,Q)$ ,<br>1=using non-active power:<br>$Q=f(S,P)$  |       | UINT16 | R/W |  |
| +1                                |          | Energy roll value <sup>E</sup>                | 0= $1 \times 10^4$ , 1= $1 \times 10^5$ , 2= $1 \times 10^6$ ,<br>3= $1 \times 10^7$ , 4= $1 \times 10^8$ , 5= $1 \times 10^9$ |       | UINT16 | R/W | Default $1 \times 10^8$  |
| +2                                |          | Phase energy calculation mode <sup>E</sup>    | 0=disabled, 1=enabled  |       | UINT16 | R/W |  |
| +3-9                              |          | Reserved                                      |  |       | UINT16 | R/W | Read as 65535  |
| +10                               |          | Energy LED test mode <sup>E</sup>             | 0=disabled, 1=Wh test, 2=varh test   |       | UINT16 | R/W | LED pulse rate is 10,000 pulses/kWh  |
| +11                               |          | Starting voltage, percent of FS voltage       | 15-50  | ×0.1% | UINT16 | R/W | Default 1.5%   |
| +12-13                            |          | Reserved                                      |  |       | UINT16 | R/W | Read as 65535  |
| +14                               |          | Device resolution (see Section 4 for details) | 0 = Low resolution, 1 = High resolution  |       | UINT16 | R/W | Default 0  |
| <b>Local Settings</b>             |          |   |  |       |        |     |  |
| 4320-4330                         |          |   |  |       |        |     |  |
| +0                                |          | Daylight savings time (DST) option            | 0 = DST disabled (standard time only), 1 = DST enabled   |       | UINT16 | R/W |  |
| +1                                |          | DST start month                               | 1-12   |       | UINT16 | R/W |  |
| +2                                |          | DST start week of the month                   | 1-4 = 1st, 2nd, 3rd and 4th week,<br>5=the last week of the month  |       | UINT16 | R/W |  |
| +3                                |          | DST start weekday                             | 1-7 (1=Sun, 7=Sat)   |       | UINT16 | R/W |  |
| +4                                |          | DST end month                                 | 1-12   |       | UINT16 | R/W |  |
| +5                                |          | DST end week of the month                     | 1-4=1st, 2nd, 3 <sup>rd</sup> and 4th week,<br>5=the last week of the month  |       | UINT16 | R/W |  |
| +6                                |          | DST end weekday                               | 1-7 (1=Sun, 7=Sat)   |       | UINT16 | R/W |  |
| +7                                |          | Clock synchronization source                  | 1-12 = DI1-DI12, 32767 = meter clock   |       | UINT16 | R/W | A DI input is considered a pulse or KYZ input. The pulse edge adjusts the clock at the nearest whole minute. |
| +8                                |          | Country code                                  | ITU calling number   |       | UINT16 | R/W |  |
| +9                                |          | DST start hour                                | 1-6  |       | UINT16 | R/W |  |
| +10                               |          | DST end hour                                  | 1-6  |       | UINT16 | R/W |  |
| <b>Clock Indication and Setup</b> |          |   |  |       |        |     |  |
| 4352-4358                         |          |   |  |       |        |     |  |
| +0                                |          | Seconds                                       | 0-59   |       | UINT16 | R/W |  |
| +1                                |          | Minutes                                       | 0-59   |       | UINT16 | R/W |  |
| +2                                |          | Hour  | 0-23   |       | UINT16 | R/W |  |
| +3                                |          | Day of month                                  | 1-31   |       | UINT16 | R/W |  |
| +4                                |          | Month   | 1-12   |       | UINT16 | R/W |  |
| +5                                |          | Year (calendar year minus 2000)               | 0-99   |       | UINT16 | R/W |  |
| +6                                |          | Weekday                                       | 1-7 (1=Sun, 7=Sat)   |       | UINT16 | R/W | Ignored when written   |

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

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

| Address   | Point ID | Description                                  | Options/Range             | Units  | Type   | R/W | Notes |
|---|----------|--|---------------------------|--------|--------|-----|-------|
| +10-15  |          | Reserved                                     |                           |        |        |     |       |
| <b>Internet Service Provider (ISP) accounts</b> |          |  |                           |        |        |     |       |
| 46784-46831                                     |          |  |                           |        |        |     |       |
| +0-15   |          | ISP 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>Transformer Correction Setup</b>             |          |  |                           |        |        |     |       |
| 47072-47099                                     |          |  |                           |        |        |     |       |
| +0  |          | Ratio correction factor                      | 700-1300                  | ×0.001 | UINT16 | R/W |       |
| +1  |          | Phase angle error                            | -600 to 600               | min    | INT16  | R/W |       |
| +2, 3   |          | Reserved                                     |                           |        | INT16  | R/W |       |
| 47072-47075                                     |          | <b>V1 transformer correction</b>             |                           |        |        |     |       |
| 47076-47079                                     |          | <b>V2 transformer correction</b>             |                           |        |        |     |       |
| 47080-47083                                     |          | <b>V3 transformer correction</b>             |                           |        |        |     |       |
| 47084-47087                                     |          | <b>Reserved</b>                              |                           |        |        |     |       |
| 47088-47091                                     |          | <b>I1 transformer correction</b>             |                           |        |        |     |       |
| 47092-47095                                     |          | <b>I2 transformer correction</b>             |                           |        |        |     |       |
| 47096-47099                                     |          | <b>I3 transformer correction</b>             |                           |        |        |     |       |
| <b>IEC 60870-5 Options Setup</b>                |          |  |                           |        |        |     |       |
| 49460-49494                                     |          |  |                           |        |        |     |       |
| +0  |          | Maximum length of variable frame, octets     | 32-255                    |        | UINT16 | R/W |       |
| +1  |          | Link address length, octets                  | 1-2                       |        | UINT16 | R/W |       |
| +2  |          | Cause of transmission length, octets         | 1-2                       |        | UINT16 | R/W |       |
| +3  |          | Length of common address of ASDU, octets     | 1-2                       |        | UINT16 | R/W |       |
| +4  |          | Length of information object address, octets | 1-3                       |        | UINT16 | R/W |       |
| +5  |          | Select-before-operate timeout, s             | 0-30                      |        | UINT16 | R/W |       |
| +6  |          | Short pulse duration, ms                     | 100-3000                  | ms     | UINT16 | R/W |       |
| +7  |          | Long pulse duration, ms                      | 100-3000                  | ms     | UINT16 | R/W |       |
| +8,9  |          | Time synchronization period, s               | 1-86400, 0=not active     | s      | UINT32 | R/W |       |
| +10   |          | Local counter freeze period, min             | 1-60, 0=not active        | min    | UINT16 | R/W |       |

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



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

| Address                                     | Point ID | Description                                    | Options/Range | Units | Type   | R/W | Notes |
|---|----------|--|---------------|-------|--------|-----|-------|
| +4  |          | Number of parameters per section record        | 1-9           |       | UINT16 | R/W |       |
| +5  |          | Not used                                       | 0             |       | UINT16 | R/W |       |
| +6  |          | Section record size, bytes (for info only)     |               |       | UINT16 | R   |       |
| +7  |          | File record size, bytes (for info only)        |               |       | UINT16 | R   |       |
| +8, 9                                       |          | Allocated file size, bytes (for info only)     |               |       | UINT32 | R   |       |
| 52598-52607                                 |          | <b>Event Log File Setup</b>                    |               |       |        |     |       |
| 52608-52617                                 |          | <b>Data Log #1 File Setup</b>                  |               |       |        |     |       |
| 52758-52767                                 |          | <b>Data Log #16 File Setup</b>                 |               |       |        |     |       |
| <b>Data Log Setup <sup>E</sup></b>          |          |  |               |       |        |     |       |
| 54006-54517                                 |          |  |               |       |        |     |       |
| +0  |          | Data log parameter #1 ID                       | 0x0000-0xFFFF |       | UINT16 | R/W |       |
| +1  |          | Data log parameter #2 ID                       | 0x0000-0xFFFF |       | UINT16 | R/W |       |
| +2  |          | Data log parameter #3 ID                       | 0x0000-0xFFFF |       | UINT16 | R/W |       |
| +3  |          | Data log parameter #4 ID                       | 0x0000-0xFFFF |       | UINT16 | R/W |       |
| +4  |          | Data log parameter #5 ID                       | 0x0000-0xFFFF |       | UINT16 | R/W |       |
| +5  |          | Data log parameter #6 ID                       | 0x0000-0xFFFF |       | UINT16 | R/W |       |
| +6  |          | Data log parameter #7 ID                       | 0x0000-0xFFFF |       | UINT16 | R/W |       |
| +7  |          | Data log parameter #8 ID                       | 0x0000-0xFFFF |       | UINT16 | R/W |       |
| +8  |          | Data log parameter #9 ID                       | 0x0000-0xFFFF |       | UINT16 | R/W |       |
| +9-31                                       |          | Reserved                                       |               |       | UINT16 | R/W |       |
| 54006-54037                                 |          | <b>Data log #1 Setup</b>                       |               |       |        |     |       |
| 54486-54517                                 |          | <b>Data log #16 Setup</b>                      |               |       |        |     |       |
| <b>TOU Daily Profile Setup <sup>E</sup></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> |               |       |        |     |       |

| Address   | Point ID | Description                                    | Options/Range   | Units | Type   | R/W | Notes |
|---|----------|--|---|-------|--------|-----|-------|
| 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 <sup>E</sup></b>                        |          |  |   |       |        |     |       |
| 55712-56031   |          |  |   |       |        |     |       |
| +0-9  |          | <b>Calendar entry record</b>                   |   |       |        | R/W |       |
| +0  |          | Daily profile                                  | 0-3 = Season 1, Day types 0-3<br>4-7 = Season 2, Day types 0-3<br>8-11 = Season 3, Day types 0-3<br>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,<br>5=last week of the month   |       | UINT16 | R/W |       |
| +2  |          | Weekday  | 0=all, 1-7 (Sun=1, Sat=7)   |       | UINT16 | R/W |       |
| +3  |          | Till Weekday                                   | 0=all, 1-7 (Sun=1, Sat=7)   |       | UINT16 | R/W |       |
| +4  |          | Month  | 0=all, 1-12=January - December  |       | UINT16 | R/W |       |
| +5  |          | Day of month                                   | 0=all, 1-31=day 1-31  |       | UINT16 | R/W |       |
| +6  |          | Till Month                                     | 0=all, 1-12=January - December  |       | UINT16 | R/W |       |
| +7  |          | Till Day of month                              | 0=all, 1-31=day 1-31  |       | UINT16 | R/W |       |
| +8-9  |          | Reserved                                       |   |       | UINT16 | R/W |       |
| 55712-55721   |          | <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 <sup>E</sup></b>        |          |  |   |       |        |     |       |
| 56672-56703   |          |  |   |       |        |     |       |
| +0  |          | Not used                                       |   |       | UINT16 | R/W |       |
| +1  |          | Units of measurement                           | 0=none, 1=kWh, 2=kvarh, 3=kVAh,<br>4=m <sup>3</sup> , 5=CF (cubic feet), 6=CCF<br>(hundred cubic feet)                              |       | UINT16 | R/W |       |
| +2  |          | Flags (bitmap)                                 | Bit 0=1 - TOU enabled   |       | UINT16 | R/W |       |
| +3  |          | Not used                                       | 0   |       | UINT16 | R/W |       |
| 56672-56675   |          | <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>                       |   |       |        |     |       |
| <b>Summary Energy/TOU Registers Source Setup <sup>E</sup></b> |          |  |   |       |        |     |       |
| 56928-57183   |          |  |   |       |        |     |       |
| +0  |          | Energy source ID                               | F11   |       | UINT16 | R/W |       |

| Address                     | Point ID | Description                    | Options/Range  | Units  | Type   | R/W | Notes   |
|-----------------------------|----------|--------------------------------|--|--------|--------|-----|---|
| +1                          |          | Target summary register number | 0-7 = register #1-#8   |        | UINT16 | R/W |   |
| +2,3                        |          | Multiplier                     | 0-1000000  | ×0.001 | INT32  | R/W |   |
| 56928-56931                 |          | <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>        |  |        |        |     |   |
| <b>Digital Inputs Setup</b> |          |                                |  |        |        |     |   |
| 61728-61775                 |          |                                |  |        |        |     |   |
| +0                          |          | Pulse mode                     | 0 = pulse, 1 = KYZ   |        | UINT16 | R/W |   |
| +1                          |          | Polarity                       | Bit 0 – pulse polarity: 0=normal, 1=inverting<br>Bit 1 – input polarity: 0=normal, 1=inverting |        | UINT16 | R/W |   |
| +2                          |          | De-bounce time, ms             | 1-100  |        | UINT16 | R/W | The same debounce time is set in groups of 4 inputs |
| +3                          |          | Reserved                       |  |        | UINT16 | R/W |   |
| 61728-61731                 |          | <b>DI1 Setup</b>               |  |        |        |     |   |
| 61732-61735                 |          | <b>DI2 Setup</b>               |  |        |        |     |   |
|                             |          | ...                            |  |        |        |     |   |
| 61772-61775                 |          | <b>DI12 Setup</b>              |  |        |        |     |   |
| <b>Relay Outputs Setup</b>  |          |                                |  |        |        |     |   |
| 61984-62007                 |          |                                |  |        |        |     |   |
| +0                          |          | Operation Mode                 | 0=unlatched, 1=latched, 2=pulse, 3=KYZ   |        | UINT16 | R/W |   |
| +1                          |          | Polarity                       | 0=normal, 1=inverting  |        | UINT16 | R/W |   |
| +2                          |          | Pulse width, ms                | 1-1000   |        | UINT16 | R/W |   |
| +3                          |          | Pulse source ID <sup>E</sup>   | F17  |        | UINT16 | R/W |   |
| +4                          |          | Units per pulse                | 1-10000  | ×0.1   | UINT16 | R/W |   |
| +5                          |          | Reserved                       |  |        | UINT16 | R/W |   |
| 61984-61989                 |          | <b>RO1 Setup</b>               |  |        |        |     |   |
| 61990-61995                 |          | <b>RO2 Setup</b>               |  |        |        |     |   |
| 61996-62001                 |          | <b>RO3 Setup</b>               |  |        |        |     |   |
| 62002-62007                 |          | <b>RO4 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 |   |
| 62560-62565                 |          | <b>AO1 Setup</b>               |  |        |        |     |   |
| 62566-62571                 |          | <b>AO2 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         | 0-4           |       | UINT16 | R   |       |
| +2                                  |          | First I/O number on the slot       | 0             |       | UINT16 | R   |       |
| +3                                  |          | Last I/O number on the slot        | 0-4           |       | UINT16 | R   |       |
| 63008-63011                         |          | <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 | 0-4           |       | UINT16 | R   |       |
| +2                                  |          | Number of I/O's on the slot        | 0-4           |       | 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 <sup>Ⓔ</sup>

| 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<br>3 = set file position<br>5 = reset file position<br>7 = find<br>11 = read file<br>127 = erase file |           | UINT16 | R/W | 1 - clears the file transfer block<br>3 - changes the file position<br>5 - sets the file position at the first (oldest) record<br>7 - finds a record matching an event or/and time (see Note 3)<br>11 - opens the file for reading from the present file position |
| +1                                  |          | File ID   | F2  |           | UINT16 | R/W |   |
| +2                                  |          | Section number (functions 3, 5, 11)                   | 0-7, 0xFFFF = use channel ID  |           | UINT16 | R/W |   |
| +3                                  |          | Section channel ID (functions 3, 5, 11)               | F6, F7  |           | UINT16 | R/W |   |
| +4                                  |          | Record sequence number (functions 3, 11)              | 0-65535   |           | UINT16 | R/W | The record sequence number with function 11 does not change the file position (see Note 2).   |
| +5                                  |          | Request variation (function 11)                       | 0   |           | UINT16 | R/W | See file response headings  |
| +6                                  |          | Find key: N/A   |   |           | UINT16 | R/W |   |
| +7                                  |          | Find key: N/A   |   |           | UINT16 | R/W |   |
| +8, 9                               |          | Find key: Start time, seconds since 1/1/1970          | F1  | sec       | UINT32 | R/W | Note 3  |
| +10, 11                             |          | Find key: Start time, fractional seconds in $\mu$ sec |   | $\mu$ sec | 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 $\mu$ sec   |   | $\mu$ sec | UINT32 | R/W | Note 3  |
| +16-31                              |          | Reserved  |   |           | UINT16 | R/W |   |
| 63152-63799                         |          | <b>File Response Block</b>                            |   |           |        |     |   |
|                                     |          | Data transfer area [0 – 647]                          |   |           | 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  | 0-7, 0xFFFF = use channel ID  |           | UINT16 | R/W |   |
| +3                                  |          | Section channel ID                                    | F6, F7  |           | UINT16 | R/W |   |
| +4                                  |          | Not used  | 0   |           | UINT16 | R/W |   |
| +5                                  |          | Request variation                                     | 0, 1, 2   |           | UINT16 | R/W |   |
| +6-7                                |          | Reserved  |   |           | UINT16 | R/W |   |
| 64952-65151                         |          | <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  |          | Maximum number of records in the block         | 1             |       | UINT16 | R   |                          |
| +5  |          | Record size, words                             | 36            |       | UINT16 | R   |                          |
| +6  |          | Request variation                              | 0             |       | UINT16 | R   |                          |
| +7  |          | Reserved                                       | 0             |       | UINT16 | R   |                          |
| 64960-64997   |          | <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   |                          |
| +24,25  |          | Null   | 0             | µsec  | UINT32 | R   |                          |
| +26,27  |          | Null   | 0             | sec   | UINT32 | R   |                          |
| +28,29  |          | Null   | 0             | µsec  | UINT32 | R   |                          |
| +30   |          | Maximum number of records                      | 0-65535       |       | UINT16 | R   |                          |
| +31   |          | Number of parameters per data section record   | 0-16          |       | UINT16 | R   |                          |

| Address   | Point ID | Description                                    | Options/Range | Units | Type   | R/W | Notes |
|---|----------|--|---------------|-------|--------|-----|-------|
| +32   |          | Section record size, bytes                     |               | Byte  | UINT16 | R   |       |
| +33   |          | File record size, bytes                        |               | Byte  | UINT16 | R   |       |
| +34,35  |          | Allocated file size, bytes                     |               | Byte  | UINT32 | R   |       |
| <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  |          | Maximum number of records in the block         | 1             |       | UINT16 | R   |       |
| +5  |          | Record size, words                             | 8             |       | UINT16 | R   |       |
| +6  |          | Request variation                              | 1             |       | UINT16 | R   |       |
| +7  |          | Reserved                                       | 0             |       | UINT16 | R   |       |
| 64960-64997   |          | <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                                 | 0-7           |       | UINT16 | R   |       |
| +3  |          | Section channel ID                             | F6, F7        |       | UINT16 | R   |       |
| +4  |          | Number of records in the block                 | 1             |       | UINT16 | R   |       |
| +5  |          | Record size, words                             | 18            |       | UINT16 | R   |       |
| +6  |          | Request variation                              | 2             |       | UINT16 | R   |       |
| +7  |          | Reserved                                       | 0             |       | UINT16 | R   |       |
| 64960-64997   |          | <b>File Info</b>                               |               |       |        |     |       |
| +0  |          | Not used                                       | 0             |       | UINT16 | R   |       |
| +1  |          | Number of fields in a data record              | 1-9           |       | UINT16 | R   |       |
| +2  |          | Field 1 parameter ID                           | 0-0xFFFF      |       | UINT16 | R   |       |
| +3  |          | Field 2 parameter ID                           | 0-0xFFFF      |       | UINT16 | R   |       |
|   |          | ...  |               |       |        |     |       |
| +10   |          | Field 9 parameter ID                           | 0-0xFFFF      |       | UINT16 | R   |       |
| <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   |       |



| Address                           | Point ID | Description                                   | Options/Range                        | Units     | Type   | R/W | Notes |
|-----------------------------------|----------|---|--------------------------------------|-----------|--------|-----|-------|
| +4                                |          | Maximum number of records in the block        | 32                                   |           | UINT16 | R   |       |
| +5                                |          | Record size, words                            | 12                                   |           | UINT16 | R   |       |
| +6                                |          | Request variation                             | 0                                    |           | UINT16 | R   |       |
| +7                                |          | Reserved                                      | 0                                    |           | UINT16 | R   |       |
| 63160-63543                       |          | <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                                |          | Reserved                                      | 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                                |          | Maximum number of records in the block        | 8 for regular log, 4 for profile log |           | UINT16 | R   |       |
| +5                                |          | Record size, words                            | 8 + 2 $\times$ Number of parameters  |           | UINT16 | R   |       |
| +6                                |          | Request variation                             | 0                                    |           | UINT16 | R   |       |
| +7                                |          | Reserved                                      | 0                                    |           | UINT16 | R   |       |
| 63160-63367                       |          | <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                                    |           | UINT16 | R   |       |
| +8,9                              |          | Log value #1                                  |                                      |           | INT32  | R   |       |
| +10,11                            |          | Log value #2                                  |                                      |           | INT32  | R   |       |
|                                   |          | ...   |                                      |           |        | R   |       |
| 63160-...                         |          | <b>Record #1</b> (variable length)            |                                      |           |        |     |       |
|                                   |          | ...   |                                      |           |        |     |       |
|                                   |          | <b>Record #8</b> (variable length)            |                                      |           |        |     |       |
| <b>RT Waveform Response Block</b> |          |   |                                      |           |        |     |       |
| 63152-63159                       |          | <b>Block Heading</b>                          |                                      |           |        |     |       |
| +0                                |          | Last file function                            | 1, 3, 5, 11                          |           | UINT16 | R   |       |

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

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

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

**NOTE**

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

### 3.10 Billing/TOU Daily Profile Data Log <sup>E</sup>

| File Channel/<br>Section <sup>1</sup> | Record<br>Field No. <sup>2</sup> | Point Label | Point<br>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 | kWh                | UINT32 |       |
|                                       | 2                                | TRF1        | 0x7000      | Tariff #1 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 3                                | TRF2        | 0x7001      | Tariff #2 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 4                                | TRF3        | 0x7002      | Tariff #3 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 5                                | TRF4        | 0x7003      | Tariff #4 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 6                                | TRF5        | 0x7004      | Tariff #5 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 7                                | TRF6        | 0x7005      | Tariff #6 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 8                                | TRF7        | 0x7006      | Tariff #7 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 9                                | TRF8        | 0x7007      | Tariff #8 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
| ...                                   |                                  |             |             | ...                                     |               |                    |        |       |
| 3/3                                   |                                  |             |             | <b>Energy Register #4</b>               |               |                    |        |       |
|                                       | 1                                | REG4        | 0x1783      | Summary (total) energy reading          | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 2                                | TRF1        | 0x7000      | Tariff #1 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 3                                | TRF2        | 0x7001      | Tariff #2 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 4                                | TRF3        | 0x7002      | Tariff #3 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 5                                | TRF4        | 0x7003      | Tariff #4 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 6                                | TRF5        | 0x7004      | Tariff #5 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 7                                | TRF6        | 0x7005      | Tariff #6 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 8                                | TRF7        | 0x7006      | Tariff #7 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
|                                       | 9                                | TRF8        | 0x7007      | Tariff #8 energy reading                | 0-999,999,999 | kWh                | UINT32 |       |
| 16/4                                  |                                  |             |             | <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 |       |
| ...                                   |                                  |             |             | ...                                     |               |                    |        |       |
| 19/7                                  |                                  |             |             | <b>Daily Maximum Demand Register #4</b> |               |                    |        |       |
|                                       | 1                                | REG4 MD     | 0x4783      | Summary (total) max. demand reading     | 0-Pmax        | U3                 | UINT32 |       |
|                                       | 2                                | TRF1 MD     | 0x7100      | Tariff #1 max. demand reading           | 0-Pmax        | U3                 | UINT32 |       |
|                                       | 3                                | TRF2 MD     | 0x7101      | Tariff #2 max. demand reading           | 0-Pmax        | U3                 | UINT32 |       |
|                                       | 4                                | TRF3 MD     | 0x7102      | Tariff #3 max. demand reading           | 0-Pmax        | U3                 | UINT32 |       |
|                                       | 5                                | TRF4 MD     | 0x7103      | Tariff #4 max. demand reading           | 0-Pmax        | U3                 | UINT32 |       |

| File Channel/<br>Section <sup>1</sup> | Record<br>Field No. <sup>2</sup> | Point Label | Point<br>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     |
| Imax                                       |   | Current scale $\times$ CT Ratio, A   | 1, 3  |
| Pmax                                       | Wiring 4LN3, 3LN3, 3BLN3                    | $V_{max} \times I_{max} \times 3, W$ | 4     |
|  | Wiring 4LL3, 3LL3, 3BLL3, 3OP2, 3OP3, 3DIR2 | $V_{max} \times I_{max} \times 2, W$ |       |
| Fmax                                       | Nominal frequency 25, 50 or 60 Hz           | 100 Hz                               |       |
|  | Nominal frequency 400Hz                     | 500 Hz                               |       |
| <b>Data Units – Low Resolution Option</b>  |   |                                      |       |
| U1   |   | 1V                                   |       |
| U2   |   | 1A                                   |       |
| U3   |   | 1kW/kvar/kVA                         |       |
| <b>Data Units – High Resolution Option</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                         |       |

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

<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 (2.0A with 1A secondaries, 10.A with 5A secondaries). You can change it via the Device Data Scale setup (see Section 3.1) or via the Device Options setup in PAS.

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

# 5 Data Formats

| Format Code                                  | Value                            | Description  | Notes              |
|--|----------------------------------|--|--------------------|
| <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                                | Data log #1  |                    |
|  | 16                               | Data log #16   |                    |
|  | 128                              | Real time waveform   |                    |
| <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 |
| <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   | 0-3                              | Summary/TOU energy/usage registers #1-#4   |                    |
|  | 16-19                            | Summary/TOU maximum demand registers #1-#4   |                    |
| <b>Waveform Log Channel ID</b>               |                                  |  |                    |
| F7   | 0                                | V1/V12   | 3                  |
|  | 1                                | V2/V23   | 3                  |
|  | 2                                | V3/V31   | 3                  |
|  | 4                                | I1   |                    |
|  | 5                                | I2   |                    |
|  | 6                                | I3   |                    |
|  | <b>Profile Log Sections Mask</b> |  |                    |
| F8   | Bit 0:3 = 1                      | Summary/TOU energy/usage registers #1-#4   |                    |
|  | Bit 16:19 = 1                    | Summary/TOU maximum demand registers #1-#4   |                    |
| <b>Waveform Channel Mask</b>                 |                                  |  |                    |
| F9   | Bit 0 = 1                        | Channel V1/V12   | 3                  |
|  | Bit 1 = 1                        | Channel V2/V23   | 3                  |
|  | Bit 2 = 1                        | Channel V3/V31   | 3                  |
|  | Bit 3 = 1                        | N/A  |                    |
|  | Bit 4 = 1                        | Channel I1   |                    |
|  | Bit 5 = 1                        | Channel I2   |                    |
|  | Bit 6 = 1                        | Channel I3   |                    |
| <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   |                    |

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

| Format Code               | Value  | Description                                       | Notes |
|---------------------------|--------|---|-------|
|                           | 0x1104 | High I2 current                                   |       |
|                           | 0x1105 | High I3 current                                   |       |
|                           | 0x9103 | Low I1 current                                    |       |
|                           | 0x9104 | Low I2 current                                    |       |
|                           | 0x9105 | Low I3 current                                    |       |
|                           |        | <b>1-Sec Values on any Phase</b>                  |       |
|                           | 0x1300 | High voltage                                      |       |
|                           | 0x9200 | Low voltage                                       |       |
|                           | 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                                     |       |
|                           |        | <b>Present Demands</b>                            |       |
|                           | 0x1600 | High V1/V12 Volt demand                           |       |
|                           | 0x1601 | High V2/V23 Volt demand                           |       |
|                           | 0x1602 | High V3/V31 Volt demand                           |       |
|                           | 0x1603 | High I1 Ampere demand                             |       |
|                           | 0x1604 | High I2 Ampere demand                             |       |
|                           | 0x1605 | High I3 Ampere demand                             |       |
|                           | 0x1606 | High block kW import demand <sup>E</sup>          |       |
|                           | 0x1608 | High block kVA demand <sup>E</sup>                |       |
|                           | 0x1609 | High sliding window kW import demand <sup>E</sup> |       |
|                           | 0x160B | High sliding window kVA demand <sup>E</sup>       |       |
|                           | 0x160F | High accumulated kW import demand <sup>E</sup>    |       |
|                           | 0x1611 | High accumulated kVA demand <sup>E</sup>          |       |
|                           | 0x1612 | High predicted kW import demand <sup>E</sup>      |       |
|                           | 0x1614 | High predicted kVA demand <sup>E</sup>            |       |
|                           |        | <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>Setpoint Action ID</b> |        |   |       |
| F14                       | 0x0000 | No action   |       |
|                           | 0x3000 | Operate Relay #1                                  |       |
|                           | 0x3001 | Operate Relay #2                                  |       |
|                           | 0x3002 | Operate Relay #3                                  |       |
|                           | 0x3003 | Operate Relay #4                                  |       |
|                           | 0x3100 | Release latched Relay #1                          |       |
|                           | 0x3101 | Release latched Relay #2                          |       |
|                           | 0x3102 | Release latched Relay #3                          |       |
|                           | 0x3103 | Release latched Relay #4                          |       |
|                           | 0x4000 | Increment counter #1                              |       |
|                           | 0x4001 | Increment counter #2                              |       |
|                           | 0x4002 | Increment counter #3                              |       |
|                           | 0x4003 | Increment counter #4                              |       |
|                           | 0x4400 | Count operating time using counter #1             |       |
|                           | 0x4401 | Count operating time using counter #2             |       |
|                           | 0x4402 | Count operating time using counter #3             |       |
|                           | 0x4403 | Count operating time using counter #4             |       |
|                           | 0x5100 | Send event notification                           |       |
|                           | 0x7100 | Data log #1                                       |       |



| Format Code                         | Value                               | Description                          | Notes                        |  |
|-------------------------------------|-------------------------------------|--------------------------------------|------------------------------|--|
| <b>Counter Source ID</b>            |                                     |                                      |                              |  |
| F16                                 | 0x0000                              | None                                 |                              |  |
|                                     | 0x0001-0x000C                       | Pulse input DI1-DI12                 |                              |  |
| <b>Relay Output Pulse Source ID</b> |                                     |                                      |                              |  |
| F17                                 | 0x0000                              | None                                 |                              |  |
|                                     | 0x0400                              | kWh import pulse <sup>E</sup>        |                              |  |
|                                     | 0x0401                              | kWh export pulse <sup>E</sup>        |                              |  |
|                                     | 0x0403                              | kvarh import pulse <sup>E</sup>      |                              |  |
|                                     | 0x0404                              | kvarh export pulse <sup>E</sup>      |                              |  |
|                                     | 0x0405                              | kvarh total pulse <sup>E</sup>       |                              |  |
|                                     | 0x0406                              | kVAh pulse <sup>E</sup>              |                              |  |
| <b>AO Parameters ID</b>             |                                     |                                      |                              |  |
| F18                                 | 0x0000                              | None (output disabled)               | 2                            |  |
|                                     | <b>1-Cycle Phase Values</b>         |                                      |                              |  |
|                                     | 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                        |                              |  |
|                                     | <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                        |                              |  |
|                                     | <b>1-Sec Auxiliary Values</b>       |                                      |                              |  |
|                                     | 0x1501                              | In Current                           |                              |  |
|                                     | 0x1502                              | Frequency                            |                              |  |
|                                     | <b>Present Demands <sup>E</sup></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>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>Hardware Diagnostics Events</b>   |                              |  |

| Format Code               | Value             | Description   | Notes |
|---------------------------|-------------------|---|-------|
|                           | 0x6202            | RAM/Data error                                      |       |
|                           | 0x6203            | Hardware watchdog reset                             |       |
|                           | 0x6204            | Sampling fault                                      |       |
|                           | 0x6205            | CPU exception                                       |       |
|                           | 0x6206            | Reserved  |       |
|                           | 0x6207            | Software watchdog reset                             |       |
|                           | 0x620D            | Low battery   |       |
|                           | 0x620F            | EEPROM fault  |       |
|                           |                   | <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 maximum demands cleared                 |       |
|                           | 0x6200            | Summary/TOU energy registers cleared                |       |
|                           | 0x6300            | Summary/TOU maximum demand registers cleared        |       |
|                           | 0x6400            | All counters cleared                                |       |
|                           | 0x6401-0x6403     | Counter cleared (low byte = counter ID)             |       |
|                           | 0x6500            | Min/Max log cleared                                 |       |
|                           | 0x6A00-0x6A1A     | Log file cleared (low byte = File ID)               |       |
|                           | 0x6B06            | Communication counters cleared                      |       |
|                           | 0xF100-0xF10F     | Setpoint cleared (low byte = setpoint ID)           |       |
|                           | 0xF200            | Setup/Data cleared                                  |       |
|                           | 0xF300            | Setup reset (set by default)                        |       |
|                           | 0xF400            | Setup changed                                       |       |
|                           | 0xF500            | RTC set   |       |
| <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                        |       |
|                           | 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   |       |
| <b>Event Type ID</b>      |                   |   |       |
| F22                       |                   | <b>Setpoint Events</b>                              |       |
|                           | 0x0000            | SP: Generic setpoint event                          |       |
|                           | 0x0001-0x0010     | SP1-SP16: Setpoint #1-#16 event                     |       |
| <b>Device Diagnostics</b> |                   |   |       |
| F23                       | Reg. 3475 - Bit 0 | Reserved  |       |
|                           | Reg. 3475 - Bit 1 | Reserved  |       |

| Format Code                  | Value                  | Description                                | Notes |
|------------------------------|------------------------|--|-------|
|                              | Reg. 3475 - Bit 2 = 1  | RAM/Data error                             |       |
|                              | Reg. 3475 - Bit 3 = 1  | CPU watchdog reset                         |       |
|                              | Reg. 3475 - Bit 4 = 1  | Sampling fault                             |       |
|                              | Reg. 3475 - Bit 5 = 1  | CPU exception                              |       |
|                              | Reg. 3475 - Bit 6      | Reserved                                   |       |
|                              | Reg. 3475 - Bit 7 = 1  | Software watchdog reset                    |       |
|                              | Reg. 3475 - Bit 8 = 1  | Power down                                 |       |
|                              | Reg. 3475 - Bit 9 = 1  | Device reset                               |       |
|                              | Reg. 3475 - Bit 10 = 1 | Configuration reset                        |       |
|                              | Reg. 3475 - Bit 11 = 1 | RTC fault                                  |       |
|                              | Reg. 3475 - Bit 12     | Reserved                                   |       |
|                              | Reg. 3475 - Bit 13     | Reserved                                   |       |
|                              | Reg. 3475 - Bit 14     | Reserved                                   |       |
|                              | Reg. 3475 - Bit 15 = 1 | EEPROM fault                               |       |
|                              | Reg. 3476 - Bit 0      | Reserved                                   |       |
|                              | Reg. 3476 - Bit 1      | Reserved                                   |       |
|                              | Reg. 3476 - Bit 2      | Reserved                                   |       |
|                              | Reg. 3476 - Bit 3      | Correct wiring configuration verification: |       |
| <b>DNP Object Variations</b> |                        |  |       |
| F24                          |                        | <b>Static Binary Input Objects</b>         |       |
|                              | 0                      | Single-Bit Binary Input                    |       |
|                              | 1                      | Binary Input With Status                   |       |
|                              |                        | <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>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           |       |
| <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                         |       |
|                              | 0x1F01                 | Frozen Analog Input 31:01                  |       |
|                              | 0x1F02                 | Frozen Analog Input 31:02                  |       |
|                              | 0x1F03                 | Frozen Analog Input 31:03                  |       |
|                              | 0x1F04                 | Frozen Analog Input 31:04                  |       |
|                              | 0x1F05                 | Frozen Analog Input 31:05                  |       |
|                              | 0x1F06                 | Frozen Analog Input 31:06                  |       |
|                              | 0x2801                 | Analog Output 40:01                        |       |
|                              | 0x2802                 | Analog Output 40:02                        |       |
|                              | 0x0101                 | Binary Input 01:01                         |       |
|                              | 0x0102                 | Binary Input 01:02                         |       |
|                              | 0x0A01                 | Binary Output 10:01                        |       |
|                              | 0x0A02                 | Binary Output Status 10:02                 |       |
|                              | 0x1401                 | Binary Counter 20:01                       |       |
|                              | 0x1402                 | Binary Counter 20:02                       |       |
|                              | 0x1405                 | Binary Counter 20:05                       |       |
|                              | 0x1406                 | Binary Counter 20:06                       |       |
|                              | 0x1501                 | Frozen Counter 21:01                       |       |
|                              | 0x1502                 | Frozen Counter 21:02                       |       |
|                              | 0x1505                 | Frozen Counter 21:05                       |       |
|                              | 0x1506                 | Frozen Counter 21:06                       |       |
|                              | 0x1509                 | Frozen Counter 21:09                       |       |
|                              | 0x150A                 | Frozen Counter 21:10                       |       |
|                              | 0x3201                 | Time and Date 50:01                        |       |

| Format Code               | Value      | Description   | Notes     |
|---------------------------|------------|---|-----------|
| <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  |           |
|                           | 7          | 2LL1 - 2-wire connection using the current from one phase (1 CT) and the L-L voltage from the other two phases  |           |
|                           | 8          | 3BLN3 - 3-wire broken delta using 2 PTs (2 1/2 element), line-to-neutral voltage readings   |           |
|                           | 9          | 3BLL3 - 3-wire broken delta using 2 PTs (2 1/2 element), line-to-line voltage readings  |           |
|                           | 15         | 1LL3 - 2-wire connection using the current from the same phase of three separate branches (3 CT) and the L-L voltage from the other two phases (1 PT) |           |
| <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 $\pm 1$ mA  |           |
|                           | Bit 9=1    | RO option   |           |
|                           | Bit 10=1   | DI option   |           |
|                           | Bit 11=1   | Reserved  |           |
|                           | Bit 12=1   | Setup is secured by a password (authorization required)   |           |
|                           | Bits 13-15 | Reserved  |           |
|                           | Bits 16-18 | Number of RO - 1  |           |
|                           | Bits 19-22 | Number of DI - 1  |           |
|                           | Bits 23-24 | Number of AO - 1  |           |
| Bits 25-31                | Reserved   |   |           |
| <b>I/O Slot Types</b>     |            |   |           |
| F29                       | DI         | DRY   | 00000000B |
|                           | RO         |   | 00100000B |
|                           | AI         | $\pm 1$ mA  | 01010000B |
|                           | AI         | 0-20 mA   | 01010001B |
|                           | AI         | 4-20 mA   | 01010010B |
|                           | AI         | 0-1 mA  | 01010011B |
|                           | AO         | $\pm 1$ mA  | 01100000B |
|                           | AO         | 0-20 mA   | 01100001B |
|                           | AO         | 4-20 mA   | 01100010B |
|                           | AO         | 0-1 mA  | 01100011B |
|                           | Empty slot |   | 11111111B |

**NOTES:**

<sup>1</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>2</sup> **Phase Reversal Trigger**

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

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

<sup>4</sup> The event value field shows the present meter time in the F1 format.