



# Branch Feeder Monitor

## BFM II

# 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 2015	Initial MODBUS guide
A2	----	Updated MODBUS guide
A3	Jan 2016	Add Min/Max log registers (V, I, P, PF)
A4	Mar 2016	Add DI/AI/RO and GPRS
A5	Mar-2016	DI and Counter MODBUS address assignment
A6	Aug-2016	New module support – 9RO, up to 2 modules per system, 18 relay outputs Submeter & Virtual meter ID name setup
A7	May-2017	Updated MODBUS guide ( removed MODBUS registers 3648, 44198-44215, 44410-44413, average)
A8	Jan-2018	Added reset maximum demands and reset Billing/TOU maximum demands for all submeters (F/W 18.5.8 )
A9	Feb-2018	Formatting issues corrections, removed non valid counters registers.
A10	Dec-2018	New Counter and Relay Output Setup MODBUS address assignment
A11	Dec-2019	Password security, DFR, Harmonics

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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 BFM II. The document provides the complete information necessary to develop third-party communications software capable of communication with the Series BFM II instruments.

For additional information concerning communications operation, configuring the communications parameters, and communications connections see the BFM II Installation and Operation Manual.

## 2. Modbus Protocol Implementation

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

### 2.1 Transmission Modes

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

### 2.2 Address Field

The address field contains a device submeter address (1-247) on a Modbus network. The user assigned device address (see Communication Ports Setup in Section 3.7) is used as a reference address of the first device submeter. See Submeter Addressing in Section 2.6 for more information on device addressing.

Broadcast mode using address 0 is not supported.

### 2.3 Function Field

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

**Table 2-1 Modbus Function Codes**

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

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

### 2.4 Exception Responses

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

Implemented exception response codes:

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

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

### 2.5 Modbus Register Addresses

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

## 2.6 Submeter Addressing

Each active submeter in the BFM II is assigned a unique communication address that allows accessing its private registers and setups. A separate Modbus address is engaged for each submeter for which at least one current input is allocated in the Channel Assignments Setup (see Section 3.7), and for each additional submeter, which is allocated as a target in the Billing/TOU Registers Source Setup (see Section 3.7).

The BFM II can occupy up to 40 contiguous addresses starting with the device reference address. All submeter addresses are assigned automatically in a sequential order starting from the device base address that is programmed through the device Communication Setup. The following table illustrates submeter addressing in the device with the base address N.

Device Base Address	Submeter Number	Submeter Address
N	SM 1	N
	SM 2	N+1
	...	
	SM 54	N+53
	SM 55	N+54
	...	
	SM 60	N+59

Your device is factory preset to address 1 and occupies the range of addresses 1 through 18, configured for 18 three-phase submeters.

### NOTE

**Device setup settings, excluding the alarm setpoints and data log setup, are shared across all submeters. Though you can read/write them using any submeter address, your changes affect all submeters in the device. Note that the communication port setup may only be changed via the device base address.**

Select your submeters (both metering and Totalization) in a sequence without gaps so that your device would not occupy unnecessary network addresses.

If you connect a number of devices to a serial network, allocate a range of addresses for each device so that they do not overlap. For example, if you use three devices with 18 submeters in each one, assign the base address 1 to the first device, the address 19 to the second, and the address 37 to the third device so that they will occupy three non-overlapped address ranges 1 through 18, 19 through 36, and 37 through 54.

## 2.7 Data Formats

The BFM II uses two data formats to pass data between a master application and the instrument: 16-bit short integer and 32-bit long integer 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.

### 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.

## CONVERSION EXAMPLES

### 1. Voltage readings

Voltage engineering scales (see Section 4):

$$\begin{aligned} \text{HI} &= V_{\text{max}} = 600.0\text{V} \\ \text{LO} &= 0\text{V} \end{aligned}$$

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

$$\text{Volts reading} = 1449 \times (600.0 - 0)/(9999 - 0) + 0 = 86.9\text{V}$$

### 2. Current readings

Assume device settings: CT primary current = 50A.

Current engineering scales (see Section 4):

$$\begin{aligned} \text{HI} &= I_{\text{max}} = \text{CT primary current} \times 2 = 50.00 \times 2 = 100.00\text{A} \\ \text{LO} &= 0\text{A} \end{aligned}$$

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

$$\text{Amps reading} = 250 \times (100.00 - 0)/(9999 - 0) + 0 = 2.50\text{A}$$

### 3. Power readings

a) Assume device settings: CT primary current = 50A.

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

$$\begin{aligned} \text{HI} &= P_{\text{max}} = V_{\text{max}} \times I_{\text{max}} \times 2 = (600.0 \times 1) \times (50.00 \times 2) \times 2 = 120,000\text{W} = 120 \text{ kW} \\ \text{LO} &= -P_{\text{max}} = -120 \text{ kW} \end{aligned}$$

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

$$\text{Watts reading} = 5500 \times (120 - (-120))/(9999 - 0) + (-120) = 12.013\text{kW}$$

If the raw data reading is 4000 then the power reading in engineering units will be as follows:

$$\text{Watts reading} = 4000 \times (120 - (-120))/(9999 - 0) + (-120) = -23.99\text{kW}$$

### 4. Power Factor readings

Power factor engineering scales:

$$\begin{aligned} \text{HI} &= 1.000. \\ \text{LO} &= -1.000. \end{aligned}$$

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):

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

Fractional 32-bit data is transmitted using decimal scaling to pass fractional numbers in 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.

## 2.8 User Assignable Registers

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

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

To build your own register map, write to map registers 120 to 239 the actual addresses you want to read from or write to via the assignable area (registers 0 to 119). 32-bit long registers should always be aligned at even addresses. For example, if you want to read registers 4672 (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 4672 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 BFM II 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 from the front panel display. For details, refer to your instrument Operation Manual.

When password protection is enabled, the user password you set in your instrument should be written into the device authorization register (44378-44379) 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 Transfer

### 2.10.1 Log File Organization

Historical files are stored to the non-volatile memory. The device memory is automatically partitioned between files and does not require additional settings. Each submeter has individual historical files.

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.

Each file has a wrap-around attribute (circular file), the most recent records overwrites 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 BFM II 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.

### **Data Log File**

Data log file of each submeter can store up to 16 measured parameters per a record. 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 file can be triggered through the setpoints on a time basis using the meter clock.

### **Billing/TOU Profile Log File**

Data log file #16 is automatically 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 Billing/TOU register. See Section 3.9 for information on the file record structure.

The number of sections is taken automatically from the Billing/TOU Registers setup. Since each Billing/TOU energy register has a shadow maximum demand register, the number of sections in the file can be twice the number of the allocated Billing/TOU registers.

Sections within a 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.

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 3.8), 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.

## **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 service uses 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 3.8 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 Profile Files**

In a multi-section data profile 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.

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 BFM II 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.

## 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	Submeter address
+6-7	Device IP address	UINT32	Network byte order
+8	Event type	UINT16	See F22 in Section 5
+9	Event sequence number	UINT16	
+10-11	Event timestamp, seconds	UINT32	Local time since Jan 1, 1970
+12-13	Event timestamp, seconds fraction, in microseconds	UINT32	
+14-15	Reserved	UINT32	Written as 0

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

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

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

Client connections are triggered via programmable setpoints. To send event notifications to a server, configure a setpoint to respond to desired triggers or to periodic time events and add the "Send notification" action to the end of the setpoint actions list.



### 3. Modbus Register Map

#### 3.1 Modbus Setup Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Modbus Assignable Registers</b>							
<b>0-119</b>							Shared across all submeters
+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>							Shared across all submeters
+0		Register 0 address	0-65535		UINT16	R/W	
+1		Register 1 address	0-65535		UINT16	R/W	
+119		Register 119 address	0-65535		UINT16	R/W	
<b>Modbus Conversion Scales</b>							
240		Low raw scale	0		UINT16	R/W	Shared across all submeters
241		High raw scale	9999		UINT16	R/W	
242		Voltage scale, in secondary volts	60-600 (default 600V)	1V	UINT16	R/W	
243		Current scale, in secondary amps = CT secondary current (1A, 5A, 50A) × Current overload	20, 100, 1000 (2.0A, 10.0A, 100.0A)	×0.1A	UINT16	R	

#### 3.2 16-bit Scaled Analog Values - Basic Register Set

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
256-308		<b>1-Second Values</b>					
+0	0x1100	V1 Voltage	0-Vmax	U1	UINT16	R	
+1	0x1101	V2 Voltage	0-Vmax	U1	UINT16	R	
+2	0x1102	V3 Voltage	0-Vmax	U1	UINT16	R	
+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	

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+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 Current	0-Imax	U2	UINT16	R	
+23	0x1502	Frequency	4500-6500	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	0x1700	kWh import (low)	0-9999	×0.1kWh	UINT16	R	<sup>2</sup>
+32	0x1701	kWh import (high)	0-9999	×1MWh	UINT16	R	<sup>2</sup>
+33	0x1702	kWh export (low)	0-9999	×0.1kWh	UINT16	R	<sup>2</sup>
+34	0x1703	kWh export (high)	0-9999	×1MWh	UINT16	R	<sup>2</sup>
+35	0x1704	kvarh import (low)	0-9999	×0.1kvarh	UINT16	R	<sup>2</sup>
+36	0x1705	kvarh import (high)	0-9999	×1Mvarh	UINT16	R	<sup>2</sup>
+37	0x1706	kvarh export (low)	0-9999	×0.1kvarh	UINT16	R	<sup>2</sup>
+38	0x1707	kvarh export (high)	0-9999	×1Mvarh	UINT16	R	<sup>2</sup>
+39	0x1112	V1 Voltage THD	0-999.9	0.1%	UINT16	R	On a 3-s interval
+40	0x1113	V2 Voltage THD	0-999.9	0.1%	UINT16	R	
+41	0x1114	V3 Voltage THD	0-999.9	0.1%	UINT16	R	
+42	0x1115	I1 Current THD	0-999.9	0.1%	UINT16	R	
+43	0x1116	I2 Current THD	0-999.9	0.1%	UINT16	R	
+44	0x1117	I3 Current THD	0-999.9	0.1%	UINT16	R	
+45	0x1708	kVAh (low)	0-9999	×0.1kVAh	UINT16	R	<sup>2</sup>
+46	0x1708	kVAh (high)	0-9999	×1MVAh	UINT16	R	<sup>2</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		Reserved	0		UINT16	R	
+50	0x111B	Reserved	0		UINT16	R	
+51	0x111C	Reserved	0		UINT16	R	
+52	0x111D	Reserved	0		UINT16	R	

<sup>1</sup> For volts, amps and power scales refer to Chapter 4 “Data Scales and Units”.

<sup>2</sup> If you use these energy registers instead of 32-bit registers, limit the energy roll value to 8 digits (see Device Options Setup) to avoid overflow.

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

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
3584	0x0000	<b>None</b>	0		UINT16	R	
3616	0x0080	<b>Setpoint Status</b>	0x0000-0xFFFF		UINT16	R	Bitmap: 0=released, 1=operated
3776	0x0300	Event Flags	0x0000-0x00FF		UINT16	R	Bitmap: 0=OFF, 1=ON
3968	0x0600	Digital Inputs	0x0000-0xFFFF		UINT16	R	Bitmap: 0=open, 1=closed
4096	0x0800	Relay Outputs	0x0000-0x0FFF		UINT16	R	Bitmap: 0=open, 1=closed
4224-4295		Counters					
+0,1	0x0A00	Counter #1	0-999,999,999		UINT32	R/W	
+2,3	0x0A01	Counter #2	0-999,999,999		UINT32	R/W	
		...					
+62,63	0x0A1F	Counter #32	0-999,999,999		UINT32	R/W	
4352-4384		<b>1-Cycle Phase Values</b>					
+0		V1 Voltage	0-Vmax	U1	UINT16	R	
+1	0x0C01	V2 Voltage	0-Vmax	U1	UINT16	R	
+2	0x0C02	V3 Voltage	0-Vmax	U1	UINT16	R	
+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 Voltage THD	0-999.9	0.1%	UINT16	R	2-cycle value
+19	0x0C13	V2 Voltage THD	0-999.9	0.1%	UINT16	R	2-cycle value
+20	0x0C14	V3 Voltage THD	0-999.9	0.1%	UINT16	R	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

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+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
+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	2-cycle value
+31	0x0C1F	V23 Voltage	0-Vmax	U1	UINT16	R	2-cycle value
+32	0x0C20	V31 Voltage	0-Vmax	U1	UINT16	R	
4416-4427		<b>1-Cycle Low Phase Values</b>					
+0	0x0D00	Low L-N voltage	0-Vmax	U1	UINT16	R	
+1	0x0D01	Low current	0-Imax	U2	UINT16	R	
+2	0x0D02	Low kW	-Pmax-Pmax	U3	INT16	R	
+3	0x0D03	Low kvar	-Pmax-Pmax	U3	INT16	R	
+4	0x0D04	Low kVA	0-Pmax	U3	UINT16	R	
+5	0x0D05	Low PF Lag	0-100.0	0.001	UINT16	R	
+5	0x0D06	Low PF Lead	0-100.0	0.001	UINT16	R	
+7	0x0D07	Low voltage THD	0-999.9	0.1%	UINT16	R	
+8	0x0D08	Low current THD	0-999.9	0.1%	UINT16	R	
+9	0x0D09	Low K-Factor	1.0-999.9	0.1	UINT16	R	
+10	0x0D0A	Low current TDD	0-100.0	0.1%	UINT16	R	
+11	0x0D0B	Low L-L voltage	0-Vmax	U1	UINT16	R	
4480-4491		<b>1-Cycle High Phase Values</b>					
+0	0x0E00	High L-N voltage	0-Vmax	U1	UINT16	R	
+1	0x0E01	High current	0-Imax	U2	UINT16	R	
+2	0x0E02	High kW	-Pmax-Pmax	U3	INT16	R	
+3	0x0E03	High kvar	-Pmax-Pmax	U3	INT16	R	
+4	0x0E04	High kVA	0-Pmax	U3	UINT16	R	
+5	0x0E05	High PF Lag	0-1.000	0.001	UINT16	R	
+5	0x0E06	High PF Lead	0-1.000	0.001	UINT16	R	
+7	0x0E07	High voltage THD	0-999.9	0.1%	UINT16	R	
+8	0x0E08	High current THD	0-999.9	0.1%	UINT16	R	
+9	0x0E09	High K-Factor	1.0-999.9	0.1	UINT16	R	
+10	0x0E0A	High voltage THD	0-999.9	0.1%	UINT16	R	
+11	0x0E0B	High L-L voltage	0-Vmax	U1	UINT16	R	
4544-4556		<b>1-Cycle Total Values</b>					
+0	0x0F00	Total kW	-Pmax-Pmax	U3	INT16	R	
+1	0x0F01	Total kvar	-Pmax-Pmax	U3	INT16	R	
+2	0x0F02	Total kVA	0-Pmax	U3	UINT16	R	
+3	0x0F03	Total PF	-1.000-1.000	0.001	INT16	R	
+4	0x0F04	Total PF lag	0-1.000	0.001	UINT16	R	
+5	0x0F05	Total PF lead	0-1.000	0.001	UINT16	R	

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+5	0x0F06	Total kW import	0-Pmax	U3	UINT16		
+7	0x0F07	Total kW export	0-Pmax	U3	UINT16	R	
+8	0x0F08	Total kvar import	0-Pmax	U3	UINT16	R	
+9	0x0F09	Total kvar export	0-Pmax	U3	UINT16	R	
4608-4612		<b>1-Cycle Auxiliary Values</b>					
+0	0x1000	Not used			UINT16	R	
+1	0x1001	In (neutral) Current	0-I <sub>max</sub>	U2	UINT16	R	
+2	0x1002	Frequency	4500-6500	0.01Hz	UINT16	R	
+3	0x1003	Voltage unbalance	0-3000	×0.1%	UINT16	R	
+4	0x1004	Current unbalance	0-3000	×0.1%	UINT16	R	
7360-7375		<b>1-Cycle Analog Inputs</b>					
+0	0x3B00	Analog input AI1	AI1min-AI1max		UINT16	R	
+1	0x3B01	Analog input AI2	AI2min-AI2max		UINT16	R	
		...					
+15	0x3B0F	Analog input AI16	AI16min-AI16max		UINT16	R	
7392-7407		<b>Raw Analog Inputs</b>					
+0	0x3B80	Analog input AI1	0-4095		UINT16	R	
+1	0x3B81	Analog input AI2	0-4095		UINT16	R	
		...					
4512-4527		<b>1-Second Analog Inputs</b>					
+0	0x0E80	Analog input AI1	AI1min-AI1max		UINT16	R	
+1	0x0E81	Analog input AI2	AI2min-AI2max		UINT16	R	
		...					
+15	0x0E8F	Analog input AI16	AI16min-AI16max		UINT16	R	
4640-4655		<b>Phasor</b>					
+0	0x1080	V1 Voltage magnitude	0-V <sub>max</sub>	U1	UINT16	R	
+1	0x1081	V2 Voltage magnitude	0-V <sub>max</sub>	U1	UINT16	R	
+2	0x1082	V3 Voltage magnitude	0-V <sub>max</sub>	U1	UINT16	R	
+3	0x1083	Not used			UINT16	R	
+4	0x1084	I1 Current magnitude	0-I <sub>max</sub>	U2	UINT16	R	
+5	0x1085	I2 Current magnitude	0-I <sub>max</sub>	U2	UINT16	R	
+5	0x1086	I3 Current magnitude	0-I <sub>max</sub>	U2	UINT16	R	
+7	0x1087	Not used			UINT16	R	
+8	0x1088	V1 Voltage angle	-180.0-180.0	0.1°	INT16	R	
+9	0x1089	V2 Voltage angle	-180.0-180.0	0.1°	INT16	R	
+10	0x108A	V3 Voltage angle	-180.0-180.0	0.1°	INT16	R	
+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>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
4672-4704		<b>1-Second Phase Values</b>					
+0	0x1100	V1 Voltage	0-Vmax	U1	UINT16	R	
+1	0x1101	V2 Voltage	0-Vmax	U1	UINT16	R	
+2	0x1102	V3 Voltage	0-Vmax	U1	UINT16	R	
+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 Voltage THD	0-999.9	0.1%	UINT16	R	3-sec value
+19	0x1113	V2 Voltage THD	0-999.9	0.1%	UINT16	R	3-sec value
+20	0x1114	V3 Voltage THD	0-999.9	0.1%	UINT16	R	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
+24-26		I1 K-Factor	1.0-999.9	0.1	UINT16	R	3-sec value
+27	0x111B	I2 K-Factor	1.0-999.9	0.1	UINT16	R	3-sec value
+28	0x111C	I3 K-Factor	1.0-999.9	0.1	UINT16	R	3-sec value
+29	0x111D	I1 Current TDD	0-100.0	0.1%	UINT16	R	3-sec value
+30	0x111E	V12 Voltage	0-Vmax	U1	UINT16	R	3-sec value
+31	0x111F	V23 Voltage	0-Vmax	U1	UINT16	R	3-sec value
+32	0x1120	V31 Voltage	0-Vmax	U1	UINT16	R	
4736-4747		<b>1-Second Low Phase Values</b>					
+0	0x1200	Low L-N voltage	0-Vmax	U1	UINT16	R	
+1	0x1201	Low current	0-Imax	U2	UINT16	R	
+2	0x1202	Low kW	-Pmax-Pmax	U3	INT16	R	
+3	0x1203	Low kvar	-Pmax-Pmax	U3	INT16	R	
+4	0x1204	Low kVA	0-Pmax	U3	UINT16	R	
+5	0x1205	Low PF Lag	0-1.000	0.001	UINT16	R	
+6	0x1206	Low PF Lead	0-1.000	0.001	UINT16	R	
+7	0x1207	Low voltage THD	0-999.9	0.1%	UINT16	R	
+8	0x1208	Low current THD	0-999.9	0.1%	UINT16	R	
+9	0x1209	Low K-Factor	1.0-999.9	0.1	UINT16	R	

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+10	0x120A	Low current TDD	0-100.0	0.1%	UINT16	R	
+11	0x120B	Low L-L voltage	0-Vmax	U1	UINT16	R	
4800-4811		<b>1-Second High Phase Values</b>					
+0	0x1300	High L-N voltage	0-Vmax	U1	UINT16	R	
+1	0x1301	High current	0-Imax	U2	UINT16	R	
+2	0x1302	High kW	-Pmax-Pmax	U3	INT16	R	
+3	0x1303	High kvar	-Pmax-Pmax	U3	INT16	R	
+4	0x1304	High kVA	0-Pmax	U3	UINT16	R	
+5	0x1305	High PF Lag	0-1.000	0.001	UINT16	R	
+6	0x1306	High PF Lead	0-1.000	0.001	UINT16	R	
+7	0x1307	High voltage THD	0-999.9		UINT16	R	
+8	0x1308	High current THD	0-999.9		UINT16	R	
+9	0x1309	High K-Factor	1.0-999.9		UINT16	R	
+10	0x130A	High current TDD	0-100.0		UINT16	R	
+11	0x130B	High L-L voltage	0-Vmax	U1	UINT16	R	
4864-4873		<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		
+6	0x1406	Total kW import	0-Pmax	U3	UINT16		
+7	0x1407	Total kW export	0-Pmax	U3	UINT16	R	
+8	0x1408	Total kvar import	0-Pmax	U3	UINT16	R	
+9	0x1409	Total kvar export	0-Pmax	U3	UINT16	R	
4928-4932		<b>1-Second Auxiliary Values</b>					
+0	0x1000	Not used			UINT16	R	
+1	0x1001	In (neutral) Current	0-Imax	U2	UINT16	R	
+2	0x1002	Frequency	4500-6500	0.01Hz	UINT16	R	
+3	0x1003	Voltage unbalance	0-3000	×0.1%	UINT16	R	
+4	0x1004	Current unbalance	0-3000	×0.1%	UINT16	R	
4992-5021		<b>Present Demands</b>					
+0	0x1600	V1 Volt demand	0-Vmax	U1	UINT16	R	
+1	0x1601	V2 Volt demand	0-Vmax	U1	UINT16	R	
+2	0x1602	V3 Volt demand	0-Vmax	U1	UINT16	R	
+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	Not used			UINT16	R	
+7	0x1607	Not used			UINT16	R	
+8	0x1608	Not used			UINT16	R	
+9	0x1609	kW import sliding window demand	0-Pmax	U3	UINT16	R	

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+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	Not used			UINT16	R	
+22	0x1616	Not used			UINT16	R	
+23	0x1617	Not used			UINT16	R	
+24	0x1618	kW export sliding window demand	0-Pmax	U3	UINT16	R	
+25	0x1619	kvar export sliding window demand	0-Pmax	U3	UINT16	R	
+26	0x161A	kW export accumulated demand	0-Pmax	U3	UINT16	R	
+27	0x161B	kvar export accumulated demand	0-Pmax	U3	UINT16	R	
+28	0x161C	kW export predicted sliding window demand	0-Pmax	U3	UINT16	R	
+29	0x161D	kvar export predicted sliding window demand	0-Pmax	U3	UINT16	R	
5056-5073		<b>Total Energies</b>					
+0,1	0x1700	kWh import	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x1701	kWh export	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x1702	Not used			INT32	R	
+6,7	0x1703	Not used			UINT32	R	
+8,9	0x1704	kvarh import	0-999,999,999	0.1 kvarh	UINT32	R	
+10,11	0x1705	kvarh export	0-999,999,999	0.1 kvarh	UINT32	R	
+12,13	0x1706	Not used			INT32	R	
+14,15	0x1707	Not used			UINT32	R	
+16,17	0x1708	kVAh total	0-999,999,999	0.1 kVAh	UINT32	R	
5088-5095		<b>Billing Summary Registers</b>					
+0,1	0x1780	Summary energy register #1	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x1781	Summary energy register #2	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x1782	Summary energy register #3	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x1783	Summary energy register #4	0-999,999,999	0.1 kWh	UINT32	R	
5152-5161		<b>Symmetrical Components</b>					
+0	0x1880	Positive-sequence voltage	0-Vmax	U1	UINT16	R	
+1	0x1881	Negative-sequence voltage	0-Vmax	U1	UINT16	R	
+2	0x1882	Zero-sequence voltage	0-Vmax	U1	UINT16	R	
+3	0x1883	Negative-sequence voltage unbalance	0-300.0	0.1%	UINT16	R	
+4	0x1884	Zero-sequence voltage unbalance	0-300.0	0.1%	UINT16	R	
+5	0x1885	Positive-sequence current	0-I <sub>max</sub>	U2	UINT16	R	



Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+6	0x1886	Negative-sequence current	0-Imax	U2	UINT16	R	
+7	0x1887	Zero-sequence current	0-Imax	U2	UINT16	R	
+8	0x1888	Negative-sequence current unbalance	0-300.0	0.1%	UINT16	R	
+9	0x1889	Zero-seq current unbalance	0-300.0	0.1%	UINT16	R	
5184-5246		<b>V1 Harmonics</b>					
+0	0x1900	H01 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
+1	0x1901	H02 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
		...					
+24	0x1918	H25 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
5248-5310		<b>V2 Harmonics</b>					
+0	0x1A00	H01 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
+1	0x1A01	H02 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
		...					
+24	0x1A18	H25 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
5312-5374		<b>V3 Harmonics</b>					
+0	0x1B00	H01 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
+1	0x1B01	H02 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
		...					
+24	0x1B18	H25 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
5376-5438		<b>I1 Harmonics</b>					
+0	0x1C00	H01 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
+1	0x1C01	H02 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
		...					
+24	0x1C18	H25 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
5440-5502		<b>I2 Harmonics</b>					
+0	0x1D00	H01 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
+1	0x1D01	H02 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
		...					
+24	0x1D18	H25 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
5504-5566		<b>I3 Harmonics</b>					
+0	0x1E00	H01 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
+1	0x1E01	H02 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
		...					
+24	0x1E18	H25 Harmonic magnitude	0-100.00	0.01%	UINT16	R	
6208-6225		<b>Fundamental Phase Values</b>					2-cycle values
+0	0x2900	V1 Voltage	0-Vmax	U1	UINT16	R	
+1	0x2901	V2 Voltage	0-Vmax	U1	UINT16	R	
+2	0x2902	V3 Voltage	0-Vmax	U1	UINT16	R	
+3	0x2903	I1 Current	0-Imax	U4	UINT16	R	
+4	0x2904	I2 Current	0-Imax	U4	UINT16	R	
+5	0x2905	I3 Current	0-Imax	U4	UINT16	R	
+6	0x2906	kW L1	-Pmax-Pmax	U3	INT16	R	

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+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	
6464-6467		<b>Fundamental Total Values</b>					2-cycle values
+0	0x2A00	Total fundamental kW	-Pmax-Pmax	U3	INT16	R	
+1	0x2A01	Total fundamental kvar	-Pmax-Pmax	U3	INT16	R	
+2	0x2A02	Total fundamental kVA	0-Pmax	U3	UINT16	R	
+3	0x2A03	Total fundamental PF	-1.000-1.000	0.001	INT16	R	
9984-10046		<b>V1 Harmonic Angles</b>					
+0	0x6400	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6401	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+24	0x6418	H25 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
10048-10110		<b>V2 Harmonic Angles</b>					
+0	0x6500	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6501	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+24	0x6518	H25 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
10112-10174		<b>V3 Harmonic Angles</b>					
+0	0x6600	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6601	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+24	0x6618	H25 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
10240-10302		<b>I1 Harmonic Angles</b>					
+0	0x6800	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6801	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+24	0x6818	H25 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
10304-10366		<b>I2 Harmonic Angles</b>					
+0	0x6900	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
+1	0x6901	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+24	0x6918	H25 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
10368-10430		<b>I3 Harmonic Angles</b>					
+0	0x6A00	H01 Harmonic angle	-180.0-180.0	0.1°	INT16	R	

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+1	0x6A01	H02 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
		...					
+24	0x6A18	H25 Harmonic angle	-180.0-180.0	0.1°	INT16	R	
7104-7120		<b>Maximum Demands</b>					
+0	0x3700	V1 Maximum volt demand	0-Vmax	U1	UINT16	R	
+1	0x3701	V2 Maximum volt demand	0-Vmax	U1	UINT16	R	
+2	0x3702	V3 Maximum volt demand	0-Vmax	U1	UINT16	R	
+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	
+6-8		Not used	0		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	
+12-14		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	
7424-7425		<b>TOU Parameters</b>					
+0	0x3C00	Active tariff	0-7		UINT16		
+1	0x3C01	Active profile	0-15: 0-3 = Season 1 Profile #1-4, 4-7 = Season 2 Profile #1-4, 8-11 = Season 3 Profile #1-4, 12-15 = Season 4 Profile #1-4		UINT16		
7488-7499		<b>Billing TOU Register #1</b>					
+0,1	0x3D00	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x3D01	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x3D02	Tariff #3 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x3D03	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x3D04	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x3D05	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
+12,13	0x3D06	Tariff #7 register	0-999,999,999	0.1 kWh	UINT32	R	
+14,15	0x3D07	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
7552-7563		<b>Billing TOU Register #2</b>					
+0,1	0x3E00	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x3E01	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x3E02	Tariff #3 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x3E03	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x3E04	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x3E05	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
+12,13	0x3E06	Tariff #7 register	0-999,999,999	0.1 kWh	UINT32	R	

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+14,15	0x3E07	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
7616-7627		<b>Billing TOU Register #3</b>					
+0,1	0x3F00	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x3F01	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x3F02	Tariff #3 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x3F03	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x3F04	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x3F05	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
+12,13	0x3F06	Tariff #7 register	0-999,999,999	0.1 kWh	UINT32	R	
+14,15	0x3F07	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
7680-7691		<b>Billing TOU Register #4</b>					
+0,1	0x4000	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x4001	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x4002	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x4003	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x4004	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x4005	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
+12,13	0x4006	Tariff #7 register	0-999,999,999	0.1 kWh	UINT32	R	
+14,15	0x4007	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
7744-7759		<b>Billing TOU Register #5</b>					
+0,1	0x4100	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x4101	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x4102	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x4103	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x4104	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x4105	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
+12,13	0x4106	Tariff #7 register	0-999,999,999	0.1 kWh	UINT32	R	
+14,15	0x4107	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
7808-7823		<b>Billing TOU Register #6</b>					
+0,1	0x4200	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x4201	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x4202	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x4203	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x4204	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x4205	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
+12,13	0x4206	Tariff #7 register	0-999,999,999	0.1 kWh	UINT32	R	
+14,15	0x4207	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
7872-7887		<b>Billing TOU Register #7</b>					
+0,1	0x4300	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x4301	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+4,5	0x4302	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x4303	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x4304	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x4305	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
+12,13	0x4306	Tariff #7 register	0-999,999,999	0.1 kWh	UINT32	R	
+14,15	0x4307	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
7936-7951		<b>Billing TOU Register #8</b>					
+0,1	0x4400	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x4401	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x4402	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x4403	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x4404	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x4405	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
+12,13	0x4406	Tariff #7 register	0-999,999,999	0.1 kWh	UINT32	R	
+14,15	0x4407	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
8000-8007		<b>Billing Summary Accumulated Demands</b>					
+0	0x4500	Summary register #1	0-Pmax	U3	UINT16	R	
+1	0x4501	Summary register #2	0-Pmax	U3	UINT16	R	
+2	0x4502	Summary register #3	0-Pmax	U3	UINT16	R	
+3	0x4503	Summary register #4	0-Pmax	U3	UINT16	R	
+5	0x4504	Summary register #5	0-Pmax	U3	UINT16	R	
+6	0x4505	Summary register #6	0-Pmax	U3	UINT16	R	
+7	0x4506	Summary register #7	0-Pmax	U3	UINT16	R	
+8	0x4507	Summary register #8	0-Pmax	U3	UINT16	R	
8032-8039		<b>Billing Summary Block Demands</b>					
+0	0x4580	Summary register #1	0-Pmax	U3	UINT16	R	
+1	0x4581	Summary register #2	0-Pmax	U3	UINT16	R	
+2	0x4582	Summary register #3	0-Pmax	U3	UINT16	R	
+3	0x4583	Summary register #4	0-Pmax	U3	UINT16	R	
+4	0x4584	Summary register #5	0-Pmax	U3	UINT16	R	
+5	0x4585	Summary register #6	0-Pmax	U3	UINT16	R	
+6	0x4586	Summary register #7	0-Pmax	U3	UINT16	R	
+7	0x4587	Summary register #8	0-Pmax	U3	UINT16	R	
8064-8071		<b>Billing Summary Sliding Window Demands</b>					
+0	0x4600	Summary register #1	0-Pmax	U3	UINT16	R	
+1	0x4601	Summary register #2	0-Pmax	U3	UINT16	R	
+2	0x4602	Summary register #3	0-Pmax	U3	UINT16	R	
+3	0x4603	Summary register #4	0-Pmax	U3	UINT16	R	
+4	0x4604	Summary register #5	0-Pmax	U3	UINT16	R	
+5	0x4605	Summary register #6	0-Pmax	U3	UINT16	R	
+6	0x4606	Summary register #7	0-Pmax	U3	UINT16	R	

Address	Point ID	Description	Low and High Scales <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+7	0x4607	Summary register #8	0-Pmax	U3	UINT16	R	
8160-8167		<b>Billing Summary Maximum Demands</b>					
+0	0x4780	Summary register #1	0-Pmax	U3	UINT16	R	
+1	0x4781	Summary register #2	0-Pmax	U3	UINT16	R	
+2	0x4782	Summary register #3	0-Pmax	U3	UINT16	R	
+3	0x4783	Summary register #4	0-Pmax	U3	UINT16	R	
+4	0x4784	Summary register #5	0-Pmax	U3	UINT16	R	
+5	0x4785	Summary register #6	0-Pmax	U3	UINT16	R	
+6	0x4786	Summary register #7	0-Pmax	U3	UINT16	R	
+7	0x4787	Summary register #8	0-Pmax	U3	UINT16	R	
8192-8199		<b>Billing TOU Maximum Demand Register #1</b>					
+0	0x4800	Tariff #1 register	0-Pmax	U3	UINT16	R	
+1	0x4801	Tariff #2 register	0-Pmax	U3	UINT16	R	
+2	0x4802	Tariff #3 register	0-Pmax	U3	UINT16	R	
+3	0x4803	Tariff #4 register	0-Pmax	U3	UINT16	R	
+4	0x4804	Tariff #5 register	0-Pmax	U3	UINT16	R	
+5	0x4805	Tariff #6 register	0-Pmax	U3	UINT16	R	
+6	0x4804	Tariff #7 register	0-Pmax	U3	UINT16	R	
+7	0x4805	Tariff #8 register	0-Pmax	U3	UINT16	R	
8224-8231		<b>Billing TOU Maximum Demand Register #2</b>					
+0	0x4880	Tariff #1 register	0-Pmax	U3	UINT16	R	
+1	0x4881	Tariff #2 register	0-Pmax	U3	UINT16	R	
+2	0x4882	Tariff #3 register	0-Pmax	U3	UINT16	R	
+3	0x4883	Tariff #4 register	0-Pmax	U3	UINT16	R	
+4	0x4884	Tariff #5 register	0-Pmax	U3	UINT16	R	
+5	0x4885	Tariff #6 register	0-Pmax	U3	UINT16	R	
+6	0x4884	Tariff #7 register	0-Pmax	U3	UINT16	R	
+7	0x4885	Tariff #8 register	0-Pmax	U3	UINT16	R	
8256-8261		<b>Billing TOU Maximum Demand Register #3</b>					
+0	0x4900	Tariff #1 register	0-Pmax	U3	UINT16	R	
+1	0x4901	Tariff #2 register	0-Pmax	U3	UINT16	R	
+2	0x4902	Tariff #3 register	0-Pmax	U3	UINT16	R	
+3	0x4903	Tariff #4 register	0-Pmax	U3	UINT16	R	
+4	0x4904	Tariff #5 register	0-Pmax	U3	UINT16	R	
+5	0x4905	Tariff #6 register	0-Pmax	U3	UINT16	R	
+6	0x4904	Tariff #7 register	0-Pmax	U3	UINT16	R	
+7	0x4905	Tariff #8 register	0-Pmax	U3	UINT16	R	
8320-8327		<b>Billing TOU Maximum Demand Register #4</b>					
+0	0x4A00	Tariff #1 register	0-Pmax	U3	UINT16	R	



Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
12544-12615	0x0600	<b>Digital Inputs</b>			UINT32	R	Bitmap: 0=open, 1=closed
12544-12561		Digital inputs DI1–DI18	0x00000000 - 0xFFFFFFFF		UINT32	R	
12562-12579		Digital inputs DI19–DI36	0x00000000 - 0xFFFFFFFF		UINT32	R	
12580-12597		Digital inputs DI37–DI54	0x00000000 - 0xFFFFFFFF		UINT32	R	
12598-12615		Digital inputs DI55–DI72	0x00000000 - 0xFFFFFFFF		UINT32	R	
	0x0600	Digital input DI1	0/1			TRG	0x0600
	0x0601	Digital input DI2	0/1			TRG	0x0601
		...					
	0x0647	Digital input DI172	0/1			TRG	0x0647
		<b>Pulse Inputs</b>					9
	0x0700	Digital input DI1	0/1			TRG	
	0x0701	Digital input DI2	0/1			TRG	
		...					
	0x0747	Digital input DI72	0/1			TRG	
		<b>Relay Outputs</b>					
12800-12801		Relay outputs RO1–RO18	0x00000000 - 0x00000FFF		UINT32	R	Bitmap: 0=open, 1=closed
12864-12865		Not used					
	0x0800	Relay output RO1	0/1			TRG	
	0x0801	Relay output RO2	0/1			TRG	
		...					
	0x0811	Relay output RO18	0/1			TRG	
13056-13119	<b>0x0A00</b>	<b>Counters 1-32</b>					
+0,1	0x0A00	Counter #1	0-999,999,999		UINT32	R/W	
+2,3	0x0A01	Counter #2	0-999,999,999		UINT32	R/W	
		...					
+62,63	0x0A1F	Counter #32	0-999,999,999		UINT32	R/W	
13120-13183	<b>0x0A80</b>	<b>Counters 33-64</b>					
+0,1	0x0A80	Counter #33	0-999,999,999		UINT32	R/W	
+2,3	0x0A81	Counter #34	0-999,999,999		UINT32	R/W	
		...					
+62,63	0x0A9F	Counter #64	0-999,999,999		UINT32	R/W	
13312-13377		<b>1-Cycle Phase Values</b>					
+0,1	0x0C00	V1 Voltage	0-Vmax	U1	UINT32	R	
+2,3	0x0C01	V2 Voltage	0-Vmax	U1	UINT32	R	
+4,5	0x0C02	V3 Voltage	0-Vmax	U1	UINT32	R	
+6,7	0x0C03	I1 Current	0-I <sub>max</sub>	U2	UINT32	R	
+8,9	0x0C04	I2 Current	0-I <sub>max</sub>	U2	UINT32	R	
+10,11	0x0C05	I3 Current	0-I <sub>max</sub>	U2	UINT32	R	
+12,13	0x0C06	kW L1	-P <sub>max</sub> -P <sub>max</sub>	U3	INT32	R	
+14,15	0x0C07	kW L2	-P <sub>max</sub> -P <sub>max</sub>	U3	INT32	R	
+16,17	0x0C08	kW L3	-P <sub>max</sub> -P <sub>max</sub>	U3	INT32	R	
+18,19	0x0C09	kvar L1	-P <sub>max</sub> -P <sub>max</sub>	U3	INT32	R	



Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+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 Voltage THD	0-9999	×0.1%	UINT32	R	2-cycle value
+38,39	0x0C13	V2 Voltage THD	0-9999	×0.1%	UINT32	R	2-cycle value
+40,41	0x0C14	V3/V31 Voltage THD	0-9999	×0.1%	UINT32	R	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
+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	
13440-13453		<b>1-Cycle Low Phase Values</b>					
+0,1	0x0D00	Low L-N voltage	0-Vmax	U1	UINT32	R	
+2,3	0x0D01	Low current	0-Imax	U2	UINT32	R	
+4,5	0x0D02	Low kW	-Pmax-Pmax	U3	INT32	R	
+6,7	0x0D03	Low kvar	-Pmax-Pmax	U3	INT32	R	
+8,9	0x0D04	Low kVA	0-Pmax	U3	UINT32	R	
+10,11	0x0D05	Low PF Lag	0-1000	×0.001	UINT32	R	
+12,13	0x0D06	Low PF Lead	0-1000	×0.001	UINT32	R	
13568-13581		<b>1-Cycle High Phase Values</b>					
+0,1	0x0E00	High L-N voltage	0-Vmax	U1	UINT32	R	
+2,3	0x0E01	High current	0-Imax	U2	UINT32	R	
+4,5	0x0E02	High kW	-Pmax-Pmax	U3	INT32	R	
+6,7	0x0E03	High kvar	-Pmax-Pmax	U3	INT32	R	
+8,9	0x0E04	High kVA	0-Pmax	U3	UINT32	R	
+10,11	0x0E05	High PF Lag	0-1000	×0.001	UINT32	R	
+12,13	0x0E06	High PF Lead	0-1000	×0.001	UINT32	R	
13632-13663		<b>1-Second Analog Inputs</b>					
+0,1	0x0E80	Analog input AI1	AI1min-AI1max		INT32	R	
+2,3	0x0E81	Analog input AI2	AI2min-AI2max		INT32	R	

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
		...					
+30,31	0x0E8F	Analog input AI16	AI16min-AI16max		INT32	R	
13696-13715		<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	UINT32	R	
+10,11	0x0F05	Total PF lead	0-1000	×0.001	UINT32		
+12,13	0x0F06	Total kW import	0-Pmax	U3	UINT32		
+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	
13760-13775	<b>0xF100</b>	<b>Counters 65-72</b>					
+0,1	0xF101	Counter #65	0-999,999,999		UINT32	R/W	
+2,3	0xF102	Counter #66	0-999,999,999		UINT32	R/W	
		...					
+14,15	0xF107	Counter #72	0-999,999,999		UINT32	R/W	
13824-13833		<b>1-Cycle Auxiliary Values</b>					
+0,1	0x1500	Not used			UINT32	R	
+2,3	0x1501	In (neutral) Current	0-I <sub>max</sub>	U2	UINT32	R	
+4,5	0x1502	Frequency	4500 – 6500	×0.01Hz	UINT32	R	
+6,7	0x1503	Voltage unbalance	0-3000	×0.1%	UINT32	R	
+8,9	0x1504	Current unbalance	0-3000	×0.1%	UINT32	R	
13888-13919		<b>Phasor</b>					
+0,1	0x1080	V1 Voltage magnitude	0-V <sub>max</sub>	U1	UINT32	R	
+2,3	0x1081	V2 Voltage magnitude	0-V <sub>max</sub>	U1	UINT32	R	
+4,5	0x1082	V3 Voltage magnitude	0-V <sub>max</sub>	U1	UINT32	R	
+6,7	0x1083	Not used			UINT32	R	
+8,9	0x1084	I1 Current magnitude	0-I <sub>max</sub>	U2	UINT32	R	
+10,11	0x1085	I2 Current magnitude	0-I <sub>max</sub>	U2	UINT32	R	
+12,13	0x1086	I3 Current magnitude	0-I <sub>max</sub>	U2	UINT32	R	
+14,15	0x1087	Not used			UINT32	R	
+16,17	0x1088	V1 Voltage angle	-1800-1800	×0.1°	INT32	R	
+18,19	0x1089	V2 Voltage angle	-1800-1800	×0.1°	INT32	R	
+20,21	0x108A	V3 Voltage angle	-1800-1800	×0.1°	INT32	R	
+22,23	0x108B	Not used			INT32	R	
+24,25	0x108C	I1 Current angle	-1800-1800	×0.1°	INT32	R	
+26,27	0x108D	I2 Current angle	-1800-1800	×0.1°	INT32	R	
+28,29	0x108E	I3 Current angle	-1800-1800	×0.1°	INT32	R	
+30,31	0x108F	Not used			INT32	R	
13952-14017		<b>1-Second Phase Values</b>					

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+0,1	0x1100	V1 Voltage	0-Vmax	U1	UINT32	R	
+2,3	0x1101	V2 Voltage	0-Vmax	U1	UINT32	R	
+4,5	0x1102	V3 Voltage	0-Vmax	U1	UINT32	R	
+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	3-sec value
+38,39	0x1113	V2/V23 Voltage THD	0-9999	×0.1%	UINT32	R	3-sec value
+40,41	0x1114	V3/V31 Voltage THD	0-9999	×0.1%	UINT32	R	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	
14080-14093		<b>1-Second Low Phase Values</b>					
+0,1	0x1200	Low L-N voltage	0-Vmax	U1	UINT32	R	
+2,3	0x1201	Low current	0-Imax	U2	UINT32	R	
+4,5	0x1202	Low kW	-Pmax-Pmax	U3	INT32	R	
+6,7	0x1203	Low kvar	-Pmax-Pmax	U3	INT32	R	
+8,9	0x1204	Low kVA	0-Pmax	U3	UINT32	R	
+10,11	0x1205	Low PF Lag	0-1000	×0.001	UINT32	R	
+12,13	0x1206	Low PF Lead	0-1000	×0.001	UINT32	R	
14208-14221		<b>1-Second High Phase Values</b>					
+0,1	0x1300	High L-N voltage	0-Vmax	U1	UINT32	R	

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+2,3	0x1301	High current	0-Imax	U2	UINT32	R	
+4,5	0x1302	High kW	-Pmax-Pmax	U3	INT32	R	
+6,7	0x1303	High kvar	-Pmax-Pmax	U3	INT32	R	
+8,9	0x1304	High kVA	0-Pmax	U3	UINT32	R	
+10,11	0x1305	High PF Lag	0-1000	×0.001	UINT32	R	
+12,13	0x1306	High PF Lead	0-1000	×0.001	UINT32	R	
14336-14355		<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	UINT32	R	
+10,11	0x1405	Total PF lead	0-1000	×0.001	UINT32		
+12,13	0x1406	Total kW import	0-Pmax	U3	UINT32		
+14,15	0x1407	Total kW export	0-Pmax	U3	UINT32	R	
+16,17	0x1408	Total kvar import	0-Pmax	U3	UINT32	R	
+18,19	0x1409	Total kvar export	0-Pmax	U3	UINT32	R	
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	4500 – 6500	×0.01Hz	UINT32	R	
+6,7	0x1503	Voltage unbalance	0-3000	×0.1%	UINT32	R	
+8,9	0x1504	Current unbalance	0-3000	×0.1%	UINT32	R	
14592-14651		<b>Present Demands</b>					
+0,1	0x1600	V1 Volt demand	0-Vmax	U1	UINT32	R	
+2,3	0x1601	V2 Volt demand	0-Vmax	U1	UINT32	R	
+4,5	0x1602	V3 Volt demand	0-Vmax	U1	UINT32	R	
+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	Not used			UINT32	R	
+14,15	0x1607	Not used			UINT32	R	
+16,17	0x1608	Not used			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	0		UINT32	R	
+26,27	0x160D	Not used	0		UINT32	R	
+28,29	0x160E	Not used	0		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	

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+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	Not used			UINT32	R	
+44,45	0x1616	Not used			UINT32	R	
+46,47	0x1617	Not used			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	
14720-14737		<b>Total Energies</b>					
+0,1	0x1700	kWh import	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x1701	kWh export	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x1702	Not used			INT32	R	
+6,7	0x1703	Not used			UINT32	R	
+8,9	0x1704	kvarh import	0-999,999,999	0.1 kvarh	UINT32	R	
+10,11	0x1705	kvarh export	0-999,999,999	0.1 kvarh	UINT32	R	
+12,13	0x1706	Not used			INT32	R	
+14,15	0x1707	Not used			UINT32	R	
+16,17	0x1708	kVAh total	0-999,999,999	0.1 kVAh	UINT32	R	
14784-14791		<b>Billing Summary Registers</b>					
+0,1	0x1780	Summary energy register #1	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x1781	Summary energy register #2	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x1782	Summary energy register #3	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x1783	Summary energy register #4	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x1784	Summary energy register #5	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x1785	Summary energy register #6	0-999,999,999	0.1 kWh	UINT32	R	
+12,13	0x1786	Summary energy register #7	0-999,999,999	0.1 kWh	UINT32	R	
+14,15	0x1787	Summary energy register #8	0-999,999,999	0.1 kWh	UINT32	R	
14912-14931		<b>Symmetrical Components</b>					
+0,1	0x1880	Positive-sequence voltage	0-Vmax	U1	UINT32	R	
+2,3	0x1881	Negative-sequence voltage	0-Vmax	U1	UINT32	R	
+4,5	0x1882	Zero-sequence voltage	0-Vmax	U1	UINT32	R	
+6,7	0x1883	Negative-sequence voltage unbalance	0-3000	×0.1%	UINT32	R	
+8,9	0x1884	Zero-sequence voltage unbalance	0-3000	×0.1%	UINT32	R	
+10,11	0x1885	Positive-sequence current	0-Imax	U2	UINT32	R	
+12,13	0x1886	Negative-sequence current	0-Imax	U2	UINT32	R	
+14,15	0x1887	Zero-sequence current	0-Imax	U2	UINT32	R	
+16,17	0x1888	Negative-sequence current unbalance	0-3000	×0.1%	UINT32	R	
+18,19	0x1889	Zero-sequence current unbalance	0-3000	×0.1%	UINT32	R	
14976-15025		<b>V1 Harmonics</b>					
+0,1	0x1900	H01 Harmonic magnitude	0-10000	×0.01%	UINT32	R	

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+2,3	0x1901	H02 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
		...					
+48,49	0x1918	H25 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
15104-15153		<b>V2 Harmonics</b>					
+0,1	0x1A00	H01 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
+2,3	0x1A01	H02 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
		...					
+48,49	0x1A18	H25 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
15232-15281		<b>V3 Harmonics</b>					
+0,1	0x1B00	H01 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
+2,3	0x1B01	H02 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
		...					
+48,49	0x1B18	H25 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
15360-15409		<b>I1 Harmonics</b>					
+0,1	0x1C00	H01 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
+2,3	0x1C01	H02 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
		...					
+48,49	0x1C18	H25 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
15488-15537		<b>I2 Harmonics</b>					
+0,1	0x1D00	H01 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
+2,3	0x1D01	H02 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
		...					
+48,49	0x1D18	H25 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
15616-15665		<b>I3 Harmonics</b>					
+0,1	0x1E00	H01 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
+2,3	0x1E01	H02 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
		...					
+48,49	0x1E18	H25 Harmonic magnitude	0-10000	×0.01%	UINT32	R	
17024-17059		<b>Fundamental Phase Values</b>					2-cycle values
+0,1	0x2900	V1/V12 Voltage	0-Vmax	U1	UINT32	R	
+2,3	0x2901	V2/V23 Voltage	0-Vmax	U1	UINT32	R	
+4,5	0x2902	V3/V31 Voltage	0-Vmax	U1	UINT32	R	
+6,7	0x2903	I1 Current	0-Imax	U4	UINT32	R	
+8,9	0x2904	I2 Current	0-Imax	U4	UINT32	R	
+10,11	0x2905	I3 Current	0-Imax	U4	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	

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+28,29	0x290E	kVA L3	0-Pmax	U3	UINT32	R	
+30,31	0x290F	Power factor L1	-1000-1000	×0.001	INT32	R	
+32,33	0x2910	Power factor L2	-1000-1000	×0.001	INT32	R	
+34,35	0x2911	Power factor L3	-1000-1000	×0.001	INT32	R	
17152-17159		<b>Fundamental Total Values</b>					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	
18816-18839		<b>Maximum Demands</b>					
+0,1	0x3700	V1 Maximum volt demand	0-Vmax	U1	UINT32	R	
+2,3	0x3701	V2 Maximum volt demand	0-Vmax	U1	UINT32	R	
+4,5	0x3702	V3 Maximum volt demand	0-Vmax	U1	UINT32	R	
+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	0		UINT32	R	
+14,15	0x3707	Not used	0		UINT32	R	
+16,17	0x3708	Not used	0		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	
19328-19359		<b>1-Cycle Analog Inputs</b>					
+0,1	0x3B00	Analog input AI1	AI1min-AI1max		INT32	R	
+2,3	0x3B01	Analog input AI2	AI2min-AI2max		INT32	R	
		...					
+30,31	0x3B0F	Analog input AI16	AI16min-AI16max		INT32	R	
19392-19423		<b>Raw Analog Inputs</b>					
+0, 1	0x3B80	Analog input AI1	0-4095		UINT32	R	
+2, 3	0x3B81	Analog input AI2	0-4095		UINT32	R	
		...					
+30, 31	0x3B8F	Analog input AI16	0-4095		UINT32	R	
19456-19459		<b>Energy/TOU Parameters</b>					
+0,1	0x3C00	Active tariff	0-15		UINT32	R	
+2,3	0x3C01	Active profile	0-15 1-3 = Season 1 Profile #1-4, 4-7 = Season 2 Profile #1-4, 8-11 = Season 3 Profile #1-4,		UINT32	R	

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
19584-19599		<b>Billing TOU Energy Register #1</b>	12-15 = Season 4 Profile #1-4				
+0,1	0x3D00	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x3D01	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
		...				R	
+14,15	0x3D07	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
19712-19727		<b>Billing TOU Energy Register #2</b>					
+0,1	0x3E00	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x3E01	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
		...				R	
+14,15	0x3E07	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
19840-19855		<b>Billing TOU Energy Register #3</b>					
+0,1	0x3F00	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x3F01	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
		...				R	
+14,15	0x3F07	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
19968-19983		<b>Billing TOU Energy Register #4</b>					
+0,1	0x4000	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x4001	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
		...				R	
+14,15	0x4007	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
20096-20111		<b>Billing TOU Energy Register #5</b>					
+0,1	0x4100	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x4101	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
		...				R	
+14,15	0x4107	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
20224-20239		<b>Billing TOU Energy Register #6</b>					
+0,1	0x4200	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x4201	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
		...				R	
+14,15	0x4207	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
20352-20367		<b>Billing TOU Energy Register #7</b>					
+0,1	0x4300	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x4301	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
		...				R	
+14,15	0x4307	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
20480-20495		<b>Billing TOU Energy Register #8</b>					
+0,1	0x4400	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x4401	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
		...				R	
+14,15	0x4407	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
20608-20627		<b>Billing Summary Accumulated Demands</b>					
+0,1	0x4500	Summary register #1 demand	0-Pmax	U3	UINT32	R	



Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+2,3	0x4501	Summary register #2 demand	0-Pmax	U3	UINT32	R	
		...	0-Pmax	U3	UINT32	R	
+14,15	0x4507	Summary register #8 demand	0-Pmax	U3	UINT32	R	
20736-20755		<b>Billing Summary Sliding Window Demands</b>					
+0,1	0x4600	Summary register #1 demand	0-Pmax	U3	UINT32	R	
+2,3	0x4601	Summary register #2 demand	0-Pmax	U3	UINT32	R	
		...	0-Pmax	U3	UINT32	R	
+14,15	0x4607	Summary register #8 demand	0-Pmax	U3	UINT32	R	
20928-20979		<b>Billing Summary (Total) Maximum Demands</b>					
+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	
		...	0-Pmax	U3	UINT32	R	
+14,15	0x4787	Summary register #8 maximum demand	0-Pmax	U3	UINT32	R	
20992-21043		<b>Billing TOU Maximum Demand Register #1</b>					
+0,1	0x4800	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4801	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x4807	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
21120-21171		<b>Billing TOU Maximum Demand Register #2</b>					
+0,1	0x4900	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4901	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x4907	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
21248-21299		<b>Billing TOU Maximum Demand Register #3</b>					
+0,1	0x4A00	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4A01	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x4A07	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
21056-21107		<b>Billing TOU Maximum Demand Register #4</b>					
+0,1	0x4880	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4881	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x4887	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
21184-21235		<b>Billing TOU Maximum Demand Register #5</b>					
+0,1	0x4980	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4981	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x4987	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
21312-21363		<b>Billing TOU Maximum Demand Register #6</b>					
+0,1	0x4A80	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x4A81	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x4A87	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
22400-22451		<b>Billing TOU Maximum Demand Register #7</b>					
+0,1	0x5300	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x5301	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x5307	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
22464-22515		<b>Billing TOU Maximum Demand Register #8</b>					
+0,1	0x5380	Tariff #1 maximum demand	0-Pmax	U3	UINT32	R	
+2,3	0x5381	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	
		...				R	
+14,15	0x5387	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	
		<b>Generic TOU Season Energy Registers ID's</b>					Point references
	0x7000	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
	0x7001	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
	0x7002	Tariff #3 register	0-999,999,999	0.1 kWh	UINT32	R	
	0x7003	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
	0x7004	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
	0x7005	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
	0x7006	Tariff #7 register	0-999,999,999	0.1 kWh	UINT32	R	
	0x7007	Tariff #8 register	0-999,999,999	0.1 kWh	UINT32	R	
		<b>Generic TOU Season Maximum Demand Registers ID's</b>					Point references
	0x7100	Tariff #1 register	0-Pmax	U3	UINT32	R	
	0x7101	Tariff #2 register	0-Pmax	U3	UINT32	R	
	0x7102	Tariff #3 register	0-Pmax	U3	UINT32	R	
	0x7103	Tariff #4 register	0-Pmax	U3	UINT32	R	
	0x7104	Tariff #5 register	0-Pmax	U3	UINT32	R	
	0x7105	Tariff #6 register	0-Pmax	U3	UINT32	R	
	0x7106	Tariff #7 register	0-Pmax	U3	UINT32	R	
	0x7107	Tariff #8 register	0-Pmax	U3	UINT32	R	
24576-24625		<b>V1/V12 Harmonic Angles</b>					
+0,1	0x6400	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6401	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+48,49	0x6418	H25 Harmonic angle	-1800-1800	×0.1°	INT32	R	
24704-24753		<b>V2/V23 Harmonic Angles</b>					
+0,1	0x6500	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6501	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+48,49	0x6518	H25 Harmonic angle	-1800-1800	×0.1°	INT32	R	
24832-24881		<b>V3/V31 Harmonic Angles</b>					
+0,1	0x6600	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6601	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+48,49	0x6618	H25 Harmonic angle	-1800-1800	×0.1°	INT32	R	
25088-25137		<b>I1 Harmonic Angles</b>					
+0,1	0x6800	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6801	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+48,49	0x6818	H25 Harmonic angle	-1800-1800	×0.1°	INT32	R	
25216-25265		<b>I2 Harmonic Angles</b>					
+0,1	0x6900	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6901	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+48,49	0x6918	H25 Harmonic angle	-1800-1800	×0.1°	INT32	R	
25344-25393		<b>I3 Harmonic Angles</b>					
+0,1	0x6A00	H01 Harmonic angle	-1800-1800	×0.1°	INT32	R	
+2,3	0x6A01	H02 Harmonic angle	-1800-1800	×0.1°	INT32	R	
		...					
+48,49	0x6A18	H25 Harmonic angle	-1800-1800	×0.1°	INT32	R	

<sup>1</sup> For volts, amps and power scales refer to Chapter 4 "Data Scales and Units".

### 3.5 Minimum/Maximum Log Registers

Address	Point ID	Description	Options/Range/Format <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
35840-35971		<b>Minimum Phase Values</b>					
+0,1	0x2C00	Min. V1/V12 Voltage	0-Vmax	U1	UINT32	R	<sup>1</sup>
+2,3		Timestamp	F1	sec	UINT32	R	
+4,5	0x2C01	Min. V2/V23 Voltage	0-Vmax	U1	UINT32	R	<sup>1</sup>
+6,7		Timestamp	F1	sec	UINT32	R	
+8,9	0x2C02	Min. V3/V31 Voltage	0-Vmax	U1	UINT32	R	<sup>1</sup>
+10,11		Timestamp	F1	sec	UINT32	R	
+12,13	0x2C03	Min. I1 Current	0-Imax	U4	UINT32	R	Per submeter
+14,15		Timestamp	F1	sec	UINT32	R	
+16,17	0x2C04	Min. I2 Current	0-Imax	U4	UINT32	R	Per submeter
+18,19		Timestamp		sec	UINT32	R	
+20,21	0x2C05	Min. I3 Current	0-Imax	U4	UINT32	R	Per submeter
+22,23		Timestamp		sec	UINT32	R	
+24,25	0x2C06	Min. kW L1	-Pmax-Pmax	U3	INT32	R	Per submeter
+26,27		Timestamp		sec	INT32	R	
+28,29	0x2C07	Min. kW L2	-Pmax-Pmax	U3	INT32	R	Per submeter
+30,31		Timestamp		sec	INT32	R	
+32,33	0x2C08	Min. kW L3	-Pmax-Pmax	U3	INT32	R	Per submeter
+34,35		Timestamp		sec	INT32	R	
+36,37	0x2C09	Min. kvar L1	-Pmax-Pmax	U3	INT32	R	Per submeter
+38,39		Timestamp		sec	INT32	R	

Address	Point ID	Description	Options/Range/Format <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+40,41 +42,43	0x2C0A	Min. kvar L2 Timestamp	-Pmax-Pmax	U3 sec	INT32 INT32	R R	Per submeter
+44,45 +46,47	0x2C0B	Min. kvar L3 Timestamp	-Pmax-Pmax	U3 sec	INT32 INT32	R R	Per submeter
+48,49 +50,51	0x2C0C	Min. kVA L1 Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	Per submeter
+52,53 +54,55	0x2C0D	Min. kVA L2 Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	Per submeter
+56,57 +58,59	0x2C0E	Min. kVA L3 Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	Per submeter
+60,61 +62,63	0x2C0F	Min. Power factor L1 Timestamp	0-1000	×0.001 sec	UINT32 UINT32	R R	Absolute value
+64,65 +66,67	0x2C10	Min. Power factor L2 Timestamp	0-1000	×0.001 sec	UINT32 UINT32	R R	Absolute value
+68,69 +70,71	0x2C11	Min. Power factor L3 Timestamp	0-1000	×0.001 sec	UINT32 UINT32	R R	Absolute value
+72,73 +74,75	0x2C12	Not used					
+76,77 +78,79	0x2C13	Not used					
+80,81 +82,83	0x2C14	Not used					
+84,85 +86,87	0x2C15	Not used					
+88,89 +90,91	0x2C16	Not used					
+92,93 +94,95	0x2C17	Not used					
+96,97 +98,99	0x2C18	Not used					
+100,101 +102,103	0x2C19	Not used					
+104,105 +106,107	0x2C1A	Not used					
+108,109 +110,111	0x2C1B	Not used					
+112,113 +114,115	0x2C1C	Not used					
+116,117 +118,119	0x2C1D	Not used					
+120,121 +122,123	0x2C1E	Min. V12 voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	
+124,125 +126,127	0x2C1F	Min. V23 voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	

Address	Point ID	Description	Options/Range/Format <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+128,129 +130,131	0x2C20	Min. V31 voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	
36096-36119		<b>Minimum Total Values</b>					
+0,1 +2,3	0x2D00	Min. Total kW Timestamp	-Pmax-Pmax	U3 sec	INT32 UINT32	R R	
+4,5 +6,7	0x2D01	Min. Total kvar Timestamp	-Pmax-Pmax	U3 sec	INT32 UINT32	R R	
+8,9 +10,11	0x2D02	Min. Total kVA Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+12,13 +14,15	0x2D03	Min. Total PF Timestamp	-1000-1000	×0.001 sec	INT32 UINT32	R R	
+16,17 +18,19	0x2D04	Min. Total PF lag Timestamp	0-1000	×0.001 sec	UINT32 UINT32	R R	
+20,21 +22,23	0x2D05	Min. Total PF lead Timestamp	0-1000	×0.001 sec	UINT32 UINT32	R R	
36864-36995		<b>Maximum Phase Values</b>					
+0,1 +2,3	0x3400	Max. V1/V12 Voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+4,5 +6,7	0x3401	Max. V2/V23 Voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+8,9 +10,11	0x3402	Max. V3/V31 Voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	<sup>1</sup>
+12,13 +14,15	0x3403	Max. I1 Current Timestamp	0-I <sub>max</sub>	U4 sec	UINT32 UINT32	R R	Per submeter
+16,17 +18,19	0x3404	Max. I2 Current Timestamp	0-I <sub>max</sub>	U4 sec	UINT32 UINT32	R R	Per submeter
+20,21 +22,23	0x3405	Max. I3 Current Timestamp	0-I <sub>max</sub>	U4 sec	UINT32 UINT32	R R	Per submeter
+24,25 +26,27	0x3406	Max. kW L1 Timestamp	-Pmax-Pmax	U3 sec	INT32 INT32	R R	Per submeter
+28,29 +30,31	0x3407	Max. kW L2 Timestamp	-Pmax-Pmax	U3 sec	INT32 INT32	R R	Per submeter
+32,33 +34,35	0x3408	Max. kW L3 Timestamp	-Pmax-Pmax	U3 sec	INT32 INT32	R R	Per submeter
+36,37 +38,39	0x3409	Max. kvar L1 Timestamp	-Pmax-Pmax	U3 sec	INT32 INT32	R R	Per submeter
+40,41 +42,43	0x340A	Max. kvar L2 Timestamp	-Pmax-Pmax	U3 sec	INT32 INT32	R R	Per submeter
+44,45 +46,47	0x340B	Max. kvar L3 Timestamp	-Pmax-Pmax	U3 sec	INT32 INT32	R R	Per submeter
+48,49 +50,51	0x340C	Max. kVA L1 Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	Per submeter
+52,53 +54,55	0x340D	Max. kVA L2 Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	Per submeter

Address	Point ID	Description	Options/Range/Format <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+56,57 +58,59	0x340E	Max. kVA L3 Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	Per submeter
+60,61 +62,63	0x340F	Max. Power factor L1 Timestamp	0-1000	×0.001 sec	UINT32 UINT32	R R	Absolute value, Per submeter
+64,65 +66,67	0x3410	Max. Power factor L2 Timestamp	0-1000	×0.001 sec	UINT32 UINT32	R R	Absolute value, Per submeter
+68,69 +70,71	0x3411	Max. Power factor L3 Timestamp	0-1000	×0.001 sec	UINT32 UINT32	R R	Absolute value, Per submeter
+72,73 +74,75	0x3412	Not used					
+76,77 +78,79	0x3413	Not used					
+80,81 +82,83	0x3414	Not used					
+84,85 +86,87	0x3415	Not used					
+88,89 +90,91	0x3416	Not used					
+92,93 +94,95	0x3417	Not used					
+96,97 +98,99	0x3418	Not used					
+100,101 +102,103	0x3419	Not used					
+104,105 +106,107	0x341A	Not used					
+108,109 +110,111	0x341B	Not used					
+112,113 +114,115	0x341C	Not used					
+116,117 +118,119	0x341D	Not used					
+120,121 +122,123	0x341E	Max. V12 voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	
+124,125 +126,127	0x341F	Max. V23 voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	
+128,129 +130,131	0x3420	Max. V31 voltage Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	
37120-37143		<b>Maximum Total Values</b>					
+0,1 +2,3	0x3500	Max. Total kW Timestamp	-Pmax-Pmax	U3 sec	INT32 UINT32	R R	
+4,5 +6,7	0x3501	Max. Total kvar Timestamp	-Pmax-Pmax	U3 sec	INT32 UINT32	R R	
+8,9	0x3502	Max. Total kVA	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range/Format <sup>3</sup>	Units <sup>3</sup>	Type	R/W	Notes
+10,11		Timestamp		sec	UINT32	R	
+12,13 +14,15	0x3503	Max. Total PF Timestamp	-1000-1000	×0.001 sec	INT32 UINT32	R R	
+16,17 +18,19	0x3504	Max. Total PF lag Timestamp	0-1000	×0.001 sec	UINT32 UINT32	R R	
+20,21 +22,23	0x3505	Max. Total PF lead Timestamp	0-1000	×0.001 sec	UINT32 UINT32	R R	

### 3.6 Maximum Demands Log Registers

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
37504-37519		<b>Billing Summary Maximum Demands</b>					
+0,1 +2,3	0x4780	Summary register #1 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
+4,5 +6,7	0x4781	Summary register #2 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
+8,9 +10,11	0x4782	Summary register #3 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
+12,13 +14,15	0x4783	Summary register #4 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
+16,17 +18,19	0x4784	Summary register #5 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
+20,21 +22,23	0x4785	Summary register #6 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
+24,25 +26,27	0x4786	Summary register #7 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
+28,29 +30,31	0x4787	Summary register #8 Maximum Demand Timestamp	0-Pmax	U3	UINT32	R	
37632-37699		<b>Maximum Demands</b>					
+0,1 +2,3	0x3700	V1 Maximum volt demand Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x3701	V2 Maximum volt demand Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	
+8,9 +10,11	0x3702	V3 Maximum volt demand Timestamp	0-Vmax	U1 sec	UINT32 UINT32	R R	
+12,13 +14,15	0x3703	I1 Maximum ampere demand Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+16,17 +18,19	0x3704	I2 Maximum ampere demand Timestamp	0-Imax	U2 sec	UINT32 UINT32	R R	
+20,21	0x3705	I2 Maximum ampere demand	0-Imax	U2	UINT32	R	

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+22,23		Timestamp		sec	UINT32	R	
+24,25 +26,27	0x3706	Not used	0		UINT32 UINT32	R R	
+28,29 +30,31	0x3707	Not used	0		UINT32 UINT32	R R	
+32,33 +34,35	0x3708	Not used	0		UINT32 UINT32	R R	
+36,37 +38,39	0x3709	Maximum kW import sliding window demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+40,41 +42,43	0x370A	Maximum kvar import sliding window demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+44,45 +46,47	0x370B	Maximum kVA sliding window demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+48,49 +50,51	0x370C	Not used Timestamp			UINT32 UINT32	R R	
+52,53 +54,55	0x370D	Not used Timestamp			UINT32 UINT32	R R	
+56,57 +58,59	0x370E	Not used Timestamp			UINT32 UINT32	R R	
+60,61 +62,63	0x370F	Maximum kW export sliding window demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+64,65 +66,67	0x3710	Maximum kvar export sliding window demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38144-38175		<b>Billing TOU Maximum Demand Register #1</b>					
+0,1 +2,3	0x4800	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4801	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		...				R	
+28,29 +30,31	0x4807	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38400-38431		<b>Billing TOU Maximum Demand Register #2</b>					
+0,1 +2,3	0x4900	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4901	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		...				R	
+28,29 +30,31	0x4907	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38656-38687		<b>Billing TOU Maximum Demand Register #3</b>					
+0,1 +2,3	0x4A00	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5	0x4A01	Tariff #2 maximum demand	0-Pmax	U3	UINT32	R	



Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+6,7		Timestamp		sec	UINT32	R	
		...				R	
+28,29 +30,31	0x4A07	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38272-38313		<b>Billing TOU Maximum Demand Register #4</b>					
+0,1 +2,3	0x4880	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4881	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		...				R	
+28,29 +30,31	0x4887	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38528-38559		<b>Billing TOU Maximum Demand Register #5</b>					
+0,1 +2,3	0x4980	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4981	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		...				R	
+28,29 +30,31	0x4987	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38784-38815		<b>Billing TOU Maximum Demand Register #6</b>					
+0,1 +2,3	0x4A80	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4A81	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		...				R	
+28,29 +30,31	0x4A87	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38912-38943		<b>Billing TOU Maximum Demand Register #7</b>					
+0,1 +2,3	0x5300	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x5301	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		...				R	
+28,29 +30,31	0x5307	Tariff #8 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
39040-39071		<b>Billing TOU Maximum Demand Register #8</b>					
+0,1 +2,3	0x5380	Tariff #1 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x5381	Tariff #2 maximum demand Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
		...				R	
+28,29	0x5387	Tariff #8 maximum demand	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range <sup>1</sup>	Units <sup>1</sup>	Type	R/W	Notes
+30,31		Timestamp		sec	UINT32	R	

<sup>1</sup> For volts, amps and power scales refer to Chapter 4 "Data Scales and Units".

### 3.7 Billing Period Data

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
40412-40557		<b>Current Register Readings</b>					
40558-40703		<b>Current Day's Usage</b>					
40704-40849		<b>Current Week's Usage</b>					
40850-40995		<b>Current Month's Usage</b>					
40996-41141		<b>Current Quarter's Usage</b>					
41142-41287		<b>Previous Day's Readings</b>					
41288-41433		<b>Previous Week's Readings</b>					
41434-41579		<b>Previous Month's Readings</b>					
41580-41725		<b>Previous Quarter's Readings</b>					
41726-41871		<b>Previous Day's Usage</b>					
41872-42017		<b>Previous Week's Usage</b>					
42018-42163		<b>Previous Month's Usage</b>					
42164-42309		<b>Previous Quarter's Usage</b>					
42310-42455		<b>Second Previous Day's Readings</b>					
42456-42601		<b>Second Previous Week's Readings</b>					
42602-42747		<b>Second Previous Month's Readings</b>					
42748-42893		<b>Second Previous Quarter's Readings</b>					
42894-43039		<b>Second Previous Day's Usage</b>					
43040-43185		<b>Second Previous Week's Usage</b>					
43186-43331		<b>Second Previous Month's Usage</b>					
43332-43477		<b>Second Previous Quarter's Usage</b>					
		<b>Period Data Structure</b>					
+0,1		Reading timestamp	F1		UINT32	R	Local time, seconds since 1/1/1970 0 = no period data available yet
+2,3		Register #1, total	0-999,999,999	U4	UINT32	R	
+4,5		Register #2, total	0-999,999,999	U4	UINT32	R	
+6,7		Register #3, total	0-999,999,999	U4	UINT32	R	
+8,9		Register #4, total	0-999,999,999	U4	UINT32	R	
+10,11		Register #5, total	0-999,999,999	U4	UINT32	R	
+12,13		Register #6, total	0-999,999,999	U4	UINT32	R	
+14,15		Register #7, total	0-999,999,999	U4	UINT32	R	
+16,17		Register #8, total	0-999,999,999	U4	UINT32	R	
+18,19		Register #1, tariff #1	0-999,999,999	U4	UINT32	R	
+20,21		Register #1, tariff #2	0-999,999,999	U4	UINT32	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+22,23		Register #1, tariff #3	0-999,999,999	U4	UINT32	R	
+24,25		Register #1, tariff #4	0-999,999,999	U4	UINT32	R	
+26,27		Register #1, tariff #5	0-999,999,999	U4	UINT32	R	
+28,29		Register #1, tariff #6	0-999,999,999	U4	UINT32	R	
+30,31		Register #1, tariff #7	0-999,999,999	U4	UINT32	R	
+32,33		Register #1, tariff #8	0-999,999,999	U4	UINT32	R	
+34,35		Register #2, tariff #1	0-999,999,999	U4	UINT32	R	
+36,37		Register #2, tariff #2	0-999,999,999	U4	UINT32	R	
+38,39		Register #2, tariff #3	0-999,999,999	U4	UINT32	R	
+40,41		Register #2, tariff #4	0-999,999,999	U4	UINT32	R	
+42,43		Register #2, tariff #5	0-999,999,999	U4	UINT32	R	
+44,45		Register #2, tariff #6	0-999,999,999	U4	UINT32	R	
+46,47		Register #2, tariff #7	0-999,999,999	U4	UINT32	R	
+48,49		Register #2, tariff #8	0-999,999,999	U4	UINT32	R	
+50,51		Register #3, tariff #1	0-999,999,999	U4	UINT32	R	
+52,53		Register #3, tariff #2	0-999,999,999	U4	UINT32	R	
+54,55		Register #3, tariff #3	0-999,999,999	U4	UINT32	R	
+56,57		Register #3, tariff #4	0-999,999,999	U4	UINT32	R	
+58,59		Register #3, tariff #5	0-999,999,999	U4	UINT32	R	
+60,61		Register #3, tariff #6	0-999,999,999	U4	UINT32	R	
+62,63		Register #3, tariff #7	0-999,999,999	U4	UINT32	R	
+64,65		Register #3, tariff #8	0-999,999,999	U4	UINT32	R	
+66,67		Register #4, tariff #1	0-999,999,999	U4	UINT32	R	
+68,69		Register #4, tariff #2	0-999,999,999	U4	UINT32	R	
+70,71		Register #4, tariff #3	0-999,999,999	U4	UINT32	R	
+72,73		Register #4, tariff #4	0-999,999,999	U4	UINT32	R	
+74,75		Register #4, tariff #5	0-999,999,999	U4	UINT32	R	
+76,77		Register #4, tariff #6	0-999,999,999	U4	UINT32	R	
+78,79		Register #4, tariff #7	0-999,999,999	U4	UINT32	R	
+80,81		Register #4, tariff #8	0-999,999,999	U4	UINT32	R	
+82,83		Register #5, tariff #1	0-999,999,999	U4	UINT32	R	
+84,85		Register #5, tariff #2	0-999,999,999	U4	UINT32	R	
+86,87		Register #5, tariff #3	0-999,999,999	U4	UINT32	R	
+88,89		Register #5, tariff #4	0-999,999,999	U4	UINT32	R	
+90,91		Register #5, tariff #5	0-999,999,999	U4	UINT32	R	
+92,93		Register #5, tariff #6	0-999,999,999	U4	UINT32	R	
+94,95		Register #5, tariff #7	0-999,999,999	U4	UINT32	R	
+96,97		Register #5, tariff #8	0-999,999,999	U4	UINT32	R	
+98,99		Register #6, tariff #1	0-999,999,999	U4	UINT32	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+100,101		Register #6, tariff #2	0-999,999,999	U4	UINT32	R	
+102,103		Register #6, tariff #3	0-999,999,999	U4	UINT32	R	
+104,105		Register #6, tariff #4	0-999,999,999	U4	UINT32	R	
+106,107		Register #6, tariff #5	0-999,999,999	U4	UINT32	R	
+108,109		Register #6, tariff #6	0-999,999,999	U4	UINT32	R	
+110,111		Register #6, tariff #7	0-999,999,999	U4	UINT32	R	
+112,113		Register #6, tariff #8	0-999,999,999	U4	UINT32	R	
+114,115		Register #7, tariff #1	0-999,999,999	U4	UINT32	R	
+116,117		Register #7, tariff #2	0-999,999,999	U4	UINT32	R	
+118,119		Register #7, tariff #3	0-999,999,999	U4	UINT32	R	
+120,121		Register #7, tariff #4	0-999,999,999	U4	UINT32	R	
+122,123		Register #7, tariff #5	0-999,999,999	U4	UINT32	R	
+124,125		Register #7, tariff #6	0-999,999,999	U4	UINT32	R	
+126,127		Register #7, tariff #7	0-999,999,999	U4	UINT32	R	
+128,129		Register #7, tariff #8	0-999,999,999	U4	UINT32	R	
+130,131		Register #8, tariff #1	0-999,999,999	U4	UINT32	R	
+132,133		Register #8, tariff #2	0-999,999,999	U4	UINT32	R	
+134,135		Register #8, tariff #3	0-999,999,999	U4	UINT32	R	
+136,137		Register #8, tariff #4	0-999,999,999	U4	UINT32	R	
+138,139		Register #8, tariff #5	0-999,999,999	U4	UINT32	R	
+140,141		Register #8, tariff #6	0-999,999,999	U4	UINT32	R	
+142,143		Register #8, tariff #7	0-999,999,999	U4	UINT32	R	
+144,145		Register #8, tariff #8	0-999,999,999	U4	UINT32	R	
43478-43497		<b>Current Day's Use Cost</b>					
43498-43517		<b>Current Week's Use Cost</b>					
43518-43537		<b>Current Month's Use Cost</b>					
		<b>Use Cost Structure</b>					
+0,1		Reading timestamp	F1		UINT32	R	Local time, seconds since 1/1/1970 0 = no period data available yet
+2,3		Register #1, total	0-999,999,999	• \$0.01	UINT32	R	
+4,5		Register #2, total	0-999,999,999	• \$0.01	UINT32	R	
+6,7		Register #3, total	0-999,999,999	• \$0.01	UINT32	R	
+8,9		Register #4, total	0-999,999,999	• \$0.01	UINT32	R	
+10,11		Register #5, total	0-999,999,999	• \$0.01	UINT32	R	
+12,13		Register #6, total	0-999,999,999	• \$0.01	UINT32	R	
+14,15		Register #7, total	0-999,999,999	• \$0.01	UINT32	R	
+16,17		Register #8, total	0-999,999,999	• \$0.01	UINT32	R	
+18,19		CO2 emission equivalent, total	0-999,999,999	• 0.01 kg	UINT32	R	



### 3.8 Device Control and Status Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Remote Relay Control Registers (bitmap)</b>							
44038-44045		Reserved		UINT32			
44046-44047		Force relay operate register: 0 = no effect, 1 = operate	0x00000000 - 0x00000FFF	UINT32		W	
44050-44051		Force relay release register: 0 = no effect, 1 = release	0x00000000 - 0x00000FFF	UINT32		W	
<b>Reset/Clear Registers</b>							
44103		Clear maximum demands	<b>Individual for each submeter</b> 0 = clear all maximum demands 1 = clear power demands 2 = clear volt and ampere demands 3 = clear volt demands 4 = clear ampere demands  <b>All submeters</b> 129 = clear all maximum demands 130 = clear power demands 132 = clear volt and ampere demands		UINT16	W	Individual for each submeter
44105		Clear Billing/TOU maximum demands	0 = Individual submeter 7 = All submeters		UINT16	W	
44106		Clear counters	0 = clear all counters, 1-32 = clear counter #1-72		UINT16	W	
44107		Clear Min/Max log	0		UINT16	W	
44108		Clear operation/event counters	6 = clear communication counters		UINT16	W	Individual for each submeter
<b>Setpoint Status Registers</b>							
44294		Setpoints 1-4 status (bitmap: 0=released, 1=operated)	0x00000000 - 0x0000000F		UINT32	R	Individual for each submeter
<b>Setpoint Alarm Latch Registers</b>							
44310		Setpoints 1-4 alarm status, nonvolatile (bitmap). Read: 0 = no setpoint operations logged, 1=setpoint has been operated at least once since the last alarm reset. Write: 0=clear setpoint alarm bit, 1=no effect.	0x0000 - 0x000F		UINT16	R/W	Individual for each submeter
44312-44325		Reserved					
<b>Device Diagnostics Register</b>							
44326-44327		Device self-diagnostics flags, nonvolatile (bitmap). Read: 0=no faults logged, 1=diagnostic bit has been set at least once since the last reset.	F23		UINT32	R/W	Shared across all submeters

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Remote Relay Control Registers (bitmap)</b>							
44038-44045		Reserved		UINT32			
44046-44047		Force relay operate register: 0 = no effect, 1 = operate	0x00000000 - 0x00000FFF	UINT32		W	
44050-44051		Force relay release register: 0 = no effect, 1 = release	0x00000000 - 0x00000FFF	UINT32		W	
		Write: 0=clear diagnostic bit, 1=no effect.					
44328-44341		Reserved					
<b>Port Identification Registers</b>							
44342		Current port number	0-2 = serial port COM1-COM3, 6 = USB/Modbus port, 7-12 = Ethernet/TCP port		UINT16	R	
44343		Communication interface	0=RS-232, 1=RS-422, 2=RS-485, 4=Dial-Up Modem, 5=RF Modem, 6=Ethernet, 8=GSM/GPRS		UINT16	R	
44343-44345		Reserved					
<b>Network Identification</b>							
44346-44367							
+0,1		Ethernet network IP Address			UINT32	R	
+2,3		Ethernet network subnet mask			UINT32	R	
+4,5		Ethernet network default gateway			UINT32	R	
+6,7		Not used			UINT32	R	
+8,9		Not used			UINT32	R	
+10,11		GPRS network IP Address			UINT32	R	
+12,13		GPRS network subnet mask	N/A		UINT32	R	
+14,15		GPRS network default gateway	N/A		UINT32	R	
+16		Not used			UINT32	R	
+17		Cellular network type	0 = 3GPP network (GSM, UMTS, LTE) 1 = 3GPP2 network (CDMA2000)		UINT32	R	
+18-21		Cellular module's mobile equipment identifier: IMEI for 3GPP networks MEID for 3GPP2 networks	IMEI (15 decimal digits): +18,19 – 8 lower digits in binary, +20,21 – 7 higher digits in binary; MEID (14 hex digits): +18,19 – 8 lower digits, +20,21 – 6 higher digits		UINT32	R	
44368-44377		Reserved					
<b>Current Network Settings</b>							
44346-44377							
+0, 1		Active device IP Address			UINT32	R	Network byte order
+2, 3		Active network subnet mask			UINT32	R	Network byte order
+4, 5		Active network default gateway			UINT32	R	Network byte order
44352-44377		Reserved					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Remote Relay Control Registers (bitmap)</b>							
44038-44045		Reserved		UINT32			
44046-44047		Force relay operate register: 0 = no effect, 1 = operate	0x00000000 - 0x00000FFF	UINT32		W	
44050-44051		Force relay release register: 0 = no effect, 1 = release	0x00000000 - 0x00000FFF	UINT32		W	
<b>Device Authorization Register</b>							
44378-44379		When write: 8-digit password. When read: 0 = access permitted, -1 = authorization required.	0 - 99999999 (write) 0/-1 (read)		INT32	R/W	
<b>Communication Status</b>							
44394		RSSI (received signal strength)	0 = not known or not detectable, 51-113 = -51 to -113 dBm		UINT16	R	
44395		GPRS status	0 = not connected, 1 = not registered, 2 = registered		UINT16	R	
44396-44409		Reserved			UINT16	R	65535 = N/A
<b>Factory Diagnostic Registers</b>							
45952-46079		Factory diagnostic registers			UINT32	R	
<b>Device Mode Control Registers</b>							
44135		Reserved			UINT16		
44136		Reserved			UINT16		
44137		Fault recorder	0 = disabled, 1 = enabled		UINT16		

### 3.9 Device Setup Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Control/Alarm Setpoints Setup</b>							
2576-2607							Individually configurable for each submeter
+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 3.4		INT32	R/W	
+6,7		Release limit	See Section 3.4		INT32	R/W	
2576-2583		<b>Setpoint #1</b>					
2584-2591		<b>Setpoint #2</b>					
2592-2599		<b>Setpoint #3</b>					
2600-2607		<b>Setpoint #4</b>					



Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Factory Device Settings and Identification</b>							
46080-46207							Shared across all submeters
+0, 1		Device serial number			UINT32	R	
+2, 3		Device model ID	15400		UINT32	R	
+4-11		Device model name	"BFM II"		CHAR16	R	Null-terminated string
+12-13		Device options (bitmap)			UINT32	R	
+14-19		Reserved			UINT16	R	
+20		Device firmware version number			UINT16	R	
+21		Device firmware build number			UINT16	R	
+22		RF modem firmware version number			UINT16	R	
+23		RF modem firmware build number			UINT16	R	
+24		Boot loader version number			UINT16	R	
+25		Boot loader build number			UINT16	R	
+26-31		Reserved			UINT16	R	
+32		V1-V3 inputs range	120, 277	V	UINT16	R	
+33		V1-V3 inputs overload	125	%	UINT16	R	
+34		Reserved			UINT16	R	
+35		Reserved			UINT16	R	
+36		I1-I3 inputs range	1, 5, 50	A	UINT16	R	
+37		I1-I3 inputs overload	200	%	UINT16	R	
+38-95		Reserved		A	UINT16	R	
+96		Ethernet MAC address 0-1	0x0500		UINT16	R	
+97		Ethernet MAC address 2-3	0x00F0		UINT16	R	
+98		Ethernet MAC address 4-5	0x0000-0xFFFF		UINT16	R	
+99-128		Reserved			UINT16	R	
<b>Basic Setup</b>							
46208-46271							Shared across all submeters
+0		Wiring mode	1 = 4LN3 (4-wire WYE), 2 = 4LL3 (4-wire DELTA)		UINT16	R/W	
+1		PT ratio (primary to secondary ratio)	10 - 65000	× 0.1	UINT16	R/W	
+2		PT secondary (Line-to-Line)	480	V	UINT16	R/W	
+3		Reserved			UINT16	R/W	
+4		Reserved			UINT16	R/W	
+5		CT primary current	1-10000	A	UINT16	R/W	
+6		CT secondary current	1, 5, 50	A	UINT16	R/W	
+7-16		Reserved			UINT16	R/W	
+17		Nominal line frequency	50, 60	Hz	UINT16	R/W	
+18-23		Reserved			UINT16	R/W	
+24		Maximum demand load current	0-10000 (0=CT primary current)	A	UINT16	R/W	
+25-31		Reserved			UINT16	R/W	
<b>Demands Setup</b>							
46240-46255							Shared across all submeters
+0		Power block demand period	1, 2, 3, 5, 10, 15, 30, 60	min	UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+1		Number of blocks in a sliding window	1-15		UINT16	R/W	
+2-7		Reserved			UINT16	R/W	
+8		Volt demand period	0-9000	sec	UINT16	R/W	
+9		Ampere demand period	0-9000	sec	UINT16	R/W	
<b>Device Options Setup</b>							
46256-46399							Shared across all submeters
+0		Power calculation mode	0=using reactive power: $S = f(P,Q)$ , 1=using non-active power: $Q = f(S,P)$		UINT16	R/W	
+1		Energy roll value	2 = $0.1 \times 10^6$ , 3 = $0.1 \times 10^7$ , 4 = $0.1 \times 10^8$ , 5 = $0.1 \times 10^9$		UINT16	R/W	
+2		Reserved			UINT16	R/W	
+3		End of billing (TOU/Billing maximum demand reset) mode, bitmap	Bit 0 = 1 – automatic/monthly mode allowed Bit 1 = 1 - COM mode allowed Bit 2 = 1 - manual mode allowed		UINT16	R/W	
+4		Tariff control	0 = via a calendar scheduler, 0x4000 = via communications, 0x0100-0x0107 = via tariff inputs DI1-DI72 (bits 0:2 denote the first digital input index used)		UINT16	R/W	
+5		Number of tariffs	1-8 (does not have effect with a calendar tariff control option)		UINT16	R/W	When read with a calendar tariff control option, indicates the actual number of tariffs selected in TOU profiles
+7		Energy test mode	0 = disabled, 1 = Wh pulse test, 2 = varh pulse test		UINT16	R/W	
+8		Wh LED pulse rate, Wh/pulse	1 – 10000	× 0.01Wh	UINT16	R/W	
+9		Reserved			UINT16	R/W	
+10		Wh LED pulse source	0 = disabled, 1-60 = submeter		UINT16	R/W	
+11-14		Reserved					
+15		Number of decimal places for energy registers	0-4		UINT16	R/W	Default 4
+16-143		Reserved			UINT16	R/W	
<b>Local Settings</b>							
46400-46415							Shared across all submeters
+0		Local time offset, min	0-+/-720		INT16	R/W	Offset in minutes from UTC (Universal Coordinated or Greenwich Mean time)
+1		Daylight savings time (DST) option	0=DST disabled (standard time only), 1=DST enabled		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+2		DST start month	1-12		UINT16	R/W	
+3		DST start week of the month	1=1st, 2=2nd, 3=3rd, 4=4th week, 5=the last week of the month		UINT16	R/W	
+4		DST start weekday	1-7 (1=Sun, 7=Sat)		UINT16	R/W	
+5		DST end month	1-12		UINT16	R/W	
+6		DST end week of the month	1=1st, 2=2nd, 3=3rd, 4=4th week, 5=the last week of the month		UINT16	R/W	
+7		DST end weekday	1-7 (1=Sun, 7=Sat)		UINT16	R/W	
+8		Reserved			UINT16	R/W	
+9		Country code	ITU country calling code		UINT16	R/W	
+10		DST start hour	1-6		UINT16	R/W	
+11		DST end hour	1-6		UINT16	R/W	
+12-15		Reserved			UINT16		
<b>Clock Setup and Status</b>							
46416-46447							Shared across all submeters
+0,1		Local time, in seconds, since Jan 1, 1970	F1	sec	UINT32	R/W	
+2,3		Fractional seconds, µsec		µsec	UINT32	R/W	
+4		Fractional seconds, milliseconds	0-999	ms	UINT16	R/W	
+5		Seconds	0-59		UINT16	R/W	
+6		Minutes	0-59		UINT16	R/W	
+7		Hour	0-23		UINT16	R/W	
+8		Day of month	1-31		UINT16	R/W	
+9		Month	1-12		UINT16	R/W	
+10		Year (calendar year minus 2000)	0-99		UINT16	R/W	
+11		Weekday	1-7 (1=Sun, 7=Sat)		UINT16	R	
+12		Daylight savings time status	0=standard time is active, 1=daylight savings time is active		UINT16	R	
+13-31		Reserved			UINT16		
<b>Communication Ports Setup</b>							
46448-46575							Shared across all submeters
+0		Communication protocol	0 = Modbus RTU, 1 = Modbus ASCII, 2 = DNP3.0,		UINT16	R/W	
+1		Interface	0 = RS-232, 1 = RS-422, 2 = RS-485, 4 = Modem		UINT16	R/W	
+2		Device address	Modbus: 1-247 DNP3.0: 0-65532		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,		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
			1 = 8 bits/no parity, 2 = 8 bits/even parity				
+5		CTS mode	0 = not used, 1 = wait for CTS before sending data		UINT16	R/W	
+6		RTS mode	0 = not used, 1 = RTS is asserted during the transmission		UINT16	R/W	
+7		Minimum delay before sending data	0-1000 (default = 5)	ms	UINT16	R/W	
+8		Inter-character timeout	1-1000 (default = 4)	ms	UINT16	R/W	Added to standard 4-character time
+9-15		Reserved					
46448-46463		<b>COM1 Setup</b>					
46464-46479		<b>COM2 Setup</b>					Only 8 bits/no parity data format
46480-46495		<b>COM3 Setup</b>					
46496-46511		<b>COM4 Setup</b>					
46512-46575		Reserved					
<b>Network Setup</b>							
46576-46607							Shared across all submeters
+0,1		Device IP Address	0x01000000-0xFFFFFFFF		UINT32	R/W	Network byte order
+2,3		Network subnet mask	0x00000001-0xFFFFFFFF		UINT32	R/W	Network byte order
+4,5		Network default gateway	0x00000000-0xFFFFFFFF		UINT32	R/W	Network byte order
+6,7		Use DHCP	0 = NO, 1 = YES		UINT32	R/W	
+8,9		TCP service port	502 = Modbus/TCP		UINT32	R/W	
+10,11		Primary DNS IP address	0x00000000-0xFFFFFFFF		UINT32	R/W	Network byte order
+12,13		Secondary DNS IP address	0x00000000-0xFFFFFFFF		UINT32	R/W	Network byte order
+14-31		Reserved					
46608-46703		<b>Reserved</b>					
<b>Dial-up/GPRS Modem Setup</b>							
46640-46671							
+0,1		Device IP Address	0x01000000-0xFFFFFFFF		UINT32	R/W	
+2,3		Network subnet mask	0x00000001-0xFFFFFFFF		UINT32	R/W	
+4,5		Network default gateway	0x00000000-0xFFFFFFFF		UINT32	R/W	
+6,7		Number of dial attempts	0-1000, 0=dial forever		UINT32	R/W	
+8,9		Connection timeout, sec	0-9999		UINT32	R/W	
+10,11		Delay between redials, sec	0-9999		UINT32	R/W	
+12,13		Idle connection timeout, sec	0-9999, 0 = never		UINT32	R/W	
+14,15		Number of rings before answer	0-20, 0 = never answer		UINT32	R/W	
+16-23		Modem init string	<b>"AT&amp;F&amp;D1&amp;C1"</b>		CHAR16	R/W	Null-terminated string
+24,25		Auto-reset period, hours	1-24, 0 = never		UINT32	R/W	
+26-31		Reserved					
<b>Security/Password Setup</b>							
46704-46715							

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+0,1		Password 1 (Low level)	0-99999999		UINT32	R/W	Read as 0
+2,3		Password protection (always ON)	1 = enabled		UINT16	R/W	
+4,5		Password 2 (Medium level)	0-99999999		UINT32	R/W	Read as 0
+6,7		Password 3 (High level)	0-99999999		UINT32	R/W	Read as 0
+8,9		Not used			UINT32	R/W	Read as 0
+10,11		Front panel security	0=full access, 1=view only		UINT32	R/W	
<b>Expert Power Service Setup</b>							
46768-46783							Shared across all submeters
+0,1		Expert Power server IP Address	0x01000000-0xFFFFFFFF		UINT32	R/W	Default = 207.232.60.18
+2,3		Expert Power server TCP service port	0-65535		UINT32	R/W	Default = 5001
+4,5		Expert Power client enabled	0=client disabled, 1=client enabled		UINT32	R/W	
+6,7		Time to next session	1-99999	min	UINT32	R/W	
+8,9		Time to next session	1-99999	min	UINT32	R	Same as previous
+10,11		Connection network	0 = Ethernet, 1=GPRS		UINT32	R/W	
+12,13		Connection idle timeout	1-120	min	UINT32	R/W	
+14-15		Reserved			UINT32		
<b>Internet Service Provider (ISP) accounts</b>							
46784-46831							Shared across all submeters
+0-15		ISP telephone number			CHAR32	R/W	
+16-31		Login name			CHAR32	R/W	
+32-47		Login password			CHAR32	R/W	
<b>TCP Notification Client Setup</b>							
46896-46991							Shared across all submeters
+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>Channel Assignments</b>							
46928-47143							Shared across all submeters
+0		Channel CT primary current	1-10000 A	A	UINT16	R/W	
+1		Submeter's phase L1 current input channel	0=not assigned, 1-54 = I1-I54		UINT16	R/W	
+2		Submeter's phase L2 current input channel	0=not assigned, 1-54 = I1-I54		UINT16	R/W	
+3		Submeter's phase L3 current input channel	0=not assigned, 1-54 = I1-I54		UINT16	R/W	
46928-46931		<b>Submeter #1 channels</b>					
46932-46935		<b>Submeter #2 channels</b>					
		...					
47140-47143		<b>Submeter #54 channels</b>					
<b>Transformer Correction Setup</b>							
47144-47375							Shared across all submeters
+0		Ratio correction factor	900-1100	×0.001	UINT16	R/W	
+1		Phase angle error	-600 to 600	min	INT16	R/W	
+2, 3		Reserved			INT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
47144-47147		<b>V1 transformer correction</b>					
47148-47151		<b>V2 transformer correction</b>					
47152-47155		<b>V3 transformer correction</b>					
47156-47159		<b>Reserved</b>					
47160-47163		<b>I1 transformer correction</b>					
47164-47167		<b>I2 transformer correction</b>					
...		...					
47372-47375		<b>I54 transformer correction</b>					
<b>Submeter ID name Setup</b>							
47400-47407		<b>Submeter #1 ID name</b>			CHAR16	R/W	
47408-47415		<b>Submeter #2 ID name</b>			CHAR16	R/W	
...		...			CHAR16	R/W	
47824-47831		<b>Submeter #54 ID name</b>			CHAR16	R/W	
47832-47839		<b>Virtual meter #1 ID name</b>			CHAR16	R/W	
47840-47847		<b>Virtual meter #2 ID name</b>			CHAR16	R/W	
...		...			CHAR16	R/W	
47872-47879		<b>Virtual meter #6 ID name</b>			CHAR16	R/W	
<b>Data Log #1 Setup</b>							
54006-55541							Individually configurable for each submeter
+0		Data log parameter #1 ID	0x0000-0xFFFF		UINT16	R/W	
+1		Data log parameter #2 ID	0x0000-0xFFFF		UINT16	R/W	
+2		Data log parameter #3 ID	0x0000-0xFFFF		UINT16	R/W	
+3		Data log parameter #4 ID	0x0000-0xFFFF		UINT16	R/W	
+4		Data log parameter #5 ID	0x0000-0xFFFF		UINT16	R/W	
+5		Data log parameter #6 ID	0x0000-0xFFFF		UINT16	R/W	
+6		Data log parameter #7 ID	0x0000-0xFFFF		UINT16	R/W	
+7		Data log parameter #8 ID	0x0000-0xFFFF		UINT16	R/W	
+8		Data log parameter #9 ID	0x0000-0xFFFF		UINT16	R/W	
+9		Data log parameter #10 ID	0x0000-0xFFFF		UINT16	R/W	
+10		Data log parameter #11 ID	0x0000-0xFFFF		UINT16	R/W	
+11		Data log parameter #12 ID	0x0000-0xFFFF		UINT16	R/W	
+12		Data log parameter #13 ID	0x0000-0xFFFF		UINT16	R/W	
+13		Data log parameter #14 ID	0x0000-0xFFFF		UINT16	R/W	
+14		Data log parameter #15 ID	0x0000-0xFFFF		UINT16	R/W	
+15		Data log parameter #16 ID	0x0000-0xFFFF		UINT16	R/W	
+16-31		Reserved			UINT16	R/W	
54006-54037		<b>Data log #1 Setup</b>					
54038-54069		<b>Data log #2 Setup</b>					DFR only
54070-54101		<b>Data log #3 Setup</b>					DFR only
54102-54133		<b>Data log #4 Setup</b>					DFR only
54390-54421		<b>Data log #13 Setup</b>					DFR only

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Data Log #16 (Profile Data Log) Setup</b>							
54486-54517							Shared across all submeters
54486-54517		<b>Data log #16 Setup (Energy/TOU daily profile)</b>					Auto-configured
<b>TOU Daily Profile Setup</b>							
55574-55701							Shared across all submeters
+0		1 <sup>st</sup> tariff change	F10		UINT16	R/W	
+1		2 <sup>nd</sup> tariff change	F10		UINT16	R/W	
+2		3 <sup>rd</sup> tariff change	F10		UINT16	R/W	
+3		4 <sup>th</sup> tariff change	F10		UINT16	R/W	
+4		5 <sup>th</sup> tariff change	F10		UINT16	R/W	
+5		6 <sup>th</sup> tariff change	F10		UINT16	R/W	
+6		7 <sup>th</sup> tariff change	F10		UINT16	R/W	
+7		8 <sup>th</sup> tariff change	F10		UINT16	R/W	
55574-55581		<b>Daily profile #1: Season 1, Day type 1</b>					
55582-55589		<b>Daily profile #2: Season 1, Day type 2</b>					
55590-55597		<b>Daily profile #3: Season 1, Day type 3</b>					
55598-55605		<b>Daily profile #4: Season 1, Day type 4</b>					
55606-55613		<b>Daily profile #5: Season 2, Day type 1</b>					
55614-55621		<b>Daily profile #6: Season 2, Day type 2</b>					
55622-55629		<b>Daily profile #7: Season 2, Day type 3</b>					
55630-55637		<b>Daily profile #8: Season 2, Day type 4</b>					
55638-55645		<b>Daily profile #9: Season 3, Day type 1</b>					
55646-55653		<b>Daily profile #10: Season 3, Day type 2</b>					
55654-55661		<b>Daily profile #11: Season 3, Day type 3</b>					
55662-55669		<b>Daily profile #12: Season 3, Day type 4</b>					
55670-55677		<b>Daily profile #13: Season 4, Day type 1</b>					
55678-55685		<b>Daily profile #14: Season 4, Day type 2</b>					
55686-55693		<b>Daily profile #15: Season 4, Day type 3</b>					
55694-55701		<b>Daily profile #16: Season 4, Day type 4</b>					
55702-55711		Reserved					
<b>TOU Calendar Setup</b>							
55712-56031							Shared across all submeters
+0-9		<b>Calendar entry record</b>				R/W	
+0		Daily profile	0-3 = Season 1, Day types 0-3 4-7 = Season 2, Day types 0-3 8-11 = Season 3, Day types 0-3 12-15 = Season 4, Day types 0-3		UINT16	R/W	
+1		Week of month	0=all, 1=1st, 2=2nd, 3=3 <sup>rd</sup> , 4=4th, 5=last week of the month		UINT16	R/W	
+2		Weekday	0=all, 1-7 (Sun=1, Sat=7)		UINT16	R/W	
+3		Till Weekday	0=all, 1-7 (Sun=1, Sat=7)		UINT16	R/W	
+4		Month	0=all, 1-12=January - December		UINT16	R/W	
+5		Day of month	0=all, 1-31=day 1-31		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+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>Billing Rates Setup</b>							
56192-56200							Not password protected
+0		Register 1 billing rate, total, per unit F15		• \$0.01	UINT16	R/W	
+1		Register 2 billing rate, total, per unit F15		• \$0.01	UINT16	R/W	
+2		Register 3 billing rate, total, per unit F15		• \$0.01	UINT16	R/W	
+3		Register 4 billing rate, total, per unit F15		• \$0.01	UINT16	R/W	
+4		Register 5 billing rate, total, per unit F15		• \$0.01	UINT16	R/W	
+5		Register 6 billing rate, total, per unit F15		• \$0.01	UINT16	R/W	
+6		Register 7 billing rate, total, per unit F15		• \$0.01	UINT16	R/W	
+7		Register 8 billing rate, total, per unit F15		• \$0.01	UINT16	R/W	
+8		CO2 emission factor		• 0.01 kg/kWh	UINT16	R/W	
<b>Billing/TOU Registers Setup</b>							
56672-56927							Shared across all submeters
+0		Not used			UINT16	R/W	
+1		Units of measurement	F15		UINT16	R/W	
+2		Flags	Bit 0: TOU enabled Bit 1: Use profile enabled Bit 2: Max. Demand profile enabled Bit 3: Summary (total) profile enabled (set automatically)		UINT16	R/W	
+3		Not used	0		UINT16	R/W	
56672-56675		<b>Register #1 Setup</b>					
56676-56679		<b>Register #2 Setup</b>					
56680-56683		<b>Register #3 Setup</b>					
56684-56687		<b>Register #4 Setup</b>					
56688-56691		<b>Register #5 Setup</b>					
56692-56695		<b>Register #6 Setup</b>					
56696-56699		<b>Register #7 Setup</b>					
56700-56703		<b>Register #8 Setup</b>					
<b>Billing/TOU Registers Source Setup</b>							
56928-57183							Shared across all submeters



Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+0		Energy source ID	F11		UINT16	R/W	
+1		Target summary register/submeter	0-3=register #1-4, 0x7F00-0x7F3B=submeter #1-#60		UINT16	R/W	
+2, 3		Multiplier	0-1000000	x0.001	INT32	R/W	
56928-56931		<b>Energy Source #1</b>					
56932-56935		<b>Energy Source #2</b>					
56936-56939		<b>Energy Source #3</b>					
56940-56943		<b>Energy Source #4</b>					
56944-56947		<b>Energy Source #5</b>					
56948-56951		<b>Energy Source #6</b>					
56952-56955		<b>Energy Source #7</b>					
56956-56959		<b>Energy Source #8</b>					
<b>Counter Source Setup 1-64</b>							
61472-61727							
+0		Pulse source ID	F16		UINT16	R/W	
+1		Target counter number	0-71		UINT16	R/W	
+2,3		Multiplier	+/-1-10000		INT32	R/W	
61472-61475		<b>Counter Source #1</b>					
61476-61479		<b>Counter Source #2</b>					
		...					
61724-61727		<b>Counter Source #64</b>					
<b>Digital Inputs Setup DI1-DI64</b>							
61728-61983							
+0		Pulse mode	0 = pulse, 1 = KYZ		UINT16	R/W	
+1		Polarity	Bit 0 – pulse polarity: 0=normal, 1=inverting Bit 1 – input polarity: 0=normal, 1=inverting		UINT16	R/W	
+2		De-bounce time, ms	1-1000		UINT16	R/W	Note 3
+3		Flags	Bit 0 – SOE Log: 0=disabled, 1=enabled; Bit 1 – Fault Log: 0=disabled, 1=enabled;		UINT16	R/W	
61728-61731		<b>DI1 Setup</b>					
61732-61735		<b>DI2 Setup</b>					
		...					
61980-61983		<b>DI64 Setup</b>					
<b>Digital Inputs Setup DI65-DI72</b>							
62752-62783							
62752-62755		<b>DI65 Setup</b>					
62756-62759		<b>DI66 Setup</b>					
		...					
62780-62783		<b>DI72 Setup</b>					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Relay Outputs Setup</b>							
61984-62081							
+0		Operation Mode	0=unlatched, 1=latched, 2=pulse, 3=KYZ		UINT16	R/W	
+1		Flags	Bit 0 – polarity: 0=normal, 1=inverting Bit 1 - retentive mode: 0=disabled, 1=enabled Bit 2 – blocking: 0=unblocked relay, 1=blocked relay Bit 3 – SOE log on output change: 0=disabled, 1=enabled		UINT16	R/W	A blocked relay can only be <b>unblocked by the “unlock relay”</b> setpoint command
+2		Pulse width, ms	1-3000		UINT16	R/W	
+3		Pulse source ID	F17		UINT16	R/W	
+4,5		kWh units per pulse	1-5000000	x0.1	UINT32	R/W	
61984-61989		<b>RO1 Setup</b>					
61990-61995		<b>RO2 Setup</b>					
		...					
62077-62081		<b>RO18 Setup</b>					
<b>Analog Inputs Setup</b>							
62368-62559							
+0		Input parameter ID	0 = input not assigned		UINT16	R/W	
+1		Not used	0		UINT16	R/W	
+2,3		Zero scale value (0/4 mA, 0V)			INT32	R/W	
+4,5		Full scale value (1/20/50 mA, 10V)			INT32	R/W	
62368-62373		<b>AI1 Setup</b>					
62374-62379		<b>AI2 Setup</b>					
		...					
62458-62463		<b>AI16 Setup</b>					
62464-62559		Reserved					
<b>Fault Log Triggers Setup (DFR only)</b>							
52150-52277							
+0		Trigger 1: Threshold, %	0-2000	x 0.1%	UINT16	R/W	
+1		Trigger 1: Hysteresis, % of threshold	0-500	x 0.1%	UINT16	R/W	
+2		Trigger 1: Trigger enabled	0 = disabled, 1 = enabled		UINT16	R/W	
+3		Trigger 2: Threshold, %	0-2000	x 0.1%	UINT16	R/W	
+4		Trigger 2: Hysteresis, % of threshold	0-500	x 0.1%	UINT16	R/W	
+5		Trigger 2: Trigger enabled	0 = disabled, 1 = enabled		UINT16	R/W	
+6-7		Reserved			UINT16	R/W	
52150-52157		<b>External trigger</b>					Enabled by default
52158-52165		<b>Zero-sequence current</b>					
52166-52173		<b>Zero-sequence voltage</b>					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
52174-52181		<b>Current unbalance</b>					
52182-52189		<b>Voltage unbalance</b>					
52190-52197		<b>Overcurrent and Undervoltage</b>					
52198-52205		<b>Undervoltage</b>					
52206-52213		<b>I4 (neutral) current</b>					
52214-52277		<b>Reserved</b>			UINT16	R/W	
<b>Fault Log Recording Setup (DFR only)</b>							
52278-52341							
+0		<b>Log options, bitmap</b>	Bit 0 – waveform log on event start: 0=disabled, 1=enabled; Bit 1 – waveform log on event end: 0=disabled, 1=enabled; Bit 2 – recording to PQ log: 0=enabled, 1=disabled; Bit 3 – distance to fault log: 0=disabled, 1=enabled.		UINT16	R/W	
+1		<b>Waveform log number</b>	0-7 = log #1-8		UINT16	R/W	
+2		<b>Data/RMS plot option</b>	0 = disabled, 1 = enabled		UINT16	R/W	
+3		<b>Data log number</b>	Bits 0-7 – RMS data log number (12 = log #13, factory preset) Bits 8-15 – distance to fault data log number (0-15=log#1-#16)		UINT16	R/W	
+4		<b>1/2-cycle RMS plot, cycles before event</b>	0–20	cycle	UINT16	R/W	
+5		<b>1/2-cycle RMS plot, cycles after event</b>	0–20	cycle	UINT16	R/W	
+6		<b>1/2-cycle RMS plot duration, cycles</b>	0–10000	cycle	UINT16	R/W	
+7-63		<b>Reserved</b>	0		UINT16	R/W	
<b>Waveform Recorder Setup (DFR only)</b>							
53878-53949							
+0		<b>Sampling rate, samples per cycle</b>	Regular waveform: 32, 64, 128, 256 Transient recorder: 512, 1024		UINT16	R/W	
+1		<b>Number of cycles per series</b>	16-10848 (32 samples/cycle), 8-5424 (64 samples/cycle), 4-2712 (128 samples/cycle), 2-1356 (256 samples/cycle) 2-4 (512 samples/cycle) 2 (1024 samples/cycle)		UINT16	R/W	
+3		<b>Recording time mode and number of post-event cycles in event-controlled mode</b>	Bit 15 – mode: 0=fixed time, 1= event-controlled time Bits 0-9 – post-event cycles: 0-2048		UINT16	R/W	
+4		<b>Number of cycles before trigger</b>	1-20		UINT16	R/W	
+4,5		<b>File channel mask (channels 1-32), bitmap</b>	F9		UINT32	R/W	
+6,7		<b>File channel mask (channels 33-64), bitmap</b>	F9		UINT32	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes

### 3.10 Expansion I/O Slots Configuration

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>Expansion I/O Slots Configuration Info</b>							
63008-63071		<b>Expansion I/O Slots Configuration Info</b>					
	+0	I/O module type	Bitmap		UINT16	R	Note 2
	+1	Number of I/Os on the slot	0-32		UINT16	R	
	+2	First I/O number on the slot	0-127		UINT16	R	Note 1
	+3	Last I/O number on the slot	0-127		UINT16	R	Note 1
63008-63011		<b>I/O Slot #1 Configuration</b>					
63012-63015		<b>I/O Slot #2 Configuration</b>					
63016-63019		<b>I/O Slot #3 Configuration</b>					
63020-63023		<b>I/O Slot #4 Configuration</b>					
63024-63071		Reserved					
<b>Expansion I/O Modules Type Info</b>							
63072-63119		<b>Expansion I/O Modules Type Info</b>					
	+0	Number of I/O modules of this type	0-14		UINT16	R	
	+1	Total number of I/O's of this type	0-128		UINT16	R	
	+2	Not used			UINT16	R	
	+3	Not used	0		UINT16	R	
63072-63075		<b>DI Module Type Info</b>					
63076-63079		<b>RO Module Type Info</b>					
63080-63083		<b>AI Module Type Info</b>					
63084-63087		<b>AO Module Type Info</b>					
<b>Counter Source Setup 65-72</b>							
63088-63119							
	+0	Pulse source ID	F16		UINT16	R/W	
	+1	Target counter number	0-71		UINT16	R/W	
	+2,3	Multiplier	+/-1-10000		INT32	R/W	
63088-63091		<b>Counter Source #65</b>					
63092-63095		<b>Counter Source #66</b>					
		...					
63116-63119		<b>Counter Source #72</b>					

NOTES:

1. I/O numbers of expansion I/O modules are automatically assigned in the order of connection. The connection order is counted for each I/O module type separately. If the I/O module position is changed but its order in the chain of the modules of the same type is preserved, then all I/Os on the module will retain their I/O numbers. On the dual AI/AO module, both AI and AO will have same logical I/O range.
2. The type of a module in the corresponding slot position, number of I/Os on the module and their I/O numbers can be read through the I/O Slots Configuration Info registers. I/O module type register contains bit-mapped information on the module type and its options in bits D7:D0 as shown in the Table below.

## I/O Module Type

Module	Option	D7	D6	D5	D4	D3	D2	D1	D0	HEX
9DI		0	0	0	0	1	0	0	0	0x08
18DI		0	0	0	0	1	0	0	1	0x09
4DI/4DO		0	0	0	1	0	0	0	0	0x10
8DO		0	0	0	1	1	0	0	0	0x18
4AI	±1 mA	0	0	1	0	0	0	0	0	0x20
4AI	0-20 mA	0	0	1	0	0	0	0	1	0x21
4AI	4-20 mA	0	0	1	0	0	0	1	0	0x22
4AI	0-1 mA	0	0	1	0	0	0	1	1	0x23
4AI	0-50 mA	0	0	1	0	0	1	0	0	0x24
4AI	±10 V	0	1	0	0	0	1	0	1	0x25
CIM6/18 – HACS – n x 100A/40mA (external CT)	CIM6 D4=1	0	1	0	0/1	0	0	0	0	0x4/50
CIM6/18 – RS5 – 2.5mA – 5A/2.5mA (external CT)	CIM6 D4=1	0	1	0	0/1	0	0	0	1	0x4/51
CIM6/18 – 5A AC – n xA/5A (internal CT)	CIM6 D4=1	0	1	0	0/1	0	0	1	0	0x4/52
CIM6/18 – 5A DC – 5-10A DC (internal CT direct connection)	CIM6 D4=1	0	1	0	0/1	0	0	1	1	0x4/53
CIM6/18 – HW version*: 0x48-F (CIM18), 0x58-F (CIM6)	CIM6 D4=1	0	1	0	0/1	1	X	X	X	0x4/58-F
PSM AC – 3Phase Power Supply 120-277V AC & measurement		0	1	0	0	0	1	0	0	0x44
PSM DC – 48-250VDC Power Supply & measurement		0	1	0	0	0	1	0	1	0x45
PSM – HW version*		0	1	1	1	1	X	X	X	0x78-F
MCM – HACS – n x 100A/40mA (external CT)		0	1	1	0	0	0	0	0	0x60
MCM – RS5 – 2.5mA – 5A/2.5mA (external CT)		0	1	1	0	0	0	0	1	0x61
MCM – HW version*		0	1	1	0	1	X	X	X	0x68-F
Dial-Up Modem (COM5) + RS-232/485 (COM2)	RS-232 D4=1	1	0	0	0/1	0	0	0	0	0x8/90
Ethernet TX/FX + RS-232/485 (COM2)	RS-232 D4=1	1	0	0	0/1	0	0	0	1	0x8/91
Profibus (COM5) + RS-232/485 (COM2)	RS-232 D4=1	1	0	0	0/1	0	0	1	0	0x8/92
Wireless WiFi (COM5) + RS-232/485 (COM2)	RS-232 D4=1	1	0	0	0/1	0	0	1	1	0x8/93
Wireless Cellular GSM/GPRS Telit (COM5)+ RS-232/485 (COM2)	RS-232 D4=1	1	0	0	0/1	0	1	0	0	0x8/94
Wireless Cellular CDMA Telit (COM5)+ RS-232/485 (COM2)	RS-232 D4=1	1	0	0	0/1	0	1	1	0	0x8/96
BACNET (COM5) + RS-232/485 (COM2)	RS-232 D4=1	1	0	0	0/1	0	1	1	1	0x8/97
LonWorks (COM5) + RS-232/485 (COM2)	RS-232 D4=1	1	0	1	0/1	0	0	0	0	0xC/D0
Wireless RF (COM5) + RS-232/485 (COM2)	RS-232 D4=1	1	0	1	0/1	0	0	0	1	0xC/D1
Empty slot		1	1	1	1	1	1	1	1	0xFF

### 3.11 File Transfer Blocks

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>File Transfer Control Blocks</b>							
63120-63151		<b>File Request Block</b>					
+0		File function	1 = ACK - acknowledgement 3 = set file position 5 = reset file position 7 = find 11 = read file		UINT16	R/W	1 - clears the file transfer block 3 - changes the file position 5 - sets the file position at the first (oldest) record 7 - finds a record matching an event or/and time (see Note 3) 11 - opens the file for reading from the present file position
+1		File ID	F2		UINT16	R/W	
+2		Section number (functions 3, 5, 11)	0-31, 0xFFFF = use channel ID		UINT16	R/W	
+3		Section channel ID (functions 3, 5, 11)	F6, F7		UINT16	R/W	
+4		Record sequence number (functions 3, 11)	0-65535		UINT16	R/W	The record sequence number with function 11 does not change the file position (see Note 2).
+5		Request variation (function 11)	0		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	
63152-64943		<b>File Response Block</b>					
		Data transfer area [0 – 1791]			UINT16	R	
64944-64951		<b>File Info Request Block</b>					
+0		File function	9 = read file info		UINT16	R/W	
+1		File ID	F2		UINT16	R/W	
+2		Section number	0-31, 0xFFFF = use channel ID		UINT16	R/W	
+3		Section channel ID	F6, F7		UINT16	R/W	
+4		Not used	0		UINT16	R/W	
+5		Request variation	0, 1, 2		UINT16	R/W	
+6-7		Reserved			UINT16	R/W	
64952-65151		<b>File Info Response Block</b>					
		Data transfer area [0 - 199]			UINT16	R	

**NOTES:**

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

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

## File Response Blocks

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
<b>File Info Response Block (Variation 0 – File info)</b>							
64952-64959		<b>Block Heading</b>					
+0		File function	9		UINT16	R	
+1		File ID	16		UINT16	R	
+2		Section number	0-31		UINT16	R	
+3		Section channel ID	F6, F7		UINT16	R	
+4		Number of records in the block	1		UINT16	R	
+5		Record size, words	36		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		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		UNT16	R	
+3		Number of sections in the file	0-32		UINT16	R	0 = non-partitioned file
+4,5		File channel mask (channels 1-32), bitmap	F8, F9		UINT32	R	
+6,7		File channel mask (channels 33-64), bitmap	F8, F9		UINT32	R	
+8		Number of records in the file	0-65535		UINT16	R	
+9		Number of records until the end of the file	0-65535		UINT16	R	
+10		Current record (read position) sequence number	0-65535		UINT16	R	
+11		Current write position sequence number	0-65535		UINT16	R	
+12		First (oldest) record sequence number	0-65535		UINT16	R	
+13		Last (newest) record sequence number	0-65535		UINT16	R	
+14,15		Last record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+16,17		Last record time, fractional seconds		µsec	UINT32	R	
+18,19		First record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+20,21		First record time, fractional seconds		µsec	UINT32	R	
+22,23		Not used	0		UINT32	R	
+24,25		Not used	0	µsec	UINT32	R	
+26,27		Not used	0	sec	UINT32	R	
+28,29		Not used	0	µsec	UINT32	R	
+30		Maximum number of records	0-65535		UINT16	R	
+31		Number of parameters per data section record	0-16		UINT16	R	
+32		Section record size, bytes		Byte	UINT16	R	



Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+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	16		UINT16	R	
+2		Section number	0-31		UINT16	R	
+3		Section channel ID	F6, F7		UINT16	R	
+4		Number of records in the block	1		UINT16	R	
+5		Record size, words	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		UNT16	R	
+1		Number of records in the file	0-65535		UINT16	R	
+2		Number of records until the end of the file	0-65535		UINT16	R	
+3		Current record (read position) sequence number	0-65535		UINT16	R	
+4,5		Current record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+6,7		Current record time, fractional seconds		µsec	UINT32	R	
<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		UINT16	R	
+2		Section number	0		UINT16	R	
+3		Section channel ID	0		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	1-16		UINT16	R	
+2		Field 1 parameter ID			UINT16	R	
+3		Field 2 parameter ID			UINT16	R	
		...			UINT16	R	
+17		Field 16 parameter ID			UINT16	R	
<b>File Info Response Block (Variation 2 – Profile data log record structure)</b>							
64952-64959		<b>Block Heading</b>					
+0		File function	9		UINT16	R	
+1		File ID	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	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+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		
+1		Number of fields in a data record	1-9		UINT16		
+2		Field 1 parameter ID	0-0xFFFF		UINT16		
+3		Field 2 parameter ID	0-0xFFFF		UINT16		
		...			UINT16		
+10		Field 9 parameter ID	0-0xFFFF		UINT16		
<b>Event Log Response Block</b>							
63152-63159		<b>Block Heading</b>					
+0		Last file function	1, 3, 5, 11		UINT16	R	
+1		File ID	0		UINT16	R	
+2		Section number	0		UINT16	R	
+3		Section channel ID	0		UINT16	R	
+4		Number of records in the block	1-32		UINT16	R	
+5		Record size, words	12		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		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		UINT16	R	
+2		Section number	0		UINT16	R	
+3		Section channel ID	0		UINT16	R	
+4		Number of records in the block	1-16		UINT16	R	
+5		Record size, words	8 + 2x Number of parameters		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
63160-64439		<b>Data Log Records</b>					
+0		Record status	F5		INT16	R	
+1		Record sequence number	0-65535		UINT16	R	
+2,3		Record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+4,5		Record time, fractional seconds in µsec		µsec	UINT32	R	
+6		Trigger event type	F22		INT16	R	
+7		Trigger event number	0		UINT16	R	
+8,9		Log value #1			INT32	R	
+10,11		Log value #2			INT32	R	
		...				R	
63160-...		<b>Record #1</b> (variable length)					
		...					
		<b>Record #16</b> (variable length)					
<b>Profile Data Log Response Block</b>							
63152-63159		<b>Block Heading</b>					
+0		Last file function	1, 3, 5, 11		UINT16	R	
+1		File ID	16		UINT16	R	
+2		Section number	0-7		UINT16	R	
+3		Section channel ID	F6		UINT16	R	
+4		Number of records in the block	1-16		UINT16	R	
+5		Record size, words	10-18		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
63160-64439		<b>Data Log Records</b>					
+0		Record status	F5		INT16	R	
+1		Record sequence number	0 - 65535		UINT16	R	
+2,3		Record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+4,5		Record time, fractional seconds in µsec		µsec	UINT32	R	
+6		Trigger event type	0		INT16	R	
+7		Trigger event number	0		UINT16	R	
+8,9		Log value #1	Total (summary) register		INT32	R	
+10,11		Log value #2	Tariff #1 register		INT32	R	
+12,13		Log value #3	Tariff #2 register		INT32	R	
+14,15		Log value #4	Tariff #3 register		INT32	R	
+16,17		Log value #5	Tariff #4 register		INT32	R	
+18,19		Log value #6	Tariff #5 register		INT32	R	
+20,21		Log value #7	Tariff #6 register		INT32	R	
+22,23		Log value #7	Tariff #5 register		INT32	R	
+24,25		Log value #8	Tariff #6 register		INT32	R	
63160-...		<b>Record #1</b> (variable length)					
		...					
		<b>Record #16</b> (variable length)					
<b>RT Waveform Response Block</b> (as EM133-R)							

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
63152-63159		<b>Block Heading</b>					
+0		Last file function	1, 3, 5, 11		UINT16	R	
+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	×0.1μ sec	UINT16	R	
+17		Sampling rate, samples/cycle	32, 64, 128		UINT16	R	
+18		Sampling frequency	4500 – 6500	×0.01 Hz	UINT16	R	
+19		Channel offset, sampling units	0		INT16	R	
+20,21		Channel multiplier, primary units	See Generic Data in Section 3.4		UINT32	R	
+22		Channel divisor, sampling units	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>

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

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

**NOTE:**

If you read the block through a TCP connection and change a file ID or the number of records in the block, your assignments for the transfer block 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 block heading before accessing data records.

### 3.12 Billing/TOU Daily Profile Data Log

File Channel/ Section 1	Record Field No. 2	Point Label	Point ID	Description	Range	Units 3	Type	Notes
0/0				<b>Energy Register #1</b>				
	1	REG1	0x1780	Summary (total) energy reading	0-999,999,999	0.1 kWh	UINT32	
	2	TRF1	0x7000	Tariff #1 energy reading	0-999,999,999	0.1 kWh	UINT32	
	3	TRF2	0x7001	Tariff #2 energy reading	0-999,999,999	0.1 kWh	UINT32	
	4	TRF3	0x7002	Tariff #3 energy reading	0-999,999,999	0.1 kWh	UINT32	
	5	TRF4	0x7003	Tariff #4 energy reading	0-999,999,999	0.1 kWh	UINT32	
	6	TRF5	0x7004	Tariff #5 energy reading	0-999,999,999	0.1 kWh	UINT32	
	7	TRF6	0x7005	Tariff #6 energy reading	0-999,999,999	0.1 kWh	UINT32	
	8	TRF7	0x7006	Tariff #7 energy reading	0-999,999,999	0.1 kWh	UINT32	
	9	TRF8	0x7007	Tariff #8 energy reading	0-999,999,999	0.1 kWh	UINT32	
...				...				
7/7				<b>Energy Register #8</b>				
	1	REG8	0x1787	Summary (total) energy reading	0-999,999,999	0.1 kWh	UINT32	
	2	TRF1	0x7000	Tariff #1 energy reading	0-999,999,999	0.1 kWh	UINT32	
	3	TRF2	0x7001	Tariff #2 energy reading	0-999,999,999	0.1 kWh	UINT32	
	4	TRF3	0x7002	Tariff #3 energy reading	0-999,999,999	0.1 kWh	UINT32	
	5	TRF4	0x7003	Tariff #4 energy reading	0-999,999,999	0.1 kWh	UINT32	
	6	TRF5	0x7004	Tariff #5 energy reading	0-999,999,999	0.1 kWh	UINT32	
	7	TRF6	0x7005	Tariff #6 energy reading	0-999,999,999	0.1 kWh	UINT32	
	8	TRF7	0x7006	Tariff #7 energy reading	0-999,999,999	0.1 kWh	UINT32	
	9	TRF8	0x7007	Tariff #8 energy reading	0-999,999,999	0.1 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	
...				...				

File Channel/ Section 1	Record Field No. 2	Point Label	Point ID	Description	Range	Units 3	Type	Notes
23/11				<b>Daily Maximum Demand Register #8</b>				
	1	REG8 MD	0x4787	Summary (total) max. demand reading	0-Pmax	U3	UINT32	
	2	TRF1 MD	0x7100	Tariff #1 max. demand reading	0-Pmax	U3	UINT32	
	3	TRF2 MD	0x7101	Tariff #2 max. demand reading	0-Pmax	U3	UINT32	
	4	TRF3 MD	0x7102	Tariff #3 max. demand reading	0-Pmax	U3	UINT32	
	5	TRF4 MD	0x7103	Tariff #4 max. demand reading	0-Pmax	U3	UINT32	
	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 Billing/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 Billing/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 × PT Ratio, V	1
I <sub>max</sub>		CT Primary current × 2, A	
P <sub>max</sub>		V <sub>max</sub> × I <sub>max</sub> × 2, W	2
<b>Data Units</b>			
U1	PT Ratio = 1	0.1 V	
	PT Ratio > 1	1 V	
U2		0.01 A	
U3	PT Ratio = 1	0.001 kW/kvar/kVA	
	PT Ratio > 1	1 kW/kvar/kVA	
U4		10 <sup>-d</sup> × register measurement unit (see F15 in Section 5). d = 0-4 – number of decimal places for energy registers (see Device Options Setup)	

<sup>1</sup> The default Voltage scale is 600V. You can change it via the Device Data Scale setup (see Section 3.1) or via the Device Options setup in PAS.

<sup>2</sup> P<sub>max</sub> is rounded to whole kilowatts. With PT=1.0, if P<sub>max</sub> is greater than 9,999,000 W, it is truncated to 9,999,000 W.

## 5. Data Formats

Format Code	Value	Description	Notes
<b>Timestamp</b>			
F1		Local time in a UNIX-style format. Represents the number of seconds since midnight (00:00:00), January 1, 1970. The time is valid after January 1, 2000.	
<b>File ID</b>			
F2	0	Event log	
	1	Data log	
	16	Daily profile log file	
<b>File Attributes</b>			
F3	Bit 0	0=Non-wrap (stop when filled), 1=Wrap-around (circular file)	
	Bit 5 = 1	TOU daily profile log	
<b>File Status Word</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</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>Billing/TOU Profile Log Channel ID</b>			
F6	0-7	Billing/TOU energy registers #1-#8	
	16-23	Billing/TOU maximum demand registers #1-#8	
<b>Waveform Log Channel ID</b>			
F7	0	V1/V12	
	1	V2/V23	
	2	V3/V31	
	4	I1	
	5	I2	
	6	I3	
<b>Billing/TOU Profile Log Channel Mask</b>			
F8	Bit 0:15 = 1	Billing/TOU energy registers #1-#8	
	Bit 16:31 = 1	Billing/TOU maximum demand registers #1-#8	
<b>Waveform Channel Mask</b>			
F9	Bit 0 = 1	Channel V1/V12	
	Bit 1 = 1	Channel V2/V23	
	Bit 2 = 1	Channel V3/V31	
	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>Billing Register Source ID</b>			
F11	0x0000	None	
	0x0700-0x0747	Pulse input DI1-DI72	
	0x1700	kWh import	
	0x1701	kWh export	
	0x1704	kvarh import	



Format Code	Value	Description	Notes	
	0x1705	kvarh export		
	0x1708	kVAh total		
	0x7F00-0x7F3B	Submeter #1-#60		
<b>Setpoint Trigger Parameters ID</b>				
F12	0x0000	None (condition is not active)		
	<b>0x0080</b>	Fault Event active	DFR only	
	<b>0x0081</b>	Fault Event cleared	DFR only	
		<b>Status Inputs</b>		
	0x0600-0x0647	Status input #1-#72 ON		
	0x8600-0x8647	Status input #1-#72 OFF		
		<b>Relays</b>		
	0x0800-0x0811	Relay #1-#18 ON	For DFR Relay #1-#12 only	
	0x8800-0x8811	Relay #2-#18 OFF	For DFR Relay #1-#12 only	
	0x0B02	Day of week		
	0x0B05	Day of month		
	0x0B06	Hour		
	0x0B07	Minutes		
	0x0B08	Seconds		
	0x0B09	Minute interval		
	0x1100	High voltage V1		
	0x1101	High voltage V2		
	0x1102	High voltage V3		
	0x9100	Low voltage V1		
	0x9101	Low voltage V2		
	0x9102	Low voltage V3		
	0x111E	High voltage V12		
	0x111F	High voltage V23		
	0x1120	High voltage V31		
	0x911E	Low voltage V12		
	0x911F	Low voltage V23		
	0x9120	Low voltage V31		
	0x1103	High current I1		
	0x1104	High current I2		
	0x1105	High current I3		
	0x9103	Low current I1		
	0x9104	Low current I2		
	0x9105	Low current I3		
	0x1002	High frequency		
	0x9002	Low frequency		
	0x1406	High kW import		
	0x1408	High kvar import		
	0x1402	High kVA		
	<b>Setpoint Action ID</b>			
	F14	0x0000	No action	
0x3000-0x3011		Operate Relay #1-#18	For DFR Relay #1-#12 only	
0x3100-0x3111		Release latched Relay #1-#18	For DFR Relay #1-#12 only	
0x3800-0x3807		Unblock direct control port. Lower byte 0-7: 0=all ports, 1=COM1, 2=COM2, 3=COM3, 4=COM4, 6=USB, 7=Ethernet	As PM180	
0x4000-0x401F		Increment counter #1-#32	As PM180	
0x4020-0x4047		Increment Counter #33 - #72		
0x4100-0x411F		Decrement counter #1-#32	As PM180	
0x4120-0x4147		Decrement Counter #33 - #72		
0x4200-0x421F		Clear counter #1-#32	As PM180	
0x4220-0x4247		Clear Counter #33 - #72		
0x5100		Send event notification		
0x6100		Reset all total maximum demand registers	0x6100	
0x6101		Reset maximum power demand registers	0x6101	
0x6102		Reset maximum volt and ampere demand registers	0x6102	
0x6103		Reset maximum volt demand registers	0x6103	
0x6104		Reset maximum ampere demand registers	0x6104	
0x6105		Reset maximum harmonic demand registers	0x6105	
0x6300		Reset Billing/TOU maximum demands	0x6300	

Format Code	Value	Description	Notes
	0x6400	Clear all counters	0x6400
	0x6500	Clear Min/Max log registers	0x6500
	0x7000	Event log on setpoint operated	0x7000
	0x7001	Event log on setpoint released	0x7001
	0x7002	Event log on any setpoint transition	0x7002
	0x7100-0x710D	Data log #1-#14	0x7100-0x710D
	0x7200-0x7201	Waveform Log #1-#2	0x7200-0x7201
<b>Billing/TOU Register Units (as EM133-R)</b>			
F15	0	None	
	1	kWh	
	2	kvarh	
	3	kVAh	
	4	m3	
	5	CF (cubic feet)	
	6	CCF (hundred cubic feet)	
	7	kL	
	8	MJ	
<b>Counter Source ID</b>			
F16	0x0000	None	
	0x0700-0x0747	Pulse input DI1-DI72	
<b>Relay Output Pulse Source ID</b>			
F17		<b>Setpoint Operation Events</b>	
	0x0200	KWh Import pulse	
	0x0201	KWh Export pulse	
	0x0202	Kvarh Import pulse	
	0x0203	Kvarh Export pulse	
	0x0204	KVA Total pulse	
<b>Event Source/Point ID</b>			
F19		<b>Setpoint Operation Events</b>	
	0x0000-0x59FF	Trigger parameter ID	
	0x6400-0xFFFF	Trigger parameter ID	
		<b>Setpoint Action Events</b>	
	0x5A00-0x5A0F	Setpoint #1-#16	
		<b>Communications Events</b>	
	0x5B00-0x5BFF	Data/Function point ID (low byte, see F21)	
		<b>Self-Check Diagnostics Events</b>	
	0x5D00-0x5DFF	Data/Function point ID (low byte, see F21)	
		<b>Self-Update Events</b>	
	0x5E08	RTC DST/Standard time update	
		<b>Run-time Error</b>	
	0x6014	Library error	
	0x6015	RTOS Kernel error	
	0x6016	Task error	
		<b>Hardware Diagnostics Events</b>	
	0x6201	Permanent fault	
	0x6202	RAM/Data error	
	0x6203	CPU watchdog reset	
	0x6204	DSP/Sampling fault	
	0x6205	CPU exception	
	0x6206	Reserved	
	0x6207	Software watchdog reset	
	0x620E	Expanded memory fault (Event effect = File ID + 1)	
	0x620F	CPU EEPROM fault	
	0x6210	AC board EEPROM fault	
	0x6211	I/O board EEPROM fault	
		<b>External Events</b>	
	0x6300	Power down	
	0x6308	Power up	
	0x6309	External reset	
	0x6320	SNTP server failed	4
	0x6321	SNTP server reconnected	4
<b>Event Effect ID</b>			
F20		<b>Communications/Self-check Events</b>	
	0x0000	None	
	0x6000	Total energy registers cleared	
	0x6100	Maximum demands cleared	

Format Code	Value	Description	Notes
	0x6101	Power maximum demands cleared	
	0x6102	Volt/Ampere maximum demands cleared	
	0x6103	Volt maximum demands cleared	
	0x6104	Ampere maximum demands cleared	
	0x6200	TOU energy registers cleared	
	0x6300	TOU demand registers cleared	
	0x6A00-0x6A10	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>Setpoint Operation Events</b>	
	0xE100-0xE11F	Setpoint operated (low byte = setpoint ID)	
	0xE200-0xE21F	Setpoint released (low byte = setpoint ID)	
		<b>Setpoint Action Events</b>	
	See F14	Setpoint action ID	
<b>Data/Function Point ID</b>			
F21		<b>Data Location</b>	
	0x03	Data memory	
	0x04	Factory setup	
	0x05	Access/Password setup	
	0x06	Basic setup	
	0x07	Communications setup	
	0x08	Real-time clock	
	0x09	Digital inputs setup	
	0x0E	Timers setup	
	0x10	Event/alarm setpoints	
	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	
	0x1D	RO Setup	
	0x1C	User selectable options	
	0x23	Calibration registers	
	0x24	Date/Time Setup	
	0x25	Net setup	
	0x2A	Device mode control	
	0x2B	Channels setup	
	0x44	Fault recorder	
	0x2B-0x3F	Reserved	
<b>Event Type ID</b>			
F22	0x0000	SP: Generic setpoint event	
	0x0001-0x0010	SP1-SP16: Setpoint #1-#16 event	
<b>Device Diagnostics</b>			
F23	Bit 0 = 1	Critical error	
	Bit 1 = 1	Permanent fault (critical error)	
	Bit 2 = 1	RAM/Data error	
	Bit 3 = 1	CPU watchdog reset	
	Bit 4 = 1	DSP/Sampling fault	
	Bit 5 = 1	CPU exception	
	Bit 6	Reserved	
	Bit 7 = 1	Software watchdog reset	
	Bit 8 = 1	Power down	
	Bit 9 = 1	Device reset	
	Bit 10 = 1	Configuration reset	
	Bit 11 = 1	RTC fault (critical error)	
	Bit 12 = 1	Configuration fault (critical error)	
	Bit 13	Reserved	
	Bit 14 = 1	Expanded memory fault	
	Bit 15 = 1	CPU EEPROM fault	
	Bit 16 = 1	AC board EEPROM fault	
	Bit 17 = 1	I/O board EEPROM fault	

<b>Format Code</b>	<b>Value</b>	<b>Description</b>	<b>Notes</b>
	Bit 18	Reserved	
	Bit 19	Reserved	
	Bit 20 = 1	C Library error	
	Bit 21 = 1	RTOS Kernel error	
	Bit 22 = 1	Task error	
	Bit 23	Reserved	

## 6.BFM II Parameters for Data Monitoring and Logging

The following table lists parameters measured by the meter that are available for data logging and monitoring through communications for each feeder. The left column shows data abbreviations used in PAS. Parameter groups are highlighted in bold.

Energy and PWR DMD import is calculated and registered Only if defined (TOU and data log)

<b>Designation</b>	<b>Description</b>
NONE	None (stub, read as zero)
<b>RT PHASE</b>	<b>1-Cycle Phase Values</b>
V1	V1
V2	V2
V3	V3
I1	I1 Current
I2	I2 Current
I3	I3 Current
<b>Power and PF with sign</b>	
kW L1	kW L1
kW L2	kW L2
kW L3	kW L3
kvar L1	kvar L1
kvar L2	kvar L2
kvar L3	kvar L3
kVA L1	kVA L1
kVA L2	kVA L2
kVA L3	kVA L3
PF L1	Power factor L1
PF L2	Power factor L2
PF L3	Power factor L3
V12	V12 Voltage
V23	V23 Voltage
V31	V31 Voltage
<b>RT TOTAL</b>	<b>1-Cycle Total Values</b>
kW	Total kW
kvar	Total kvar
kVA	Total kVA
PF	Total PF
<b>RT AUX</b>	<b>1-Cycle Auxiliary Values</b>
V UNB%	Voltage unbalance <sup>2</sup>
In	In (neutral) Current <sup>3</sup>
FREQ	Frequency
<b>AVR PHASE</b>	<b>1-Second Phase Values <sup>1</sup></b>
V1	V1 Voltage
V2	V2 Voltage
V3	V3 Voltage
I1	I1 Current
I2	I2 Current
I3	I3 Current
<b>Power and PF with sign</b>	
kW L1	kW L1
kW L2	kW L2
kW L3	kW L3
kvar L1	kvar L1
kvar L2	kvar L2
kvar L3	kvar L3
kVA L1	kVA L1
kVA L2	kVA L2
kVA L3	kVA L3
PF L1	Power factor L1
PF L2	Power factor L2
PF L3	Power factor L3
V12	V12 Voltage

<b>Designation</b>	<b>Description</b>
V23	V23 Voltage
V31	V31 Voltage
<b>AVR TOTAL</b>	<b>1-Second Total Values</b> <sup>1</sup>
kW	Total kW
kvar	Total kvar
kVA	Total kVA
PF	Total PF
<b>AVR AUX</b>	<b>1-Second Auxiliary Values</b> <sup>1</sup>
V UNB%	Voltage unbalance <sup>2</sup>
In	In (neutral) Current <sup>3</sup>
FREQ	Frequency
<b>DEMANDS</b>	<b>Present Demands</b> <sup>1</sup>
V1 DMD	V1 Volt demand
V2 DMD	V2 Volt demand
V3 DMD	V3 Volt demand
I1 DMD	I1 Ampere demand
I2 DMD	I2 Ampere demand
I3 DMD	I3 Ampere demand
kW IMP SD	kW import sliding window demand
kvar IMP SD	kvar import sliding window demand
kVA IMP SD	kVA import sliding window demand
kW IMP ACC DMD	kW import accumulated demand
kvar IMP ACC DMD	kvar import accumulated demand
kVA IMP ACC DMD	kVA import accumulated demand
kW IMP PRD DMD	kW import predicted sliding window demand
kvar IMP PRD DMD	kvar import predicted sliding window demand
kVA IMP PRD DMD	kVA import predicted sliding window demand
kW EXP SD	kW Export sliding window demand
kvar EXP SD	kvar Export sliding window demand
kVA EXP SD	kVA Export sliding window demand
kW EXP ACC DMD	kW Export accumulated demand
kvar EXP ACC DMD	kvar Export accumulated demand
kVA EXP ACC DMD	kVA Export accumulated demand
kW EXP PRD DMD	kW Export predicted sliding window demand
kvar EXP PRD DMD	kvar Export predicted sliding window demand
kVA EXP PRD DMD	kVA Export predicted sliding window demand
<b>SUMM ACC DMD</b>	<b>Summary (TOU Total) Accumulated Demands</b>
SUM REG1 ACC DMD	Summary register #1 demand
SUM REG2 ACC DMD	Summary register #2 demand
SUM REG3 ACC DMD	Summary register #3 demand
SUM REG4 ACC DMD	Summary register #4 demand
SUMM SW DMD	<b>Summary (TOU Total) Sliding Demands</b> <sup>1</sup>
SUM REG1 SW DMD	Summary register #1 demand
SUM REG2 SW DMD	Summary register #2 demand
SUM REG3 SW DMD	Summary register #3 demand
SUM REG4 SW DMD	Summary register #4 demand
<b>ENERGY</b>	<b>Submeter Energy</b> <sup>1</sup>
kWh IMP	kWh import
kvarh IMP	kvarh import
kVAh IMP	kVAh import
kWh EXP	kWh export
kvarh EXP	kvarh export
kVAh EXP	kVAh export
KWh NET	KWh netto
Kvarh NET	Kvarh netto
KVAh TOT	KVAh total
<b>SUMMARY REGS</b>	<b>Summary (TOU Total) Energy Registers</b> <sup>1</sup>
SUM REG1	Summary energy register #1
SUM REG2	Summary energy register #2
SUM REG3	Summary energy register #3
SUM REG4	Summary energy register #4
SUM REG5	Summary energy register #5
SUM REG6	Summary energy register #6
SUM REG7	Summary energy register #7
SUM REG8	Summary energy register #8
<b>MAX DMD</b>	<b>Maximum Demands</b>
V1 DMD MAX	V1 Maximum volt demand

<b>Designation</b>	<b>Description</b>
V2 DMD MAX	V2 Maximum volt demand
V3 DMD MAX	V3 Maximum volt demand
I1 DMD MAX	I1 Maximum ampere demand
I2 DMD MAX	I2 Maximum ampere demand
I3 DMD MAX	I3 Maximum ampere demand
kW IMP SD MAX	Maximum kW import sliding window demand
kW EXP SD MAX	Maximum kW export sliding window demand
kvar IMP SD MAX	Maximum kvar import sliding window demand
kvar EXP SD MAX	Maximum kvar export sliding window demand
kVA IMP SD MAX	Maximum kVA import sliding window demand
kVA EXP SD MAX	Maximum kVA export sliding window demand
<b>MAX SUMMARY DMD</b>	<b>Maximum Summary (TOU Total) Demands</b>
SUM REG1 DMD MAX	Summary register #1 maximum demand
SUM REG2 DMD MAX	Summary register #2 maximum demand
SUM REG3 DMD MAX	Summary register #3 maximum demand
SUM REG4 DMD MAX	Summary register #4 maximum demand
SUM REG5 DMD MAX	Summary register #5 maximum demand
SUM REG6 DMD MAX	Summary register #6 maximum demand
SUM REG7 DMD MAX	Summary register #7 maximum demand
SUM REG8 DMD MAX	Summary register #8 maximum demand
<b>TOU PRMS</b>	<b>TOU Parameters</b>
ACTIVE TARIFF	Active TOU tariff
ACTIVE PROFILE	Active TOU profile
<b>TOU REG1</b>	<b>TOU Energy Register #1<sup>1</sup> – (8 tariffs)</b>
TOU REG1 TRF1	Tariff #1 register
TOU REG1 TRF2	Tariff #2 register
TOU REG1 TRF3	Tariff #3 register
TOU REG1 TRF4	Tariff #4 register
TOU REG1 TRF5	Tariff #5 register
TOU REG1 TRF6	Tariff #6 register
TOU REG1 TRF7	Tariff #7 register
TOU REG1 TRF8	Tariff #8 register
<b>TOU REG2</b>	<b>TOU Energy Register #2<sup>1</sup></b>
TOU REG2 TRF1	Tariff #1 register
TOU REG2 TRF2	Tariff #2 register
TOU REG2 TRF3	Tariff #3 register
TOU REG2 TRF4	Tariff #4 register
TOU REG2 TRF5	Tariff #5 register
TOU REG2 TRF6	Tariff #6 register
TOU REG2 TRF7	Tariff #7 register
TOU REG2 TRF8	Tariff #8 register
<b>TOU REG3</b>	<b>TOU Energy Register #3<sup>1</sup></b>
TOU REG3 TRF1	Tariff #1 register
TOU REG3 TRF2	Tariff #2 register
TOU REG3 TRF3	Tariff #3 register
TOU REG3 TRF4	Tariff #4 register
TOU REG3 TRF5	Tariff #5 register
TOU REG3 TRF6	Tariff #6 register
TOU REG3 TRF7	Tariff #7 register
TOU REG3 TRF8	Tariff #8 register
<b>TOU REG4</b>	<b>TOU Energy Register #4<sup>1</sup></b>
TOU REG4 TRF1	Tariff #1 register
TOU REG4 TRF2	Tariff #2 register
TOU REG4 TRF3	Tariff #3 register
TOU REG4 TRF4	Tariff #4 register
TOU REG4 TRF5	Tariff #5 register
TOU REG4 TRF6	Tariff #6 register
TOU REG4 TRF7	Tariff #7 register
TOU REG4 TRF8	Tariff #8 register
<b>TOU REG5</b>	<b>TOU Energy Register #5<sup>1</sup></b>
TOU REG5 TRF1	Tariff #1 register
TOU REG5 TRF2	Tariff #2 register
TOU REG5 TRF3	Tariff #3 register
TOU REG5 TRF4	Tariff #4 register
TOU REG5 TRF5	Tariff #5 register
TOU REG5 TRF6	Tariff #6 register
TOU REG5 TRF7	Tariff #7 register

<b>Designation</b>	<b>Description</b>
TOU REG5 TRF8	Tariff #8 register
<b>TOU REG6</b>	<b>TOU Energy Register #6</b> <sup>1</sup>
TOU REG6 TRF1	Tariff #1 register
TOU REG6 TRF2	Tariff #2 register
TOU REG6 TRF3	Tariff #3 register
TOU REG6 TRF4	Tariff #4 register
TOU REG6 TRF5	Tariff #5 register
TOU REG6 TRF6	Tariff #6 register
TOU REG6 TRF7	Tariff #7 register
TOU REG6 TRF8	Tariff #8 register
<b>TOU REG7</b>	<b>TOU Energy Register #7</b> <sup>1</sup>
TOU REG7 TRF1	Tariff #1 register
TOU REG7 TRF2	Tariff #2 register
TOU REG7 TRF3	Tariff #3 register
TOU REG7 TRF4	Tariff #4 register
TOU REG7 TRF5	Tariff #5 register
TOU REG7 TRF6	Tariff #6 register
TOU REG7 TRF7	Tariff #7 register
TOU REG7 TRF8	Tariff #8 register
<b>TOU REG8</b>	<b>TOU Energy Register #8</b> <sup>1</sup>
TOU REG8 TRF1	Tariff #1 register
TOU REG8 TRF2	Tariff #2 register
TOU REG8 TRF3	Tariff #3 register
TOU REG8 TRF4	Tariff #4 register
TOU REG8 TRF5	Tariff #5 register
TOU REG8 TRF6	Tariff #6 register
TOU REG8 TRF7	Tariff #7 register
TOU REG8 TRF8	Tariff #8 register
<b>TOU MAX DMD REG1</b>	<b>TOU Maximum Demand Register #1</b> <sup>1</sup>
DMD1 TRF1 MAX	Tariff #1 register
DMD1 TRF2 MAX	Tariff #2 register
DMD1 TRF3 MAX	Tariff #3 register
DMD1 TRF4 MAX	Tariff #4 register
DMD1 TRF5 MAX	Tariff #5 register
DMD1 TRF6 MAX	Tariff #6 register
DMD1 TRF7 MAX	Tariff #7 register
DMD1 TRF8 MAX	Tariff #8 register
<b>TOU MAX DMD REG2</b>	<b>TOU Maximum Demand Register #2</b> <sup>1</sup>
DMD2 TRF1 MAX	Tariff #1 register
DMD2 TRF2 MAX	Tariff #2 register
DMD2 TRF3 MAX	Tariff #3 register
DMD2 TRF4 MAX	Tariff #4 register
DMD2 TRF5 MAX	Tariff #5 register
DMD2 TRF6 MAX	Tariff #6 register
DMD2 TRF7 MAX	Tariff #7 register
DMD2 TRF8 MAX	Tariff #8 register
<b>TOU MAX DMD REG3</b>	<b>TOU Maximum Demand Register #3</b> <sup>1</sup>
DMD3 TRF1 MAX	Tariff #1 register
DMD3 TRF2 MAX	Tariff #2 register
DMD3 TRF3 MAX	Tariff #3 register
DMD3 TRF4 MAX	Tariff #4 register
DMD3 TRF5 MAX	Tariff #5 register
DMD3 TRF6 MAX	Tariff #6 register
DMD3 TRF7 MAX	Tariff #7 register
DMD3 TRF8 MAX	Tariff #8 register
<b>TOU MAX DMD REG4</b>	<b>TOU Maximum Demand Register #4</b> <sup>1</sup>
DMD4 TRF1 MAX	Tariff #1 register
DMD4 TRF2 MAX	Tariff #2 register
DMD4 TRF3 MAX	Tariff #3 register
DMD4 TRF4 MAX	Tariff #4 register
DMD4 TRF5 MAX	Tariff #5 register
DMD4 TRF6 MAX	Tariff #6 register
DMD4 TRF7 MAX	Tariff #7 register
DMD4 TRF8 MAX	Tariff #8 register
<b>TOU MAX DMD REG5</b>	<b>TOU Maximum Demand Register #5</b> <sup>1</sup>
DMD5 TRF1 MAX	Tariff #1 register
DMD5 TRF2 MAX	Tariff #2 register



<b>Designation</b>	<b>Description</b>
DMD5 TRF3 MAX	Tariff #3 register
DMD5 TRF4 MAX	Tariff #4 register
DMD5 TRF5 MAX	Tariff #5 register
DMD5 TRF6 MAX	Tariff #6 register
DMD5 TRF7 MAX	Tariff #7 register
DMD5 TRF8 MAX	Tariff #8 register
<b>TOU MAX DMD REG6</b>	<b>TOU Maximum Demand Register #6</b> <sup>1</sup>
DMD6 TRF1 MAX	Tariff #1 register
DMD6 TRF2 MAX	Tariff #2 register
DMD6 TRF3 MAX	Tariff #3 register
DMD6 TRF4 MAX	Tariff #4 register
DMD6 TRF5 MAX	Tariff #5 register
DMD6 TRF6 MAX	Tariff #6 register
DMD6 TRF7 MAX	Tariff #7 register
DMD6 TRF8 MAX	Tariff #8 register
<b>TOU MAX DMD REG7</b>	<b>TOU Maximum Demand Register #7</b> <sup>1</sup>
DMD7 TRF1 MAX	Tariff #1 register
DMD7 TRF2 MAX	Tariff #2 register
DMD7 TRF3 MAX	Tariff #3 register
DMD7 TRF4 MAX	Tariff #4 register
DMD7 TRF5 MAX	Tariff #5 register
DMD7 TRF6 MAX	Tariff #6 register
DMD7 TRF7 MAX	Tariff #7 register
DMD7 TRF8 MAX	Tariff #8 register
<b>TOU MAX DMD REG8</b>	<b>TOU Maximum Demand Register #8</b> <sup>1</sup>
DMD8 TRF1 MAX	Tariff #1 register
DMD8 TRF2 MAX	Tariff #2 register
DMD8 TRF3 MAX	Tariff #3 register
DMD8 TRF4 MAX	Tariff #4 register
DMD8 TRF5 MAX	Tariff #5 register
DMD8 TRF6 MAX	Tariff #6 register
DMD8 TRF7 MAX	Tariff #7 register
DMD8 TRF8 MAX	Tariff #8 register
<b>MIN/MAX LOGGING</b>	<b>1-second averaged values</b> <sup>1</sup>
V1 MIN	V1 Minimum
V2 MIN	V2 Minimum
V3 MIN	V3 Minimum
I1 MIN	I1 Minimum
I2 MIN	I2 Minimum
I3 MIN	I3 Minimum
KW MIN	KW Minimum
Kvar MIN	Kvar Minimum
KVA MIN	KVA Minimum
Frequency MIN	Frequency Minimum
V1 MAX	V1 Maximum
V2 MAX	V2 Maximum
V3 MAX	V3 Maximum
I1 MAX	I1 Maximum
I2 MAX	I2 Maximum
I3 MAX	I3 Maximum
KW MAX	KW Maximum
Kvar MAX	Kvar Maximum
KVA MAX	KVA Maximum
Frequency MAX	Frequency Maximum
<b>HARMONICS</b>	<b>1-second average</b> <sup>1</sup>
V1 THD	V1 Voltage THD
V2 THD	V2 Voltage THD
V3 THD	V3 Voltage THD
<b>PULSE COUNTERS</b>	<b>Gas/Water billing</b> <sup>1</sup>
CNT1	Counter 1
.....	
CNT72	Counter 72
<b>DI/DO STATUS</b>	
D11 – D19	Digital Input 1 - Digital Input 9 Status
D110 – D118	Digital Input 10 - Digital Input 18 Status
D119 – D127	Digital Input 19 - Digital Input 27 Status
D128 – D136	Digital Input 28 - Digital Input 36 Status

<b>Designation</b>	<b>Description</b>
DI37 – DI45	Digital Input 37 - Digital Input 45 Status
DI46 – DI54	Digital Input 46 - Digital Input 54 Status
DI55 – DI63	Digital Input 55 - Digital Input 63 Status
DI64 – DI72	Digital Input 64 - Digital Input 72 Status
DO1 – DO9	Relay output 1 - Relay output 9
DO10 – D18	Relay output 10 - Relay output 18
<b>ANALOG INPUTS</b>	
AI1	Analog Input 1
AI2	Analog Input 2
AI3	Analog Input 3
AI4	Analog Input 4
AI5	Analog Input 5
AI6	Analog Input 6
AI7	Analog Input 7
AI8	Analog Input 8
<b>PHASE ROTATON</b>	
<b>DAY AND TIME</b>	

- 1 - Available for data logging
- 2 - Available for three-phase feeders only
- 3 - Available for three-phase feeders with neutral wire

Notes.

1. Parameters in this table are available for three-phase feeder having 4LN wiring configuration.
2. At two-phase feeder the parameters of phase L3 are absent
3. At single phase feeder the parameters of phase L2, L3 are absent and the total Parameters have the same values as Parameters of L1 phase

#### **Additional data for one three phase feeder selected by special menu (phase II)**

<b>Designation</b>	<b>Description</b>
<b>HARMONICS</b>	
<b>1-second average</b>	
I1 THD	I1 Current THD
I2 THD	I2 Current THD
I3 THD	I3 Current THD
I1 TDD	I1 Current TDD
I2 TDD	I2 Current TDD
I3 TDD	I3 Current TDD
I1 K-F	I1 Current K-Factor
I2 K-F	I2 Current K-Factor
I3 K-F	I3 Current K-Factor
V1% HD02 ... V1% HD40	Voltage harmonics V1 up to 40-th order
V2% HD02 ... V2% HD40	Voltage harmonics V2 up to 40-th order
V3% HD02 ... V3% HD40	Voltage harmonics V3 up to 40-th order
I1% HD02 ... I1% HD40	Current harmonics I1 up to 40-th order
I2% HD02 ... I2% HD40	Current harmonics I2 up to 40-th order
I3% HD02 ... I3% HD40	Current harmonics I3 up to 40-th order
<b>Fundamental Components</b>	
V1 MAG	Voltage magnitude L1 H01
V2 MAG	Voltage magnitude L2 H01
V3 MAG	Voltage magnitude L3 H01
I1 MAG	Current magnitude L1 H01
I2 MAG	Current magnitude L2 H01
I3 MAG	Current magnitude L3 H01
V1 ANG	Voltage angle L1 H01
V2 ANG	Voltage angle L2 H01
V3 ANG	Voltage angle L3 H01
I1 ANG	Current angle L1 H01
I2 ANG	Current angle L2 H01
I3 ANG	Current angle L3 H01
KW L1 H01	Fundamental kW L1
KW L2 H01	Fundamental kW L2
KW L3 H01	Fundamental kW L3
Kvar L1 H01	Fundamental kvar L1
Kvar L2 H01	Fundamental kvar L2

<b>Designation</b>	<b>Description</b>
Kvar L3 H01	Fundamental kvar L3
KVA L1 H01	Fundamental kVA L1
KVA L1 H01	Fundamental kVA L2
KVA L1 H01	Fundamental kVA L3
PF L1 H01	Displacement PF L1
PF L2 H01	Displacement PF L2
PF L3 H01	Displacement PF L3
KW TOT H01	Total kW H01
Kvar TOT H01	Total kvar H01
KVA TOT H01	Total kVA H01
PF TOT H01	Total Displacement PF

## 7. Setpoints Triggers and Actions

### Setpoints Triggers

Designation	Description
<b>AC FEEDERS</b>	
NONE	None (condition is not active)
MINUTE INTERVAL	Minute intervals (10, 15, 30, 60 min) synchronized with the clock
DAY OF WEEK	Day of week
YEAR	Year
MONTH	Month of the year
DAY OF MONTH	Day of month
HOURS	Hours
MINUTES	Minutes
HIGH V1	High V1 voltage
HIGH V2	High V2 voltage
HIGH V3	High V3 voltage
LOW V1	Low V1 voltage
LOW V2	Low V2 voltage
LOW V3	Low V3 voltage
HIGH V12	High V12 voltage
HIGH V23	High V23 voltage
HIGH V31	High V31 voltage
LOW V12	Low V12 voltage
LOW V23	Low V23 voltage
LOW V31	Low V31 voltage
HIGH I1	High I1 current
HIGH I2	High I2 current
HIGH I3	High I3 current
LOW I1	Low I1 current
LOW I2	Low I2 current
LOW I3	Low I3 current
HIGH V1 THD	High V1 voltage THD
HIGH V2 THD	High V2 voltage THD
HIGH V3 THD	High V3 voltage THD
HIGH I1 THD	High I1 voltage THD (for selected feeder only)
HIGH I2 THD	High I2 voltage THD (for selected feeder only)
HIGH I3 THD	High I3 voltage THD (for selected feeder only)
V UNB%	Voltage unbalance
In	In (neutral) Current
HIGH FREQ	High frequency
LOW FREQ	Low frequency
HIGH kW	High kW
HIGH kVA	High kVA
DI1-DI72	
<b>DC FEEDERS</b>	
<b>(phase III)</b>	
HIGH V DC	High DC voltage
LOW V DC	Low DC voltage
HIGH I DC	High DC current

### Setpoints Actions

Designation	Description
NONE	None (no action)
EVENT LOG	Log to Event Log
DATA LOG #1	Log to Data Log file #1
Clear VOLT/AMP DMD	Clear volt/ampere maximum demand
Clear PWR DMD	Clear maximum power demand
Clear ALL DMD	Clear all maximum demand
Clear TOU DMD	Clear TOU maximum demand
Clear Min/Max log	Clear minimum/maximum demand log
POWER QUALITY LOG	<b>phase II</b>
DATA LOG #2	Log to Data Log file #2 (for selected feeder only) additional data log @ <b>phase II</b>
RELAY OUTPUT #1 up to #18	

<b>Designation</b>	<b>Description</b>
Waveform #1	3 voltage and 3 current channels, 16 cycles. 64 samples per cycle (for selected feeder only)

### **Power Quality Setpoints phase II**

<b>Parameter</b>	<b>Setpoint</b>
Voltage Dip	(0.7 – 0.95) Vn, default 0.9Vn
Voltage swell	(1.05- 1.2) Vn, default 1.1Vn
Voltage THD	(2-10)%, default 8% (according to V DMD period)
Voltage unbalance	(1-5)%, default 2%
Frequency	95-105%, default 1%

## **8. Display Views**

The BFM II display will have multiple-page screen modes for viewing numerous measurement parameters shown in the following tables. Navigate through the screen modes to display the required parameters (see BFM II HMI Requirements V1.4).