SATEC
Powerful Solutions

Branch Feeder Monitor
BFM136/036

Modbus Communications Protocol

Reference Guide

BG0395 Rev. A7

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

REVISION HISTORY

A4	Sep 2009	Added transformer correction setup. Added TCP event notification client. Added GPRS setup and communication counters.
A5	Oct 2010	Added phasor registers. Number of tariffs is extended to 6 (F/W 18.4.1 and later)
A6	Feb 2013	Added exported kWh/kvarh and exported kW/kvar demands (F/W 18.5.1 and later)
A7	Jan 2018	Added reset maximum demands and reset Billing/TOU maximum demands for all submeters (F/W 18.5.8)

Table of Contents

1 General

This document specifies a subset of the Modbus serial communications protocol used to transfer data between a master computer station and the BFM136/036. The document provides the complete information necessary to develop third-party communications software capable of communication with the Series BFM136/036 instruments.

For additional information concerning communications operation, configuring the communications parameters, and communications connections see the BFM136/036 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 Website. The following paragraphs outline some issues concerning the implementation of the Modbus protocol in the BFM136/036.

2.1 Transmission Modes

The BFM136/036can 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 BFM136/036 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 BFM136/036 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[1]	Loop-back test	Communications test

[1] The BFM136/036 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 BFM136/036 Modbus registers are numbered in the range of 0 to 65535. From Modbus applications, the BFM136/036 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 BFM136/036 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 BFM136/036 register address.

2.6 Submeter Addressing

Each active submeter in the BFM136/036 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 BFM136/036 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 36	N+35
	SM 37	N+36
	...	
	SM 40	N+39

Your device is factory preset to address 1 and occupies the range of addresses 1 through 12, configured for 12 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 12 submeters in each one, assign the base address 1 to the first device, the address 13 to the second, and the address 25 to the third device so that they will occupy three non-overlapped address ranges 1 through 12, 13 through 24, and 25 through 36.

2.7 Data Formats

The BFM136/036 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):

HI = Vmax = 600.0V
LO = 0V

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

Volts reading = 1449 × (600.0 - 0)/(9999 - 0) + 0 = 86.9V

2. Current readings

Assume device settings: CT primary current = 50A.

Current engineering scales (see Section 4):

HI = Imax = CT primary current × 2 = 50.00 × 2 = 100.00A
LO = 0A

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

Amps reading = 250 × (100.00 - 0)/(9999 - 0) + 0 = 2.50A

3. Power readings

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

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

HI = Pmax = Vmax × Imax × 2 = (600.0 × 1) × (50.00 × 2) × 2 = 120,000W = 120 kW
LO = -Pmax = -120 kW

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

Watts reading = 5500 × (120 - (-120))/(9999 - 0) + (-120) = 12.013kW

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

Watts reading = 4000 × (120 - (-120))/(9999 - 0) + (-120) = -23.99kW

4. Power Factor readings

Power factor engineering scales:

HI = 1.000.
LO = -1.000.

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

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

2.7.2 32-bit Long Integer Format

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

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

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

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

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

2.8 User Assignable Registers

The BFM136/036 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 BFM136/036 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 BFM136/036 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 6 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 BFM136/036 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	UINT 32	
+2-4	Device MAC address	CHA R6	
+5	Device address	UINT 16	Submeter address
+6-7	Device IP address	UINT 32	Network byte order
+8	Event type	UINT 16	See F22 in Section 5
+9	Event sequence number	UINT 16	
+10-11	Event timestamp, seconds	UINT 32	Local time since Jan 1, 1970
+12-13	Event timestamp, seconds fraction, in microseconds	UINT 32	
+14-15	Reserved	UINT 32	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
Modbus Assignable Registers							
0-119							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	
Assignable Registers Map							
120-239							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	
Modbus Conversion Scales							
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[1]	Units [1]	Type	R / W	Notes
256-308		**1-Second Values**					
+0	0x110	V1 Voltage	0-Vmax	U1	UINT16	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	0						
+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	
+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	0x150	In Current	0-Imax	U2	UINT16	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	1						
+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	[2]
+32	0x1700	kWh import (high)	0-9999	×1MWh	UINT16	R	[2]
+33		Reserved	0		UINT16	R	
+34		Reserved	0		UINT16	R	
+35	0x1704	kvarh import (low)	0-9999	×0.1kvarh	UINT16	R	[2]
+36	0x1704	kvarh import (high)	0-9999	×1Mvarh	UINT16	R	[2]
+37		Reserved	0		UINT16	R	
+38		Reserved	0		UINT16	R	
+39	0x1112	Reserved	0		UINT16	R	
+40	0x1113	Reserved	0		UINT16	R	
+41	0x1114	Reserved	0		UINT16	R	
+42	0x1115	Reserved	0		UINT16	R	
+43	0x1116	Reserved	0		UINT16	R	
+44	0x1117	Reserved	0		UINT16	R	
+45	0x170	kVAh (low)	0-9999	×0.1k	UINT16	R	[2]

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	8			VAh			
+46	0x1708	kVAh (high)	0-9999	×1MVAh	UINT16	R	[2]
+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	

[1] For volts, amps and power scales refer to Chapter 4 ”Data Scales and Units”.

[2] 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 Values

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
4352-4384		**1-Cycle Phase Values**					
+0	0x0C00	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	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
+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	Reserved	0		UINT16	R	
+19	0x0C13	Reserved	0		UINT16	R	
+20	0x0C14	Reserved	0		UINT16	R	
+21	0x0C15	Reserved	0		UINT16	R	
+22	0x0C16	Reserved	0		UINT16	R	
+23	0x0C17	Reserved	0		UINT16	R	
+24-26		Reserved	0		UINT16	R	
+27	0x0C1B	Reserved	0		UINT16	R	
+28	0x0C1C	Reserved	0		UINT16	R	
+29	0x0C1D	Reserved	0		UINT16	R	
+30	0x0C1E	V12 Voltage	0-Vmax	U1	UINT16	R	
+31	0x0C1F	V23 Voltage	0-Vmax	U1	UINT16	R	
+32	0x0C2	V31 Voltage	0-Vmax	U1	UINT16	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	0						
4416-4427		**1-Cycle Low Phase Values**					
+0	0x0D 00	Low L-N voltage	0-Vmax	U1	UINT16	R	
+1	0x0D 01	Low current	0-Imax	U2	UINT16	R	
+2	0x0D 02	Low kW	-Pmax-Pmax	U3	INT16	R	
+3	0x0D 03	Low kvar	-Pmax-Pmax	U3	INT16	R	
+4	0x0D 04	Low kVA	0-Pmax	U3	UINT16	R	
+5	0x0D 05	Low PF Lag	0-100.0	0.001	UINT16	R	
+5	0x0D 06	Low PF Lead	0-100.0	0.001	UINT16	R	
+7	0x0D 07	Reserved	0		UINT16	R	
+8	0x0D 08	Reserved	0		UINT16	R	
+9	0x0D 09	Reserved	0		UINT16	R	
+10	0x0D 0A	Reserved	0		UINT16	R	
+11	0x0D 0B	Low L-L voltage	0-Vmax	U1	UINT16	R	
4480-4491		**1-Cycle High Phase Values**					
+0	0x0E0 0	High L-N voltage	0-Vmax	U1	UINT16	R	
+1	0x0E0 1	High current	0-Imax	U2	UINT16	R	
+2	0x0E0 2	High kW	-Pmax-Pmax	U3	INT16	R	
+3	0x0E0 3	High kvar	-Pmax-Pmax	U3	INT16	R	
+4	0x0E0 4	High kVA	0-Pmax	U3	UINT16	R	
+5	0x0E0 5	High PF Lag	0-1.000	0.001	UINT16	R	
+5	0x0E0 6	High PF Lead	0-1.000	0.001	UINT16	R	
+7	0x0E0	Reserved	0		UINT16	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	7						
+8	0x0E08	Reserved	0		UINT16	R	
+9	0x0E09	Reserved	0		UINT16	R	
+10	0x0E0A	Reserved	0		UINT16	R	
+11	0x0E0B	High L-L voltage	0-Vmax	U1	UINT16	R	
4544-4553		**1-Cycle Total Values**					
+0	0x0F00	Total kW	-Pmax-Pmax	U3	INT16	R	
+1	0x0F01	Total kvar	-Pmax-Pmax	U3	INT16	R	
+2	0x0F02	Total kVA	0-Pmax	U3	UINT16	R	
+3	0x0F03	Total PF	-1.000-1.000	0.001	INT16	R	
+4	0x0F04	Total PF lag	0-1.000	0.001	UINT16	R	
+5	0x0F05	Total PF lead	0-1.000	0.001	UINT16		
+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		**1-Cycle Auxiliary Values**					
+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	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
4640-4655		**Phasor**					
+0	0x1080	V1 Voltage magnitude	0-Vmax	U1	UINT16	R	
+1	0x1081	V2 Voltage magnitude	0-Vmax	U1	UINT16	R	
+2	0x1082	V3 Voltage magnitude	0-Vmax	U1	UINT16	R	
+3	0x1083	Not used			UINT16	R	
+4	0x1084	I1 Current magnitude	0-Imax	U2	UINT16	R	
+5	0x1085	I2 Current magnitude	0-Imax	U2	UINT16	R	
+5	0x1086	I3 Current magnitude	0-Imax	U2	UINT16	R	
+7	0x1087	Not used			UINT16	R	
+8	0x1088	V1 Voltage angle	-180.0-180.0	0.1º	INT16	R	
+9	0x1089	V2 Voltage angle	-180.0-180.0	0.1º	INT16	R	
+10	0x108A	V3 Voltage angle	-180.0-180.0	0.1º	INT16	R	
+11	0x108B	Not used			INT16	R	
+12	0x108C	I1 Current angle	-180.0-180.0	0.1º	INT16	R	
+13	0x108D	I2 Current angle	-180.0-180.0	0.1º	INT16	R	
+14	0x108E	I3 Current angle	-180.0-180.0	0.1º	INT16	R	
+15	0x108F	Not used			INT16	R	
4672-4704		**1-Second Phase Values**					
+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	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
+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	Reserved	0		UINT16	R	
+19	0x1113	Reserved	0		UINT16	R	
+20	0x1114	Reserved	0		UINT16	R	
+21	0x1115	Reserved	0		UINT16	R	
+22	0x1116	Reserved	0		UINT16	R	
+23	0x1117	Reserved	0		UINT16	R	
+24-26		Reserved	0		UINT16	R	
+27	0x111	Reserved	0		UINT16	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	B						
+28	0x111C	Reserved	0		UINT16	R	
+29	0x111D	Reserved	0		UINT16	R	
+30	0x111E	V12 Voltage	0-Vmax	U1	UINT16	R	
+31	0x111F	V23 Voltage	0-Vmax	U1	UINT16	R	
+32	0x1120	V31 Voltage	0-Vmax	U1	UINT16	R	
4736-4747		**1-Second Low Phase Values**					
+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	Reserved	0		UINT16	R	
+8	0x1208	Reserved	0		UINT16	R	
+9	0x1209	Reserved	0		UINT16	R	
+10	0x120A	Reserved	0		UINT16	R	
+11	0x120B	Low L-L voltage	0-Vmax	U1	UINT16	R	
4800-4811		**1-Second High Phase Values**					
+0	0x1300	High L-N voltage	0-Vmax	U1	UINT16	R	
+1	0x1301	High current	0-Imax	U2	UINT16	R	
+2	0x130	High kW	-Pmax-Pmax	U3	INT16	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	2						
+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	Reserved	0		UINT16	R	
+8	0x1308	Reserved	0		UINT16	R	
+9	0x1309	Reserved	0		UINT16	R	
+10	0x130A	Reserved	0		UINT16	R	
+11	0x130B	High L-L voltage	0-Vmax	U1	UINT16	R	
4864-4873		**1-Second Total Values**					
+0	0x1400	Total kW	-Pmax-Pmax	U3	INT16	R	
+1	0x1401	Total kvar	-Pmax-Pmax	U3	INT16	R	
+2	0x1402	Total kVA	0-Pmax	U3	UINT16	R	
+3	0x1403	Total PF	-1.000-1.000	0.001	INT16	R	
+4	0x1404	Total PF lag	0-1.000	0.001	UINT16	R	
+5	0x1405	Total PF lead	0-1.000	0.001	UINT16		
+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		**1-Second Auxiliary Values**					
+0	0x100	Not used			UINT16	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	0						
+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		**Present Demands**					
+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	
+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	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
+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		**Total Energies**					
+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	0x170	Not used			INT32	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	6						
+14,15	0x1707	Not used			UINT32	R	
+16,17	0x1708	kVAh total	0-999,999,999	0.1 kVAh	UINT32	R	
5088-5095		**Billing Summary Registers**					
+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	
7104-7120		**Maximum Demands**					
+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	
7488-7499		**Billing TOU Register #1**					
+0,1	0x3D00	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
+2,3	0x3D 01	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x3D 02	Tariff #3 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x3D 03	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x3D 04	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x3D 05	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
7552-7563		**Billing TOU Register #2**					
+0,1	0x3E0 0	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x3E0 1	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x3E0 2	Tariff #3 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x3E0 3	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x3E0 4	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x3E0 5	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
7616-7627		**Billing TOU Register #3**					
+0,1	0x3F0 0	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x3F0 1	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x3F0 2	Tariff #3 register	0-999,999,999	0.1 kWh	UINT32	R	
+6,7	0x3F0 3	Tariff #4 register	0-999,999,999	0.1 kWh	UINT32	R	
+8,9	0x3F0 4	Tariff #5 register	0-999,999,999	0.1 kWh	UINT32	R	
+10,11	0x3F0 5	Tariff #6 register	0-999,999,999	0.1 kWh	UINT32	R	
7680-7691		**Billing TOU Register #4**					
+0,1	0x400 0	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x400 1	Tariff #2 register	0-999,999,999	0.1 kWh	UINT32	R	
+4,5	0x400	Tariff #2 register	0-999,999,999	0.1	UINT32	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	2			kWh			
+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	
8000-8003		**Billing Summary Accumulated Demands**					
+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	
8032-8035		**Billing Summary Block Demands**					
+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	
8064-8067		**Billing Summary Sliding Window Demands**					
+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	
8160-8163		**Billing Summary Maximum Demands**					
+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	0x478	Summary register #4	0-Pmax	U3	UINT16	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	3						
8192-8197		**Billing TOU Maximum Demand Register #1**					
+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	
8224-8229		**Billing TOU Maximum Demand Register #4**					
+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 #4register	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	
8256-8261		**Billing TOU Maximum Demand Register #2**					
+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	
8320-8325		**Billing TOU Maximum Demand Register #3**					
+0	0x4A0	Tariff #1 register	0-Pmax	U3	UINT16	R	

Address	Point ID	Description	Low and High Scales[1]	Units [1]	Type	R / W	Notes
	0						
+1	0x4A01	Tariff #2 register	0-Pmax	U3	UINT16	R	
+2	0x4A02	Tariff #3 register	0-Pmax	U3	UINT16	R	
+3	0x4A03	Tariff #4 register	0-Pmax	U3	UINT16	R	
+4	0x4A04	Tariff #5 register	0-Pmax	U3	UINT16	R	
+5	0x4A05	Tariff #6 register	0-Pmax	U3	UINT16	R	

[1] For volts, amps and power scales refer to Chapter 4 ”Data Scales and Units”.

3.4 32-bit Binary and Analog Values

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
11776-11777	0x0000	**None**	0		UINT32	R	
11840-11841	0x0080	**Setpoint Status SP1-SP16**	0x00000000 - 0x0000FFFF		UINT32	R	Bitmap: 0=released, 1=operated
13312-13377		**1-Cycle Phase Values**					
+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-Imax	U2	UINT32	R	
+8,9	0x0C04	I2 Current	0-Imax	U2	UINT32	R	
+10,11	0x0C05	I3 Current	0-Imax	U2	UINT32	R	
+12,13	0x0C06	kW L1	-Pmax-Pmax	U3	INT32	R	
+14,15	0x0C07	kW L2	-Pmax-Pmax	U3	INT32	R	
+16,17	0x0C08	kW L3	-Pmax-Pmax	U3	INT32	R	
+18,19	0x0C09	kvar L1	-Pmax-Pmax	U3	INT32	R	
+20,21	0x0C0A	kvar L2	-Pmax-Pmax	U3	INT32	R	
+22,23	0x0C0B	kvar L3	-Pmax-Pmax	U3	INT32	R	
+24,25	0x0C0C	kVA L1	0-Pmax	U3	UINT32	R	
+26,27	0x0C0D	kVA L2	0-Pmax	U3	UINT32	R	
+28,29	0x0C0E	kVA L3	0-Pmax	U3	UINT32	R	
+30,31	0x0C0F	Power factor L1	-1000-1000	×0.001	INT32	R	
+32,33	0x0C1	Power factor L2	-1000-1000	×0.00	INT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	0			1			
+34,35	0x0C11	Power factor L3	-1000-1000	×0.001	INT32	R	
+36,37	0x0C12	Reserved	0		UINT32	R	
+38,39	0x0C13	Reserved	0		UINT32	R	
+40,41	0x0C14	Reserved	0		UINT32	R	
+42,43	0x0C15	Reserved	0		UINT32	R	
+44,45	0x0C16	Reserved	0		UINT32	R	
+46,47	0x0C17	Reserved	0		UINT32	R	
+48,49	0x0C18	Not used	0		UINT32	R	
+50,51	0x0C19	Not used	0		UINT32	R	
+52,53	0x0C1A	Not used	0		UINT32	R	
+54,55	0x0C1B	Reserved	0		UINT32	R	
+56,57	0x0C1C	Reserved	0		UINT32	R	
+58,59	0x0C1D	Reserved	0		UINT32	R	
+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		**1-Cycle Low Phase Values**					
+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	0x0D	Low kvar	-Pmax-Pmax	U3	INT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	03						
+8,9	0x0D 04	Low kVA	0-Pmax	U3	UINT32	R	
+10,11	0x0D 05	Low PF Lag	0-1000	×0.00 1	UINT32	R	
+12,13	0x0D 06	Low PF Lead	0-1000	×0.00 1	UINT32	R	
13568-13581		**1-Cycle High Phase Values**					
+0,1	0x0E0 0	High L-N voltage	0-Vmax	U1	UINT32	R	
+2,3	0x0E0 1	High current	0-Imax	U2	UINT32	R	
+4,5	0x0E0 2	High kW	-Pmax-Pmax	U3	INT32	R	
+6,7	0x0E0 3	High kvar	-Pmax-Pmax	U3	INT32	R	
+8,9	0x0E0 4	High kVA	0-Pmax	U3	UINT32	R	
+10,11	0x0E0 5	High PF Lag	0-1000	×0.00 1	UINT32	R	
+12,13	0x0E0 6	High PF Lead	0-1000	×0.00 1	UINT32	R	
13696-13715		**1-Cycle Total Values**					
+0,1	0x0F0 0	Total kW	-Pmax-Pmax	U3	INT32	R	
+2,3	0x0F0 1	Total kvar	-Pmax-Pmax	U3	INT32	R	
+4,5	0x0F0 2	Total kVA	0-Pmax	U3	UINT32	R	
+6,7	0x0F0 3	Total PF	-1000-1000	×0.00 1	INT32	R	
+8,9	0x0F0 4	Total PF lag	0-1000	×0.00 1	UINT32	R	
+10,11	0x0F0 5	Total PF lead	0-1000	×0.00 1	UINT32		
+12,13	0x0F0 6	Total kW import	0-Pmax	U3	UINT32		
+14,15	0x0F0 7	Total kW export	0-Pmax	U3	UINT32	R	
+16,17	0x0F0	Total kvar import	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	8						
+18,19	0x0F09	Total kvar export	0-Pmax	U3	UINT32	R	
13824-13833		**1-Cycle Auxiliary Values**					
+0,1	0x1500	Not used			UINT32	R	
+2,3	0x1501	In (neutral) Current	0-Imax	U2	UINT32	R	
+4,5	0x1502	Frequency	4500 – 6500	×0.01 Hz	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		**Phasor**					
+0,1	0x1080	V1 Voltage magnitude	0-Vmax	U1	UINT32	R	
+2,3	0x1081	V2 Voltage magnitude	0-Vmax	U1	UINT32	R	
+4,5	0x1082	V3 Voltage magnitude	0-Vmax	U1	UINT32	R	
+6,7	0x1083	Not used			UINT32	R	
+8,9	0x1084	I1 Current magnitude	0-Imax	U2	UINT32	R	
+10,11	0x1085	I2 Current magnitude	0-Imax	U2	UINT32	R	
+12,13	0x1086	I3 Current magnitude	0-Imax	U2	UINT32	R	
+14,15	0x1087	Not used			UINT32	R	
+16,17	0x1088	V1 Voltage angle	-1800-1800	×0.1º	INT32	R	
+18,19	0x1089	V2 Voltage angle	-1800-1800	×0.1º	INT32	R	
+20,21	0x108A	V3 Voltage angle	-1800-1800	×0.1º	INT32	R	
+22,23	0x108B	Not used			INT32	R	
+24,25	0x108	I1 Current angle	-1800-1800	×0.1º	INT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	C						
+26,27	0x108 D	I2 Current angle	-1800-1800	×0.1º	INT32	R	
+28,29	0x108 E	I3 Current angle	-1800-1800	×0.1º	INT32	R	
+30,31	0x108 F	Not used			INT32	R	
13952-14017		**1-Second Phase Values**					
+0,1	0x110 0	V1 Voltage	0-Vmax	U1	UINT32	R	
+2,3	0x110 1	V2 Voltage	0-Vmax	U1	UINT32	R	
+4,5	0x110 2	V3 Voltage	0-Vmax	U1	UINT32	R	
+6,7	0x110 3	I1 Current	0-Imax	U2	UINT32	R	
+8,9	0x110 4	I2 Current	0-Imax	U2	UINT32	R	
+10,11	0x110 5	I3 Current	0-Imax	U2	UINT32	R	
+12,13	0x110 6	kW L1	-Pmax-Pmax	U3	INT32	R	
+14,15	0x110 7	kW L2	-Pmax-Pmax	U3	INT32	R	
+16,17	0x110 8	kW L3	-Pmax-Pmax	U3	INT32	R	
+18,19	0x110 9	kvar L1	-Pmax-Pmax	U3	INT32	R	
+20,21	0x110 A	kvar L2	-Pmax-Pmax	U3	INT32	R	
+22,23	0x110 B	kvar L3	-Pmax-Pmax	U3	INT32	R	
+24,25	0x110 C	kVA L1	0-Pmax	U3	UINT32	R	
+26,27	0x110 D	kVA L2	0-Pmax	U3	UINT32	R	
+28,29	0x110 E	kVA L3	0-Pmax	U3	UINT32	R	
+30,31	0x110 F	Power factor L1	-1000-1000	×0.00 1	INT32	R	
+32,33	0x111	Power factor L2	-1000-1000	×0.00	INT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	0			1			
+34,35	0x1111	Power factor L3	-1000-1000	×0.001	INT32	R	
+36,37	0x1112	Reserved	0		UINT32	R	
+38,39	0x1113	Reserved	0		UINT32	R	
+40,41	0x1114	Reserved	0		UINT32	R	
+42,43	0x1115	Reserved	0		UINT32	R	
+44,45	0x1116	Reserved	0		UINT32	R	
+46,47	0x1117	Reserved	0		UINT32	R	
+48,49	0x1118	Not used	0		UINT32	R	
+50,51	0x1119	Not used	0		UINT32	R	
+52,53	0x111A	Not used	0		UINT32	R	
+54,55	0x111B	Reserved	0		UINT32	R	
+56,57	0x111C	Reserved	0		UINT32	R	
+58,59	0x111D	Reserved	0		UINT32	R	
+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		**1-Second Low Phase Values**					
+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	0x120	Low kvar	-Pmax-Pmax	U3	INT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	3						
+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		**1-Second High Phase Values**					
+0,1	0x1300	High L-N voltage	0-Vmax	U1	UINT32	R	
+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		**1-Second Total Values**					
+0,1	0x1400	Total kW	-Pmax-Pmax	U3	INT32	R	
+2,3	0x1401	Total kvar	-Pmax-Pmax	U3	INT32	R	
+4,5	0x1402	Total kVA	0-Pmax	U3	UINT32	R	
+6,7	0x1403	Total PF	-1000-1000	×0.001	INT32	R	
+8,9	0x1404	Total PF lag	0-1000	×0.001	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	0x140	Total kvar import	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	8						
+18,19	0x1409	Total kvar export	0-Pmax	U3	UINT32	R	
14464-14473		**1-Second Auxiliary Values**					
+0,1	0x1500	Not used			UINT32	R	
+2,3	0x1501	In (neutral) Current	0-Imax	U2	UINT32	R	
+4,5	0x1502	Frequency	4500 – 6500	×0.01 Hz	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		**Present Demands**					
+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	0x160	Not used	0		UINT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	C						
+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	
+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		**Total Energies**					
+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	0x170	Not used			INT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	2						
+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		**Billing Summary Registers**					
+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	
18816-18839		**Maximum Demands**					
+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	V2 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	Not used	0	U2	UINT32	R	
+12,13	0x3706	Not used	0		UINT32	R	
+14,15	0x3707	Not used	0		UINT32	R	
+16,17	0x370	Not used	0		UINT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	8						
+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	
19456-19459		**Energy/TOU Parameters**					
+0,1	0x3C00	Active tariff	0-15		UINT32	R	
+2,3	0x3C01	Active profile	0-15		UINT32	R	
19584-19595		**Billing TOU Register #1**					
+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	
19712-19723		**Billing TOU Register #2**					
+0,1	0x3E00	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	
+2,3	0x3E0	Tariff #2 register	0-999,999,999	0.1	UINT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	1			kWh			
+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	
19840-19851		**Billing TOU Register #3**					
+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	
19968-19979		**Billing TOU Register #4**					
+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 #3 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	
20608-20615		**Billing Summary Accumulated Demands**					
+0,1	0x4500	Summary register #1	0-Pmax	U3	UINT32	R	
+2,3	0x450	Summary register #2	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	1						
+4,5	0x4502	Summary register #3	0-Pmax	U3	UINT32	R	
+6,7	0x4503	Summary register #4	0-Pmax	U3	UINT32	R	
20736-20743		**Billing Summary Sliding Window Demands**					
+0,1	0x4600	Summary register #1	0-Pmax	U3	UINT32	R	
+2,3	0x4601	Summary register #2	0-Pmax	U3	UINT32	R	
+4,5	0x4602	Summary register #3	0-Pmax	U3	UINT32	R	
+6,7	0x4603	Summary register #4	0-Pmax	U3	UINT32	R	
20928-20935		**Billing Summary Maximum Demands**					
+0,1	0x4780	Summary register #1	0-Pmax	U3	UINT32	R	
+2,3	0x4781	Summary register #2	0-Pmax	U3	UINT32	R	
+4,5	0x4782	Summary register #3	0-Pmax	U3	UINT32	R	
+6,7	0x4783	Summary register #4	0-Pmax	U3	UINT32	R	
20992-21003		**Billing TOU Maximum Demand Register #1**					
+0,1	0x4800	Tariff #1 register	0-Pmax	U3	UINT32	R	
+2,3	0x4801	Tariff #2 register	0-Pmax	U3	UINT32	R	
+4,5	0x4802	Tariff #3 register	0-Pmax	U3	UINT32	R	
+6,7	0x4803	Tariff #4 register	0-Pmax	U3	UINT32	R	
+8,9	0x4804	Tariff #5 register	0-Pmax	U3	UINT32	R	
+10,11	0x4805	Tariff #6 register	0-Pmax	U3	UINT32	R	
21120-21131		**Billing TOU Maximum Demand Register #2**					
+0,1	0x490	Tariff #1 register	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	0						
+2,3	0x4901	Tariff #2 register	0-Pmax	U3	UINT32	R	
+4,5	0x4902	Tariff #3 register	0-Pmax	U3	UINT32	R	
+6,7	0x4903	Tariff #4 register	0-Pmax	U3	UINT32	R	
+8,9	0x4904	Tariff #5 register	0-Pmax	U3	UINT32	R	
+10,11	0x4905	Tariff #6 register	0-Pmax	U3	UINT32	R	
21248-21259		**Billing TOU Maximum Demand Register #3**					
+0,1	0x4A00	Tariff #1 register	0-Pmax	U3	UINT32	R	
+2,3	0x4A01	Tariff #2 register	0-Pmax	U3	UINT32	R	
+4,5	0x4A02	Tariff #3 register	0-Pmax	U3	UINT32	R	
+6,7	0x4A03	Tariff #4 register	0-Pmax	U3	UINT32	R	
+8,9	0x4A04	Tariff #5 register	0-Pmax	U3	UINT32	R	
+10,11	0x4A05	Tariff #6 register	0-Pmax	U3	UINT32	R	
21056-21067		**Billing TOU Maximum Demand Register #4**					
+0,1	0x4880	Tariff #1 register	0-Pmax	U3	UINT32	R	
+2,3	0x4881	Tariff #2 register	0-Pmax	U3	UINT32	R	
+4,5	0x4882	Tariff #3 register	0-Pmax	U3	UINT32	R	
+6,7	0x4883	Tariff #4 register	0-Pmax	U3	UINT32	R	
+8,9	0x4884	Tariff #5 register	0-Pmax	U3	UINT32	R	
+10,11	0x4885	Tariff #6 register	0-Pmax	U3	UINT32	R	
		Generic TOU Season Energy Registers ID's					Point references
	0x7000	Tariff #1 register	0-999,999,999	0.1 kWh	UINT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
	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	
		Generic TOU Season Maximum Demand Registers ID's					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	

[1] 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[1]	Units [1]	Type	R / W	Notes
37504-37519		**Billing Summary Maximum Demands**					
+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	
37632-37699		**Maximum Demands**					
+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 +22,23	0x3705	I2 Maximum ampere demand Timestamp	0-Imax	U2 sec	UINT32 UINT32	R 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	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
+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	
38144-38167		**Billing TOU Maximum Demand Register #1**					
+0,1 +2,3	0x4800	Tariff #1 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4801	Tariff #2 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+8,9 +10,11	0x4802	Tariff #3 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+12,13 +14,15	0x4803	Tariff #4 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+16,17 +18,19	0x4804	Tariff #5 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+20,21 +22,23	0x4805	Tariff #6 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38400-38423		**Billing TOU Maximum Demand Register #2**					
+0,1 +2,3	0x4900	Tariff #1 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4901	Tariff #2 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+8,9 +10,11	0x4902	Tariff #3 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+12,13 +14,15	0x4903	Tariff #4 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+16,17 +18,19	0x4904	Tariff #5 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+20,21 +22,23	0x4905	Tariff #6 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38656-38679		**Billing TOU Maximum Demand Register #3**					
+0,1 +2,3	0x4A00	Tariff #1 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5	0x4A0	Tariff #2 register	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range[1]	Units [1]	Type	R / W	Notes
+6,7	1	Timestamp		sec	UINT32	R	
+8,9 +10,11	0x4A02	Tariff #3 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+12,13 +14,15	0x4A03	Tariff #4 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+16,17 +18,19	0x4A04	Tariff #5 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+20,21 +22,23	0x4A05	Tariff #6 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
38272-38295		**Billing TOU Maximum Demand Register #4**					
+0,1 +2,3	0x4880	Tariff #1 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4,5 +6,7	0x4881	Tariff #2 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+8,9 +10,11	0x4882	Tariff #3 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+12,13 +14,15	0x4883	Tariff #4 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+16,17 +18,19	0x4884	Tariff #5 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+20,21 +22,23	0x4885	Tariff #6 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	

[1] For volts, amps and power scales refer to Chapter 4 ”Data Scales and Units”.

3.6 Device Control and Status Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
Reset/Clear Registers							
44103		Clear maximum demands	**Individual for each submeter** 0 = clear all maximum demands 1 = clear power demands 2 = clear volt and ampere demands 3 = clear volt demands 4 = clear ampere demands **All submeters** 129 = clear all maximum demands 130 = clear power demands 132 = clear volt and ampere demands		UINT16	W	
44105		Clear Billing/TOU maximum demands	0 = Individual submeter 7 = All submeters		UINT16	W	
44108		Clear operation/event counters	6 = clear communication counters		UINT16	W	Individual for each submeter
Setpoint Status Registers							
44294		Setpoints 1-4 status (bitmap: 0=released, 1=operated)	0x00000000 - 0x0000000F		UINT32	R	Individual for each submeter
Setpoint Alarm Latch Registers							
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					
Device Diagnostics Register							
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. Write: 0=clear diagnostic bit, 1=no effect.	F23		UINT32	R/W	Shared across all submeters
44328-44341		Reserved					

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
Port Identification Registers							
44342		Current port number	0=COM1, 1=COM2		UINT16	R	
44343		Communication interface	0=RS-232, 1=RS-422, 2=RS-485, 3=Infrared, 4=Dial-Up Modem, 5=RF Modem, 6=Ethernet, 8=GSM/GPRS		UINT16	R	
Current Network Settings							
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					
Device Authorization Register							
44378-44379		When write: 8-digit password. When read: 0 = access permitted, -1 = authorization required.	0 - 99999999 (write) 0/-1 (read)		INT32	R/W	
Communication Status							
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
Communication Counters							
44410		Successful eXpertPower client connections	0-65534		UINT16	R	
44411		Failed eXpertPower client connections	0-65534		UINT16	R	
44412		Successful TCP notification client connections	0-65534		UINT16	R	
44413		Failed TCP notification client connections	0-65534		UINT16	R	
44414-44441		Reserved			UINT16	R	65535 = N/A
Factory Diagnostic Registers							
45952-46079		Factory diagnostic registers			UINT32	R	

3.7 Device Setup Registers

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
Control/Alarm Setpoints Setup							
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		**Setpoint #1**					
2584-2591		**Setpoint #2**					
2592-2599		**Setpoint #3**					
2600-2607		**Setpoint #4**					
Factory Device Settings and Identification							
46080-46207							Shared across all submeters
+0, 1		Device serial number			UINT32	R	
+2, 3		Device model ID	136/036		UINT32	R	
+4-11		Device model name	“BFM136/036”		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	

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
+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	
Basic Setup							
46208-46271							Shared across all submeters
+0		Wiring mode	1 = 4LN3 (4-wire WYE)		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	Not used
+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	
Demands Setup							
46240-46255							Shared across all submeters
+0		Power block demand period	1, 2, 3, 5, 10, 15, 30, 60	min	UINT16	R/W	
+1		Number of blocks in a sliding window	1-15		UINT16	R/W	
+2-7		Reserved			UINT16	R/	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
						W	
+8		Volt demand period	0-9000	sec	UINT16	R/W	
+9		Ampere demand period	0-9000	sec	UINT16	R/W	
Device Options Setup							
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 = $0.1x10^6$, 3 = $0.1x10^7$, 4 = $0.1x10^8$, 5 = $0.1x10^9$		UINT16	R/W	
+2-6		Reserved			UINT16	R/W	
+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	× 0.01 Wh	UINT16	R/W	
+9		Reserved			UINT16	R/W	
+10		Wh LED pulse source	0 = disabled, 1-40 = submeter		UINT16	R/W	
+11-143		Reserved			UINT16	R/W	
Local Settings							
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	
+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	

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
+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		
Clock Setup and Status							
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		

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
Communication Ports Setup							
46448-46575							Shared across all submeters
+0		Communication protocol	0=Modbus RTU, 1=Modbus ASCII		UINT16	R/W	
+1		Communication interface	0=RS-232, 1=RS-422, 2=RS-485, 3=Infrared, 4=Dial-Up Modem, 5=RF Modem		UINT16	R/W	
+2		Device reference address	1-247		UINT16	R/W	
+3		Baud rate	1=300 bps, 2=600 bps, 3=1200 bps, 4=2400 bps, 5=4800 bps, 6=9600 bps, 7=19200 bps, 8=38400 bps, 9=57600 bps, 10=115200 bps		UINT16	R/W	
+4		Data format	0=7 bits/even parity, 1=8 bits/no parity, 2=8 bits/even parity		UINT16	R/W	
+5		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 time-out	0-1000 (default = 4-character time)	ms	UINT16	R/W	
+9-15		Reserved					
46448-46463		**COM1 Setup**					
46464-46479		**COM2 Setup**					
46480-46575		Reserved					
Network Setup							
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/	Network byte order

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
						W	
+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					
RF Modem Setup							
46608-46639							Shared across all submeters
+0		MAC net ID	0-255		UINT16	R/ W	Read as 0
+1		MAC node ID	1-255		UINT16	R/ W	Read as 0
+2		Net cluster ID	0-255		UINT16	R/ W	Read as 0
+3		Net node ID	1-255		UINT16	R/ W	Read as 0
+4		Node type	0=master, 1=RN+, 2= RN-, 3=RFD		UINT16	R/ W	Read as 0
+5		RF channel	0=907MHz, 1=910MHz, 2= 912MHz, 3=915MHz, 4=917MHz, 5=920MHz, 6=922MHz		UINT16	R/ W	Read as 0
+6		RF send power	0–255 (2=-20dBm, 9=-10dBm, 160=0dBm, 255=4dBm)		UINT16	R/ W	Read as 0
+7		Number of cluster child nodes (master only)	0-255		UINT16	R/ W	Read as 0
+8		Network cluster tree depth (master only)	0-255		UINT16	R/ W	Read as 0
+9		Network routing algorithm (master only)	0=AODV (Ad-hoc on-demand vector), 1=cluster tree, 2=hybrid (cluster tree + AODV)		UINT16	R/ W	Read as 0
+10-31		Reserved					
46640-46703		**Reserved**					
Password Setup							
46704-46715							Shared across all submeters
+0, 1		Communications password (8 digits)	0 - 99999999		UINT32	R/	Read as 0

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
						W	
+2		Password protection enable	0 = disabled, 1 = enabled		UINT16	R/ W	
+3		Reserved			UINT16	R/ W	
+4-11		Local Login name	“”		CHAR16	R/ W	Null-terminated string
46712-46767		Reserved					
Expert Power Service Setup							
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		Not used			UINT32	R	
+10,11		Not used			UINT32	R	
+12,13		Connection idle timeout	1-120	min	UINT32	R/ W	
+14-15		Reserved			UINT32		
Internet Service Provider (ISP) accounts							
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	
GPRS Setup							
46832-46879							Shared across all submeters
+0-15		Access Point Name (APN)			CHAR32	R/ W	
+16-31		User name			CHAR32	R/ W	
+32-39		Password			CHAR16	R/	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
						W	
+40-47		Reserved			CHAR16	R/W	
TCP Notification Client Setup							
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					
Channel Assignments							
46928-47071							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, 1-36 = I1-I36		UINT16	R/W	
+2		Submeter's phase L2 current input channel	0=not assigned, 1-36 = I1-I36		UINT16	R/W	
+3		Submeter's phase L3 current input channel	0=not assigned, 1-36 = I1-I36		UINT16	R/W	
46928-46931		**Submeter #1 channels**					
46932-46935		**Submeter #2 channels**					
		...					
47068-47071		**Submeter #36 channels**					
Transformer Correction Setup							
47072-47231							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
47072-47075		**V1 transformer correction**					
47076-47079		**V2 transformer correction**					
47080-47083		**V3 transformer correction**					
47084-47087		**Reserved**					
47088-47091		**I1 transformer correction**					
47092-47095		**I2 transformer correction**					
...		**...**					
47228-47231		**I36 transformer correction**					
Data Log #1 Setup							
54006-54037							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	
+6-31		Reserved			UINT16	R/W	
Data Log #16 (Profile Data Log) Setup							
54486-54517							Shared across all submeters
+0		Data log parameter #1 ID	0x1780		UINT16	R	Summary register #1
+1		Data log parameter #2 ID	0x7000		UINT16	R	Tariff #1 register
+2		Data log parameter #3 ID	0x7001		UINT16	R	Tariff #2 register
+3		Data log parameter #4 ID	0x7002		UINT16	R	Tariff #3 register
+4		Data log parameter #5 ID	0x7003		UINT16	R	Tariff #4 register
+5		Data log parameter #6 ID	0x7004		UINT16	R	Tariff #5 register
+6		Data log parameter #7 ID	0x7005		UINT16	R	Tariff #6 register

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
+7-31		Not used			UINT16	R	
TOU Daily Profile Setup							
55574-55701							Shared across all submeters
+0		1st tariff change	F10		UINT16	R/W	
+1		2nd tariff change	F10		UINT16	R/W	
+2		3rd tariff change	F10		UINT16	R/W	
+3		4th tariff change	F10		UINT16	R/W	
+4		5th tariff change	F10		UINT16	R/W	
+5		6th tariff change	F10		UINT16	R/W	
+6		7th tariff change	F10		UINT16	R/W	
+7		8th tariff change	F10		UINT16	R/W	
55574-55581		**Daily profile #1: Season 1, Day type 1**					
55582-55589		**Daily profile #2: Season 1, Day type 2**					
55590-55597		**Daily profile #3: Season 1, Day type 3**					
55598-55605		**Daily profile #4: Season 1, Day type 4**					
55606-55613		**Daily profile #5: Season 2, Day type 1**					
55614-55621		**Daily profile #6: Season 2, Day type 2**					
55622-55629		**Daily profile #7: Season 2, Day type 3**					
55630-55637		**Daily profile #8: Season 2, Day type 4**					
55638-55645		**Daily profile #9: Season 3, Day type 1**					
55646-55653		**Daily profile #10: Season 3, Day type 2**					
55654-55661		**Daily profile #11: Season 3, Day type 3**					

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
55662-55669		**Daily profile #12: Season 3, Day type 4**					
55670-55677		**Daily profile #13: Season 4, Day type 1**					
55678-55685		**Daily profile #14: Season 4, Day type 2**					
55686-55693		**Daily profile #15: Season 4, Day type 3**					
55694-55701		**Daily profile #16: Season 4, Day type 4**					
55702-55711		Reserved					
TOU Calendar Setup							
55712-56031							Shared across all submeters
+0-9		**Calendar entry record**				R/W	
+0		Daily profile	0-3 = Season 1, Day types 0-3 4-7 = Season 2, Day types 0-3 8-11 = Season 3, Day types 0-3 12-15 = Season 4, Day types 0-3		UINT16	R/W	
+1		Week of month	0=all, 1=1st, 2=2nd, 3=3rd, 4=4th, 5=last week of the month		UINT16	R/W	
+2		Weekday	0=all, 1-7 (Sun=1, Sat=7)		UINT16	R/W	
+3		Till Weekday	0=all, 1-7 (Sun=1, Sat=7)		UINT16	R/W	
+4		Month	0=all, 1-12=January - December		UINT16	R/W	
+5		Day of month	0=all, 1-31=day 1-31		UINT16	R/W	
+6		Till Month	0=all, 1-12=January - December		UINT16	R/W	
+7		Till Day of month	0=all, 1-31=day 1-31		UINT16	R/W	
+8-9		Reserved			UINT16	R/W	
55712-55721		**Calendar entry #1**					
55722-55731		**Calendar entry #2**					
55732-		**Calendar entry #3**					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
55741							
...							
56022-56031		**Calendar entry #32**					
56032-56191		Reserved					
Billing/TOU Registers Setup							
56672-56927							Shared across all submeters
+0		Not used			UINT16	R/W	
+1		Units of measurement	0=none, 1=kWh, 2=kvarh, 3=kVAh		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		**Register #1 Setup**					
56676-56679		**Register #2 Setup**					
56680-56683		**Register #3 Setup**					
56684-56687		**Register #4 Setup**					
56688-56927		Reserved					
Billing/TOU Registers Source Setup							
56928-57183							Shared across all submeters
+0		Energy source ID	F11		UINT16	R/W	
+1		Target summary register/submeter	0-3=register #1-4, 0x7F00-0x7F27=submeter #1-#40		UINT16	R/W	
+2, 3		Multiplier	0-1000000	×0.001	INT32	R/W	
56928-		**Energy Source #1**					

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
56931							
56932-56935		**Energy Source #2**					
56936-56939		**Energy Source #3**					
56940-56943		**Energy Source #4**					
56944-57183		Reserved					

3.8 File Transfer Blocks

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
File Transfer Control Blocks							
63120-63151		**File Request Block**					
+0		File function	1 = ACK - acknowledgement 3 = set file position 5 = reset file position 7 = find 11 = read file		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 µsec		µsec	UINT32	R/W	Note 3
+12,13		Find key: End time, seconds since 1/1/1970	F1	sec	UINT32	R/W	Note 3
+14,15		Find key: End time, fractional seconds in µsec		µsec	UINT32	R/W	Note 3
+16-31		Reserved			UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
63152-64943		**File Response Block**					
		Data transfer area [0 – 1791]			UINT16	R	
64944-64951		**File Info Request Block**					
+0		File function	9 = read file info		UINT16	R/W	
+1		File ID	F2		UINT16	R/W	
+2		Section number	0-31, 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		**File Info Response Block**					
		Data transfer area [0 - 199]			UINT16	R	

NOTES:

1. 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
File Info Response Block (Variation 0 – File info)							
64952-64959		**Block Heading**					
+0		File function	9		UINT16	R	
+1		File ID	16		UINT16	R	
+2		Section number	0-31		UINT16	R	
+3		Section channel ID	F6, F7		UINT16	R	
+4		Number of records in the block	1		UINT16	R	
+5		Record size, words	36		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
64960-64997		**File Info**					
+0		File type	0		UINT16	R	
+1		File attributes	F3		UINT16	R	
+2		File (section) status	F4		UNT16	R	
+3		Number of sections in the file	0-32		UINT16	R	0 = non-partitioned file
+4,5		File channel mask (channels 1-32), bitmap	F8, F9		UINT32	R	
+6,7		File channel mask (channels 33-64), bitmap	F8, F9		UINT32	R	
+8		Number of records in the file	0-65535		UINT16	R	
+9		Number of records until the end of the file	0-65535		UINT16	R	
+10		Current record (read position) sequence number	0-65535		UINT16	R	
+11		Current write position sequence number	0-65535		UINT16	R	
+12		First (oldest) record sequence number	0-65535		UINT16	R	
+13		Last (newest) record sequence number	0-65535		UINT16	R	
+14,15		Last record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+16,17		Last record time, fractional seconds		µsec	UINT32	R	
+18,19		First record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+20,21		First record time, fractional seconds		µsec	UINT32	R	
+22,23		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	
+33		File record size, bytes		Byte	UINT16	R	
+34,35		Allocated file size, bytes		Byte	UINT32	R	

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
File Info Response Block (Variation 1 – Current record info)							
64952-64959		**Block Heading**					
+0		File function	9		UINT16	R	
+1		File ID	16		UINT16	R	
+2		Section number	0-31		UINT16	R	
+3		Section channel ID	F6, F7		UINT16	R	
+4		Number of records in the block	1		UINT16	R	
+5		Record size, words	8		UINT16	R	
+6		Request variation	1		UINT16	R	
+7		Reserved	0		UINT16	R	
64960-64997		**File Info**					
+0		File (section) status	F4		UNT16	R	
+1		Number of records in the file	0-65535		UINT16	R	
+2		Number of records until the end of the file	0-65535		UINT16	R	
+3		Current record (read position) sequence number	0-65535		UINT16	R	
+4,5		Current record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+6,7		Current record time, fractional seconds		µsec	UINT32	R	
File Info Response Block (Variation 2 – Data log record structure)							
64952-64959		**Block Heading**					
+0		File function	9		UINT16	R	
+1		File ID	1		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		**File Info**					
+0		Not used	0		UINT16	R	
+1		Number of fields in a data record	1-5		UINT16	R	
+2		Field 1 ID			UINT16	R	
+3		Field 2 ID			UINT16	R	
+4		Field 3 ID			UINT16	R	
+5		Field 4 ID			UINT16	R	
+6		Field 5 ID			UINT16	R	
+7		Field 6 ID			UINT16	R	
+8-17		Not used			UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
File Info Response Block (Variation 2 – Profile data log record structure)							
64952-64959		**Block Heading**					
+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	
+5		Record size, words	18		UINT16	R	
+6		Request variation	2		UINT16	R	
+7		Reserved	0		UINT16	R	
64960-64997		**File Info**					
+0		Not used	0		UINT16	R	
+1		Number of fields in a data record	1-5		UINT16	R	
+2		Field 1 ID	0x1780-0x1783		UINT16	R	Summary register #1-#4
+3		Field 2 ID	0x7000		UINT16	R	Tariff #1 register
+4		Field 3 ID	0x7001		UINT16	R	Tariff #2 register
+5		Field 4 ID	0x7002		UINT16	R	Tariff #3 register
+6		Field 5 ID	0x7003		UINT16	R	Tariff #4 register
+7		Field 6 ID	0x7004		UINT16	R	Tariff #5 register
+8		Field 7 ID	0x7005		UINT16	R	Tariff #6 register
+9-17		Not used			UINT16	R	
Event Log Response Block							
63152-63159		**Block Heading**					
+0		Last file function	1, 3, 5, 11		UINT16	R	
+1		File ID	0		UINT16	R	
+2		Section number	0		UINT16	R	
+3		Section channel ID	0		UINT16	R	
+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		**Event Log Records**					
+0		Record status	F5		INT16	R	
+1		Record sequence number	0-65535		UINT16	R	
+2,3		Trigger time, seconds since 1/1/1970	F1	sec	UINT32	R	
+4,5		Trigger time, fractional seconds in µsec		µsec	UINT32	R	
+6		Event number	1-65535		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
+7		Event point/source ID	F19		UINT16	R	
+8		Event effect	F20		UINT16	R	
+9		Reserved	0		UINT16	R	
+10,11		Value triggered			INT32	R	
63160-63171		**Record #1**					
		...					
63532-63543		**Record #32**					
Data Log Response Block							
63152-63159		**Block Heading**					
+0		Last file function	1, 3, 5, 11		UINT16	R	
+1		File ID	1		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 + 2× Number of parameters		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
63160-64439		**Data Log Records**					
+0		Record status	F5		INT16	R	
+1		Record sequence number	0-65535		UINT16	R	
+2,3		Record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+4,5		Record time, fractional seconds in µsec		µsec	UINT32	R	
+6		Trigger event type	F22		INT16	R	
+7		Trigger event number	0		UINT16	R	
+8,9		Log value #1			INT32	R	
+10,11		Log value #2			INT32	R	
		...				R	
63160-...		**Record #1** (variable length)					
		...					
		Record #16 (variable length)					
Profile Data Log Response Block							
63152-63159		**Block Heading**					
+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	

Address	Point ID	Description	Options/Range	Units	Type	R / W	Notes
+4		Number of records in the block	1-16		UINT16	R	
+5		Record size, words	10-18		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
63160-64439		**Data Log Records**					
+0		Record status	F5		INT16	R	
+1		Record sequence number	0 - 65535		UINT16	R	
+2,3		Record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+4,5		Record time, fractional seconds in µsec		µsec	UINT32	R	
+6		Trigger event type	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	
63160-...		**Record #1** (variable length)					
		...					
		Record #16 (variable length)					

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.

3.9 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				**Energy Register #1**				
	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	
...				...				
3/3				**Energy Register #4**				
	1	REG4	0x1783	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	0x7	Tariff #4 energy reading	0-	0.1 kWh	UINT	

File Channel/Section [1]	Record Field No. [2]	Point Label	Point ID	Description	Range	Units [3]	Type	Notes
			003		999,999,999		32	
	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	
16/4				**Daily Maximum Demand Register #1**				
	1	REG1 MD	0x4780	Summary (total) max. demand reading	0-Pmax	U3	UINT32	
	2	TRF1 MD	0x7100	Tariff #1 max. demand reading	0-Pmax	U3	UINT32	
	3	TRF2 MD	0x7101	Tariff #2 max. demand reading	0-Pmax	U3	UINT32	
	4	TRF3 MD	0x7102	Tariff #3 max. demand reading	0-Pmax	U3	UINT32	
	5	TRF4 MD	0x7103	Tariff #4 max. demand reading	0-Pmax	U3	UINT32	
	6	TRF5 MD	0x7104	Tariff #5 max. demand reading	0-Pmax	U3	UINT32	
	7	TRF6 MD	0x7105	Tariff #6 max. demand reading	0-Pmax	U3	UINT32	
...				...				
19/7				**Daily Maximum Demand Register #4**				
	1	REG4 MD	0x4783	Summary (total) max. demand reading	0-Pmax	U3	UINT32	
	2	TRF1 MD	0x7100	Tariff #1 max. demand reading	0-Pmax	U3	UINT32	
	3	TRF2 MD	0x7101	Tariff #2 max. demand reading	0-Pmax	U3	UINT32	
	4	TRF3 MD	0x7102	Tariff #3 max. demand reading	0-Pmax	U3	UINT32	
	5	TRF4 MD	0x7103	Tariff #4 max. demand reading	0-Pmax	U3	UINT32	
	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	

[1] 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.

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

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

4 Data Scales and Units

Code	Condition	Value/Range	Notes
Data Scales			
Vmax		Voltage scale × PT Ratio, V	1
Imax		CT Primary current × 2, A	
Pmax		Vmax × Imax × 2, W	2
Data Units			
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	

1 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.

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

5 Data Formats

Format Code	Value	Description	Notes
Timestamp			
F1		Local time in a UNIX-style format. Represents the number of seconds since midnight (00:00:00), January 1, 1970. The time is valid after January 1, 2000.	
File ID			
F2	0	Event log	
	1	Data log	
	16	Daily profile log file	
File Attributes			
F3	Bit 0	0=Non-wrap (stop when filled), 1=Wrap-around (circular file)	
	Bit 5 = 1	TOU daily profile log	
File Status Word			
F4	Bit 0 = 1	The last record of the file is being read	
	Bit 8 = 1	File is empty	
	Bit 9 = 1	Reading after EOF	
	Bit 10 = 1	Corrupted record (CRC error)	
	Bit 11 = 1	No file section found for the requested channel	
	Bit 12 = 1	Reading after the end of a data block	
	Bit 13 = 1	File is not accessible	
	Bit 14 = 1	Record not found	
	Bit 15 = 1	Generic read error (with one of the bits 8-14)	
File Record Status Word			
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)	
Billing/TOU Profile Log Channel ID			
F6	0-3	Billing/TOU energy registers #1-#4	
	16-19	Billing/TOU maximum demand registers #1-#4	
Billing/TOU Profile Log Channel Mask			
F8	Bit 0:15 = 1	Billing/TOU energy registers #1-#4	
	Bit 16:31 = 1	Billing/TOU maximum demand registers #1-#4	
TOU Tariff Change Time			
F10	Bits 8:15 = 0-5	Tariff number #1-#6	
	Bits 2:7 = 0-23	Tariff start hour	
	Bits 0:1 = 0-3	Tariff start quarter of an hour	
Billing Register Source ID			
F11	0x0000	None	
	0x1700	kWh import	
	0x1701	kWh export	
	0x1704	kvarh import	
	0x1705	kvarh export	
	0x1708	kVAh total	
	0x7F00-0x7F27	Submeter #1-#40	
Setpoint Trigger Parameters ID			
F12	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	

Format Code	Value	Description	Notes
	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	
Setpoint Action ID			
F14	0x5100	Send event notification	
	0x7000	Event log	
	0x7100	Data log	
Event Source/Point ID			
F19		**Setpoint Operation Events**	
	0x0000-0x59FF	Trigger parameter ID	
	0x6400-0xFFFF	Trigger parameter ID	
		Setpoint Action Events	
	0x5A00-0x5A0F	Setpoint #1-#16	
		Communications Events	
	0x5B00-0x5BFF	Data/Function point ID (low byte, see F21)	
		Self-Check Diagnostics Events	
	0x5D00-0x5DFF	Data/Function point ID (low byte, see F21)	
		Self-Update Events	
	0x5E08	RTC DST/Standard time update	
		Run-time Error	
	0x6014	Library error	
	0x6015	RTOS Kernel error	
	0x6016	Task error	
		Hardware Diagnostics Events	
	0x6202	RAM/Data error	
	0x6203	CPU watchdog reset	
	0x6204	Sampling fault	
	0x6205	CPU exception	
	0x6206	Reserved	
	0x6207	Software watchdog reset	
	0x620E	Expanded memory/Data flash memory fault	
	0x620F	CPU EEPROM fault	
		External Events	
	0x6300	Power down	
	0x6308	Power up	
	0x6309	External reset	
Event Effect ID			
F20		**Communications/Self-check Events**	
	0x0000	None	
	0x6000	Total energy registers cleared	
	0x6100	Maximum demands cleared	
	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	

Format Code	Value	Description	Notes
	0xF300	Setup reset (set by default)	
	0xF400	Setup changed	
	0xF500	RTC set	
		Setpoint Operation Events	
	0xE100-0xE11F	Setpoint operated (low byte = setpoint ID)	
	0xE200-0xE21F	Setpoint released (low byte = setpoint ID)	
		Setpoint Action Events	
	See F14	Setpoint action ID	
Data/Function Point ID			
F21		**Data Location**	
	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	
	0x2B-0x3F	Reserved	
Event Type ID			
F22	0x0000	SP: Generic setpoint event	
	0x0001-0x0010	SP1-SP16: Setpoint #1-#16 event	
Device Diagnostics			
F23	Bit 0 = 1	N/A	
	Bit 1 = 1	N/A	
	Bit 2 = 1	RAM/Data error	
	Bit 3 = 1	CPU watchdog reset	
	Bit 4 = 1	Sampling fault	
	Bit 5 = 1	CPU exception	
	Bit 6	Reserved	
	Bit 7 = 1	Software watchdog reset	
	Bit 8 = 1	Power down	
	Bit 9 = 1	Device reset	
	Bit 10 = 1	Configuration reset	
	Bit 11 = 1	RTC fault	
	Bit 14 = 1	Data Flash memory fault	