

BFM136/036 Branch Feeder Monitor

Modbus Communications Protocol Reference Guide

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Table of Contents

1 GENERAL	6
2 MODBUS PROTOCOL IMPLEMENTATION.....	7
2.1 TRANSMISSION MODES	7
2.2 ADDRESS FIELD.....	7
2.3 FUNCTION FIELD.....	7
2.4 EXCEPTION RESPONSES	7
2.5 MODBUS REGISTER ADDRESSES	8
2.6 DATA FORMATS	8
2.6.1 16-BIT SCALED INTEGER FORMAT	8
2.6.2 32-BIT LONG INTEGER FORMAT.....	9
2.7 USER ASSIGNABLE REGISTERS.....	9
2.8 PASSWORD PROTECTION	10
2.9 FILE TRANSFER	10
2.9.1 LOG FILE ORGANIZATION.....	10
2.9.2 FILE TRANSFERS	10
Common File Transfer	11
Reading Multi-section Profile Files.....	11
3 MODBUS REGISTER MAP	13
3.1 MODBUS SETUP REGISTERS	13
Modbus Assignable Registers	13
Assignable Registers Map	13
Modbus Conversion Scales.....	13
3.2 16-BIT SCALED ANALOG VALUES - BASIC REGISTER SET	13
3.3 16-BIT SCALED ANALOG VALUES	15
1-Cycle Phase Values	15
1-Cycle Low Phase Values	15
1-Cycle High Phase Values	16
1-Cycle Total Values.....	16
1-Cycle Auxiliary Values	16
1-Second Phase Values	16
1-Second Low Phase Values.....	17
1-Second High Phase Values.....	17
1-Second Total Values	18
1-Second Auxiliary Values	18
Present Volt, Ampere and Power Demands	18
Maximum Demands.....	18
Summary Energy Accumulated Demands	19
Summary Energy Block Demands	19
Summary Energy Sliding Window Demands.....	19
Summary Energy Maximum Demands	19
TOU Maximum Demand Register #1.....	19
TOU Maximum Demand Register #4.....	19
TOU Maximum Demand Register #2.....	19
TOU Maximum Demand Register #3.....	20
3.4 32-BIT BINARY AND ANALOG VALUES	20
Setpoint Status SP1-SP16 (bitmap).....	20
Digital Inputs DI1-DI4 (bitmap).....	20
Relay Outputs RO1-RO4 (bitmap).....	20
1-Cycle Phase Values	20
1-Cycle Low Phase Values	21
1-Cycle High Phase Values	21
1-Cycle Total Values.....	21
1-Cycle Auxiliary Values	21
1-Second Phase Values	21

1-Second Low Phase Values.....	22
1-Second High Phase Values.....	22
1-Second Total Values.....	23
1-Second Auxiliary Values.....	23
Present Volt, Ampere and Power Demands.....	23
Total Energies.....	23
Summary Energy Registers.....	24
Maximum Demands.....	24
Energy/TOU Parameters.....	24
TOU Energy Register #1.....	24
TOU Energy Register #2.....	24
TOU Energy Register #3.....	24
TOU Energy Register #4.....	25
Summary Energy Accumulated Demands.....	25
Summary Energy Sliding Window Demands.....	25
Summary Energy Maximum Demands.....	25
TOU Maximum Demand Register #1.....	25
TOU Maximum Demand Register #2.....	25
TOU Maximum Demand Register #3.....	25
TOU Maximum Demand Register #4.....	25
Generic TOU Season Energy Registers ID's.....	26
Generic TOU Season Maximum Demand Registers ID's.....	26
3.5 MINIMUM/MAXIMUM LOG REGISTERS.....	26
Summary Energy Maximum Demands.....	26
Maximum Demands.....	26
TOU Maximum Demand Register #1.....	27
TOU Maximum Demand Register #2.....	27
TOU Maximum Demand Register #3.....	27
TOU Maximum Demand Register #4.....	27
3.6 DEVICE CONTROL AND STATUS REGISTERS.....	28
Remote Relay Control Registers (bitmap).....	28
Reset/Clear Registers.....	28
Memory Status Registers.....	28
Setpoint Status Registers (bitmap).....	28
Setpoint Alarm Latch Registers (bitmap).....	28
Device Diagnostics Register (bitmap).....	29
Port Identification Registers.....	29
Current Network Settings.....	29
Device Authorization Register.....	29
Factory Diagnostic Registers.....	29
3.7 DEVICE SETUP REGISTERS.....	29
Control/Alarm Setpoints Setup.....	29
Factory Device Settings and Identification.....	30
AC Inputs Range Setup.....	30
Demands Setup.....	30
Device Options Setup.....	31
Local Settings.....	31
Clock Setup and Status.....	31
Communication Ports Setup.....	32
Network Setup.....	32
RF Modem Setup.....	33
Password Setup.....	33
Expert Power Service Setup.....	33
Internet Service Provider (ISP) accounts.....	33
Channel Assignments.....	34
Profile Data Log Setup.....	34
TOU Daily Profile Setup.....	34
TOU Calendar Setup.....	35
Summary Energy/TOU Registers Setup.....	35
Summary Energy/TOU Registers Source Setup.....	36
Digital Inputs Setup.....	36
Relay Outputs Setup.....	36

3.8	FILE TRANSFER BLOCKS	37
	File Transfer Control Blocks	37
	File Info Response Block (Variation 0).....	38
	File Info Response Block (Variation 1).....	39
	File Info Response Block (Variation 2).....	39
	Profile Data Log Response Block	39
	File Response Block Alias	40
	Data Profile Log Response Block Alias	40
4	DATA SCALES AND UNITS	42
	Data Scales	42
	Data Units	42
5	DATA FORMATS	43
	Timestamp	43
	File ID	43
	File Attributes	43
	File Status Word	43
	File Record Status Word	43
	TOU Profile Log Channel ID	43
	TOU Profile Log Channel Mask	43
	TOU Tariff Change Time	43
	Summary Energy Register Source ID	43
	Setpoint Trigger Parameters ID	43
	Setpoint Action ID	44
	Relay Output Pulse Source ID	44
	Device Diagnostics	44

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. Additional information concerning communications operation, configuring the communications parameters, and communications connections is found in "Series BFM136/036 Branch Feeder Monitor, Installation and Operation Manual".

IMPORTANT

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

2 Modbus Protocol Implementation

For detailed information about Modbus protocol, Modbus message framing and error checking, refer to the "Modicon Modbus Protocol Reference Guide". It can be downloaded from the www.modbus.org Website. The following paragraphs outline some issues concerning the implementation of the Modbus protocol in the BFM136/036.

2.1 Transmission Modes

The BFM136/036 can be set up to communicate on a Modbus network using ASCII or RTU transmission mode. Refer to the "Series BFM136/036 Branch Feeder Monitor, Installation and Operation Manual" on how to select the transmission mode in your meter.

2.2 Address Field

The address field contains a device sub-meter 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 sub-meter.

The BFM136/036 can occupy up to 40 contiguous addresses starting with the device reference address. A separate Modbus address is engaged for each sub-meter for which at least one current input is allocated in the Channel Assignments Setup (see Section 3.7), and for each additional sub-meter, which is allocated as a target in the Summary Energy/TOU Registers Source Setup (see Section 3.7).

Notice that all sub-meters share the same device setup registers (excluding setpoints) so that changing a device setup for one of the sub-meters will affect all the remaining sub-meters.

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 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.

2.6.1 16-bit Scaled Integer Format

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

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

where:

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

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

CONVERSION EXAMPLES

1. Voltage readings

Voltage engineering scales (see Section 4):

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

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

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

2. Current readings

Assume device settings: CT primary current = 50A.

Current engineering scales (see Section 4):

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

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

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

3. Power readings

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

Active Power engineering scales (see Section 4):

$$\begin{aligned} HI &= P_{max} = V_{max} \times I_{max} \times 2 = (600.0 \times 1) \times (50.00 \times 2) \times 2 = 120,000W = 120.0kW \\ LO &= -P_{max} = -120.0kW \end{aligned}$$

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

$$\text{Watts reading} = 5500 \times (120.0 - (-120.0))/(9999 - 0) + (-120.0) = 12.013kW$$

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

$$\text{Watts reading} = 4000 \times (120.0 - (-120.0)) / (9999 - 0) + (-120.0) = -23.99\text{kW}$$

4. Power Factor readings

Power factor engineering scales:

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

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

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

2.6.2 32-bit Long Integer Format

32-bit long integer data is transmitted in two adjacent 16-bit Modbus registers as unsigned (UINT32) or signed (INT32) whole numbers. The first register contains the low-order word (lower 16 bits) and the second register contains the high order word (higher 16 bits). The low-order word always starts at an even Modbus address. The value range for unsigned data is 0 to 4,294,967,295; for signed data the range is -2,147,483,648 to 2,147,483,647.

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

$$\text{32-bit value} = (\text{signed short})\text{high_order_register} \times 65536L + (\text{unsigned short})\text{low_order_register}$$

Fractional 32-bit data is transmitted using decimal scaling to pass fractional numbers in integer format. Fractional numbers are pre-multiplied by 10 to the power N, where N is the number of digits in the fractional part. For example, the frequency reading of 50.01 Hz is transmitted as 5001, having been pre-multiplied by 100. Whenever a data register contains a fractional number, the register measurement unit is given with a multiplier $\times 0.1$, $\times 0.01$ or $\times 0.001$, showing the weight of the least significant decimal digit. To get an actual fractional number with specified precision, multiply the register value by the given multiplier. To write a fractional number into the register, divide the number by the given multiplier.

2.7 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.

2.8 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.

2.9 File Transfer

2.9.1 Log File Organization

Historical files are stored to the non-volatile memory. Memory is allocated for each file statically when you set up your energy/TOU registers and will not change unless you re-organize the registers.

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.

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

The 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.

TOU Profile Log File

The profile data log file is automatically configured to store a TOU daily profile log. A TOU profile log file is organized as a multi-section file that has a separate section for each TOU energy and maximum demand register. The number of sections is taken automatically from the Summary/TOU Registers setup. Since each TOU energy register has a shadow maximum demand register, the number of sections in the file will be twice the number of allocated 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.

2.9.2 File Transfers

File transfer protocol provides both data transfer and information services. File transfer is performed through two blocks of registers: a 32-word master request block and a 288-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.

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.

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 a multi-section file:

- 1) If you want 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.

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							
+0		Register 0 contents	0-65535		UINT16	R/W	
+1		Register 1 contents	0-65535		UINT16	R/W	
		...					
+119		Register 119 contents	0-65535		UINT16	R/W	
Assignable Registers Map							
120-239							
+0		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	
241		High raw scale	9999		UINT16	R/W	
242		Voltage scale, in secondary volts	600	1V	UINT16	R	
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	0x1100	V1 Voltage	0-Vmax	U1	UINT16	R	
+1	0x1101	V2 Voltage	0-Vmax	U1	UINT16	R	
+2	0x1102	V3 Voltage	0-Vmax	U1	UINT16	R	
+3	0x1103	I1 Current	0-Imax	U2	UINT16	R	
+4	0x1104	I2 Current	0-Imax	U2	UINT16	R	
+5	0x1105	I3 Current	0-Imax	U2	UINT16	R	
+6	0x1106	kW L1	-Pmax-Pmax	U3	INT16	R	
+7	0x1107	kW L2	-Pmax-Pmax	U3	INT16	R	
+8	0x1108	kW L3	-Pmax-Pmax	U3	INT16	R	
+9	0x1109	kvar L1	-Pmax-Pmax	U3	INT16	R	
+10	0x110A	kvar L2	-Pmax-Pmax	U3	INT16	R	
+12	0x110C	kVA L1	-Pmax-Pmax	U3	UINT16	R	
+13	0x110D	kVA L2	-Pmax-Pmax	U3	UINT16	R	

Address	Point ID	Description	Low and High Scales ¹	Units ¹	Type	R/W	Notes
+14	0x110E	kVA L3	-Pmax-Pmax	U3	UINT16	R	
+15	0x110F	Power factor L1	-1.000-1.000	0.001	INT16	R	
+16	0x1110	Power factor L2	-1.000-1.000	0.001	INT16	R	
+17	0x1111	Power factor L3	-1.000-1.000	0.001	INT16	R	
+18	0x1403	Total PF	-1.000-1.000	0.001	INT16	R	
+19	0x1400	Total kW	-Pmax-Pmax	U3	INT16	R	
+20	0x1401	Total kvar	-Pmax-Pmax	U3	INT16	R	
+21	0x1402	Total kVA	-Pmax-Pmax	U3	UINT16	R	
+22	0x1501	In Current	0-Imax	U2	UINT16	R	
+23	0x1502	Frequency	0-100.00	0.01Hz	UINT16	R	
+24	0x3709	Maximum kW import sliding window demand	-Pmax-Pmax	U3	UINT16	R	
+25	0x160F	kW import accumulated demand	-Pmax-Pmax	U3	UINT16	R	
+26	0x370B	Maximum kVA sliding window demand	-Pmax-Pmax	U3	UINT16	R	
+27	0x1611	kVA accumulated demand	-Pmax-Pmax	U3	UINT16	R	
+28	0x3703	I1 Maximum ampere demand	0-Imax	U2	UINT16	R	
+29	0x3704	I2 Maximum ampere demand	0-Imax	U2	UINT16	R	
+30	0x3705	I3 Maximum ampere demand	0-Imax	U2	UINT16	R	
+31	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	0x1708	kVAh (low)	0-9999	×0.1kVAh	UINT16	R	²
+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
4352-4382		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	
+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	0x0C20	V31 Voltage	0-Vmax	U1	UINT16	R	
4416-4427		1-Cycle Low Phase Values					
+0	0x0D00	Low L-N voltage	0-Vmax	U1	UINT16	R	
+1	0x0D01	Low current	0-Imax	U2	UINT16	R	
+2	0x0D02	Low kW	-Pmax-Pmax	U3	INT16	R	
+3	0x0D03	Low kvar	-Pmax-Pmax	U3	INT16	R	
+4	0x0D04	Low kVA	0-Pmax	U3	UINT16	R	
+5	0x0D05	Low PF Lag	0-100.0	0.001	UINT16	R	
+5	0x0D06	Low PF Lead	0-100.0	0.001	UINT16	R	
+7	0x0D07	Reserved	0		UINT16	R	

Address	Point ID	Description	Low and High Scales ¹	Units ¹	Type	R/W	Notes
+8	0x0D08	Reserved	0		UINT16	R	
+9	0x0D09	Reserved	0		UINT16	R	
+10	0x0D0A	Reserved	0		UINT16	R	
+11	0x0D0B	Low L-L voltage	0-Vmax	U1	UINT16	R	
4480-4491		1-Cycle High Phase Values					
+0	0x0E00	High L-N voltage	0-Vmax	U1	UINT16	R	
+1	0x0E01	High current	0-Imax	U2	UINT16	R	
+2	0x0E02	High kW	-Pmax-Pmax	U3	INT16	R	
+3	0x0E03	High kvar	-Pmax-Pmax	U3	INT16	R	
+4	0x0E04	High kVA	0-Pmax	U3	UINT16	R	
+5	0x0E05	High PF Lag	0-1.000	0.001	UINT16	R	
+5	0x0E06	High PF Lead	0-1.000	0.001	UINT16	R	
+7	0x0E07	Reserved	0		UINT16	R	
+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	
4608-4610		1-Cycle Auxiliary Values					
+1	0x1001	In Current	0-Imax	U2	UINT16	R	
+2	0x1002	Frequency	0-100.00	0.01Hz	UINT16	R	
4672-4702		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	
+4	0x1104	I2 Current	0-Imax	U2	UINT16	R	
+5	0x1105	I3 Current	0-Imax	U2	UINT16	R	
+6	0x1106	kW L1	-Pmax-Pmax	U3	INT16	R	
+7	0x1107	kW L2	-Pmax-Pmax	U3	INT16	R	
+8	0x1108	kW L3	-Pmax-Pmax	U3	INT16	R	
+9	0x1109	kvar L1	-Pmax-Pmax	U3	INT16	R	
+10	0x110A	kvar L2	-Pmax-Pmax	U3	INT16	R	

Address	Point ID	Description	Low and High Scales ¹	Units ¹	Type	R/W	Notes
+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	0x111B	Reserved	0		UINT16	R	
+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	
+5	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	0x1302	High kW	-Pmax-Pmax	U3	INT16	R	
+3	0x1303	High kvar	-Pmax-Pmax	U3	INT16	R	
+4	0x1304	High kVA	0-Pmax	U3	UINT16	R	
+5	0x1305	High PF Lag	0-1.000	0.001	UINT16	R	
+5	0x1306	High PF Lead	0-1.000	0.001	UINT16	R	
+7	0x1307	Reserved	0		UINT16	R	
+8	0x1308	Reserved	0		UINT16	R	

Address	Point ID	Description	Low and High Scales ¹	Units ¹	Type	R/W	Notes
+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		
+5	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	
4928-4930		1-Second Auxiliary Values					
+1	0x1501	In Current	0-Imax	U2	UINT16	R	
+2	0x1502	Frequency	0-100.00	0.01Hz	UINT16	R	
4992-5012		Present Volt, Ampere and Power 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	kW import block demand	0-Pmax	U3	UINT16	R	
+7	0x1607	kvar import block demand	0-Pmax	U3	UINT16	R	
+8	0x1608	kVA block demand	0-Pmax	U3	UINT16	R	
+9	0x1609	kW import sliding window demand	0-Pmax	U3	UINT16	R	
+10	0x160A	kvar import sliding window demand	0-Pmax	U3	UINT16	R	
+11	0x160B	kVA sliding window demand	0-Pmax	U3	UINT16	R	
+12-14		Reserved	0		UINT16	R	
+15	0x160F	kW import accumulated demand	0-Pmax	U3	UINT16	R	
+16	0x1610	kvar import accumulated demand	0-Pmax	U3	UINT16	R	
+17	0x1611	kVA accumulated demand	0-Pmax	U3	UINT16	R	
+18	0x1612	kW import predicted sliding window demand	0-Pmax	U3	UINT16	R	
+19	0x1613	kvar import predicted sliding window demand	0-Pmax	U3	UINT16	R	
+20	0x1614	kVA predicted sliding window demand	0-Pmax	U3	UINT16	R	
7104-7115		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	

Address	Point ID	Description	Low and High Scales ¹	Units ¹	Type	R/W	Notes
+5	0x3705	I3 Maximum ampere demand	0-Imax	U2	UINT16	R	
+6-8		Reserved	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	
8000-8003		Summary Energy 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		Summary Energy 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		Summary Energy 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		Summary Energy 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	0x4783	Summary register #4	0-Pmax	U3	UINT16	R	
8192-8195		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	
8224-8227		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 #4 register	0-Pmax	U3	UINT16	R	
8256-8259		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	

Address	Point ID	Description	Low and High Scales ¹	Units ¹	Type	R/W	Notes
8320-8323		TOU Maximum Demand Register #3					
+0	0x4A00	Tariff #1 register	0-Pmax	U3	UINT16	R	
+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	

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 (bitmap)	0x00000000 - 0x0000FFFF		UINT32	R	
12544-12545	0x0600	Digital Inputs DI1-DI4 (bitmap)	0x00000000 - 0x0000000F		UINT32	R	
12800-12801	0x0800	Relay Outputs RO1-RO4 (bitmap)	0x00000000 - 0x00000003		UINT32	R	
13312-13373		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	0x0C10	Power factor L2	-1000-1000	×0.001	INT32	R	
+34, 35	0x0C11	Power factor L3	-1000-1000	×0.001	INT32	R	
+36, 37	0x0C12	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	Null	0		UINT32	R	

Address	Point ID	Description	Options/Range ¹	Units ¹	Type	R/W	Notes
+50, 51	0x0C19	Null	0		UINT32	R	
+52, 53	0x0C1A	Null	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	0x0D03	Low kvar	-Pmax-Pmax	U3	INT32	R	
+8, 9	0x0D04	Low kVA	0-Pmax	U3	UINT32	R	
+10, 11	0x0D05	Low PF Lag	0-1000	×0.001	UINT32	R	
+12, 13	0x0D06	Low PF Lead	0-1000	×0.001	UINT32	R	
13568-13581		1-Cycle High Phase Values					
+0, 1	0x0E00	High L-N voltage	0-Vmax	U1	UINT32	R	
+2, 3	0x0E01	High current	0-Imax	U2	UINT32	R	
+4, 5	0x0E02	High kW	-Pmax-Pmax	U3	INT32	R	
+6, 7	0x0E03	High kvar	-Pmax-Pmax	U3	INT32	R	
+8, 9	0x0E04	High kVA	0-Pmax	U3	UINT32	R	
+10, 11	0x0E05	High PF Lag	0-1000	×0.001	UINT32	R	
+12, 13	0x0E06	High PF Lead	0-1000	×0.001	UINT32	R	
13696-13715		1-Cycle Total Values					
+0, 1	0x0F00	Total kW	-Pmax-Pmax	U3	INT32	R	
+2, 3	0x0F01	Total kvar	-Pmax-Pmax	U3	INT32	R	
+4, 5	0x0F02	Total kVA	0-Pmax	U3	UINT32	R	
+6, 7	0x0F03	Total PF	-1000-1000	×0.001	INT32	R	
+8, 9	0x0F04	Total PF lag	0-1000	×0.001	UINT32	R	
+10, 11	0x0F05	Total PF lead	0-1000	×0.001	UINT32		
+12, 13	0x0F06	Total kW import	0-Pmax	U3	UINT32		
+14, 15	0x0F07	Total kW export	0-Pmax	U3	UINT32	R	
+16, 17	0x0F08	Total kvar import	0-Pmax	U3	UINT32	R	
+18, 19	0x0F09	Total kvar export	0-Pmax	U3	UINT32	R	
13824-13829		1-Cycle Auxiliary Values					
+0, 1	0x1000	Null	0		UINT32	R	
+2, 3	0x1001	In Current	0-Imax	U2	UINT32	R	
+4, 5	0x1002	Frequency	0-10000	×0.01Hz	UINT32	R	
13952-14013		1-Second Phase Values					
+0, 1	0x1100	V1 Voltage	0-Vmax	U1	UINT32	R	
+2, 3	0x1101	V2 Voltage	0-Vmax	U1	UINT32	R	
+4, 5	0x1102	V3 Voltage	0-Vmax	U1	UINT32	R	

Address	Point ID	Description	Options/Range ¹	Units ¹	Type	R/W	Notes
+6, 7	0x1103	I1 Current	0-Imax	U2	UINT32	R	
+8, 9	0x1104	I2 Current	0-Imax	U2	UINT32	R	
+10, 11	0x1105	I3 Current	0-Imax	U2	UINT32	R	
+12, 13	0x1106	kW L1	-Pmax-Pmax	U3	INT32	R	
+14, 15	0x1107	kW L2	-Pmax-Pmax	U3	INT32	R	
+16, 17	0x1108	kW L3	-Pmax-Pmax	U3	INT32	R	
+18, 19	0x1109	kvar L1	-Pmax-Pmax	U3	INT32	R	
+20, 21	0x110A	kvar L2	-Pmax-Pmax	U3	INT32	R	
+22, 23	0x110B	kvar L3	-Pmax-Pmax	U3	INT32	R	
+24, 25	0x110C	kVA L1	0-Pmax	U3	UINT32	R	
+26, 27	0x110D	kVA L2	0-Pmax	U3	UINT32	R	
+28, 29	0x110E	kVA L3	0-Pmax	U3	UINT32	R	
+30, 31	0x110F	Power factor L1	-1000-1000	×0.001	INT32	R	
+32, 33	0x1110	Power factor L2	-1000-1000	×0.001	INT32	R	
+34, 35	0x1111	Power factor L3	-1000-1000	×0.001	INT32	R	
+36, 37	0x1112	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	Null	0		UINT32	R	
+50, 51	0x1119	Null	0		UINT32	R	
+52, 53	0x111A	Null	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	0x1203	Low kvar	-Pmax-Pmax	U3	INT32	R	
+8, 9	0x1204	Low kVA	0-Pmax	U3	UINT32	R	
+10, 11	0x1205	Low PF Lag	0-1000	×0.001	UINT32	R	
+12, 13	0x1206	Low PF Lead	0-1000	×0.001	UINT32	R	
14208-14221		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	

Address	Point ID	Description	Options/Range ¹	Units ¹	Type	R/W	Notes
+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	
14336-14361		1-Second Total Values					
+0, 1	0x1400	Total kW	-Pmax-Pmax	U3	INT32	R	
+2, 3	0x1401	Total kvar	-Pmax-Pmax	U3	INT32	R	
+4, 5	0x1402	Total kVA	0-Pmax	U3	UINT32	R	
+6, 7	0x1403	Total PF	-1000-1000	×0.001	INT32	R	
+8, 9	0x1404	Total PF lag	0-1000	×0.001	UINT32	R	
+10, 11	0x1405	Total PF lead	0-1000	×0.001	UINT32		
+12, 13	0x1406	Total kW import	0-Pmax	U3	UINT32		
+14, 15	0x1407	Total kW export	0-Pmax	U3	UINT32	R	
+16, 17	0x1408	Total kvar import	0-Pmax	U3	UINT32	R	
+18, 19	0x1409	Total kvar export	0-Pmax	U3	UINT32	R	
14464-14469		1-Second Auxiliary Values					
+0, 1	0x1500	Null	0		UINT32	R	
+2, 3	0x1501	In Current	0-Imax	U2	UINT32	R	
+4, 5	0x1502	Frequency	0-10000	×0.01Hz	UINT32	R	
14592-14633		Present Volt, Ampere and Power 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	Null	0		UINT32	R	
+14, 15	0x1607	Null	0		UINT32	R	
+16, 17	0x1608	Null	0		UINT32	R	
+18, 19	0x1609	kW import sliding window demand	0-Pmax	U3	UINT32	R	
+20, 21	0x160A	kvar import sliding window demand	0-Pmax	U3	UINT32	R	
+22, 23	0x160B	kVA sliding window demand	0-Pmax	U3	UINT32	R	
+24, 25	0x160C	Not used	0		UINT32	R	
+26, 27	0x160D	Not used	0		UINT32	R	
+28, 29	0x160E	Not used	0		UINT32	R	
+30, 31	0x160F	kW import accumulated demand	0-Pmax	U3	UINT32	R	
+32, 33	0x1610	kvar import accumulated demand	0-Pmax	U3	UINT32	R	
+34, 35	0x1611	kVA accumulated demand	0-Pmax	U3	UINT32	R	
+36, 37	0x1612	kW import predicted sliding window demand	0-Pmax	U3	UINT32	R	
+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	
14720-14737		Total Energies					
+0, 1	0x1700	kWh import	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+2, 3	0x1701	Null	0		UINT32	R	

Address	Point ID	Description	Options/Range ¹	Units ¹	Type	R/W	Notes
+4, 5	0x1702	Null	0		UINT32	R	
+6, 7	0x1703	Null	0		UINT32	R	
+8, 9	0x1704	kvarh import	0-10 ⁹ -1	0.1 kvarh	UINT32	R	
+10, 11	0x1705	Null	0		UINT32	R	
+12, 13	0x1706	Null	0		UINT32	R	
+14, 15	0x1707	Null	0		UINT32	R	
+16, 17	0x1708	kVAh total	0-10 ⁹ -1	0.1 kVAh	UINT32	R	
14784-14791		Summary Energy Registers					
+0, 1	0x1780	Summary energy register #1	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+2, 3	0x1781	Summary energy register #2	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+4, 5	0x1782	Summary energy register #3	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+6, 7	0x1783	Summary energy register #4	0-10 ⁹ -1	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	Null	0	U2	UINT32	R	
+12, 13	0x3706	Not used	0		UINT32	R	
+14, 15	0x3707	Not used	0		UINT32	R	
+16, 17	0x3708	Not used	0		UINT32	R	
+18, 19	0x3709	Maximum kW import sliding window demand	0-Pmax	U3	UINT32	R	
+20, 21	0x370A	Maximum kvar import sliding window demand	0-Pmax	U3	UINT32	R	
+22, 23	0x370B	Maximum kVA sliding window demand	0-Pmax	U3	UINT32	R	
19456-19459		Energy/TOU Parameters					
+0, 1	0x3C00	Active tariff	0-15		UINT32	R	
+2, 3	0x3C01	Active profile	0-15		UINT32	R	
19584-19591		TOU Energy Register #1					
+0, 1	0x3D00	Tariff #1 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+2, 3	0x3D01	Tariff #2 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+4, 5	0x3D02	Tariff #3 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+6, 7	0x3D03	Tariff #4 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
19712-19719		TOU Energy Register #2					
+0, 1	0x3E00	Tariff #1 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+2, 3	0x3E01	Tariff #2 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+4, 5	0x3E02	Tariff #3 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+6, 7	0x3E03	Tariff #4 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
19840-19847		TOU Energy Register #3					
+0, 1	0x3F00	Tariff #1 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+2, 3	0x3F01	Tariff #2 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	

Address	Point ID	Description	Options/Range ¹	Units ¹	Type	R/W	Notes
+4, 5	0x3F02	Tariff #3 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+6, 7	0x3F03	Tariff #4 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
19968-19975		TOU Energy Register #4					
+0, 1	0x4000	Tariff #1 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+2, 3	0x4001	Tariff #2 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+4, 5	0x4002	Tariff #3 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
+6, 7	0x4003	Tariff #4 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
20608-20615		Summary Energy Accumulated Demands					
+0, 1	0x4500	Summary register #1	0-Pmax	U3	UINT32	R	
+2, 3	0x4501	Summary register #2	0-Pmax	U3	UINT32	R	
+4, 5	0x4502	Summary register #3	0-Pmax	U3	UINT32	R	
+6, 7	0x4503	Summary register #4	0-Pmax	U3	UINT32	R	
20736-20743		Summary Energy 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		Summary Energy 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	
20992-21009		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	
21120-21127		TOU Maximum Demand Register #2					
+0, 1	0x4900	Tariff #1 register	0-Pmax	U3	UINT32	R	
+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	
21248-21255		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	
21056-21063		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	

Address	Point ID	Description	Options/Range ¹	Units ¹	Type	R/W	Notes
		Generic TOU Season Energy Registers ID's					Point references
	0x7000	Tariff #1 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
	0x7001	Tariff #2 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
	0x7002	Tariff #3 register	0-10 ⁹ -1	0.1 kWh	UINT32	R	
	0x7003	Tariff #4 register	0-10 ⁹ -1	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	

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
37504-37567		Summary Energy 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	
37632-37719		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	Null	0		UINT32 UINT32	R R	
+28, 29	0x3707	Null	0		UINT32	R	

Address	Point ID	Description	Options/Range ¹	Units ¹	Type	R/W	Notes
+30, 31					UINT32	R	
+32, 33 +34, 35	0x3708	Null	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	
38144-38207		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	
38400-38463		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	
38656-38719		TOU Maximum Demand Register #3					
+0, 1 +2, 3	0x4A00	Tariff #1 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R R	
+4, 5 +6, 7	0x4A01	Tariff #2 register Timestamp	0-Pmax	U3 sec	UINT32 UINT32	R 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	
38272-38335		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	0x4882	Tariff #3 register	0-Pmax	U3	UINT32	R	

Address	Point ID	Description	Options/Range ¹	Units ¹	Type	R/W	Notes
+10, 11		Timestamp		sec	UINT32	R	
+12, 13	0x4883	Tariff #4 register	0-Pmax	U3	UINT32	R	
+14, 15		Timestamp		sec	UINT32	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
Remote Relay Control Registers (bitmap)							
44046		Force relay operate register (0 = no effect, 1 = operate)	0x0000 - 0x0003		UINT16	W	
44050		Force relay release register (0 = no effect, 1 = release)	0x0000 - 0x0003		UINT16	W	
44054		Locally latched relays status (0 = unlatched, 1 = locally latched)	0x0000 - 0x0003		UINT16	R	
44058		Remote latched relays status (0 = unlatched, 1 = remote latched)	0x0000 - 0x0003		UINT16	R	
44062		Remote relay control disabled status (0 = remote control enabled, 1 = remote control disabled)	0x0000 - 0x0003		UINT16	R	Remote relay control is disabled if the internal pulse source is linked to the relay
44066		Relay status (0 = open, 1 = closed)	0x0000 - 0x0003		UINT16	R	
44070		Latch relays (0 = not latched mode, 1 = latched mode)	0x0000 - 0x0003		UINT16	R	
44074		Pulse relays (0 = not pulse mode, 1 = pulse mode)	0x0000 - 0x0003		UINT16	R	
44078		KYZ relays (0 = not KYZ mode, 1 = KYZ mode)	0x0000 - 0x0003		UINT16	R	
44082		Relay polarity (0 = normal mode, 1 = inverting mode)	0x0000 - 0x0003		UINT16	R	
Reset/Clear Registers							
44103		Clear maximum demands	0 = clear all maximum demands 1 = clear power demands 2 = clear volt and ampere demands 3 = clear volt demands 4 = clear ampere demands		UINT16	W	
Memory Status Registers							
44262-44263		Memory size, bytes			UINT32	R	
44264-44265		Free memory, bytes			UINT32	R	
44266-44277		Reserved			UINT32	R	
Setpoint Status Registers (bitmap)							
44294		Setpoints 1-32 status (0 = released, 1 = operated)	0x00000000 - 0xFFFFFFFF		UINT32	R	
Setpoint Alarm Latch Registers (bitmap)							
44310		Setpoints 1-32 alarm status. When read: 0 = no setpoint operations logged, 1 = setpoint has been operated at least once since the last alarm bit reset.	0x0000 - 0xFFFF		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
		When written: 0 = clear setpoint alarm bit, 1 = no effect.					
44312-44325		Reserved					
Device Diagnostics Register (bitmap)							
44326-44327		Device self-diagnostics flags. When read: 0 = no faults logged, 1 = a fault bit has been set at least once since the last reset. When written: 0 = clear a fault bit, 1 = no effect.	F23		UINT32	R/W	
44328-44341		Reserved					
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		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	
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							
+0		Trigger parameter ID	F12		UINT16	R/W	
+1		Action	F13		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					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
Factory Device Settings and Identification							
46080-46207							
+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	
+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	
AC Inputs Range Setup							
46208-46271							
+0		Wiring connection	1		UINT16	R/W	
+1		PT ratio (primary to secondary ratio)	10	x 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							
+0		Power block demand period	1, 2, 5, 10, 15, 30, 60	min	UINT16	R/W	
+1		Number of blocks in a sliding window	1-15		UINT16	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+2		Demand synchronization source input	0 = device clock, 1-48 = DI1-DI48		UINT16	R/W	A DI input is considered a pulse or KYZ input. The pulse edge restarts the power demand accumulation interval.
+3-7		Reserved			UINT16	R/W	
+8		Volt demand period	0-9000	sec	UINT16	R/W	
+9		Ampere demand period	0-9000	sec	UINT16	R/W	
Device Options Setup							
46256-46399							
+0		Power calculation mode	0=using reactive power: $S = f(P,Q)$, 1=using non-active power: $Q = f(S,P)$		UINT16	R/W	
+1		Energy roll value	2 = 0.1×10^6 , 3 = 0.1×10^7 , 4 = 0.1×10^8 , 5 = 0.1×10^9		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	x0.01Wh	UINT16	R/W	
+9		Reserved			UINT16	R/W	
+10		Wh LED pulse source	0 = disabled, 1-40 = sub-meter number		UINT16	R/W	
+9, 10		Reserved			UINT16	R/W	
+11-143		Reserved			UINT16	R/W	
Local Settings							
46400-46415							
+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	
+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	
+10-15		Reserved			UINT16	R/W	
Clock Setup and Status							
46416-46447							
+0,1		Local time, in seconds, since Jan 1, 1970	F1	sec	UINT32	R/W	
+2,3		Fractional seconds, μ sec		μ sec	UINT32	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+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		
Communication Ports Setup							
46448-46575							
+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	N/A for COM2-COM5 (read as 65535)
+6		RTS mode	0=not used, 1=RTS is asserted during the transmission		UINT16	R/W	N/A for COM2-COM5 (read as 65535)
+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							
+0,1		Device IP Address	0x01000000-0xFFFFFFFF		UINT32	R/W	Network byte order
+2,3		Network subnet mask	0x00000001-0xFFFFFFFF		UINT32	R/W	Network byte order
+4,5		Network default gateway	0x00000000-0xFFFFFFFF		UINT32	R/W	Network byte order
+6,7		Use DHCP	0 = NO, 1 = YES		UINT32	R/W	
+8,9		TCP service port	502 = Modbus/TCP		UINT32	R/W	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+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							
+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							
+0, 1		Communications password (8 digits)	0 - 99999999		UINT32	R/W	Read as 0
+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							
+0,1		Expert Power server IP Address	0x01000000-0xFFFFFFFF		UINT32	R/W	Default = 207.232.60.18
+2,3		Expert Power server TCP service port	0-65535		UINT32	R/W	Default = 5001
+4,5		Expert Power client enabled	0=client disabled, 1=client enabled		UINT32	R/W	
+6,7		Time to next session	1-99999	min	UINT32	R/W	
+8,9		Time to next session	1-99999	min	UINT32	R	Same as previous
+10-15		Reserved					
Internet Service Provider (ISP) accounts							
46784-46879							
+0-15		ISP telephone number			CHAR32	R/W	
+16-31		Login name			CHAR32	R/W	
+32-47		Login password			CHAR32	R/W	
46784-46831		Account No1					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
46832-46879		Account No2					
46880-46927		Reserved					
Channel Assignments							
46928-47071							
+0		Channel CT primary current	1-10000 A	A	UINT16	R/W	
+1		Sub-meter's phase L1 current input channel	0=not assigned, 1-36 = I1-I36		UINT16	R/W	
+2		Sub-meter's phase L2 current input channel	0=not assigned, 1-36 = I1-I36		UINT16	R/W	
+3		Sub-meter's phase L3 current input channel	0=not assigned, 1-36 = I1-I36		UINT16	R/W	
46928-46931		Sub-meter #1 channels					
46932-46936		Sub-meter #2 channels					
		...					
47068-47071		Sub-meter #36 channels					
Profile Data Log Setup							
54486-54517		Profile Data log #16 Setup					
+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
+5-31		Null			UINT16	R	
TOU Daily Profile Setup							
55574-55701							
+0		1 st tariff change	F10		UINT16	R/W	
+1		2 nd tariff change	F10		UINT16	R/W	
+2		3 rd tariff change	F10		UINT16	R/W	
+3		4 th tariff change	F10		UINT16	R/W	
+4		5 th tariff change	F10		UINT16	R/W	
+5		6 th tariff change	F10		UINT16	R/W	
+6		7 th tariff change	F10		UINT16	R/W	
+7		8 th 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					
55662-55669		Daily profile #12: Season 3, Day type 4					
55670-55677		Daily profile #13: Season 4, Day type 1					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
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							
+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=3 rd , 4=4th, 5=last week of the month		UINT16	R/W	
+2		Weekday	0=all, 1-7 (Sun=1, Sat=7)		UINT16	R/W	
+3		Till Weekday	0=all, 1-7 (Sun=1, Sat=7)		UINT16	R/W	
+4		Month	0=all, 1-12=January - December		UINT16	R/W	
+5		Day of month	0=all, 1-31=day 1-31		UINT16	R/W	
+6		Till Month	0=all, 1-12=January - December		UINT16	R/W	
+7		Till Day of month	0=all, 1-31=day 1-31		UINT16	R/W	
+8-9		Reserved			UINT16	R/W	
55712-55721		Calendar entry #1					
55722-55731		Calendar entry #2					
55732-55741		Calendar entry #3					
...							
56022-56031		Calendar entry #32					
56032-56191		Reserved					
Summary Energy/TOU Registers Setup							
56672-56927							
+0		Not used			UINT16	R/W	
+1		Units of measurement	0=none, 1=kWh, 2=kvarh, 3=kVAh, 4=m ³ , 5=CF (cubic feet), 6=CCF (hundred cubic feet)		UINT16	R/W	
+2		Flags	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					

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
Summary Energy/TOU Registers Source Setup							
56928-57183							
+0		Energy source ID	F11		UINT16	R/W	
+1		Target summary register/sub-meter	0-3 = register #1-4, 0x7F00-0x7F27 = sub-meter #1-#40		UINT16	R/W	
+2, 3		Multiplier	0-1000000	×0.001	INT32	R/W	
56928-56931		Energy Source #1					
56932-56935		Energy Source #2					
56936-56939		Energy Source #3					
56940-56943		Energy Source #4					
56944-57183		Reserved					
Digital Inputs Setup							
61728-61983							
+0		Pulse mode	0 = pulse, 1 = KYZ		UINT16	R/W	
+1		Polarity	0 = normal, 1 = inverting		UINT16	R/W	
+2		De-bounce time, ms	1-1000		UINT16	R/W	Note 3
+3		Reserved			UINT16	R/W	
61728-61731		DI1 Setup					
61732-61735		DI2 Setup					
61736-61739		DI3 Setup					
61740-61743		DI4 Setup					
Relay Outputs Setup							
61984-61995							
+0		Operation Mode	0 = latched, 1 = unlatched, 2 = pulse, 3 = KYZ		UINT16	R/W	
+1		Polarity	Bit 0 – Polarity: 0=normal, 1=inverting, Bit 1 - Retentive mode: 0=disabled, 1=enabled		UINT16	R/W	
+2		Pulse width, ms	1-1000		UINT16	R/W	
+3		Pulse source ID	F17		UINT16	R/W	
+4		Units per pulse	1-10000	×0.1	UINT16	R/W	
+5		Reserved			UINT16	R/W	
61984-61989		RO1 Setup					
61990-61995		RO2 Setup					

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 μ sec		μ sec	UINT32	R/W	Note 3
+12, 13		Find key: End time, seconds since 1/1/1970	F1	sec	UINT32	R/W	Note 3
+14, 15		Find key: End time, fractional seconds in μ sec		μ sec	UINT32	R/W	Note 3
+16-31		Reserved			UINT16	R/W	
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 Summary/TOU profile log files, can be requested either by a section number, or by a section channel ID. If a section number is set to 0xFFFF, the section channel ID will be used to identify the section. The section number will be returned in the response block. If a section number is written, then the corresponding channel ID will be returned in the file response block.

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

File Response Blocks

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
File Info Response Block (Variation 0)							
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		UINT16	R	
+3		Number of sections in the file	0-32		UINT16	R	0 = non-partitioned file
+4, 5		File channel mask (channels 1-32), bitmap	F8, F9		UINT32	R	
+6, 7		File channel mask (channels 33-64), bitmap	F8, F9		UINT32	R	
+8		Number of records in the file	0-65535		UINT16	R	
+9		Number of records until the end of the file	0-65535		UINT16	R	
+10		Current record (read position) sequence number	0-65535		UINT16	R	
+11		Current write position sequence number	0-65535		UINT16	R	
+12		First (oldest) record sequence number	0-65535		UINT16	R	
+13		Last (newest) record sequence number	0-65535		UINT16	R	
+14, 15		Last record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+16, 17		Last record time, fractional seconds		µsec	UINT32	R	
+18, 19		First record time, seconds since 1/1/1970	F1	sec	UINT32	R	
+20, 21		First record time, fractional seconds		µsec	UINT32	R	
+22, 23		Null	0		UINT32	R	
+24, 25		Null	0	µsec	UINT32	R	
+26, 27		Null	0	sec	UINT32	R	
+28, 29		Null	0	µsec	UINT32	R	
+30		Maximum number of records	0-65535		UINT16	R	
+31		Number of parameters per data section record	0-16		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+32		Section record size, bytes		Byte	UINT16	R	
+33		File record size, bytes		Byte	UINT16	R	
+34, 35		Allocated file size, bytes		Byte	UINT32	R	
File Info Response Block (Variation 1)							
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)							
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	1		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
+7-17		Null			UINT16	R	
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	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+2		Section number	0-7		UINT16	R	
+3		Section channel ID	F6		UINT16	R	
+4		Number of records in the block	1-16		UINT16	R	
+5		Record size, words	10-18		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
63160-64439		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 μ sec		μ sec	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	
63160-...		Record #1 (variable length)					
		...					
		Record #16 (variable length)					

File Response Block Alias

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
File Response Block Alias							
3072-3079		Block Heading					
+0		File function	11		UINT16	R	
+1		File ID	16		UINT16	R/W	
+2		Section number	0-7		UINT16	R	
+3		Section channel ID	F6, F7 (default 0)		UINT16	R/W	Write: sets the section ID
+4		Number of records in the block	1-10 (default 3)		UINT16	R/W	Write: sets the block size
+5		Record size, words	18		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
3080-3583		Last 1-10 file records					
Data Profile Log Response Block Alias							
3072-3079		Block Heading					
+0		File function	11		UINT16	R	
+1		File ID	16		UINT16	R/W	
+2		Section number	0		UINT16	R	
+3		Section channel ID	0		UINT16	R	

Address	Point ID	Description	Options/Range	Units	Type	R/W	Notes
+4		Number of records in the block	1-10		UINT16	R/W	Write: sets the block size
+5		Record size, words	18		UINT16	R	
+6		Request variation	0		UINT16	R	
+7		Reserved	0		UINT16	R	
3080-3259		Data Profile 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 μ sec		μ sec	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	
3080...		Record #1 (variable length)					
		...					
		Record #10 (variable length)					

The block of registers 3072-3583 is the alias for the common file response block. It is intended for continuous polling of the last 1 to 10 records of the data profile log file #16 from SCADA systems. The alias block is preset at factory to provide access to the last three profile log records from the first section related to the Summary/TOU register #1. You can change factory assignments to point to another file section or change the number of the records in the transfer block by re-writing of the corresponding registers in the block heading. To update records in the alias block, at least one of the block heading registers 3072-3079 must be read first.

NOTES:

1. Registers 3080-3259 share the same data transfer buffer as the common file transfer block registers 63152-64943. Reading data from the common transfer block within the same connection session can destroy data in the alias transfer block. To guarantee that the alias block contains correct data, always read block heading registers 3072-3079 before accessing data records in the alias block.
2. 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.

4 Data Scales and Units

Code	Value/Range	Notes
Data Scales		
Vmax	600V	
I _{max}	CT Primary current × 2, A	
P _{max}	V _{max} × I _{max} × 2, W	
Data Units		
U1	0.1V	
U2	0.01A	
U3	1W/var/VA	

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	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)		
TOU Profile Log Channel ID			
F6	0-3	TOU energy registers #1-#4	
	16-19	TOU maximum demand registers #1-#4	
TOU Profile Log Channel Mask			
F8	Bit 0:15 = 1	TOU energy registers #1-#16	
	Bit 16:31 = 1	TOU maximum demand registers #1-#16	
TOU Tariff Change Time			
F10	Bits 8:15 = 0-15	Tariff number #1-#16	
	Bits 2:7 = 0-23	Tariff start hour	
	Bits 0:1 = 0-3	Tariff start quarter of an hour	
Summary Energy Register Source ID			
F11	0x0000	None	
	0x0700-0x0703	Pulse input DI1-DI4	
	0x1700	kWh import	
	0x1704	kvarh import	
	0x1708	kVAh total	
	0x7F00-0x7F27	Sub-meter #1-#40	
Setpoint Trigger Parameters ID			
F12	0x0600	Status input ON	
	0x0601	Status input ON	
	0x0602	Status input ON	
	0x0603	Status input ON	
	0x8600	Status input OFF	
	0x8601	Status input OFF	
	0x8602	Status input OFF	
	0x8603	Status input OFF	
	0x1100	High voltage V1	
	0x1101	High voltage V2	
	0x1102	High voltage V3	
	0x9100	Low voltage V1	
	0x9101	Low voltage V2	
	0x9102	Low voltage V3	
	0x111E	High voltage V12	
	0x111F	High voltage V23	

Format Code	Value	Description	Notes
	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	
	0x1406	High kW import	
	0x1408	High kvar import	
	0x1402	High kVA	
Setpoint Action ID			
F14	0x0000	No action	
	0x3000-0x3003	Operate relay RO1-RO4	
Relay Output Pulse Source ID			
F17	0x0000	None	
	0x0400	kWh Import pulse	
	0x0403	kvarh Import pulse	
	0x0406	kVAh pulse	
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	