SATEC
Powerful Solutions

Branch Feeder Monitor™

BFM II

DNP3 Communications Protocol

Reference Guide

BG0590 Rev. A4

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

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

REVISION HISTORY

A1	Nov 2015	Initial release.
A2	Feb 2016	Class 0 and Level 1 implementation only
A4	Jan 2018	All submeters max demand /TOU max demand reset in one click

Table of Contents

1 General

This document specifies a subset of the DNP3 communications protocol used to transfer data between a master computer station and the BFM II. The document provides the complete information necessary to develop third-party communications software capable of communication with the BFM II. Additional information concerning communications operation, configuring the communications parameters, and communications connections is found in the BFM II Installation and Operation Manual.

2 DNP 3.0 Protocol Implementation

DNP3 (Distributed Network Protocol) is an open standard designed by Harris Control Division. DNP defines a command-response method of communicating digital information between a master and slave device. Detailed information regarding DNP3 is available in the "Basic 4 Document Set" which can be obtained from the DNP User Group.

2.1 Deviations from Standard

The BFM II implements Level 1 of the DNP3 communication protocol. The device does not support unsolicited requests or hardware collision avoidance.

The data link layer differs from the Basic 4 specifications because of the master-slave relationship between devices. When the device receives a request, no further requests can be sent until after the device makes the appropriate response.

2.2 DNP Implementation

The BFM II, like most devices, allows retrieving regular analog and binary data from the device by executing directed (non-broadcast) Read requests.

Binary-Output-Status objects and Analog-Output-Status objects are sent with flags that always indicate ONLINE.

A Binary-Output-Status object that indicates the current state of a control digital point (relay) uses remote forced data as well as local forced data bits. The value of a state bit indicates the current state of the digital output point.

The BFM II executes the parameter clear function and demands resets using the Direct-Operate, SBO/Operate or Direct-Operate-No-Acknowledge command to specified points of the Control-Relay-Output-Block object.

Issuing the Direct-Operate, SBO/Operate or Direct-Operate-No-Acknowledge command to appropriative points of the Analog-Output-Block object can change the setup parameters. The device also supports the DNP functions Write, Cold-Restart and Delay Measurement.

Refer to Appendix A for specific requests and responses. Appendix B contains the standard DNP Device Profile Document.

The device attempts to respond with the same object variation and qualifier as those in the request. Exceptions to this rule include changing variation 0 to a specific variation and changing qualifier code 6 to 1.

If the device receives an invalid request, it sets the internal indication to the error code. The following internal indication bits are supported:

Octet Position	Bit Position	Description
0	0	Set when a request received with a broadcast destination address. Cleared after next response.
0	7	Device restart - set when the device powers up or after executing Cold Restart, cleared by writing zero to object 80.
0	4	Time-synchronization required from the master. Cleared when master sets the time.
0	5	Set when the device is in the Local state. Cleared when the device is in the Remote state.
1	5	Set when the current configuration in the device is corrupted. May also be set as a result of the legal changes in the setup configuration whenever another setup is affected by the changes made. Cleared by resetting the device diagnostics.

2.2.1 Class 0 Response

The BFM II DNP implementation supports a wide variety of messages. The most common method of getting static object information from the device via DNP is to issue a read Class 0 request.

The BFM II allows you to configure the Class 0 response by assigning ranges of points to be polled via Class 0 requests (see Section 3.9, DNP Protocol setup).

The Class 0 point list may contain up to 32 ranges of points. The total number of points that can be reported in the Class 0 response is limited by the one application fragment size, or 2048 bytes.
Refer to "Configuring DNP" in the BFM II installation and Operation Manual for information on how to configure Class 0 responses via PAS.

2.2.2 Event Objects (future)

The BFM II allows you to assign any static object point to a predefined object change event point for Class 1, Class 2 or Class 3 event polling. A total of 64 change event points are available. You can assign any of the Analog Input, Binary Input or Binary Counter static points to the corresponding change event point through the DNP Event setup (see Section 3.9). You can also link any point to Class 1, Class 2 or Class 3 object polling.

By default, a change event point index is the same as for the corresponding static object point. The BFM II gives you an option to re-map a static point index for the corresponding event point starting with index 0, separately for each object type - Analog Input, Binary Input or Binary Counter change events. For example, if the re-mapping option is active and you first assign static point AI:23 (1-sec frequency) to an event Class 1 point, the corresponding Analog Input change event point will be identified as point 0 in the Class 1 poll response.

Each point assigned to an event class can be separately enabled or disabled for scanning.

The conditions for Analog Input change events can be specified by either an operating threshold, or a deadband, using one of the following three relations:

Delta – a new event is generated when the absolute value of the difference between the last reported value of the point and its current value exceeds the specified deadband value;

More than (Over) - a new event is generated when the point value rises over the specified threshold, and then when the point value returns below the threshold taking into consideration a predefined hysteresis;

Less than (Under) - a new event is generated when the point value drops below the specified threshold, and then when the point value returns above the threshold taking into consideration a predefined hysteresis.

For Binary Counter and Binary Input change events, a Delta relation is only applicable.

The number of event points for each object type (Analog Input, Binary Input or Binary Counter) is limited through the DNP Options setup (see Section 3.9). Every time you change the number of points for any of the objects, the device clears all event buffers and links the default set of static points to each event object type.

The scan time rates for polling events of different types are as follows:

- 1 cycle for Binary Input points
- 200 ms for Binary Counter and Analog Input points

The memory consumption for keeping events depends on the event objects variation, or DNP object size. For each event object type and event class, the device uses a separate buffer. The maximum buffer size (MBS) per DNP event object/event class is 512 bytes. The maximum number of events per class that the device can hold can be calculated as follows:

Maximum number of events = MBS/ (DNP Event Object Size + 1)

For example, the device can hold up to 512/12=40 measures of the 32-bit Analog change event with Time objects, or up to 512/8=64 measures of the 8-bit Binary change event with Time objects.

To disable change event objects, explicitly set all registers that specify the number of the Analog Input, Binary Input and Binary Counter objects to generate events to 0. In this case, the device will support only static objects.

2.2.3 Device Address

Each device on a DNP link must have a unique address. The BFM II allows up to 60 device addresses in the range of 0 to 65532 to be selected, 54 addresses for submeters and additional 4 addresses for virtual meters. The DNP master can use addresses 65533 to 65535 for broadcast requests. A broadcast request never generates a DNP response.

2.2.4 Transaction Timing

The BFM II response time to master requests via serial ports is indicated in Table 2-1. It includes the receive termination delay - 4 character times plus a default 4-ms character timeout (user-programmable from 1 to 1000 ms), and a default 5-ms response delay (user-programmable from 0 to 1000 ms).

Table 2-1 Response Time

Baud Rate, bps	Response Time, ms (including a 5-ms response delay)		
	Min	Max	Typical
9600	13	15	13
19200	11	12	11
57600	9	10	9
115200	9	10	9

The Direct-Operate, SBO/Operate or Direct-Operate-No-Acknowledge requests for reset/clear registers and setpoint changing are immediately confirmed.

2.2.5 Scaling 16-bit Analog Inputs

Any of the variations 1 through 4 can be used with the Analog Input objects. Variations specified in Sections 3.1 and 3.5 show those that can be used to read a full-range value without a possible over-range error when no scaling is used to accommodate the value to the requested object size.

When over-range occurs, a positive value is reported as 32767 and a negative value as -32768, with the over-range bit in the flag octet being set to 1 if a variation 2 is requested. To avoid over-range errors when a variation 2 or 4 is required, a liner scaling may be used to scale 32-bit analog readings to 16-bit Analog Input objects (see Section 3.9, DNP Options setup). Scaling is enabled in the device by default.

When scaling is enabled, either analog input requested with variation 2 or 4 will be scaled to the range of -32768 to 32767 for bi-directional parameters (such as power and power factor), and to the range of 0 to 32767 for single-ended positive parameters (voltage, current, frequency, etc.). To get a true reading, the reverse conversion should be done using the following formula:

$$Y = ((X - DNP\_LO) \times (HI - LO)) / (DNP\_HI - DNP\_LO) + LO$$

where:

- Y - True reading in engineering units
- X - Raw input data in the range of DNP_LO – DNP_HI
- LO, HI - Data low and high scales in engineering units (for device data scales, see Section 4)
- DNP_LO - DNP low conversion scale: DNP_LO = -32768 for a point with a negative LO scale
  DNP_LO = 0 for a point with a zero or positive LO scale
- DNP_HI - DNP high conversion scale: DNP_HI = 32767

EXAMPLE

If you have read a value of 201 for point AI:3 that shows the I1 current (see Section 3.1) and the CT primary current is 200A (the high current scale is 2×200 = 400A), then the current reading in engineering units is as follows:

(201 - 0) × (400 - 0)/(32767 - 0) + 0 = 2.45A

2.2.6 Scaling 16-bit Binary Counters

Binary counters are stored in the device in 32-bit integer format. Using 16-bit Binary Counter objects can cause over-range errors if the counter value exceeds 32767.

Scaling binary counters (see DNP Options setup in Section 3.9) allows changing a binary counter unit from 1 to 1000 in powers of 10 to accommodate a 32-bit counter value to 16-bit object format. If the scaling unit is greater than 1, the counter value is reported being divided by the scaling unit. To get the actual value, multiply the counter reading by the selected scaling unit.

2.3 Password Protection

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

When password protection is enabled, the user password you set in your instrument should be written into the device authorization register (point AO:192) 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 response "Control operation not supported for this point". It is recommended to clear the password register after you have completed your changes in order to activate password protection.

2.4 File Transfer (future)

The BFM II supports file transfer operations for reading recorded disturbance waveforms and event-related data for general device events, power quality events and fault recorder events.

Notice that the physical file organization in the BFM II is different from that seen via the DNP3 file transfer objects. See the BFM II Operation Manual for more information on the actual file organization and configuring waveform and event recorders in the device.

2.4.1 General File Operations

Remote file access via DNP3 is implemented by DNP functions OPEN_FILE, READ and CLOSE_FILE with object 70, variations 3, 4, 5, 6 and 7. See DNP3 Specification, Volume 6, Part 2 DNP3 Object Library for detailed information on using file transfer objects.

The following table lists supported file transfer functions:

Function code	Function name	Function Description
1	Read	Read a data block
25	Open	Open a file
26	Close	Close a file
129	Response	Open, Read and Close response

Via DNP3, each event data file represents data collected for a single event. Data files are grouped in 12 directories (as shown in the following section) where each file can be uniquely identified by the event type, event sequence number and the time of occurrence.

To read a data file from the device:

1. Read the corresponding directory file to get a list of available event files as described in Section 2.4.2.

2. Browse the contents of the retrieved directory and select a file entry of interest.
3. Read the data file using a file name from the chosen directory entry.

The following limitations should be observed:

1. Only one file, either a directory, or a data file, can be open in any time. Close a directory file before reading a data file.
2. The block size in Read responses never exceeds 240 bytes.

2.4.2 Reading Directory Files

Directory file names are listed in the following table with the description of the directory contents.

Directory Name	Directory Contents
EV	Device event log files

To read a directory file:

1. Issue the OPEN_FILE command to open a directory file with the desired directory name (function 25, object 70, variation 3; response – function 129, object 70, variation 4). Use the received file handle as a file identifier in the following file transfer commands.
4. Read and store the directory file blocks in succession until the last block is read, using the READ command (function 1, object 70, variation 5; response – function 129, object 70, variation 5).
5. Close the open directory file with the CLOSE_FILE command (function 26, object 70, variation 4; response – function 129, object 70, variation 4).

NOTES:

1. Directory entries are transferred beginning from the most recent record.
2. Though a physical event file in the device may contain thousands of records, the number of entries in a DNP3 directory is limited to the user selectable value from 10 to 100 most recent events (the default value is 20). See DNP Options in Section 6.1 on how to define the maximum directory size in your device.
3. A disturbance waveform directory contains two file entries for each disturbance record with the same file name and extensions .cfg and .dat that are considered a single event when compared to the directory limit.
4. Preparing a directory list for a disturbance waveform directory takes an amount of time so that the response to a directory OPEN_FILE command may be significantly delayed. The response delay may be up to 0.4 seconds per 10 disturbance records.

2.4.3 Reading Event Data Files

To read an event data file:

1. Issue the OPEN_FILE command to open a file with the desired file name (function 25, object 70, variation 3; response – function 129, object 70, variation 4). Use the received file handle as a file identifier in the following file transfer commands.
6. Read and store the file blocks in succession until the last block is read, using the READ command (function 1, object 70, variation 5; response – function 129, object 70, variation 5).
7. Close the open file with the CLOSE_FILE command (function 26, object 70, variation 4; response – function 129, object 70, variation 4).

NOTE

All 16-bit and 32-bit data is encoded in little-endian notation.

The following paragraphs describe the file structures for different file types. The following designations are used in filename templates:

eeeee – event ID that caused an event, 2 to 6 ASCII characters (see Event Type ID, F22, in Section 5 for the event type codes)

nnnnn – event sequence number, 1 to 5 ASCII characters from 1 to 65535 (may be omitted with the preceding "-" delimiter)

YYYY - year coded by 4 ASCII characters

MM - month coded by 2 ASCII characters from 01 to 12

DD - day coded by 2 ASCII characters from 01 to 31

hh - hour coded by 2 ASCII characters from 00 to 23

mm - minutes coded by 2 ASCII characters from 00 to 59

sssss - milliseconds coded by 5 ASCII characters from 00000 to 59999

Device Event Log Files

File directory name: EV

File name template: EV-nnnnn$YYYY-MM-DD-hh-mm-sssss

An event file represents an array of 1 to 12 binary structures with the following attributes:

Field Description	Range	Units	Type	Size, bytes
Trigger time, seconds since 1/1/1970		sec	UINT32	4
Trigger time, fractional seconds in µsec		µsec	UINT32	4
Logged/triggered value			INT32	4
Event number	1-65535		UINT16	2
Event point/source ID	See F19 in Section 5		UINT16	2
Event effect	See F20 in Section 5		UINT16	2
Not used			UINT16	2

A file may contain more than one record per event in case the event was triggered by a compound logical expression with multiple conditions or multiple actions were taken.

For the triggered value range and units, see Section 3 in the BFM II Modbus Reference Guide. For volt, amps, power and frequency scales and units, refer to Section 4.

2.4.4 Processing errors

Any error or timeout that occurs while reading a file causes the file to be automatically closed.

Block Number Sequence

Data blocks are numbered starting at 0. Blocks must be read in ascending order. You can read the same block several times as long as no request has been sent for the following block. An error in the requested block number generates a negative Read Block response where the status field contains a code that means that the block number did not have the expected sequence number.

Inactivity Timeout

The inactivity timer is set in the device to 60 seconds. An open file is automatically closed whenever the time between two consecutive file transfer requests exceeds the inactivity timeout. In this case the device generates a fixed DNP event Obj 70 Var 6 with the status field that means that the file is closed due to inactivity timeout. The fixed events can be polled via the event Class 3.

3 DNP Point Map

3.1 Analog Inputs - Basic Set

Object : Var.	Object : Point	Description	Options/Range[2]	Units[2]	Type	R/W	Notes
30:3	AI:0	V1/V12 voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:1	V2/V23 voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:2	V3/V31 voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:3	I1 current	0-Imax	U2	UINT32	R	
30:3	AI:4	I2 current	0-Imax	U2	UINT32	R	
30:3	AI:5	I3 current	0-Imax	U2	UINT32	R	
30:3	AI:6	kW L1	-Pmax-Pmax	U3	INT32	R	
30:3	AI:7	kW L2	-Pmax-Pmax	U3	INT32	R	
30:3	AI:8	kW L3	-Pmax-Pmax	U3	INT32	R	
30:3	AI:9	kvar L1	-Pmax-Pmax	U3	INT32	R	
30:3	AI:10	kvar L2	-Pmax-Pmax	U3	INT32	R	
30:3	AI:11	kvar L3	-Pmax-Pmax	U3	INT32	R	
30:3	AI:12	kVA L1	0-Pmax	U3	UINT32	R	
30:3	AI:13	kVA L2	0-Pmax	U3	UINT32	R	
30:3	AI:14	kVA L3	0-Pmax	U3	UINT32	R	
30:4	AI:15	Power factor L1	-1000-1000	×0.001	INT16	R	
30:4	AI:16	Power factor L2	-1000-1000	×0.001	INT16	R	
30:4	AI:17	Power factor L3	-1000-1000	×0.001	INT16	R	
30:4	AI:18	Total PF	-1000-1000	×0.001	INT16	R	
30:3	AI:19	Total kW	-Pmax-Pmax	U3	INT32	R	
30:3	AI:20	Total kvar	-Pmax-Pmax	U3	INT32	R	
30:3	AI:21	Total kVA	0-Pmax	U3	UINT32	R	
30:3	AI:22	In (neutral) current	0-Imax	U2	UINT32	R	
30:4	AI:23	Frequency	0-10000	×0.01Hz	UINT16	R	
30:3	AI:24	Maximum kW import sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:25	kW import accumulated demand	0-Pmax	U3	UINT32	R	
30:3	AI:26	Maximum kVA sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:27	kVA accumulated demand	0-Pmax	U3	UINT32	R	
30:3	AI:28	I1 Maximum ampere demand	0-Imax	U2	UINT32	R	
30:3	AI:29	I2 Maximum ampere demand	0-Imax	U2	UINT32	R	
30:3	AI:30	I3 Maximum ampere demand	0-Imax	U2	UINT32	R	
30:3	AI:31	Present kW import sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:32	Present kVA sliding window demand	0-Pmax	U3	UINT32	R	
30:4	AI:33	PF (import) at Max. kVA sliding window demand	0-1000	×0.001	UINT16	R	
~~30:4~~	~~AI:34~~	~~V1/V12 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~1, 3~~
~~30:4~~	~~AI:35~~	~~V2/V23 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~1, 3~~
~~30:4~~	~~AI:36~~	~~V3/V31 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~1, 3~~

Object : Var.	Object : Point	Description	Options/Range[2]	Units[2]	Type	R/W	Notes
~~30:4~~	~~AI:37~~	~~I1 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~3~~
~~30:4~~	~~AI:38~~	~~I2 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~3~~
~~30:4~~	~~AI:39~~	~~I3 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~3~~
~~30:4~~	~~AI:40~~	~~I1 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~3~~
~~30:4~~	~~AI:41~~	~~I2 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~3~~
~~30:4~~	~~AI:42~~	~~I3 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~3~~
30:3	AI:43	Reserved	0		UINT16	R	

NOTES:

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

[2] All analog input points except of harmonics are 1-second average values. For volts, amps and power scales and units, refer to Section 4 "Data Scales and Units". For analog input scaling formulas and examples, see Section 2.2.5, " Scaling Analog Input Objects".

[3] On a 3-s interval.

3.2 Binary Inputs - Basic Set

Object : Var.	Object : Point	Description	Range	Units	Type	R/W	Notes
		Relays					
01:1	BI:0	Relay #1 status	0-1			R	
01:1	BI:1	Relay #2 status	0-1			R	
...	...	...	0-1			R	
01:1	BI:7	Relay #8 status	0-1			R	
		Digital Inputs					
01:1	BI:64	Digital input #1	0-1			R	
01:1	BI:65	Digital input #2	0-1			R	
...	...	...					
01:1	BI:135	Digital input #72	0-1			R	

3.3 Binary Counters - Basic Set

Object : Var.	Object : Point	Description	Range	Units	Type	R/W	Notes
20:5	BC:0	kWh import	0-999,999,999	U5	UINT32	R	
20:5	BC:1	kWh export	0-999,999,999	U5	UINT32	R	
20:5	BC:2	kvarh net	-999,999,999-999,999,999	U5	UINT32	R	
20:5	BC:3	kVAh	0-999,999,999	U5	UINT32	R	
20:5	BC:4	kvarh import	0-999,999,999	U5	UINT32	R	
20:5	BC:5	kvarh export	0-999,999,999	U5	UINT32	R	

3.4 Frozen Binary Counters

Object : Var. [1]	Object : Point	Description	Range	Units	Type	R/W	Notes
		Total Energies – Basic Set					
21:var	FBC:0	kWh import	0-999,999,999	U5	UINT32	R	
21:var	FBC:1	kWh export	0-999,999,999	U5	UINT32	R	
21:var	FBC:2	kvarh net	-999,999,999-999,999,999	U5	UINT32	R	
21:var	FBC:3	kVAh	0-999,999,999	U5	UINT32	R	
21:var	FBC:4	kvarh import	0-999,999,999	U5	UINT32	R	
21:var	FBC:5	kvarh export	0-999,999,999	U5	UINT32	R	
		Counters – Extended Set					
21:var	FBC:35328	Counter #1	0-999,999,999		UINT32	R	
21:var	FBC:35329	Counter #2	0-999,999,999		UINT32	R	
21:var	FBC:35330	Counter #3	0-999,999,999		UINT32	R	
21:var	FBC:35331	Counter #4	0-999,999,999		UINT32	R	
21:var	FBC:35332	Counter #5	0-999,999,999		UINT32	R	
21:var	FBC:35333	Counter #6	0-999,999,999		UINT32	R	
21:var	FBC:35334	Counter #7	0-999,999,999		UINT32	R	
21:var	FBC:35335	Counter #8	0-999,999,999		UINT32	R	
21:var	FBC:35336	Counter #9	0-999,999,999		UINT32	R	
21:var	FBC:35337	Counter #10	0-999,999,999		UINT32	R	
21:var	FBC:35338	Counter #11	0-999,999,999		UINT32	R	
21:var	FBC:35339	Counter #12	0-999,999,999		UINT32	R	
21:var	FBC:35340	Counter #13	0-999,999,999		UINT32	R	
21:var	FBC:35341	Counter #14	0-999,999,999		UINT32	R	
21:var	FBC:35342	Counter #15	0-999,999,999		UINT32	R	
21:var	FBC:35343	Counter #16	0-999,999,999		UINT32	R	
		Total Energies - Extended Set					
21:var	FBC:38656	kWh import	0-999,999,999	U5	UINT32	R	
21:var	FBC:38657	kWh export	0-999,999,999	U5	UINT32	R	
21:var	FBC:38658	KWh net	-999,999,999-999,999,999	U5	UINT32	R	
21:var	FBC:38659	KWh total	0-999,999,999	U5	UINT32	R	
21:var	FBC:38660	kvarh import	0-999,999,999	U5	UINT32	R	
21:var	FBC:38661	kvarh export	0-999,999,999	U5	UINT32	R	
21:var	FBC:38662	kvarh net	-999,999,999-999,999,999	U5	UINT32	R	
21:var	FBC:38663	kvarh total	0-999,999,999	U5	UINT32	R	
21:var	FBC:38664	kVAh total	0-999,999,999	U5	UINT32	R	

NOTE

[1] For object variation, see DNP Options setup (see Section 3.9).

[2] Issuing a freeze and clear request (or freeze and clear - No acknowledgement) to object 20 variation 0 using function code 0x09 (or 0x10) and the data qualifier 0x06 causes all counters to be reset to zero.

3.5 Analog Inputs, Binary Inputs and Counters – Extended Set

Object : Var.	Object : Point	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
30:4	AI:32768	None	0		UINT16	R	
		Special Inputs				R	
30:4	BI:33024	Voltage disturbance	0-100	% Un		R	
30:4	BI:33025	Phase rotation order	0=ERR, 1=POS, 2=NEG			R	
		Digital Inputs				R	
01:1	BI:34304	DI1	0-1			R	
01:1	BI:34305	DI2	0-1			R	
		...				R	
01:1	BI:34375	DI72	0-1			R	
		Relay Outputs				R	
01:1	BI:34816	Relay #1	0-1			R	
01:1	BI:34817	Relay #2	0-1			R	
		...				R	
01:1	BI:34834	Relay #18	0-1			R	
		Static Event Flags				R	
01:1	BI:35072	Phase order error	0-1			R	
01:1	BI:35073	Positive phase order	0-1			R	
01:1	BI:35074	Negative phase order	0-1			R	
~~01:1~~	~~BI:35075~~	~~PQ event~~	~~0-1~~			~~R~~	
~~01:1~~	~~BI:35076~~	~~General fault event~~	~~0-1~~			~~R~~	
~~01:1~~	~~BI:35077~~	~~Fault detected~~	~~0-1~~			~~R~~	
~~01:1~~	~~BI:35078~~	~~External fault trigger~~	~~0-1~~			~~R~~	
01:1	BI:35079	Device fault (non-critical error)	0-1			R	
01:1	BI:35080	No voltage	0-1			R	
01:1	BI:35081	Remote control	0-1			R	
		Counters					
20:5	BC:35328	Counter #1	0-999,999,999		UINT32	R	
20:5	BC:35329	Counter #2	0-999,999,999		UINT32	R	
		...				R	
20:5	BC:35331	Counter #4	0-999,999,999		UINT32	R	
		Total Energies					
20:5	BC:38656	kWh import	0-999,999,999	U5	UINT32	R	
20:5	BC:38657	kWh export	0-999,999,999	U5	UINT32	R	
20:5	BC:38658	kWh net	-999,999,999-999,999,999	U5	INT32	R	
20:5	BC:38659	kWh total	0-999,999,999	U5	UINT32	R	
20:5	BC:38660	kvarh import	0-999,999,999	U5	UINT32	R	
20:5	BC:38661	kvarh export	0-999,999,999	U5	UINT32	R	
20:5	BC:38662	kvarh net	-999,999,999-999,999,999	U5	INT32	R	
20:5	BC:38663	kvarh total	0-999,999,999	U5	UINT32	R	
20:5	BC:38664	kVAh total	0-999,999,999	U5	UINT32	R	

Object : Var.	Object : Point	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
		1-Cycle Phase Values					
30:3	AI:35840	V1/V12 voltage	0-Vmax	U1	UINT32	R	[1]
30:3	AI:35841	V2/V23 voltage	0-Vmax	U1	UINT32	R	[1]
30:3	AI:35842	V3/V31 voltage	0-Vmax	U1	UINT32	R	[1]
30:3	AI:35843	I1 current	0-Imax	U2	UINT32	R	
30:3	AI:35844	I2 current	0-Imax	U2	UINT32	R	
30:3	AI:35845	I3 current	0-Imax	U2	UINT32	R	
30:3	AI:35846	kW L1	-Pmax-Pmax	U3	INT32	R	
30:3	AI:35847	kW L2	-Pmax-Pmax	U3	INT32	R	
30:3	AI:35848	kW L3	-Pmax-Pmax	U3	INT32	R	
30:3	AI:35849	kvar L1	-Pmax-Pmax	U3	INT32	R	
30:3	AI:35850	kvar L2	-Pmax-Pmax	U3	INT32	R	
30:3	AI:35851	kvar L3	-Pmax-Pmax	U3	INT32	R	
30:3	AI:35852	kVA L1	0-Pmax	U3	UINT32	R	
30:3	AI:35853	kVA L2	0-Pmax	U3	UINT32	R	
30:3	AI:35854	kVA L3	0-Pmax	U3	UINT32	R	
30:4	AI:35855	Power factor L1	-1000-1000	×0.001	INT16	R	
30:4	AI:35856	Power factor L2	-1000-1000	×0.001	INT16	R	
30:4	AI:35857	Power factor L3	-1000-1000	×0.001	INT16	R	
~~30:4~~	~~AI:35858~~	~~V1/V12 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:35859~~	~~V2/V23 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:35860~~	~~V3/V31 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:35861~~	~~I1 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~4~~
~~30:4~~	~~AI:35862~~	~~I2 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~4~~
~~30:4~~	~~AI:35863~~	~~I3 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~4~~
~~30:4~~	~~AI:35864~~	~~I1 K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT16~~	~~R~~	~~4~~
~~30:4~~	~~AI:35865~~	~~I2 K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT16~~	~~R~~	~~4~~
~~30:4~~	~~AI:35866~~	~~I3 K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT16~~	~~R~~	~~4~~
~~30:4~~	~~AI:35867~~	~~I1 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~4~~
~~30:4~~	~~AI:35868~~	~~I2 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~4~~
~~30:4~~	~~AI:35869~~	~~I3 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~4~~
30:3	AI:35870	V12 voltage	0-Vmax	U1	UINT32	R	
30:3	AI:35871	V23 voltage	0-Vmax	U1	UINT32	R	
30:3	AI:35872	V31 voltage	0-Vmax	U1	UINT32	R	
		1-Cycle Low Phase Values					
30:3	AI:36096	Low L-N voltage	0-Vmax	U1	UINT32	R	
30:3	AI:36097	Low current	0-Imax	U2	UINT32	R	
30:3	AI:36098	Low kW	-Pmax-Pmax	U3	INT32	R	
30:3	AI:36099	Low kvar	-Pmax-Pmax	U3	INT32	R	
30:3	AI:36100	Low kVA	0-Pmax	U3	UINT32	R	
30:4	AI:36101	Low PF Lag	0-1000	×0.001	UINT32	R	
30:4	AI:36102	Low PF Lead	0-1000	×0.001	UINT32	R	
~~30:4~~	~~AI:36103~~	~~Low voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 4~~

Object : Var.	Object : Point	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
~~30:4~~	~~AI:36104~~	~~Low current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:36105~~	~~Low K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:36106~~	~~Low current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:3~~	~~AI:36107~~	~~Low L-L voltage~~	~~0-Vmax~~	~~U1~~	~~UINT32~~	~~R~~	
~~30:4~~	~~AI:36108~~	~~Low voltage interharmonics THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:36109~~	~~Low current interharmonics THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
		1-Cycle High Phase Values					
30:3	AI:36352	High L-N voltage	0-Vmax	U1	UINT32	R	
30:3	AI:36353	High current	0-Imax	U2	UINT32	R	
30:3	AI:36354	High kW	-Pmax-Pmax	U3	INT32	R	
30:3	AI:36355	High kvar	-Pmax-Pmax	U3	INT32	R	
30:3	AI:36356	High kVA	0-Pmax	U3	UINT32	R	
30:4	AI:36357	High PF Lag	0-1000	×0.001	UINT32	R	
30:4	AI:36358	High PF Lead	0-1000	×0.001	UINT32	R	
~~30:4~~	~~AI:36359~~	~~High voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:36360~~	~~High current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:36361~~	~~High K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:36362~~	~~High current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:3~~	~~AI:36363~~	~~High L-L voltage~~	~~0-Vmax~~	~~U1~~	~~UINT32~~	~~R~~	
~~30:4~~	~~AI:36364~~	~~High voltage interharmonics THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:36365~~	~~High current interharmonics THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
		1-Cycle Total Values					
30:3	AI:36608	Total kW	-Pmax-Pmax	U3	INT32	R	
30:3	AI:36609	Total kvar	-Pmax-Pmax	U3	INT32	R	
30:3	AI:36610	Total kVA	0-Pmax	U3	UINT32	R	
30:4	AI:36611	Total PF	-1000-1000	×0.001	INT16	R	
30:4	AI:36612	Total PF lag	0-1000	×0.001	UINT16	R	
30:4	AI:36613	Total PF lead	0-1000	×0.001	UINT16	R	
30:3	AI:36614	Total kW import	0-Pmax	U3	UINT32	R	
30:3	AI:36615	Total kW export	0-Pmax	U3	UINT32	R	
30:3	AI:36616	Total kvar import	0-Pmax	U3	UINT32	R	
30:3	AI:36617	Total kvar export	0-Pmax	U3	UINT32	R	
30:3	AI:36618	3-phase average L-N/L-L voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:36619	3-phase average L-L voltage	0-Vmax	U1	UINT32	R	
30:3	AI:36620	3-phase average current	0-Imax	U2	UINT32	R	
		1-Cycle Auxiliary Values					
30:3	AI:36865	In (neutral) current	0-Imax	U2	UINT32	R	
30:4	AI:36866	Frequency	0-10000	×0.01Hz	UINT16	R	
30:4	AI:36867	Voltage unbalance	0-3000	×0.1%	UINT16	R	
30:4	AI:36868	Current unbalance	0-3000	×0.1%	UINT16	R	
		1-Second Phase Values					
30:3	AI:37120	V1/V12 voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:37121	V2/V23 voltage	0-Vmax	U1	UINT32	R	1

Object : Var.	Object : Point	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
30:3	AI:37122	V3/V31 voltage	0-Vmax	U1	UINT32	R	[1]
30:3	AI:37123	I1 current	0-Imax	U2	UINT32	R	
30:3	AI:37124	I2 current	0-Imax	U2	UINT32	R	
30:3	AI:37125	I3 current	0-Imax	U2	UINT32	R	
30:3	AI:37126	kW L1	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37127	kW L2	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37128	kW L3	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37129	kvar L1	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37130	kvar L2	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37131	kvar L3	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37132	kVA L1	0-Pmax	U3	UINT32	R	
30:3	AI:37133	kVA L2	0-Pmax	U3	UINT32	R	
30:3	AI:37134	kVA L3	0-Pmax	U3	UINT32	R	
30:4	AI:37135	Power factor L1	-1000-1000	×0.001	INT16	R	
30:4	AI:37136	Power factor L2	-1000-1000	×0.001	INT16	R	
30:4	AI:37137	Power factor L3	-1000-1000	×0.001	INT16	R	
~~30:4~~	~~AI:37138~~	~~V1/V12 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~2, 5~~
~~30:4~~	~~AI:37139~~	~~V2/V23 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~2, 5~~
~~30:4~~	~~AI:37140~~	~~V3/V31 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~2, 5~~
~~30:4~~	~~AI:37141~~	~~I1 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~5~~
~~30:4~~	~~AI:37142~~	~~I2 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~5~~
~~30:4~~	~~AI:37143~~	~~I3 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~5~~
~~30:4~~	~~AI:37144~~	~~I1 K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT16~~	~~R~~	~~5~~
~~30:4~~	~~AI:37145~~	~~I2 K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT16~~	~~R~~	~~5~~
~~30:4~~	~~AI:37146~~	~~I3 K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT16~~	~~R~~	~~5~~
~~30:4~~	~~AI:37147~~	~~I1 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~5~~
~~30:4~~	~~AI:37148~~	~~I2 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~5~~
~~30:4~~	~~AI:37149~~	~~I3 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT16~~	~~R~~	~~5~~
30:3	AI:37150	V12 voltage	0-Vmax	U1	UINT32	R	
30:3	AI:37151	V23 voltage	0-Vmax	U1	UINT32	R	
30:3	AI:37152	V31 voltage	0-Vmax	U1	UINT32	R	
		1-Second Low Phase Values					
30:3	AI:37376	Low L-N voltage	0-Vmax	U1	UINT32	R	
30:3	AI:37377	Low current	0-Imax	U2	UINT32	R	
30:3	AI:37378	Low kW	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37379	Low kvar	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37380	Low kVA	0-Pmax	U3	UINT32	R	
30:4	AI:37381	Low PF Lag	0-1000	×0.001	UINT32	R	
30:4	AI:37382	Low PF Lead	0-1000	×0.001	UINT32	R	
~~30:4~~	~~AI:37383~~	~~Low voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 5~~
~~30:4~~	~~AI:37384~~	~~Low current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~5~~
~~30:4~~	~~AI:37385~~	~~Low K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT32~~	~~R~~	~~5~~

Object : Var.	Object : Point	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
30:4	AI:37386	Low current TDD	0-1000	×0.1%	UINT32	R	5
30:3	AI:37387	Low L-L voltage	0-Vmax	U1	UINT32	R	
30:4	AI:37388	Low voltage interharmonics THD	0-9999	×0.1%	UINT32	R	2, 5
30:4	AI:37389	Low current interharmonics THD	0-9999	×0.1%	UINT32	R	5
		1-Second High Phase Values					
30:3	AI:37632	High L-N voltage	0-Vmax	U1	UINT32	R	
30:3	AI:37633	High current	0-Imax	U2	UINT32	R	
30:3	AI:37634	High kW	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37635	High kvar	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37636	High kVA	0-Pmax	U3	UINT32	R	
30:4	AI:37637	High PF Lag	0-1000	×0.001	UINT32	R	
30:4	AI:37638	High PF Lead	0-1000	×0.001	UINT32	R	
~~30:4~~	~~AI:37639~~	~~High voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 5~~
~~30:4~~	~~AI:37640~~	~~High current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~5~~
~~30:4~~	~~AI:37641~~	~~High K Factor~~	~~10-9999~~	~~×0.1~~	~~UINT32~~	~~R~~	~~5~~
~~30:4~~	~~AI:37642~~	~~High current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~5~~
~~30:3~~	~~AI:37643~~	~~High L-L voltage~~	~~0-Vmax~~	~~U1~~	~~UINT32~~	~~R~~	
~~30:4~~	~~AI:37644~~	~~High voltage interharmonics THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 5~~
~~30:4~~	~~AI:37645~~	~~High current interharmonics THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~5~~
		1-Second Total Values					
30:3	AI:37888	Total kW	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37889	Total kvar	-Pmax-Pmax	U3	INT32	R	
30:3	AI:37890	Total kVA	0-Pmax	U3	UINT32	R	
30:4	AI:37891	Total PF	-1000-1000	×0.001	INT16	R	
30:4	AI:37892	Total PF lag	0-1000	×0.001	UINT16	R	
30:4	AI:37893	Total PF lead	0-1000	×0.001	UINT16	R	
30:3	AI:37894	Total kW import	0-Pmax	U3	UINT32	R	
30:3	AI:37895	Total kW export	0-Pmax	U3	UINT32	R	
30:3	AI:37896	Total kvar import	0-Pmax	U3	UINT32	R	
30:3	AI:37897	Total kvar export	0-Pmax	U3	UINT32	R	
30:3	AI:37898	3-phase average L-N/L-L voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:37899	3-phase average L-L voltage	0-Vmax	U1	UINT32	R	
30:3	AI:37900	3-phase average current	0-Imax	U2	UINT32	R	
		1-Second Auxiliary Values					
30:3	AI:38144	I4 Current	0-I4max	U2	UINT32	R	
30:3	AI:38145	In (neutral) current	0-Imax	U2	UINT32	R	
30:4	AI:38146	Frequency	0-10000	×0.01Hz	UINT16	R	
30:4	AI:38147	Voltage unbalance	0-3000	×0.1%	UINT16	R	
30:4	AI:38148	Current unbalance	0-3000	×0.1%	UINT16	R	
		Present Volt, Ampere and Power Demands					
30:3	AI:38400	V1/V12 Volt demand	0-Vmax	U1	UINT32	R	2
30:3	AI:38401	V2/V23 Volt demand	0-Vmax	U1	UINT32	R	2
30:3	AI:38402	V3/V31 Volt demand	0-Vmax	U1	UINT32	R	2

Object : Var.	Object : Point	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
30:3	AI:38403	I1 Ampere demand	0-Imax	U2	UINT32	R	
30:3	AI:38404	I2 Ampere demand	0-Imax	U2	UINT32	R	
30:3	AI:38405	I3 Ampere demand	0-Imax	U2	UINT32	R	
30:3	AI:38406	kW import block demand	0-Pmax	U3	UINT32	R	
30:3	AI:38407	kvar import block demand	0-Pmax	U3	UINT32	R	
30:3	AI:38408	kVA block demand	0-Pmax	U3	UINT32	R	
30:3	AI:38409	kW import sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:38410	kvar import sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:38411	kVA sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:38412	Not used	0		UINT32	R	
30:3	AI:38413	Not used	0		UINT32	R	
30:3	AI:38414	Not used	0		UINT32	R	
30:3	AI:38415	kW import accumulated demand	0-Pmax	U3	UINT32	R	
30:3	AI:38416	kvar import accumulated demand	0-Pmax	U3	UINT32	R	
30:3	AI:38417	kVA accumulated demand	0-Pmax	U3	UINT32	R	
30:3	AI:38418	kW import predicted sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:38419	kvar import predicted sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:38420	kVA predicted sliding window demand	0-Pmax	U3	UINT32	R	
30:4	AI:38421	PF (import) at Max. kVA sliding window demand	0-1000	×0.001	UINT16	R	
30:3	AI:38422	kW export block demand	0-Pmax	U3	UINT32	R	
30:3	AI:38423	kvar export block demand	0-Pmax	U3	UINT32	R	
30:3	AI:38424	kW export sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:38425	kvar export sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:38426	kW export accumulated demand	0-Pmax	U3	UINT32	R	
30:3	AI:38427	kvar export accumulated demand	0-Pmax	U3	UINT32	R	
30:3	AI:38428	kW export predicted sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:38429	kvar export predicted sliding window demand	0-Pmax	U3	UINT32	R	
		Minimum 1-Cycle Phase Values					
30:3	AI:44032	V1 voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:44033	V2 voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:44034	V3 voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:44035	I1 current	0-Imax	U2	UINT32	R	
30:3	AI:44036	I2 current	0-Imax	U2	UINT32	R	
30:3	AI:44037	I3 current	0-Imax	U2	UINT32	R	
30:3	AI:44038	kW L1	-Pmax-Pmax	U3	INT32	R	
30:3	AI:44039	kW L2	-Pmax-Pmax	U3	INT32	R	
30:3	AI:44040	kW L3	-Pmax-Pmax	U3	INT32	R	
30:3	AI:44041	kvar L1	-Pmax-Pmax	U3	INT32	R	
30:3	AI:44042	kvar L2	-Pmax-Pmax	U3	INT32	R	
30:3	AI:44043	kvar L3	-Pmax-Pmax	U3	INT32	R	
30:3	AI:44044	kVA L1	0-Pmax	U3	UINT32	R	
30:3	AI:44045	kVA L2	0-Pmax	U3	UINT32	R	
30:3	AI:44046	kVA L3	0-Pmax	U3	UINT32	R	

Object : Var.	Object : Point	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
30:4	AI:44047	Power factor L1	0-1000	×0.001	UINT32	R	Absolute value
30:4	AI:44048	Power factor L2	0-1000	×0.001	UINT32	R	Absolute value
30:4	AI:44049	Power factor L3	0-1000	×0.001	UINT32	R	Absolute value
~~30:4~~	~~AI:44050~~	~~V1 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:44051~~	~~V2 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:44052~~	~~V3 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:44053~~	~~I1 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:44054~~	~~I2 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:44055~~	~~I3 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:44056~~	~~I1 K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:44057~~	~~I2 K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:44058~~	~~I3 K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:44059~~	~~I1 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:44060~~	~~I2 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:44061~~	~~I3 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
30:3	AI:44062	V12 voltage	0-Vmax	U1	UINT32	R	
30:3	AI:44063	V23 voltage	0-Vmax	U1	UINT32	R	
30:3	AI:44064	V31 voltage	0-Vmax	U1	UINT32	R	
~~30:3~~	~~AI:44065~~	~~I1x current~~	~~0-Ixmax~~	~~U2~~	~~UINT32~~	~~R~~	
~~30:3~~	~~AI:44066~~	~~I2x current~~	~~0-Ixmax~~	~~U2~~	~~UINT32~~	~~R~~	
~~30:3~~	~~AI:44067~~	~~I3x current~~	~~0-Ixmax~~	~~U2~~	~~UINT32~~	~~R~~	
		Minimum 1-Cycle Total Values					
30:3	AI:44288	Total kW	-Pmax-Pmax	U3	INT32	R	
30:3	AI:44289	Total kvar	-Pmax-Pmax	U3	INT32	R	
30:3	AI:44290	Total kVA	0-Pmax	U3	UINT32	R	
30:4	AI:44291	Total PF	0-1000	×0.001	UINT32	R	Absolute value
30:4	AI:44292	Total PF lag	0-1000	×0.001	UINT32	R	
30:4	AI:44293	Total PF lead	0-1000	×0.001	UINT32	R	
		Minimum 1-Cycle Auxiliary Values					
30:3	AI:44545	In current	0-Imax	U2	UINT32	R	
30:4	AI:44546	Frequency	0-10000	×0.01Hz	UINT32	R	
30:4	AI:44547	Voltage unbalance	0-3000	×0.1%	UINT32	R	
30:4	AI:44548	Current unbalance	0-3000	×0.1%	UINT32	R	
		Maximum 1-Cycle Phase Values					
30:3	AI:46080	V1 voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:46081	V2 voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:46082	V3 voltage	0-Vmax	U1	UINT32	R	1
30:3	AI:46083	I1 current	0-Imax	U2	UINT32	R	
30:3	AI:46084	I2 current	0-Imax	U2	UINT32	R	
30:3	AI:46085	I3 current	0-Imax	U2	UINT32	R	
30:3	AI:46086	kW L1	-Pmax-Pmax	U3	INT32	R	
30:3	AI:46087	kW L2	-Pmax-Pmax	U3	INT32	R	
30:3	AI:46088	kW L3	-Pmax-Pmax	U3	INT32	R	

Object : Var.	Object : Point	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
30:3	AI:46089	kvar L1	-Pmax-Pmax	U3	INT32	R	
30:3	AI:46090	kvar L2	-Pmax-Pmax	U3	INT32	R	
30:3	AI:46091	kvar L3	-Pmax-Pmax	U3	INT32	R	
30:3	AI:46092	kVA L1	0-Pmax	U3	UINT32	R	
30:3	AI:46093	kVA L2	0-Pmax	U3	UINT32	R	
30:3	AI:46094	kVA L3	0-Pmax	U3	UINT32	R	
30:4	AI:46095	Power factor L1	0-1000	×0.001	UINT32	R	Absolute value
30:4	AI:46096	Power factor L2	0-1000	×0.001	UINT32	R	Absolute value
30:4	AI:46097	Power factor L3	0-1000	×0.001	UINT32	R	Absolute value
~~30:4~~	~~AI:46098~~	~~V1 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:46099~~	~~V2 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:46100~~	~~V3 voltage THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~2, 4~~
~~30:4~~	~~AI:46101~~	~~I1 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:46102~~	~~I2 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:46103~~	~~I3 current THD~~	~~0-9999~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:46104~~	~~I1 K Factor~~	~~10-9999~~	~~×0.1~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:46105~~	~~I2 K-Factor~~	~~10-9999~~	~~×0.1~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:46106~~	~~I3 K Factor~~	~~10-9999~~	~~×0.1~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:46107~~	~~I1 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:46108~~	~~I2 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
~~30:4~~	~~AI:46109~~	~~I3 current TDD~~	~~0-1000~~	~~×0.1%~~	~~UINT32~~	~~R~~	~~4~~
30:3	AI:46110	V12 voltage	0-Vmax	U1	UINT32	R	
30:3	AI:46111	V23 voltage	0-Vmax	U1	UINT32	R	
30:3	AI:46112	V31 voltage	0-Vmax	U1	UINT32	R	
		Maximum 1-Cycle Total Values					
30:3	AI:46336	Total kW	-Pmax-Pmax	U3	INT32	R	
30:3	AI:46337	Total kvar	-Pmax-Pmax	U3	INT32	R	
30:3	AI:46338	Total kVA	0-Pmax	U3	UINT32	R	
30:4	AI:46339	Total PF	0-1000	×0.001	UINT32	R	Absolute value
30:4	AI:46340	Total PF lag	0-1000	×0.001	UINT32	R	
30:4	AI:46341	Total PF lead	0-1000	×0.001	UINT32	R	
		Maximum 1-Cycle Auxiliary Values					
30:3	AI:46593	In Current	0-Imax	U2	UINT32	R	
30:4	AI:46594	Frequency	0-10000	×0.01Hz	UINT32	R	
30:4	AI:46595	Voltage unbalance	0-3000	×0.1%	UINT32	R	
30:4	AI:46596	Current unbalance	0-3000	×0.1%	UINT32	R	
30:3	AI:46597	Reserved	0		UINT32	R	
		Maximum Demands					
30:3	AI:46848	V1 Maximum volt demand	0-Vmax	U1	UINT32	R	2
30:3	AI:46849	V2 Maximum volt demand	0-Vmax	U1	UINT32	R	2
30:3	AI:46850	V3 Maximum volt demand	0-Vmax	U1	UINT32	R	2
30:3	AI:46851	I1 Maximum ampere demand	0-Imax	U2	UINT32	R	
30:3	AI:46852	I2 Maximum ampere demand	0-Imax	U2	UINT32	R	

Object : Var.	Object : Point	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
30:3	AI:46853	I3 Maximum ampere demand	0-Imax	U2	UINT32	R	
30:4	AI:46854	Not used	0		UINT32	R	
30:4	AI:46855	Not used	0		UINT32	R	
30:4	AI:46856	Not used	0		UINT32	R	
30:3	AI:46857	Maximum kW import sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:46858	Maximum kvar import sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:46859	Maximum kVA sliding window demand	0-Pmax	U3	UINT32	R	
30:4	AI:46860	Not used	0		UINT32	R	
30:4	AI:46861	Not used	0		UINT32	R	
30:4	AI:46862	Not used	0		UINT32	R	
30:3	AI:46863	Maximum kW export sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:46864	Maximum kvar export sliding window demand	0-Pmax	U3	UINT32	R	
30:3	AI:46865	Not used	0		UINT32	R	
30:3	AI:46866	Not used	0		UINT32	R	
30:3	AI:46869	In Maximum ampere demand	0-Imax	U2	UINT32	R	
		Analog Inputs					3
30:3	AI:47872	Analog input AI1	AI1min-AI1max		UINT32	R	
30:3	AI:47873	Analog input AI2	AI2min-AI2max		UINT32	R	
						R	
30:3	AI:47887	Analog input AI16	AI16min-AI16max		UINT32	R	

NOTES:

[1] When the 4LN3, 4LL3, 3LN3, 3LL3, 3BLN3 or 3BLL3 wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line.

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

[3] For volts, amps, power and frequency scales and units: refer to Section 4 "Data Scales and Units". For analog input scaling formulas and examples, see Section 2.2.5, " Scaling Analog Input Objects".

[4] On a 0.2-s interval.

[5] On a 3-s interval.

3.6 Factory Device Settings and Identification

Object:Var.	Object:Point	Description	Options/Range	Units	Type	R/W	Notes
Device Identification							
30:3	AI:256	Device serial number	0-999999		UINT32	R	
30:3	AI:257	Device model ID	15400		UINT32	R	
30:3	AI:258-AI:261	Device model name	"BFM II"		UINT32	R	Null-terminated string. Each four characters are packed into a 32-bit word.
30:3	AI:262-AI:265	Reserved			UINT32	R	
30:4	AI:266	Device firmware version number	3701-3799		UINT16	R	Two higher decimal digits = major version number, two lower decimal digits = minor version number
30:4	AI:267	Device firmware build number	1-99		UINT16	R	
30:4	AI:268	Reserved			UINT16	R	
30:4	AI:269	Reserved			UINT16	R	
30:4	AI:270	Boot loader version number			UINT16	R	Two higher decimal digits = major version number, two lower decimal digits = minor version number
30:4	AI:271	Boot loader build number	1-99		UINT16	R	
30:3	AI:272-AI:274	Reserved			UINT32	R	
Factory Device Settings							
30:4	AI:275	V1-V3 input range	120, 277	V	UINT16	R	
30:4	AI:276	V1-V3 input overload	120	%	UINT16	R	
30:4	AI:277	Reserved			UINT16	R	
30:4	AI:278	Reserved			UINT16	R	
30:4	AI:279	I1-I3 input range	1, 5, 50	A	UINT16	R	
30:4	AI:280	I1-I3 input overload	200	%	UINT16	R	
30:4	AI:281	Reserved			UINT16	R	
30:4	AI:282	Reserved			UINT16	R	
30:4	AI:283	Reserved			UINT16	R	
30:4	AI:284	Reserved			UINT16	R	
30:4	AI:285	Reserved			UINT16	R	
30:4	AI:286	Reserved			UINT16	R	
Port Identification							
30:4	AI:320	Active port number	0-2 = serial port COM1-COM3, 4 = Modem port, 5 = USB/Modbus port, 6-10 = Ethernet/TCP port 1-99		UINT16	R	

3.7 Device Control

Object : Var.	Object : Point	Description	Options/Range	Units	Type	R/W	Notes
Device Authorization Register							
40:1(read)	AO:192	When write: 8-digit password. When read:	0/-1 (Read)			R/W	

Object : Var.	Object : Point	Description	Options/Range	Units	Type	R/W	Notes
41:1(write)		0 = access permitted, -1 = authorization required.	0-99999999(Write)				
Remote Relay Control							
10:2(read) 12:1(write)	BO:0 CROB:0	Relay #1 Force operate/Force release/Normal	0/1 = state OFF/ON			R/W	4
10:2(read) 12:1(write)	BO:1 CROB:1	Relay #2 Force operate/Force release/Normal	0/1 = state OFF/ON			R/W	4
		...					
10:2(read) 12:1(write)	BO:7 CROB:7	Relay #8 Force operate/Force release/Normal	0/1 = state OFF/ON			R/W	4
Device Reset/Clear							
10:2(read) 12:1(write)	BO:64 CROB:64	Clear total energy registers	0/1 = state OFF/ON			R/W	Returns zero PULSE ON 1
10:2(read) 12:1(write)	BO:65 CROB:65	Clear total maximum demand registers (all demands)	0/1 = state OFF/ON			R/W	Returns zero PULSE ON 1
10:2(read) 12:1(write)	BO:66 CROB:66	Clear power demands	0/1 = state OFF/ON			R/W	Returns zero PULSE ON 1
10:2(read) 12:1(write)	BO:67 CROB:67	Clear volt/ampere/harmonic demands	0/1 = state OFF/ON			R/W	Returns zero PULSE ON 1
10:2(read) 12:1(write)	BO:68-75 CROB:68-75	Reserved	0/1 = state OFF/ON			R/W	Returns zero PULSE ON 1
10:2(read) 12:1(write)	BO:76 CROB:76	Clear pulse counters (all counters)	0/1 = state OFF/ON			R/W	Returns zero PULSE ON 1
10:2(read) 12:1(write)	BO:77-84 CROB:77-84	Clear pulse counter#1-#8	0/1 = state OFF/ON			R/W	Returns zero PULSE ON 1
10:2(read) 12:1(write)	BO:85 CROB:85	Clear Min/Max log	0/1 = state OFF/ON			R/W	Returns zero PULSE ON 1
10:2(read) 12:1(write)	BO:86-93 CROB:86-93	Reserved	0/1 = state OFF/ON			R/W	Returns zero PULSE ON 1
10:2(read) 12:1(write)	BO:94-101 CROB:94-101	Clear pulse counter#9-#16	0/1 = state OFF/ON			R/W	Returns zero PULSE ON 1
Device Diagnostics							
10:2(read) 12:1(write)	BO:128 CROB:128	Critical error	0/1 = state OFF/ON			R/W	2
10:2(read) 12:1(write)	BO:129 CROB:129	Permanent fault (critical error)	0/1 = state OFF/ON			R/W	2
10:2(read) 12:1(write)	BO:130 CROB:130	RAM/Data error	0/1 = state OFF/ON			R/W	2
10:2(read) 12:1(write)	BO:131 CROB:131	CPU watchdog reset	0/1 = state OFF/ON			R/W	2
10:2(read) 12:1(write)	BO:132 CROB:132	DSP/Sampling fault	0/1 = state OFF/ON			R/W	2
10:2(read) 12:1(write)	BO:133 CROB:133	CPU exception	0/1 = state OFF/ON			R/W	2

Object : Var.	Object : Point	Description	Options/Range	Units	Type	R/W	Notes
10:2(read) 12:1(write)	BO:134 CROB:134	Reserved	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:135 CROB:135	Software watchdog reset	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:136 CROB:136	Power down	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:137 CROB:137	Device reset [3]	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:138 CROB:138	Configuration reset [3]	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:139 CROB:139	RTC fault (critical error)	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:140 CROB:140	Configuration fault (critical error)	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:141 CROB:141	Reserved	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:142 CROB:142	Expanded memory fault	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:143 CROB:143	CPU EEPROM fault	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:144 CROB:144	AC board EEPROM fault	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:145 CROB:145	I/O board EEPROM fault	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:146 CROB:146	Reserved	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:147 CROB:147	Reserved	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:148 CROB:148	C Library error	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:149 CROB:149	RTOS Kernel error	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:150 CROB:150	Task error	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:151 CROB:151	Reserved	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:152 CROB:152	IRIG-B signal lost	0/1 = state OFF/ON			R/W	[2]
10:2(read) 12:1(write)	BO:153 CROB:153	IRIG-B time unlocked	0/1 = state OFF/ON			R/W	[2]

NOTES:

[1] The following restriction should be noted when using object 12 to control the listed points.

- The Count byte is ignored.
- The Control Code byte is checked:
  - Pulse On (1) is valid for all points; other codes are invalid and will be rejected.
- The On Time and Off Time fields are ignored.
- The status byte in the response will reflect the success or failure of the control operation:
  - Request Accepted (0) will be returned if the command was accepted;
  - Request not Accepted due to Formatting Errors (3) is returned if the Control Code byte was incorrectly formatted or if an invalid code was present in the command;
  - Control Operation not Supported for this Point (4) is returned if the Control Point was out of control.

[2] The device diagnostics points indicate possible problems with the device hardware or setup configuration. The hardware problems are indicated by the appropriate points, which are set whenever the instrument fails self-test diagnostics, or in the event of loss of power. The dedicated binary point indicates the setup configuration problems, which is set when either configuration register is corrupted. In this event, the instrument will use the default configuration. The configuration corrupt bit may also be set as a result of the legal changes in the setup configuration since the instrument might implicitly change or clear other setups if they are affected by the changes made.

Issuing the Direct-Operate, SBO/Operate or Direct-Operate-No-Acknowledge command using the Control-Relay-Output-Block object (with the code operation Latch-Off) to points 128-153 resets device diagnostics points.

The following restrictions should be noted when using Object 12 to control these points:

- The Count byte is ignored.
- The Control Code byte is checked:
  - Latch Off is valid for all points; other codes are invalid and will be rejected.
- The On Time and Off Time fields are ignored.
- The status byte in the response will reflect the success or failure of the control operation:
  - Request Accepted (0) is returned if the command was accepted;
  - Request not Accepted due to Formatting Errors (3) is returned if the Control Code byte was incorrectly formatted or if an invalid Code was present in the command.

[3] These self-check alarms are doubled with the corresponding internal indication bits.

[4] To manually operate relays, use the Direct-Operate, SBO/Operate or Direct-Operate-No-Acknowledge command to points 0-31 of the Control-Relay-Output-Block object with the Control Code value Latch On. To manually release relays, use the Direct-Operate (or SBO/Operate or Direct-Operate-No-Acknowledge) command to point 0-31 of the Control-Relay-Output-Block object with the Control Code value Latch Off. To revert relays to normal operation, use the Direct-Operate, SBO/Operate or Direct-Operate-No-Acknowledge command to the corresponding points of the Control-Relay-Output-Block object with the Control Code value Null Operation and the Clear sub-field set to 1.

To operate a relay in pulse mode with the Pulse On or Pulse Off control code, put the relay in pulse mode and select a required pulse polarity via the Relay Outputs setup (use the supplemental PAS software to change the relay properties). The actual pulse width will be taken from the On Time/Off Time fields of the Control-Relay-Output-Block object.

The following restrictions should be noted when using object 12 to control these points:

- The Count byte is ignored.
- The Control Code byte is checked:
  - Pulse On, Pulse Off, Latch On (Pulse On/Close) and Latch Off (Pulse On/Trip) are valid for all points; other codes are invalid and will be rejected;

- Clear sub-field is valid; other sub-fields are ignored.

- The On Time specifies in ms the amount of time the digital point is to be turned on. The minimal value of the On Time is 500 ms and the actual value may differ from the specified value by up to 10 ms.

- The Off Time specifies in ms the amount of time the digital point is to be turned off. The minimal value of the Off Time is 500 ms and the actual value may differ from the specified value by up to 10 ms.

- The Status byte in the response reflects the success or failure of the control operation:
  - Request Accepted (0) will be return if the command was accepted;
  - Request not Accepted due to Formatting Errors (3) will be returned if the Control Code byte was incorrectly formatted or an invalid Code was present in the command;
  - Control Operation not Supported for this Point (4) will be returned if the Control Point was out of control.

3.8 Device Setup

Object:Var.	Object:Point	Description	Options/Range	Units	Type	R/W	Notes
Basic Setup							
40:2 (read) 41:2 (write)	AO:0	Wiring mode	F26		UINT16	R/W	
40:1 (read) 41:1 (write)	AO:1	PT ratio (primary to secondary ratio)	10-65000	×0.1	UINT16	R/W	
40:2 (read) 41:2 (write)	AO:2	PT secondary (Line-to-Line)	50-480	V	UINT16	R/W	
40:2 (read) 41:2 (write)	AO:3	Reserved			UINT16	R/W	
40:2 (read) 41:2 (write)	AO:4	Reserved			UINT16	R/W	
40:2 (read) 41:2 (write)	AO:5	CT primary current	1-10000	A	UINT16	R/W	
40:2 (read) 41:2 (write)	AO:6	CT secondary current	1, 5, 50	A	UINT16	R/W	
40:2 (read) 41:2 (write)	AO:7	Reserved			UINT16	R/W	
40:2 (read) 41:2 (write)	AO:8	Reserved			UINT16	R/W	
40:1 (read)	AO:9-16	Reserved			UINT16	R/W	Read as 65535
40:2 (read) 41:2 (write)	AO:17	Nominal line frequency	50, 60	Hz	UINT16	R/W	
40:2 (read) 41:2 (write)	AO:18	Phase order	0 = ABC, 1 = CBA		UINT16	R/W	
40:2 (read)	AO:19-23	Reserved			UINT16	R/W	Read as 65535
40:2 (read) 41:2 (write)	AO:24	I maximum demand load current	0-10000	A	UINT16	R/W	
40:2 (read) 41:2 (write)	AO:25	Reserved			UINT16	R/W	
40:2 (read)	AO:26-31	Reserved			UINT16	R/W	Read as 65535
Demand Setup							
40:2 (read) 41:2 (write)	AO:32	Power demand period (block interval)	1, 2, 3, 5, 10, 15, 30, 60	min	UINT16	R/W	
40:2 (read) 41:2 (write)	AO:33	Number of demand periods in a sliding window	1-15		UINT16	R/W	
40:2 (read) 41:2 (write)	AO:34	Reserved			UINT16	R/W	A DI input is considered a pulse or KYZ input. The pulse edge restarts the power demand accumulation interval.
40:2 (read)	AO:35-39	Reserved			UINT16	R/W	Read as 65535
40:2 (read) 41:2 (write)	AO:40	Volt demand period	0-9000	sec	UINT16	R/W	

Object:Var.	Object:Point	Description	Options/Range	Units	Type	R/W	Notes
40:2 (read) 41:2 (write)	AO:41	Ampere demand period	0-9000	sec	UINT16	R/W	
40:2 (read) 41:2 (write)	AO:42	Harmonic demand period	0-9000	sec	UINT16	R/W	
40:2 (read)	AO:43-47	Reserved			UINT16	R/W	Read as 65535
Device Options Setup							
40:2 (read) 41:2 (write)	AO:48	Power calculation mode	0 = using reactive power: S = f(P,Q), 1 = using non-active power: Q = f(S,P)		UINT16	R/W	
40:2 (read) 41:2 (write)	AO:49	Energy roll value	0 = 1×10^4, 1 = 1×10^5, 2 = 1×10^6, 3 = 1×10^7, 4 = 1×10^8, 5 = 1×10^9		UINT16	R/W	
40:2 (read) 41:2 (write)	AO:50	Reserved			UINT16	R/W	
40:2 (read	AO:51	Reserved			UINT16	R/W	Read as 65535
40:2 (read) 41:2 (write)	AO:52	Tariff control	0 = via a calendar scheduler, 0x4000 = via communications, 0x0100-0x010F = via tariff inputs DI1-DI8 (bits 0:3 denote the first digital input index used)		UINT16	R/W	
40:2 (read) 41:2 (write)	AO:53	Number of tariffs	1-8 (does not have effect with a calendar tariff control option)		UINT16	R/W	When read with a calendar tariff control option, indicates the actual number of tariffs selected in TOU profiles
40:2 (read	AO:54	Reserved			UINT16	R/W	Read as 65535
40:2 (read) 41:2 (write)	AO:55	Energy LED test mode	0=disabled, 1=Wh test, 2=varh test		UINT16	R/W	
40:2 (read) 41:2 (write)	AO:56	Test energy LED pulse rate, Wh/varh per pulse (in secondary units)	1-10000	×0.01	UINT16	R/W	
Channels Assignment Setup							
40:2 (read) 41:2 (write)	+0	Channel CT primary current	1-10000 A	A	UINT16	R/W	
40:2 (read) 41:2 (write)	+1	Submeter's phase L1 current input channel	0=not assigned, 1-54 = I1-I54		UINT16	R/W	
40:2 (read) 41:2 (write)	+2	Submeter's phase L2 current input channel	0=not assigned, 1-54 = I1-I54		UINT16	R/W	
40:2 (read) 41:2 (write)	+3	Submeter's phase L3 current input channel	0=not assigned, 1-54 = I1-I54		UINT16	R/W	
	AO:280-283	Submeter #1 channels					
	AO:284-287	Submeter #2 channels					
		...					
	AO:492-495	Submeter #54 channels					
Transformer Correction Setup							
40:2 (read) 41:2 (write)	+0	Ratio correction factor	700-1300	×0.001	UINT16	R/W	40:2 (read) 41:2 (write)

Object:Var.	Object:Point	Description	Options/Range	Units	Type	R/W	Notes
40:2 (read) 41:2 (write)	+1	Phase angle error	-600 to 600	min	INT16	R/W	40:2 (read) 41:2 (write)
40:2 (read) 41:2 (write)	+2,3	Reserved			INT16	R/W	40:2 (read) 41:2 (write)
	AO:512-515	V1 transformer correction					
	AO:516-519	V2 transformer correction					
	AO:520-523	V3 transformer correction					
	AO:524-527	Reserved					
	AO:528-531	I1 transformer correction					
	AO:532-535	I2 transformer correction					
	AO:536-539	I3 transformer correction					
	.....	.....					
	AO:740-743	I54 transformer correction					
Communication Ports Setup							
		COM1 Setup					
40:2 (read) 41:2 (write)	AO:112	Communication protocol	0 = Modbus RTU, 1 = Modbus ASCII, 2 = DNP3.0		UINT16	R/W	
40:2 (read) 41:2 (write)	AO:113	Interface	0 = RS-232, 1 = RS-422, 2 = RS-485, 4 = Modem		UINT16	R/W	
40:2 (read) 41:2 (write)	AO:114	Device address	Modbus: 1-247 DNP3.0: 0–65532		UINT16	R/W	Every submeter/virtual meter has its own device address, this address represents the 1st Sm address
40:2 (read) 41:2 (write)	AO:115	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	
40:2 (read) 41:2 (write)	AO:116	Data format	0 = 7 bits/even parity, 1 = 8 bits/no parity, 2 = 8 bits/even parity		UINT16	R/W	
40:2 (read) 41:2 (write)	AO:117	CTS mode	0 = not used, 1 = wait for CTS before sending data		UINT16	R/W	N/A for COM2-COM4 (read as 65535)
40:2 (read) 41:2 (write)	AO:118	RTS mode	0 = not used, 1 = RTS is asserted during the transmission		UINT16	R/W	N/A for COM2-COM4 (read as 65535)
40:2 (read) 41:2 (write)	AO:119	Minimum delay before sending data	0-1000 (default = 5)	ms	UINT16	R/W	
40:2 (read) 41:2 (write)	AO:120	Inter-character timeout	1-1000 (default = 4)	ms	UINT16	R/W	Added to standard 4-character time
40:2 (read) 41:2 (write)	AO:121-127	Reserved					Read as 65535
		COM2 Setup					
	AO:128-143	Point descriptions and ranges as for port COM1				R/W	
		COM3 Setup					

Object:Var.	Object:Point	Description	Options/Range	Units	Type	R/W	Notes
	AO:144-159	Point descriptions and ranges as for port COM1				R/W	
		COM4 Setup					
	AO:160-175	Point descriptions and ranges as for port COM1				R/W	

3.9 DNP Protocol Setup

Object:Var.	Object:Point	Description	Options/Range	Units	Type	R/W	Notes
DNP Options Setup							
40:2 (read) 41:2 (write)	AO:64	Default Binary Input Static object variation	F3 (default=0)		UINT16	R/W	1
40:2 (read) 41:2 (write)	AO:65	Default Binary Input Change object variation	F3 (default=1)		UINT16	R/W	1
40:2 (read) 41:2 (write)	AO:66	Default Binary Counter static object variation	F3 (default=3)		UINT16	R/W	1
40:2 (read) 41:2 (write)	AO:67	Default Frozen Binary Counter object variation	F3 (default=4)		UINT16	R/W	1
40:2 (read)	AO:68	Reserved	Read as 65535		UINT32	R	Read as 65535
40:2 (read) 41:2 (write)	AO:69	Default Binary Counter Change Event object variation	F3 (default=2)		UINT16	R/W	1
40:2 (read) 41:2 (write)	AO:70	Default Analog Input object variation	F3 (default=3)		UINT16	R/W	1
40:2 (read)	AO:71	Reserved	Read as 65535		UINT32	R/W	Read as 65535
40:2 (read)	AO:72	Reserved	Read as 65535		UINT32	R/W	Read as 65535
40:2 (read) 41:2 (write)	AO:73	Default Analog Input Change Event object variation	F3 (default=2)		UINT16	R/W	1
40:2 (read) 41:2 (write)	AO:74	Re-mapping static point indices for event objects	0=disabled (default), 1=enabled		UINT16	R/W	
40:1 (read) 41:2 (write)	AO:75	16-bit BC scaling	0=×1 (default), 1=×10, 2=×100, 3=×1000		UINT16	R/W	6
40:1 (read) 41:2 (write)	AO:76	16-bit AI scaling	0=disabled, 1=enabled (default)		UINT16	R/W	3
40:2 (read) 41:2 (write)	AO:77	Number of Analog Input change event points	0 to 64 (default=43)		UINT16	R/W	2
40:2 (read) 41:2 (write)	AO:78	Number of Binary Input change event points	0 to 64 (default=21)		UINT16	R/W	2
40:2 (read) 41:2 (write)	AO:79	Number of Binary Counter change event points	0 to 64 (default=0)		UINT16	R/W	2
40:2 (read) 41:2 (write)	AO:80	Select/Operate Timeout	2 to 30 (default=10 sec)	sec	UINT16	R/W	4
40:2 (read) 41:2 (write)	AO:81	Multi Fragment Interval	50 to 500 (default=50 ms)	ms	UINT16	R/W	
40:1 (read)	AO:82-AO:84	Reserved	Read as 65535		UINT32	R	Read as 65535
40:1 (read) 41:1 (write)	AO:85	Time Sync Period	1 to 86400 (default=86400 sec) 0 = disable time requests	sec	UINT32	R/W	5
40:2 (read) 41:2 (write)	AO:86	Voltage scale, secondary volts	60 to 535V (default=144V)	V	UINT16	R/W	
40:2 (read) 41:2 (write)	AO:87	Current scale, secondary amps	10 to 1000 (default CT secondary × CT overload)	×0.1A	UINT16	R/W	

Object:Var.	Object:Point	Description	Options/Range	Units	Type	R/W	Notes
40:1 (read) 41:1 (write)	AO:256-AO:263	Device location			UINT32	R/W	Null-terminated string. Each four characters are packed into a 32-bit word.
40:2 (read) 41:2 (write)	AO:264	Maximum file directory entries	10-200		UINT16	R/W	Default = 20
DNP Events Setup							
40:1(read) 41:1(write)	+0	Threshold/Deadband			UINT32	R/W	A hysteresis for the point return threshold is 0.05Hz for frequency and 2% of the operating threshold for other points
40:1(read) 41:1(write)	+1	DNP point number	DNP point number available for the selected object		UINT32	R/W	
40:2(read) 41:2(write)	+2	Event scan control field (bitmap)	Bits 0-1 - DNP Object: 0=none, 1=AI, 2=BI, 3=BC Bit 2 – Object change event scan: 0= disabled, 1=enabled Bits 5-6 - DNP event poll class: 0=Class 1, 1=Class 2, 2=Class 3 Bit 7 – unused Bits 8-9 – Threshold/Deadband relation: 0=Delta, 1=more than (over threshold) [7], 2=less than (under threshold) [7]		UINT16	R/W	If Event log is enabled, the source of a DNP event will be recorded to the device Event log file as a general Setpoint #17.
	AO:896-AO:898	DNP Event #1					
	AO:899-AO:901	DNP Event #2					
		...					
	AO:1085-AO:1087	DNP Event #64					
DNP Class 0 Point Assignments							
40:1(read) 41:1(write)	+0	DNP object and variation	F4		UINT32	R/W	
40:1(read) 41:1(write)	+1	Start point number	Start point number for the selected object		UINT32	R/W	
40:2(read) 41:2(write)	+2	Number of points in a range	0-128		UINT16	R/W	
	AO:1152-AO:1154	DNP Class 0 Points Range 1					
	AO:1155-AO:1157	DNP Class 0 Points Range 2					
		...					
	AO:1245-AO:1247	DNP Class 0 Points Range 32					

NOTES:

[1] The default object variation indicates the variation that is used for requests with qualifier code 06 (variation 0) when no specific variation is requested by a master station.

[2] The sum of all points allocated for change event objects should not exceed 64. If no points are allocated for change events, the report-by-exception mode is not supported.

[3] Scaling 16-bit AI objects (see Section 2.2.5) lets accommodate 32-bit analog input readings to 16-bit object format. Scaling is enabled by default. It is not applied to 32-bit AI objects (object 30, variations 1 and 3).

[4] The Select Before Operate command causes the device to start a timer. The following Operate command must be sent before the value specified by the Select/Operate Timeout expires.

[5] The device requests time synchronization by bit 4 in the first octet of the internal indication word being set when the time specified by the Time Sync Period elapses. The master should synchronize the time in the device by writing the Time and Date object. The device does not request time synchronization if the Time Sync Period is set to 0.

[6] Scaling 16-bit Binary Counters (see Section 2.2.6) allows changing a counter unit in powers of 10 to accommodate a 32-bit counter value to 16-bit BC object format.

3.10 Generic Data

Address	Point ID	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
		Generic Data					Point references
	0x7400	V1 voltage	0-Vmax	U1	UINT32		[1]
	0x7401	V2 voltage	0-Vmax	U1	UINT32		[1]
	0x7402	V3 voltage	0-Vmax	U1	UINT32		[1]
	0x7403	V4 voltage	0-V4max	U4	UINT32		
	0x7404	V12 voltage	0-Vmax	U1	UINT32		
	0x7405	V23 voltage	0-Vmax	U1	UINT32		
	0x7406	V31 voltage	0-Vmax	U1	UINT32		
	0x7407	I1 current	0-Imax	U2	UINT32		
	0x7408	I2 current	0-Imax	U2	UINT32		
	0x7409	I3 current	0-Imax	U2	UINT32		
	0x740A	Reserved			UINT32		
	0x740B	In current	0-Imax	U2	UINT32		
	0x740C	Reserved			UINT32		
	0x740D	Reserved			UINT32		
	0x740E	Reserved			UINT32		
	0x740F	Reserved			UINT32		
	0x7410	Reserved			UINT32		
	0x7411	Zero-sequence voltage	0-Vmax	U1	UINT32		
	0x7412	Zero-sequence current	0-Imax	U2	UINT32		
	0x7413	Reserved			UINT32		
	0x7414	Voltage unbalance	0-3000	×0.1%	UINT32		
	0x7415	Current unbalance	0-3000	×0.1%	UINT32		
	0x7416	Reserved			UINT32		
	0x7417	Not used			UINT32		
	0x7418	Frequency	0-10000	×0.01Hz	UINT32		
	0x7419	V1 THD	0-9999	×0.1%	UINT32		[2] Future
	0x741A	V2 THD	0-9999	×0.1%	UINT32		[2] Future
	0x741B	V3 THD	0-9999	×0.1%	UINT32		[2] Future
	0x741C	Reserved			UINT32		
	0x741D	I1 THD	0-9999	×0.1%	UINT32		Future
	0x741E	I2 THD	0-9999	×0.1%	UINT32		Future
	0x741F	I3 THD	0-9999	×0.1%	UINT32		Future
	0x7420	I4 THD	0-9999	×0.1%	UINT32		Future
	0x7421	V1 interharmonics THD	0-9999	×0.1%	UINT32		[2] Future
	0x7422	V2 interharmonics THD	0-9999	×0.1%	UINT32		[2] Future
	0x7423	V3 interharmonics THD	0-9999	×0.1%	UINT32		[2] Future
	0x7424	Reserved			UINT32		
	0x7425	I1 interharmonics THD	0-9999	×0.1%	UINT32		Future
	0x7426	I2 interharmonics THD	0-9999	×0.1%	UINT32		Future

Address	Point ID	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
	0x7427	I3 interharmonics THD	0-9999	×0.1%	UINT32		Future
	0x7428	Reserved			UINT32		
	0x7429	I1 TDD	0-1000	×0.1%	UINT32		Future
	0x742A	I2 TDD	0-1000	×0.1%	UINT32		Future
	0x742B	I3 TDD	0-1000	×0.1%	UINT32		Future
	0x742C	Reserved			UINT32		
	0x742D	I1 K-Factor	10-9999	×0.1	UINT32		Future
	0x742E	I2 K-Factor	10-9999	×0.1	UINT32		Future
	0x742F	I3 K-Factor	10-9999	×0.1	UINT32		Future
	0x7430	Reserved			UINT32		
	0x7431	V1 Crest Factor	0-10000	×0.01	UINT32		2 Future
	0x7432	V2 Crest Factor	0-10000	×0.01	UINT32		2 Future
	0x7433	V3 Crest Factor	0-10000	×0.01	UINT32		2 Future
	0x7434	Reserved			UINT32		
	0x7435	I1 Crest Factor	0-10000	×0.01	UINT32		
	0x7436	I2 Crest Factor	0-10000	×0.01	UINT32		
	0x7437	I3 Crest Factor	0-10000	×0.01	UINT32		
	0x7438	Reserved			UINT32		
	0x750A	Positive-sequence voltage	0-Vmax	U1	UINT32		2
	0x750B	Negative-sequence voltage	0-Vmax	U1	UINT32		2
	0x750C	Zero-sequence voltage	0-Vmax	U1	UINT32		2
	0x750D	Negative-sequence voltage unbalance	0-3000	×0.1%	UINT32		2
	0x750E	Zero-sequence voltage unbalance	0-3000	×0.1%	UINT32		2
	0x750F	V1 impulsive voltage	0-Vmax	U1	UINT32		
	0x7510	V2 impulsive voltage	0-Vmax	U1	UINT32		
	0x7511	V3 impulsive voltage	0-Vmax	U1	UINT32		
	0x7513	V12 impulsive voltage	0-Vmax	U1	UINT32		
	0x7514	V23 impulsive voltage	0-Vmax	U1	UINT32		
	0x7515	V31 impulsive voltage	0-Vmax	U1	UINT32		
	0x1900	V1 H01 Harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x1901	V1 H02 Harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
		…					
	0x1931	V1 H50 Harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x1A00	V2 H01 Harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x1A01	V2 H02 Harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
		…					
	0x1A31	V2 H50 Harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x1B00	V3 H01 Harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x1B01	V3 H02 Harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
		…					
	0x1B31	V3 H50 Harmonic voltage, %Un	0-10000	×0.01%	UINT32		2
	0x2980	Reserved			UINT32		2

Address	Point ID	Description	Options/Range[3]	Units[3]	Type	R/W	Notes
	0x2981	Reserved			UINT32		2
	0x2982	Reserved			UINT32		2
	0x2983	Reserved			UINT32		2
	0x2984	Reserved			UINT32		2
	0x2985	Reserved			UINT32		2
	0x6005	Reserved			UINT32		2
	0x6006	Reserved			UINT32		2
	0x6007	Reserved			UINT32		2
	0x6008	Reserved			UINT32		2
	0x600A	Reserved			UINT32		2
	0x600B	Reserved			UINT32		2
	0x600C	Reserved			UINT32		2
	0x600D	Reserved			UINT32		2
	0x600F	Reserved			UINT32		2
	0x6010	Reserved			UINT32		2
	0x6011	Reserved			UINT32		2
	0x6012	Reserved			UINT32		2
	0xC481	Reserved			UINT32		
	0xC486	Reserved			UINT32		
	0xC48B	Reserved			UINT32		

NOTES:

[1] When the 4LN3, 4LL3, 3LN3, 3LL3, 3BLN3 or 3BLL3 wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line.

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

[3] For volts, amps, power and frequency scales 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	2
Imax		Current Scale × CT Ratio [1], A,	3
Pmax	PT Ratio = 1	Vmax × Imax × 2, W	4
	PT Ratio > 1	(Vmax × Imax × 2)/1000, kW	
AImin AImax	+/-1mA	AImin = -AI full scale × 2 AImax = AI full scale × 2	
	0-20mA	AImin = AI zero scale AImax = AI full scale	
	4-20mA	AImin = AI zero scale AImax = AI full scale	
	0-1mA	AImin = AI zero scale AImax = AI full scale	
Data Units			
U1	PT Ratio = 1	0.1V	
	PT Ratio > 1	1V	
U2		0.01A	
U3	PT Ratio = 1	0.001 kW/kvar/kVA	
	PT Ratio > 1	1 kW/kvar/kVA	
U4		10^{-d} x register measurement unit (see F15 in Section 5). d = 0-4 – number of decimal places for energy registers (see Device Options Setup)	
U5		0.001, 0.01, 0.1, 1 kWh/kVAh/kvarh (programmable)	5

1 CT Ratio = CT primary current/CT secondary current

2 The default Voltage scale is 144V (120V +20%). You can change it via the DNP Options setup (see Section 3.9) or via the Device Options setup in PAS.

3 The default Current Scale is 4 × CT secondary current for devices with a 400% overload (ANSI) or 2 × CT secondary current for devices with a 200% overload (IEC). You can change it via the DNP Options setup (see Section 3.9) or via the Device Options setup in PAS.

4 Pmax is rounded to whole kilowatts. If Pmax is greater than 9,999,000 W, it is truncated to 9,999,000 W.

5 See Energy Decimal Places in the Device Options setup.

5 Data Formats

Format Code	Value	Description	Notes
Wiring Mode			
F1	0	3OP2 - 3-wire open delta using 2 CTs (2 element)	
	1	4LN3 - 4-wire WYE using 3 PTs (3 element), line-to-neutral voltage readings	
	2	3DIR2 - 3-wire direct connection using 2 CTs (2 element)	
	3	4LL3 - 4-wire WYE using 3 PTs (3 element), line-to-line voltage readings	
	4	3OP3 - 3-wire open delta using 3 CTs (2 1/2 element)	
	5	3LN3 - 4-wire WYE using 2 PTs (2 1/2 element), line-to-neutral voltage readings	
	6	3LL3 - 4-wire WYE using 2 PTs (2 1/2 element), line-to-line voltage readings	
	8	3BLN3 - 3-wire broken delta using 2 PTs (2 1/2 element), line-to-neutral voltage readings	
	9	3BLL3 - 3-wire broken delta using 2 PTs (2 1/2 element), line-to-line voltage readings	
DNP Object Variations			
F3		Static Binary Input Objects	
	0	Single-Bit Binary Input	
	1	Binary Input With Status	
		Binary Input Change Event Objects	
	0	Binary Input Change Without Time	
	1	Binary Input Change With Time	
		Static Binary Counters	
	0	32-bit Binary Counter	
	1	32-bit Binary Counter Without Flag	
	2	16-bit Binary Counter	
	3	16-bit Binary Counter Without Flag	
		Binary Counter Change Events	
	0	32-bit Counter Change Event Without Time	
	1	32-bit Counter Change Event With Time	
	2	16-bit Counter Change Event Without Time	
	3	16-bit Counter Change Event With Time	
		Frozen Binary Counters	
	0	32-bit Frozen Counter	
	1	32-bit Frozen Counter Without Flag	
	2	32-bit Frozen Counter With Time of Freeze	
	3	16-bit Frozen Counter	
	4	16-bit Frozen Counter Without Flag	
	5	16-bit Frozen Counter With Time of Freeze	
		Static Analog Input Objects	
	0	32-bit Analog Input	
	1	32-bit Analog Input Without Flag	
	2	16-bit Analog Input	
	3	16-bit Analog Input Without Flag	
		Analog Input Change Events	
	0	32-bit Analog Change Event Without Time	
	1	32-bit Analog Change Event With Time	
	2	16-bit Analog Change Event Without Time	
	3	16-bit Analog Change Event With Time	
DNP Class 0 Objects			
F4	0x1E01	Analog Input 30:01	
	0x1E02	Analog Input 30:02	
	0x1E03	Analog Input 30:03	
	0x1E04	Analog Input 30:04	
	0x2801	Analog Output 40:01	
	0x2802	Analog Output 40:02	
	0x0101	Binary Input 01:01	
	0x0102	Binary Input 01:02	
	0x1401	Binary Counter 20:01	
	0x0A01	Binary Output 10:01	
	0x0A01	Binary Output Status 10:02	
	0x1402	Binary Counter 20:02	

Format Code	Value	Description	Notes
	0x1405	Binary Counter 20:05	
	0x1406	Binary Counter 20:06	
	0x1501	Frozen Counter 21:01	
	0x1502	Frozen Counter 21:02	
	0x1505	Frozen Counter 21:05	
	0x1506	Frozen Counter 21:06	
	0x1509	Frozen Counter 21:09	
	0x150A	Frozen Counter 21:10	
Timestamp			
F5		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.	
Event Source/Point ID			
F19		Setpoint Operation Events	
	0x0000-0x59FF	Trigger parameter ID (see BFM II Modbus Guide, Section 3)	
	0x6400-0xFFFF	Trigger parameter ID (see BFM II Modbus Guide, Section 3)	
		Setpoint Action Events	
	0x5A00-0x5A3F	Setpoint #1-#64	
		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	1
		Run-time Error	
	0x6014	Library error	
	0x6015	RTOS Kernel error	
	0x6016	Task error	
		Control Events	
	0x6100	XSWIn_OpOpn = operation "Open" (n=see F20 Control Events)	
	0x6101	XSWIn_OpCls = operation "Close" (n=see F20 Control Events)	
	0x6102	XSWIn_Pos = switch position change (n=see F20 Control Events, Value = position)	
	0x6103	Remote control (Value: 0=OFF, 1=ON)	
		Hardware Diagnostics Events	
	0x6201	Permanent fault	
	0x6202	RAM/Data error	
	0x6203	CPU watchdog reset	
	0x6204	DSP/Sampling fault	
	0x6205	CPU exception	
	0x6206	Reserved	
	0x6207	Software watchdog reset	
	0x620E	Expanded memory fault (Event effect = File ID + 1)	
	0x620F	CPU EEPROM fault	
	0x6210	AC board EEPROM fault	
	0x6211	I/O board EEPROM fault	
		External Events	
	0x6300	Power down	
	0x6308	Power up	
	0x6309	External reset	
	0x6318	IRIG-B signal lost	
	0x6319	IRIG-B time unlocked	
	0x631A	IRIG-B time locked	
	0x6320	SNTP server failed	2
	0x6321	SNTP server reconnected	2
Event Effect ID			
F20		Communications/Self-check/Self-update Events	
	0x0000	None	
	0x6000	Total energy registers cleared	
	0x6100	All total maximum demands cleared	
	0x6101	Power maximum demands cleared	
	0x6102	Volt/Ampere maximum demands cleared	
	0x6103	Volt maximum demands cleared	
	0x6104	Ampere maximum demands cleared	

Format Code	Value	Description	Notes
	0x6105	Harmonic maximum demands cleared	
	0x6200	Billing/TOU registers cleared	
	0x6300	Billing/TOU maximum demand registers cleared	
	0x6400	All counters cleared	
	0x6401-0x641F	Counter cleared (low byte = counter ID)	
	0x6500	Min/Max log cleared	
	0x6A00-0x6A1B	Log file cleared (low byte = File ID)	
	0x6B00	EN50160 statistics cleared	
	0x6B06	Communication counters cleared	
	0x6B07	Switch operation counters cleared	
	0xF100-0xF11F	Setpoint cleared (low byte = setpoint ID)	
	0xF200	Setup/Data cleared	
	0xF300	Setup reset (set by default)	
	0xF400	Setup changed	
	0xF500	RTC set	1
	0xF600	Device function/option enabled	
	0xF700	Device function/option disabled	
	0xF800	Device function restarted	
	0xF900	Device function stopped	
		Control Events	
	0xA0XX	Position change (bits 0:7=switch number)	
	0xA1XX	Operation activated (bits 0:7=switch number)	
	0xA2XX	Operation terminated (bits 0:7=switch number)	
	0xA3XX	Operation terminated by timeout (bits 0:7=switch number)	
		Setpoint Operation Events	
	0xE100-0xE13F	Setpoint operated (low byte = setpoint ID)	
	0xE200-0xE23F	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	
	0x0A	Pulse counters setup	
	0x0B	AO setup	
	0x0E	Timers setup	
	0x10	Event/alarm setpoints	
	0x11	Pulsing setup	
	0x12	User assignable register map	
	0x13	Reserved	
	0x14	Data log setup	
	0x15	File/Memory setup	
	0x16	Billing/TOU registers setup	
	0x18	TOU daily profiles	
	0x19	TOU calendar	
	0x1D	RO Setup	
	0x1C	User selectable options	
	0x1F	DNP 3.0 class 0 map	
	0x20	DNP 3.0 options setup	
	0x21	DNP 3.0 events setup	
	0x22	DNP 3.0 event setpoints	
	0x23	Calibration registers	
	0x24	Date/Time Setup	
	0x25	Net setup	
	0x26	AI setup	
	0x27	Waveform log setup	
	0x28	PQ log setup	
	0x29	Fault log setup	
	0x2A	Device mode control	
	0x2B-0x3F	Reserved	
		Device Mode/Option	

Format Code	Value	Description	Notes
	0x40	General device operations	
	0x41	Energy test mode	
	0x42	Setpoints mode	
	0x43	PQ recorder	
	0x44	Fault recorder	
		Device Diagnostics	
	0x80	Device diagnostics	
	0x81	Critical error	
Event Type ID			
F22		Setpoint Events	
	0x0000	SP: Generic setpoint event	
	0x0001-0x0010	SP1-SP16: Setpoint #1-#16 event	
		IE 1159 PQ Events (IEEE 1159 categories)	
	0x0100	PQE: GenerEEic IEEE1159 PQ event	
	0x0102	PQE11: Impulsive transient	
	0x010C	PQE211: Sag, instantaneous	
	0x010D	PQE212: Swell, instantaneous	
	0x010F	PQE221: Interruption, momentary	
	0x0110	PQE222: Sag, momentary	
	0x0111	PQE223: Swell, momentary	
	0x0113	PQE231: Interruption, temporary	
	0x0114	PQE232: Sag, temporary	
	0x0115	PQE233: Swell, temporary	
	0x0117	PQE31: Interruption, sustained	
	0x0118	PQE32: Undervoltage	
	0x0119	PQE33: Overvoltage	
	0x011A	PQE4: Voltage imbalance	
	0x011D	PQE52: Harmonics	
	0x011E	PQE53: Interharmonics	
	0x0121	PQE6: Voltage fluctuations (flicker)	
	0x0122	PQE7: Frequency variation	
		Fault Events	
	0x0200	FE: Generic fault event	
	0x0201	FE1: Zero-sequence current	
	0x0202	FE2: Zero-sequence voltage	
	0x0203	FE3: Current unbalance	
	0x0204	FE4: Voltage unbalance	
	0x0205	FE5: Overcurrent and undervoltage	
	0x0206	FE6: Undervoltage	
	0x0207	FE7: Neutral current (I4)	
		DI Events	
	0x0300	DI: Generic DI event	
	0x0301-0x0348	DI1-DI72: DI1-DI72 event	
		RO Events	
	0x0400	RO: Generic RO event	
	0x0401-0x0408	RO1-RO8: RO1-RO8 event	
		EN 50160 PQ Events (EN 50160 categories)	
	0x0500	PQE: Generic EN50160 PQ event	
	0x0501	PQE1: Frequency variations	
	0x0502	PQE2: Voltage variations	
	0x0503	PQE3: Rapid voltage changes	
	0x0504	PQE4: Flicker	
	0x0505	PQE5: Voltage dips	
	0x0506	PQE6: Voltage interruptions	
	0x0507	PQE7: Temporary overvoltages	
	0x0508	PQE8: Transient overvoltages	
	0x0509	PQE9: Voltage unbalance	
	0x050A	PQE10: Harmonic voltage	
	0x050B	PQE11: Interharmonic voltage	
	0x050C	PQE12: Mains signaling voltage	

NOTES:

1 The event value field shows the present device time in the F5 format.

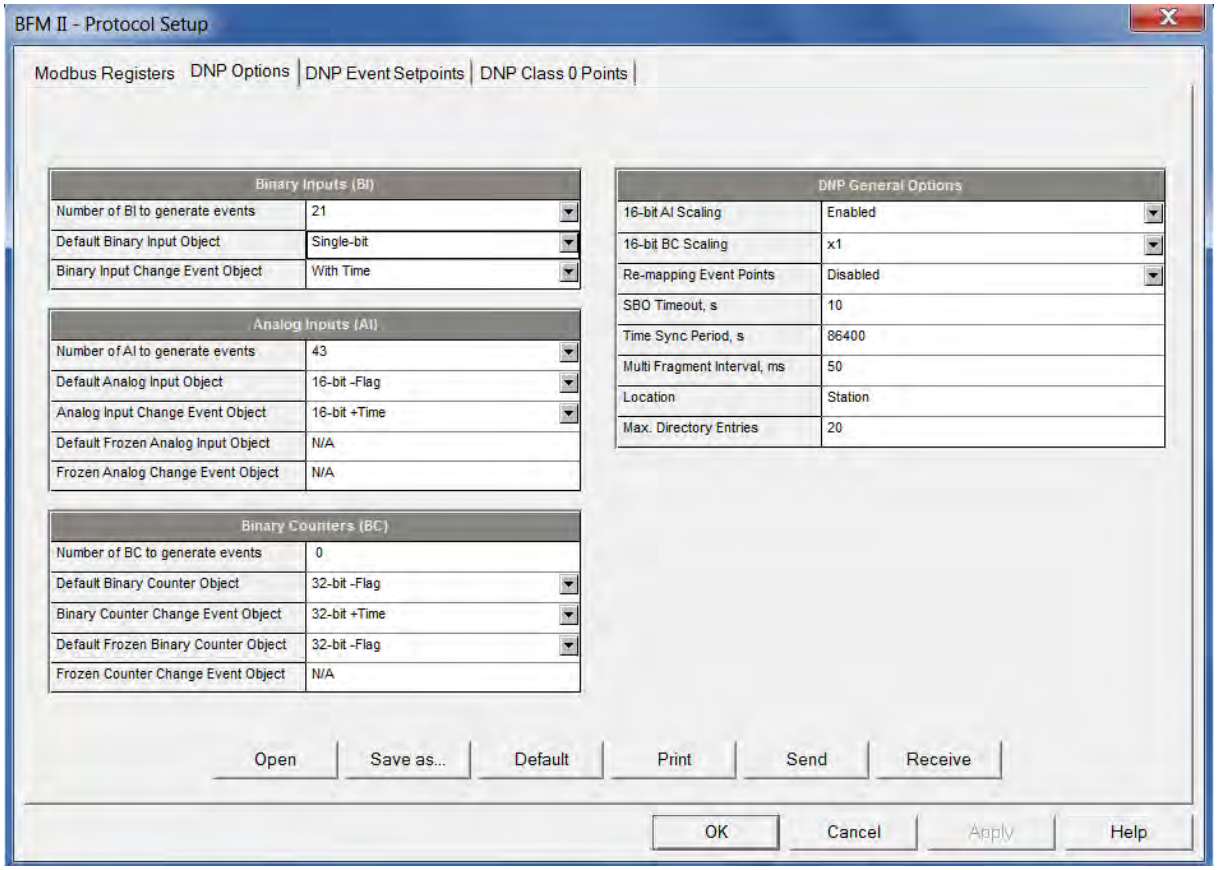
2 The event value field shows the server IP address in a network byte order.

6 Configuring DNP3

The PAS software supplied with the BFM II provides a configuration tool for customizing your device for use with DNP3 client applications. See the BFM II Operation Manual for more information on installation and operating PAS on your computer.

6.1 DNP Options

From the Meter Setup menu select Protocol Setup and click on the DNP Options tab.



Available DNP options are described in the following table. Refer to the DNP3 Data Object Library document available from the DNP User's Group on the DNP3 object types.

Parameter	Options	Default	Description
Binary Inputs (BI)			
Number of BI to Generate events	0-64 [3]	21	The total number of BI change event points for monitoring
Binary Input Object	Single-bit With Status	Single-bit	The default BI object variation for requests with qualifier code 06 when no specific variation is requested
Binary Input Change Event Object	Without Time With Time	With Time	The default BI change event object variation for requests with qualifier code 06 when no specific variation is requested
Analog Inputs (AI)			
Number of AI to Generate events	0-64 [3]	43	The total number of AI change event points for monitoring
Analog Input Object	32-bit 32-bit –Flag 16-bit 16-bit –Flag	16-bit -Flag	The default AI object variation for requests with qualifier code 06 when no specific variation is requested

Parameter	Options	Default	Description
Analog Input Change Event Object	32-bit -Time 32-bit +Time 16-bit -Time 16-bit +Time	16-bit +Time	The default AI change event object variation for requests with qualifier code 06 when no specific variation is requested
Binary Counters (BC)			
Number of BC to Generate events	0-64 [3]	0	The total number of BC change event points for monitoring
Binary Counter Object	32-bit +Flag 32-bit –Flag 16-bit +Flag 16-bit –Flag	32-bit -Flag	The default BC object variation for requests with qualifier code 06 when no specific variation is requested
Binary Counter Change Event Object	32-bit -Time 32-bit +Time 16-bit -Time 16-bit +Time	32-bit +Time	The default BC change event object variation for requests with qualifier code 06 when no specific variation is requested
Frozen Binary Counter Object	32-bit +Flag 32-bit –Flag 32-bit +Time 16-bit +Flag 16-bit –Flag 16-bit +Time	32-bit -Flag	The default frozen BC object variation for requests with qualifier code 06 when no specific variation is requested
DNP General Options			
16-bit AI Scaling	Disabled Enabled	Enabled	Allows scaling 16-bit analog input objects (see description below)
16-bit BC Scaling	x1, x10, x100, x1000	x1	Allows scaling 16-bit binary counter objects (see description below)
Re-mapping Event Points	Disabled Enabled	Disabled	Allows re-mapping event points starting with point 0.
SBO Timeout [1]	2-30 sec	10	Defines the Select Before Operate (SBO) timeout when using the Control-Relay-Output-Block object
Time Sync Period [2]	0-86400 sec	86400	Defines the time interval between periodic time synchronization requests
Multi Fragment Interval	50-500 ms	50	Defines the time interval between fragments of the response message when it is fragmented
Location	1-31 characters		Defines the device location string that is reported in the COMTRADE .cfg files.
Max. Directory Entries	10-100	20	Defines the maximum number of file entries the device may include in a directory response (the most recent events are always reported). The maximum number of entries in a disturbance waveform directory is twice the number specified.

[1] The Select Before Operate command causes the device to start a timer. The following Operate command must be sent before the specified timeout value expires.

[2] The device requests time synchronization by bit 4 in the first octet of the internal indication word being set to 1 when the time interval specified by the Time Sync Period elapses. The master should synchronize the time in the device by sending the Time and Date object to clear this bit. The device does not send time synchronization requests if the Time Sync Period is set to 0.

[3] The total number of AI, BI and BC change event points may not exceed 64. When you change the number of the change event points in the device, all event setpoints are set to defaults (see Configuring DNP Event Classes below).

Scaling 16-bit AI objects

Scaling 16-bit AI objects allows accommodating native 32-bit analog input readings to 16-bit object format; otherwise it may cause an over-range error if the full-range value exceeds a 16-bit point limit.

Scaling is enabled by default. It is not applied to points that are read using 32-bit AI objects.

Refer to Sections 3 and 4 for information on the data point scales and on a reverse conversion that should be applied to the received scaled values.

Scaling 16-bit Binary Counters

Scaling 16-bit Binary Counters allows changing a counter unit in powers of 10 to accommodate a 32-bit counter value to 16-bit BC object format.

If the scaling unit is greater than 1, the counter value is reported being divided by the selected scaling unit from 10 to 1000. To get the actual value, multiply the counter reading by the scaling unit.

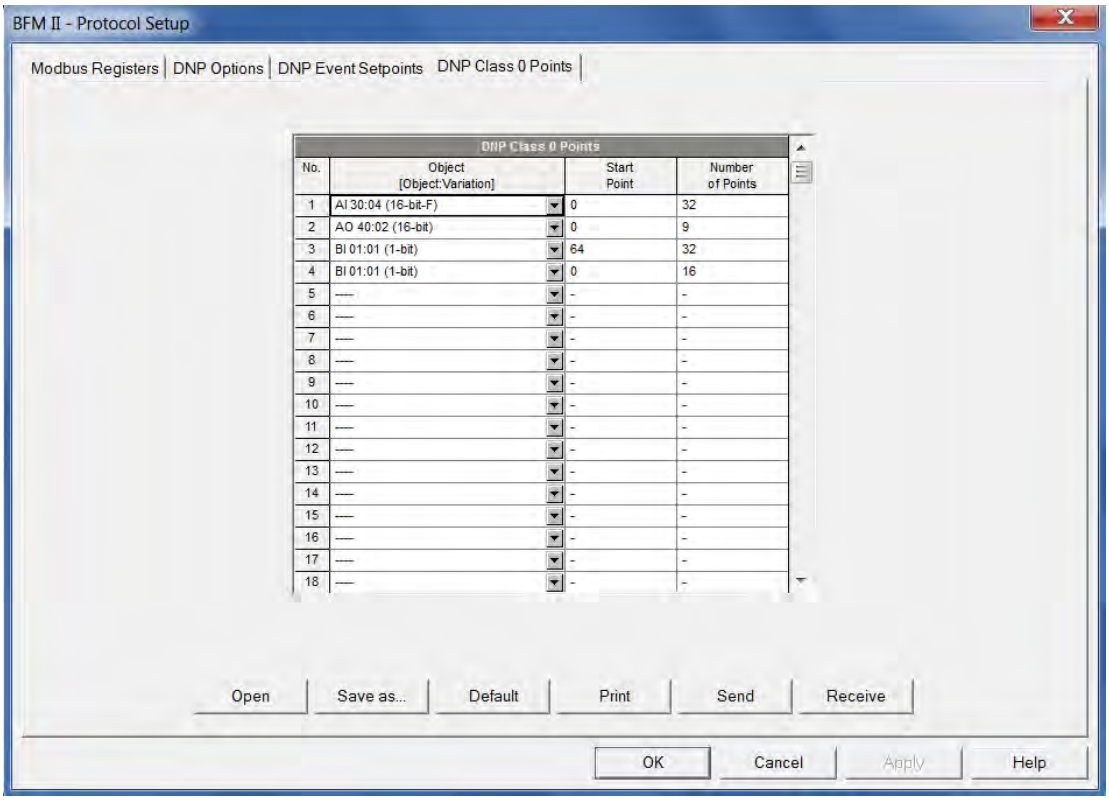
6.2 Configuring DNP Class 0 Response

The most common method of getting static object information from the device via DNP is to issue a read Class 0 request. The device allows you to configure the Class 0 response by assigning ranges of points to be polled via Class 0 requests.

To view the factory-set DNP Class 0 assignments or build your own Class 0 response message:

1. From the Meter Setup menu select Protocol Setup and click on the DNP Class 0 Points tab
8. Select the object and variation type for a point range.
9. Specify the start point index and the number of points in the range. Refer to Section 3 for available data points.
10. Repeat these steps for all point ranges you want to be included into the Class 0 response.
11. Click Send to download your setup to the device.

The factory-set Class 0 point ranges are shown in the picture below.



6.3 Configuring DNP Event Classes (future)

The device generates object change events for any static analog input, binary input, and binary counter point when a corresponding point either exceeds a predefined threshold, or the point status changes. A total of 64 change event points are available for monitoring.

Object change events are normally polled via DNP Class 1, Class 2 or Class 3 requests. You can link any change event point to any event class upon the event priority.

A change event point index is normally the same as for the corresponding static object point. To use independent numeration for event points, enable re-mapping event point indices via DNP Options setup (see above) so they start with index 0.

Define a separate event setpoint for each static object point to be monitored for change events. To view or change the factory-set DNP event setpoints, select Protocol Setup from the Meter Setup menu and click on the DNP Event Setpoints tab.

The number of event setpoints for each static object type is specified via the DNP Options setup.

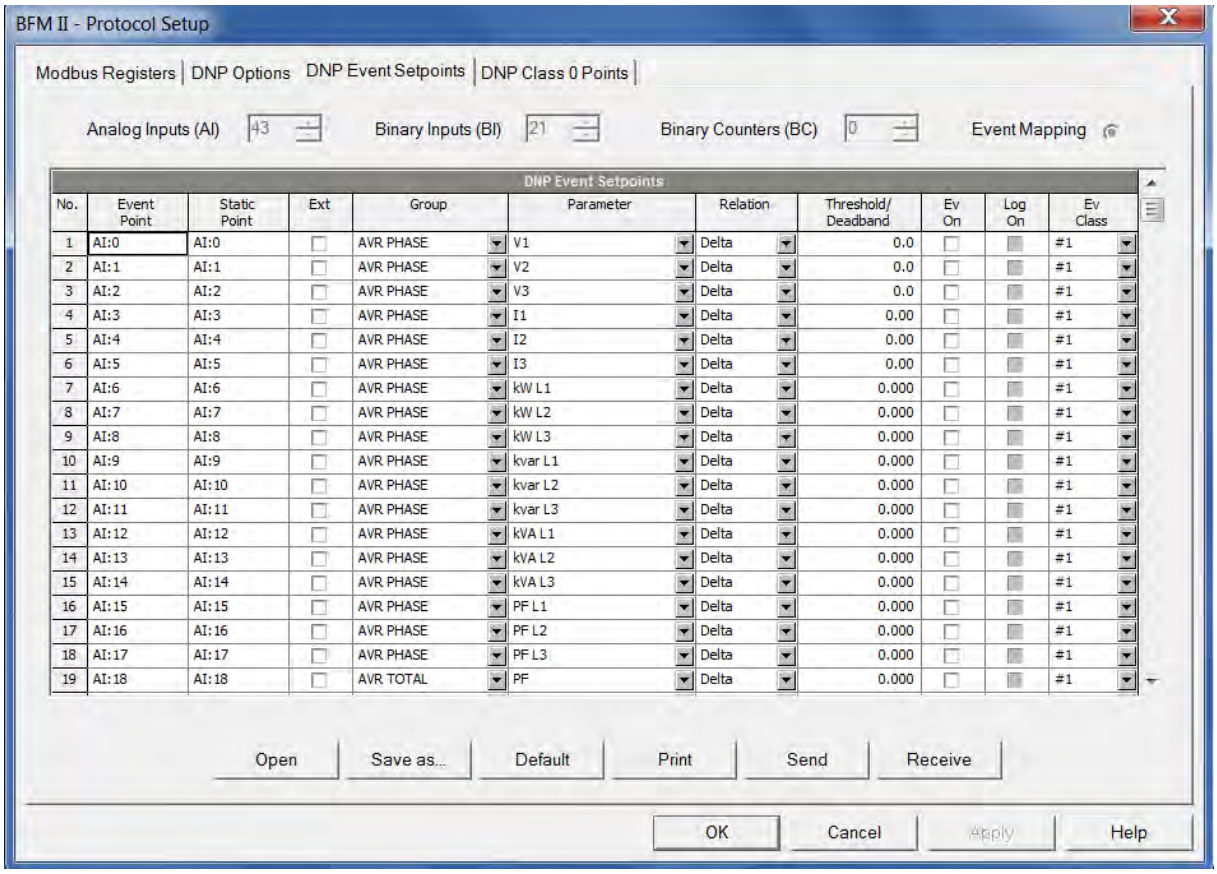
NOTE

The device clears all event buffers and links the default set of static points to each event object type every time you change the number of points for one of the objects.

To define setpoints for selected static points:

1. Check the "Ext" box if you wish to use the extended point list.

12. Select a parameter group and then a desired parameter for each event point.



13. For AI and BC points, select a relation and an operating threshold or a deadband to be used for detecting events. All thresholds are specified in primary units. The following relations are available:

    - Delta – a new event is generated when the absolute value of the difference between the last reported point value and its current value exceeds the specified deadband value;
    - More than (over) - a new event is generated when the point value rises over the specified threshold, and then when it returns below the threshold minus a predefined return hysteresis – applicable for AI objects;
    - Less than (under) - a new event is generated when the point value drops below the specified threshold, and then when it returns above the threshold plus a predefined return hysteresis – applicable for AI objects.

    Hysteresis for the return threshold is 0.05 Hz for frequency and 2% of the operating threshold for all other points.

14. Check the "Ev On" box for the points you wish to be included into event poll reports.
15. In the "Ev Class" box, select the event poll class for the change event points.
16. Repeat these steps for all points you want to be monitored for events.
17. Click Send to download your setup to the device.

APPENDIX A DNP Application Messages

The device is a DNP IED responding to external DNP Master requests. Table A-1 describes the BFM II application level responses to external requests, including object variations, functions, codes and qualifiers supported by the device. The object and formats are detailed in the DNP Basic 4 Documentation Set.

Table A-1 Application Responses

Object			Request		Response	
Object	Variation	Description	Function Code	Qualifier Code	Function Code	Qualifier Code
01	0	Single Bit Binary Input	1	B	129	01
01	1	Single Bit Binary Input	1	A	129	C
01	2	Binary Input with Status	1	A	129	C
02	0	Binary Input Change	1	06	129	17,28
02	1	Binary Input Change without Time	1	07,08	129	17,28
02	2	Binary Input Change with Time	1	07,08	129	17,28
10	0	Binary Output	1	B	129	01
10	1	Binary Output	1	A	129	C
10	2	Binary Output Status	1	A	129	C
12	1	Control Relay Output Block	3,4,5	A	129	C
12	1	Control Relay Output Block	6	A	None	N/A
20	0	Binary Counter	1, 7,9, 8,10	B B B	129 129 129	01 N/R N/A
20	1	32-bit Binary Counter	1	A	129	C
20	2	16-bit Binary Counter	1	A	129	C
20	5	32-bit Binary Counter without flag	1	A	129	C
20	6	16-bit Binary Counter without flag	1	A	129	C
21	0	Frozen Counter	1	B	129	01
21	1	32-bit Frozen Counter				
21	2	16-bit Frozen Counter				
21	5	32-bit Frozen Counter with time of freeze				
21	6	16-bit Frozen Counter with time of freeze				
21	9	32-bit Frozen Counter without flag				
21	10	16-bit Frozen Counter without flag				
22	0	Counter Change Event	1	06	129	17
22	1	32-bit Counter Change Event without Time	1	07,08	129	17
22	2	16-bit Counter Change Event without Time	1	07,08	129	17
22	5	32-bit Counter Change Event with Time	1	07,08	129	17
22	6	16-bit Counter Change Event with Time	1	07,08	129	17
30	0	Analog Input (respond like 30:3)	1	B	129	01
30	1	32-bit Analog Input	1	A	129	C
30	2	16-bit Analog Input	1	A	129	C
30	3	32-bit Analog Input without flag	1	A	129	C
30	4	16-bit Analog Input without flag	1	A	129	C
32	0	Analog Change Event	1	06	129	17
32	1	32-bit Analog Change Event without Time	1	07,08	129	17
32	2	16-bit Analog Change Event without Time	1	07,08	129	17
32	3	32-bit Analog Change Event with Time	1	07,08	129	17
32	4	16-bit Analog Change Event with Time	1	07,08	129	17
40	0	Analog Output Status (respond like 40:1)	1	B	129	01
40	1	32-bit Analog Output Status	1	A	129	C
40	2	16-bit Analog Output Status	1	A	129	C
41	1	32-bit Analog Output Block	3,4,5	A	129	C
41	2	16-bit Analog Output Block	3,4,5	A	129	C
41	1	32-bit Analog Output Block	6	A	None	N/A
41	2	16-bit Analog Output Block	6	A	None	N/A
50	1	Time and Date [1]	1,2	A	129	C
60	1	Class 0	1	B	129	01
60	2	Class 1	1	06,07,08	129	17
60	3	Class 2	1	06,07,08	129	17
60	4	Class 3	1	06,07,08	129	17
70	3	File-Control/File command	25	5B	129	5B

Object			Request		Response	
Object	Variation	Description	Function Code	Qualifier Code	Function Code	Qualifier Code
70	4	File-Control/File command status	26	5B	129	5B
70	5	File-Control/File transport	1	5B	129	5B
70	6	File-Control/File transport status	1		129	5B
70	7	File-Control/File descriptor	1		129	5B
80	1	Internal indication [2]	2	D	129	
N/A	N/A	Cold Restart [3] (respond Obj. 52:2)	13	N/A	129	07
N/A	N/A	Delay Measurement (respond Obj. 52:2)	23	N/A	129	07

[1] For this object, the quantity specified in the request must be exactly 1 or an index of 0, as there is only one instance of this object defined in the device.

[2] For this object, the qualifier code must specify an index 7 only.

[3] Respond with time object 50 variation 2 indicating time until device availability.

Qualifier Hex Codes for each category:
A - 00,01,03,04,07,17,27,08,18,28
B - 06 only
C - Qualifier echo
D - 00,01,03,04,17,27,18,28

N/A - Not Available

N/R - Null Response

Appendix B DNP Device Profile

DNP3

DEVICE PROFILE DOCUMENT

This document must be accompanied by a table having the following headings:

Object Group Request Function Codes Response Function Codes

Object Variation Request Qualifiers Response Qualifiers

Object Name (optional)

Vendor Name: SATEC Ltd.

Device Name: BFM II Branch Feeder Monitor™

Highest DNP Level Supported:	Device Function:
For Requests L1	☐ Master ■ Slave
For Responses L1	

Device supports READ of each object using either all points (Qualifier = 6) or specific points using qualifier defined in Basic 4 Documentation Set: 00, 01, 03, 04, 07, 17, 27, 08, 18, 28. Control Relay Block requires specific parameters described in this manual. Treats range field of qualifier 07 and 08 to mean point range [0..N-1].

Maximum Data Link Frame Size (octets):	Maximum Application Fragment Size (octets):
Transmitted 292	Transmitted 2048
Received 292	Received 249

Maximum Data Link Re-tries:	Maximum Application Layer Re-tries:
■ None	■ None
☐ Fixed at_____	☐ Configurable, range ____ to _____
☐ Configurable, range ___ to_____	(Fixed is not permitted)

Requires Data Link Layer Confirmation:

■ Never

☐ Always

☐ Sometimes If 'Sometimes', when?

_____

☐ Configurable If 'Configurable', how? _____

Requires Application Layer Confirmation:

☐ Never

☐ Always (not recommended)

■ When reporting Event Data (Slave devices only)

☐ When sending multi-fragment responses (Slave devices only)

☐ Sometimes If 'Sometimes', when?

_____

☐ Configurable If 'Configurable', how? _____

Device Profile Document (continued)

Timeouts while waiting for:

Data Link Confirm ■ None ☐ Fixed at _____ ☐ Variable ☐ Configurable

Complete Appl. Fragment ■ None ☐ Fixed at _____ ☐ Variable ☐ Configurable

Application Confirm ☐ None ■ Fixed at _5 sec__ ☐ Variable ☐ Configurable

Complete Appl. Response ■ None ☐ Fixed at _____ ☐ Variable ☐ Configurable

Others

Timeouts between fragments of the multi-fragment responses. Configurable: 50-500 ms (50 ms by default).

_____

Attach explanation if 'Variable' or 'Configurable' was checked for any timeout

Sends/Executes Control Operations:

WRITE Binary Outputs	■ Never	☐ Always	☐ Sometimes	☐ Configurable
SELECT/OPERATE	☐ Never	■ Always	☐ Sometimes	☐ Configurable
DIRECT OPERATE	☐ Never	■ Always	☐ Sometimes	☐ Configurable
DIRECT OPERATE - NO ACK	☐ Never	■ Always	☐ Sometimes	☐ Configurable
Count > 1	■ Never	☐ Always	☐ Sometimes	☐ Configurable
Pulse On	☐ Never	☐ Always	■ Sometimes [1]	☐ Configurable
Pulse Off	■ Never	☐ Always	☐ Sometimes [4]	☐ Configurable
Latch On	☐ Never	☐ Always	■ Sometimes [2]	☐ Configurable
Latch Off	☐ Never	☐ Always	■ Sometimes [3]	☐ Configurable
Queue	■ Never	☐ Always	☐ Sometimes	☐ Configurable
Clear Queue	☐ Never	☐ Always	■ Sometimes	☐ Configurable

1. Select timeout period is configurable : 2s to 30s

[1] used to activate the Reset function associated with points 64 to 101

[1] [2] [3] [4] used to control Relays associated with points 0 to 31

Reports Binary Input Change Events when no specific variation requested:

■ Never

☐ Only time-tagged

☐ Only non-time-tagged

☐ Configurable to send both, one or the other (attach explanation)

Reports time-tagged Binary Input Change Events when no specific variation requested:

■ Never

☐ Binary Input Change With Time

☐ Binary Input Change With Relative Time

☐ Configurable (attach explanation)

Device Profile Document (continued)

Sends Unsolicited Responses: ■ Never ☐ Configurable (attach explanation) ☐ Only certain objects ☐ Sometimes (attach explanation) ☐ ENABLE/DISABLE UNSOLICITED Function codes supported	Sends Static Data in Unsolicited Responses: ■ Never ☐ When Device Restarts ☐ When Status Flags Change No other options are permitted.
Default Counter Object/Variation: ☐ No Counters Reported ☐ Configurable (attach explanation) ■ Default Object 20 Default Variation 5 ☐ Point-by-point list attached	Counters Roll Over at: ☐ No Counters Reported ☐ Configurable (attach explanation) ☐ 16 Bits ☐ 32 Bits ■ Other Value Counters -999999999 to 99999999 (point 2) 0 to 9999999 (points 0,1,3) ☐ Point-by-point list attached
Sends Multi-Fragment Responses: ■ Yes ☐ No	